

HANCOCK ASSOCIATES

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October 29, 2019

Reading Conservation Commission
16 Lowell Street
Reading, MA 01867

RE: 259 and 267 Main Street, Reading - Residential Apartments Notice of Intent

Dear Members of the Commission,

On behalf of Stonegate Construction Corp (Applicant), Hancock Associates hereby submits this Notice of Intent application in request to obtain an Order of Conditions, permitting the construction of a 24-unit 3-story apartment building at 259 and 267 Main Street in Reading, MA. Wetland resource areas on the property include Bordering Vegetated Wetlands (BVW), Inland Bank, and Riverfront Area with associated buffer zones and setback zones under local wetland bylaw. The property is vacant and heavily degraded, having served for many years as the location of a commercial fuel oil business. Despite all efforts in site design to avoid and minimize impacts within jurisdictional wetland resource areas and associated buffer zones, due in part to zoning constraints and a wetland configuration that projects into the limited developable area, any economically feasible footprint of development will require some permanent fill within BVW. By necessity, this would also require the Commission to grant the project a waiver from work within the 35-foot No Disturb Zone under local wetland bylaw.

Given the degraded condition of the property and wetland resource areas, the Applicant believes that there exists extensive opportunity on the property to provide comprehensive compensatory mitigation through:

- 1) no less than 1:1 ratio compensatory wetland replication;
- 2) invasive species treatment;
- 3) ecological restoration of Inland Bank;
- 4) ecological restoration of local 35-foot No Disturb Zone
- 5) stormwater improvements;
- 6) stabilization of existing erosion and sedimentation;
- and 7) incorporation of a public walking trail

We believe that through this compensatory mitigation the Applicant can demonstrate compliance with all performance standards under the Massachusetts Wetlands Protection Act (WPA) and support that the project will result in no net loss of essential functions and values associated with the interests for wetlands protection defined in the WPA Regulations 310 CMR 10.01(2) and Section 7.1 of the Reading General Bylaws. We therefore request that the Commission consider issuance of an Order of Conditions to permit this project.

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Existing Conditions

259 and 267 Main Street consists of two (2) abutting properties spanning 4.3 acres of land (identified as Map 12, Lots 39 and 40 on Town of Reading Assessor's Maps). Both parcels are under common ownership of 259-267 Main Street LLC. The lots are vacant and degraded. 259 Main Street had a condemned single-family home that was recently removed, portions of which were located within delineated BVW. 267 Main Street had been the location of a commercial fuel oil business.

All jurisdictional wetland resources on the property were field delineated by a Professional Wetland Scientist (PWS®) and monumented through issuance of an Order of Resource Area Delineation (ORAD) issued on August 29, 2019 (MassDEP File# 270-0722). Wetland resource areas on the property includes BVW, Inland Bank, and Riverfront Area associated with an unnamed USGS mapped perennial stream that abuts the eastern property boundary.

Invasive species are prevalent throughout the extent of the property. The most problematic species are Asiatic bittersweet (*Celastrus orbiculatus*, FACU) and Norway maple (*Acer platanoides*, UPL). Asiatic bittersweet is a dominant species and has reached a point of maturity on the site in which many of the woody vines have reached diameters up to 10-inches. Norway maple is also dominant and is an allelopathic species, which releases natural biochemicals into the soil that inhibit the ability of other plant species to grow. As such, there is remarkably very little plant diversity and few understory plants in locations with Norway maple.

According to a desktop review of the MassGIS database, portions of the property are located within a Zone A Surface Water Protection Zone. No other sensitive resource areas such as Massachusetts Natural Heritage and Endangered Species Program (NHESP) Priority or Estimated Rare Species Habitats, NHESP Certified or Potential Vernal Pools, Areas of Critical Environmental Concern (ACECs), or Outstanding Resource Waters (ORWs) were identified within or in proximity to the survey area. According to the FEMA Flood Insurance Rate Map, portions of the property are located within mapped Zone X 500-year floodplain, however no portion of the subject properties are located within mapped 100-year floodplain coinciding with the resource area Bordering Land Subject to Flooding (see FEMA FIRM in Attachment B).

There is an existing utilities easement that runs adjacent to the perennial stream in which the Town of Reading owns and maintains a 10-inch sewer line.

The property is bisected between the Single Family 15 District and Business A District under local zoning ordinance, which is one developmental constraint on the property contributing to

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the configuration of the proposed building layout. Please refer to Existing Conditions Plan in Sheet 2 of the Site Plans.

Proposed Conditions

Work will entail the civil construction of a 3-story, 24-unit apartment building with associated utilities, parking, stormwater infrastructure, and other appurtenances. Town sewer and water are available, thus there will be no associated onsite wastewater treatment or wellheads.

Efforts to Avoid and Minimize Wetland Impacts

The site is constrained by wetland resource areas and zoning district prohibitions. The property is bisected between the Single Family 15 District and Business A District under local zoning ordinance. All elements of the building need be held within the zoned Business A District, which constrains the developable footprint to occur within roughly the first one quarter of the property closest to Main Street.

All jurisdictional wetland resource areas are primarily located outside of the Business A District, with the exception of a projection of BVW, located roughly between wetland flags A-103 through A-113 (refer to Existing Conditions Plan). This portion of the wetland is degraded and has been subject to prior alteration, as the footprint of the condemned single-family home was located partially within the wetland.

In avoidance and minimization of associated wetland impacts, the applicant has compressed the site design to the maximum extent practicable while still maintaining a viable project. For example, the building is designed to provide 35 parking spaces beneath the building to minimize the footprint of paved impervious surface parking.

However, despite efforts to avoid and minimize impacts within wetland resource areas, the project by necessity would need to fill a total of 2,750 square feet of BVW at this location to remain a viable project.

As previously discussed, the majority of the property is degraded due to prior land use as a commercial fuel oil business. We therefore believe that there exists enough on site opportunity to provide compensatory mitigation through wetland replication and restoration, to meet the performance standards in the WPA and Town of Reading Wetland Regulations in demonstrating that the project will provide a net benefit to wetland resource areas in the post construction condition.

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Impact Assessment and Riverfront Area Alternatives Analysis

The following section provides a quantitative evaluation of wetland impacts and compensatory mitigation through wetland replication and restoration, and a Riverfront Area Alternatives Analysis in accordance with 310 CMR 10.58(4).

Impact Analysis

As detailed, the project would require the fill of 2,750 square feet of BVW. As compensatory mitigation, the Applicant proposes to provide 2,750 square feet of wetland replication within the same wetland system (1:1 ratio). As additional mitigation, the Applicant proposes to restore approximately 2,315 square feet of BVW and Inland Bank along 465 linear feet of the perennial stream for which the Riverfront Area is associated.

Peripheral work within the wetland in the construction of the retaining walls associated with the apartment building at the point of wetland fill, and blending the wetland replication area into the existing wetland to maintain hydrologic connectivity would generate approximately 2,090 square feet of temporary disturbance within BVW that is proposed for restoration following construction (refer to Wetland Replication and Restoration Plan as Sheet C5 of Site Plans).

By necessity of proposing fill within the wetland, and construction of stormwater infrastructure, the Applicant will also need to work within the 35-foot No Disturb Zone under the Town of Reading Wetland Bylaw. The project would entail approximately 7,830 square feet of permanent impact, and 3,020 square feet of temporary impact within the Reading No Disturb Zone. As compensatory mitigation the Applicant offers to restore approximately 18,560 square feet of degraded No Disturb Zone through invasive species management and native plantings and seed mix applications. In addition, the Applicant proposes to incorporate a public walking trail into the development, providing public foot access from Main Street to Cross Street. Approval of work within the 35-foot No Disturb Zone is contingent upon receiving a waiver from the Reading Conservation Commission, further detailed below.

Riverfront Area Alternatives Analysis

The project has been designed to avoid and minimize alteration within the 200-foot Riverfront Area to the maximum extent practicable. The Riverfront Area boundary is located outside of the Business A District under zoning, which coincidentally pushes the footprint of the proposed apartment building entirely outside of the Riverfront Area.

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Despite efforts to avoid and minimize alterations within the Riverfront Area, the project proposes 7,950 square feet of alteration within the Riverfront Area, of which 7,800 square feet is associated within stormwater infrastructure (an extended dry detention basin), and a nominal 150 square feet is associated with a corner of the retaining wall supporting 10-surface parking spaces. The closest distance of proposed work to the perennial stream for which the Riverfront Area is broadcast is 124 linear feet. There is no work proposed within the inner 100-foot Riparian Zone of the Riverfront Area.

In accordance with the Wetlands Protection Act Regulations, 310 CMR 10.58(4)(3.)(d)1., “Within 200 foot Riverfront Areas, the issuing authority may allow the alteration of up to 5,000 square feet or 10% of the Riverfront Area within the lot, whichever is greater, on a lot recorded on or before October 6, 1997.”. The total Riverfront Area on the property totals 112,107 square feet. 7,950 square feet of alteration would total roughly 7.1% of the total Riverfront Area on the property, below the 10% performance standard.

Furthermore, in accordance with 310 CMR 10.58(4)(d)1.d., it states, “The calculation of square footage of alteration shall exclude areas of replication or compensatory flood storage required to meet performance standards for other resource areas, or any area of restoration within the riverfront area. The calculation also shall exclude areas used for structural stormwater management measures, provided there is no practicable alternative to siting these structures within the riverfront area and provided a wildlife corridor is maintained (e.g. detention basins shall not be fenced).”

Due to site topography and soils, and constraints imposed by zoning and other wetland resource areas, there is no practicable alternative to locating the extended dry detention basin outside of the Riverfront Area. As such, the 7,800 square feet of Riverfront Alteration associated with the stormwater is deducted from the calculated total of alteration within the Riverfront Area, resulting in only 150 square feet of calculable alteration within the Riverfront Area. This is far below the 5,000 square feet of alteration permissible under the performance standards. **Note: 150 square feet of Riverfront Alteration is reported on the WPA Form 3.**

Wetland Impact and Mitigation Analysis Summary

The following table provides a summary of wetland impacts and mitigation proposed:

WETLAND IMPACT AND MITIGATION AREA SUMMARY			
Resource Area	Impact Area		Proposed Mitigation
	Temp	Perm	
BVW	2,090sf	2,750sf	<ul style="list-style-type: none">• 2,750sf replicated• 4,405sf restored

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Riverfront Area	0	150sf	<ul style="list-style-type: none">• 465 linear feet of Inland Bank restored
35' No Disturb Zone	3,022sf	7,873sf	<ul style="list-style-type: none">• 18,560sf restored• Establishment of public walking trail

Request for Waiver under Reading Wetland Bylaw

As discussed, due to the necessity of proposed permanent fill within BVW, the project will also require the Commission to grant a waiver from the prohibition of work within the 35-foot No Disturb Zone under the Reading Wetlands Protection Regulations.

Pursuant to Section 2.E.1 of the Reading Wetlands Protection Regulations it states, *“The Conservation Commission may grant variance from strict compliance with these regulations for a proposed activity when the Commission finds that...”*

a. There are no reasonable conditions or alternatives that would allow the project to proceed in compliance with the performance standards in these Regulations

As detailed herein, due to the division of the property into two (2) separate zoning districts, the available developable area of the property for the apartment building is pushed toward Main Street, and coincidentally away from the majority of wetland resource areas on the property. Also as detailed, there is a portion of degraded wetland located roughly between wetland flags A-103 through A-113 that projects into the Business A District for which the apartment building must be confined. The project proponent evaluated all options in appraisal of whether the building footprint could be reduced or configured to avoid fill within this wetland (and subsequent encroachment into the 35-foot No Disturb Zone) and deemed it to be economically infeasible to maintain a viable project. As such, the Applicant believes there is no practicable alternative that would allow the project to proceed in compliance with the performance standards in the Reading Wetland Bylaw Regulations.

b. Mitigating measures are proposed that will allow the project to be conditioned so as to have no adverse impact upon the wetland values set forth in Section 7.1 of the Reading General Bylaws

As detailed herein, all wetland resource areas on the subject property are degraded from prior land use. The vegetative composition within the 35-foot No Disturb Zone lacks species diversity and is dominated by invasive species. Norway maple and Asiatic bittersweet are the most prevalent species. In consideration of issuing a waiver to permit 7,873sf of permanent impacts and 3,022sf of temporary impacts within the No Disturb Zone, the Applicant offers to provide

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ecological restoration of 18,560sf of remaining degraded No Disturb Zone through invasive species removal and native plantings and seed mix applications to increase native plant species diversity. We believe this will result in a net benefit to the interests for wetland protection to include improved wildlife habitat, slope stabilization in abatement of erosion and sediment transport, and improved water quality. The Applicant also proposes to establish a public walking trail connecting Main Street to Cross Street.

and c. The variance is necessary to accommodate an overriding community, regional, state, or national public interest.

The project would provide several elements of overriding community level interests to the public.

We believe that through providing extensive ecological restoration in exceedance of the minimal amount of compensatory mitigation required, the project will provide a net benefit to wetland resource areas beyond the extent to which the No Disturb Zone would be impacted through development. Stormwater infrastructure has been engineered to meet all Stormwater Management Standards, providing improved water quality draining into a Zone A Surface Water Protection Zone over current site conditions in which stormwater drains unabated overland from the disturbed prior commercial lot into the wetlands.

Restoration through invasive species removal and installation of native plants and seed mix applications will result in overall improved health of the wetland ecosystems for which the No Disturb Zone is intended to protect, which is in the public interest of all citizens, especially abutting residential homes.

At the request of the Conservation Commission, the project also offers a public walking trail connecting Main Street to Cross Street in support of local connectivity initiatives of the Town of Reading.

The project will also result in a significant increase in tax base generated from the property in support of public funding.

Stormwater Management

All site drainage has been designed in accordance with MassDEP Stormwater Management Standards. A full Stormwater Report and narrative is provided as Attachment C.

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Best Management Practices

The project proposes to incorporate all in construction Best Management Practices (BMPs) for wetland protection as follows:

NPDES Construction General Permit and Storm Water Pollution Prevention Plan (SWPPP)

Because the project entails the disturbance of over 1-acre of land, the project will need to obtain coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP). This includes development and execution of a Storm Water Pollution Prevention Plan (SWPPP) and onsite monitoring during construction by a qualified environmental monitor. In accordance with the CGP, environmental inspections detailing compliance with the SWPPP must be performed throughout construction, providing oversight of general contractors working onsite.

Sediment Controls

Prior to the initiation of any ground disturbing activities, sediment controls such as silt fence, staked strawbales, fiber rolls, or similar treatments, will be installed between the limits of disturbance and all down gradient wetland resource areas. These controls will be installed contiguous and flush with the ground, and maintained throughout construction in functional condition. As detailed on the Wetland Replication and Restoration Plan, the project proposed a perimeter silt fence along the entire extent of the project between the limits of disturbance and down gradient wetland resource areas.

Soil Management

During construction, all soil and other aggregate spoils generated during grading and site work will be maintained in designated soil stockpile area (to be identified through preparation and execution of the SWPPP). Designated soil stockpile areas must be located outside of the 35-foot No Disturb Zone and must be corralled with contiguous secondary sediment controls designed to retain the volume of soils in the pile in the event of heavy precipitation. Contractors may also anchor plastic sheeting over the stockpiles prior to forecasted precipitation events. Any displaced soils will be either integrated onsite or removed for approved disposal. Due to the extent of invasive species onsite, no soils generated onsite may be used for application within wetland replication or restoration areas.

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Construction Entrance Controls

To prevent sediment tracking onto the public roadway, the contractor will install a stone sediment tracking apron at the construction entrance/exit at Main Street. The sediment tracking apron must be monitored and refreshed with clean stone as necessary when it becomes saturated with sediments. The contractor will be responsible for cleaning the public roadway in the event that sediment tracking onto the public roadway becomes problematic. The contractor shall also install silt sacks within any catch basin inlets located within 100-feet of the construction entrance.

Dewatering

If dewatering is required, contractors shall pump water through a filter bag located in a vegetated upland area. If additional filtration is necessary, the contractors may opt to construct a dewatering basin in which the filter bag is placed in a corral of staked strawbales lined with filter fabric. Dewatering must be monitored at all times to insure pump rates do not exceed the capacity of the basin to provide adequate filtration, and to maintain the ability to turn off the pumps in the event of system failure. Dewatering will be monitored through execution of the SWPPP under the NPDES CGP.

Compensatory Mitigation

The Applicant proposes to provide the following compensatory mitigation through wetland replication and restoration, Inland Bank restoration, and restoration of the 35-foot No Disturb Zone as follows (please refer to Wetland Replication/Restoration Plan for additional site detail):

General Conditions for Restoration

1. The Reading Conservation Commission shall be notified no less than one (1) week in advance of the initiation of any work within wetlands.
2. Prior to any work within wetlands a qualified wetland scientist will reflag the existing jurisdictional wetland boundary.
3. Prior to the initiation of any work within wetlands, survey shall locate and demarcate the limit of work for proposed alteration, the wetland replication area, and sediment control line.
4. A qualified restoration ecologist or wetland scientist shall oversee all work performed by contractors in wetlands.
5. In the event that specified plantings are unavailable, suitable substitute species may be considered, however plant selection shall be limited to native species suitable to the

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growing conditions of the site. Any proposed deviation from this plan must be submitted to the Conservation Commission for review and approval prior to execution.

6. Due to the extent of invasive species onsite, no displaced soils generated onsite may be repurposed for placement within any wetland replication or restoration area.

Wetland Replication and Restoration Area #1 (2,750sf replication/1,050sf restoration)

NOTE: The specifications herein are designed to provide planting coverage of 3,800sf to include both the replication and restoration area.

7. Prior to any vegetation clearing or earth disturbance, sediment controls shall be installed along the limit of work line in accordance with all specifications. The Conservation Commission shall be notified upon completion of installation and afforded the opportunity to inspect all installed sediment controls prior to initiation of any work.
8. Following installation of sediment controls, contractors shall remove all vegetation within the proposed replication area.
9. Following vegetation clearing, the contractor shall reduce grades within the wetland replication area as detailed on this plan. To ensure that the replication area will maintain hydrologic connectivity to the existing wetland, grading must be monitored by a qualified wetland scientist with authorization to make minor field changes to the depth of grades based on field observed soils and hydrologic indicators.
10. Following grading, contractors shall apply a uniform layer of no greater than 6-inches of clean organic rich topsoil, screened loam, or compost to provide suitable growing substrate for native plantings and seed mixes.
11. Following application of organic topsoil, the contractor shall replant and seed the area in accordance with the following planting schedule:

Trees and Shrubs

- a. Twenty (20) common winterberry (*Ilex verticillata*, FACW)
- b. Twenty (20) gray dogwood (*Swida racemosa*, FAC)
- c. Twenty (20) highbush blueberry (*Vaccinium corymbosum*, FACW)
- d. Twenty (20) sweet pepperbush (*Clethra alnifolia*, FAC)
- e. Ten (10) American witch-hazel (*Hamamelis virginiana*, FACU)
- f. Ten (10) box elder (*Acer negundo*, FAC)

Herbaceous Plants

- g. Fifty (50) sensitive fern (*Onoclea sensibilis*, FACW)
- h. Fifty (50) cinnamon fern (*Osmundastrum cinnamomeum*, FACW)
- i. Fifty (50) white meadowsweet (*Spiraea alba*, FACW)
- j. Fifty (50) wrinkle-leaved goldenrod (*Solidago rugosa*, FAC)

Notes: All shrubs shall be no less than 2-3' at planting. All shrubs shall be planted at an off centering distance no less than 6' from other planted shrubs. Herbaceous plants shall be used to fill gaps between planted shrubs throughout restoration area.

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12. Following installation of wetland plants, apply New England Wetland Seed Mix available from New England Wetland Plants, Inc. at a rate no less than 1 pound per 1250sf to all areas of disturbed soils around wetland plantings to fill gaps in vegetation and provide soil stability.
13. Following application of seed mix, apply a thin uniform layer of straw mulch to all seeded areas.

Wetland Restoration Area #2 (approximately 1,040 square feet)

14. Upon completion of wetland fill and construction of the retaining wall, contractor shall restore all peripheral temporary impacts within the adjoining wetland.
15. Contractor shall remove any remaining invasive species within the wetland restoration area.
16. Contractor shall apply a uniform layer of no greater than 6-inches of clean organic rich topsoil, screened loam, or compost to provide suitable growing substrate for native plantings and seed mixes.
17. Following application of organic topsoil, the contractor shall replant and seed the area in accordance with the following planting schedule:

Shrubs

- k. Ten (10) highbush blueberry (*Vaccinium corymbosum*, FACW)
- l. Ten (10) sweet pepperbush (*Clethra alnifolia*, FAC)
- m. Ten (10) northern spicebush (*Lindera benzoin*, FACW)

Herbaceous Plants

- n. Twenty-five (25) sensitive fern (*Onoclea sensibilis*, FACW)
- o. Twenty-five (25) white meadowsweet (*Spiraea alba*, FACW)
- p. Twenty-five (25) wrinkle-leaved goldenrod (*Solidago rugosa*, FAC)
- q. Twenty-five (25) jewelweed (*Impatiens capensis*, FACW)

Notes: All shrubs shall be no less than 2-3' at planting. All shrubs shall be planted at an off centering distance no less than 6' from other planted shrubs. Herbaceous plants shall be used to fill gaps between planted shrubs throughout restoration area.

18. Following installation of wetland plants, apply New England Wetland Seed Mix available from New England Wetland Plants, Inc. at a rate no less than 1 pound per 1250sf to all areas of disturbed soils around wetland plantings to fill gaps in vegetation and provide soil stability.
19. Following application of seed mix, apply a thin uniform layer of straw mulch to all seeded areas.

Inland Bank Restoration Area (approximately 2,315 square feet)

20. The contractor shall remove all invasive species within a distance of 10-feet from the top of bank along the stream channel.

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21. Following removal of invasive species, the contractor shall install native trees and shrubs in accordance with the following planting schedule:

Trees and Shrubs

- r. Twenty (20) box elder (*Acer negundo*, FAC)
- s. Twenty (20) speckled alder (*Alnus incana*, FACW)
- t. Twenty (20) sweet pepperbush (*Clethra alnifolia*, FAC)
- u. Twenty (20) red maple (*Acer rubrum*, FAC)

Notes: All shrubs shall be no less than 2-3' at planting. All shrubs shall be planted at an off centering distance no less than 6' from other planted shrubs.

22. Following installation of native plants, apply New England Conservation Wildlife Seed Mix available from New England Wetland Plants, Inc. at a rate no less than 1 pound per 875sf to all areas of disturbed soils around wetland plantings.
23. Following application of seed mix, apply a thin uniform layer of straw mulch to all seeded areas.

35-foot No Disturb Zone Restoration Area (approximately 18,560 square feet)

24. Prior to installation, the contractor shall remove invasive species to the maximum extent practicable.
25. Following removal of invasive species, the contractor shall apply no less than 6-inches of clean organic rich topsoil, screened loam, or compost to top dress any stony areas devoid of native topsoil.
26. Following application of organic topsoil, the contractor shall replant and seed the area in accordance with the following planting schedule:

a. Trees and Shrubs

- b. v. Thirty (30) red maple (*Acer rubrum*, FAC)
- c. w. Thirty (30) box elder (*Acer negundo*, FAC)
- d. x. Thirty (30) eastern shadbush (*Amelanchier canadensis*, FAC)
- e. y. Thirty (30) American witch hazel (*Hamamelis virginiana*, FACU)
- f. z. Thirty (30) mountain laurel (*Kalmia latifolia*, FACU)

Notes: All shrubs shall be no less than 2-3' at planting. Shrubs and trees shall be used to fill vacancies left by removed invasive species. Herbaceous plants shall be used to fill gaps between planted trees and shrubs throughout restoration area.

27. Following installation of native plants, apply New England Erosion Control/Restoration Seed Mix available from New England Wetland Plants, Inc. at a rate no less than 1 pound per 1,250sf to all areas of exposed soils around native plantings.
28. Supplement New England Control/Restoration Seed Mix through applying no less than 1 pound per 1,900sf of New England Wildflower Seed Mix available from New England Wetland Plants throughout the restoration area.

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Note: Erosion Control/Restoration Seed Mix and New England Wildflower Seed Mix may be blended and applied via hydroseed.

29. Following application of seed mix, apply a thin uniform layer of straw mulch to all seeded areas.

Conclusion

As detailed herein, although the project will require some fill within Bordering Vegetated Wetlands and a waiver from the Reading Wetland Bylaw to permit alteration within the local 35-foot No Disturb Zone, the Applicant believes that through compensatory mitigation the Applicant can demonstrate compliance with all performance standards under the Massachusetts Wetlands Protection Act (WPA) and support that the project will result in no net loss of essential functions and values associated with the interests for wetlands protection defined in the WPA Regulations 310 CMR 10.01(2) and Section 7.1 of the Reading General Bylaws. We therefore request that the Commission consider issuance of an Order of Conditions to permit this project. Thank you for your consideration in this matter.

Respectfully,

Hancock Associates on behalf of Stonegate Construction Corp



David Cowell, PWS, CWB, CERP
Senior Wetland Scientist

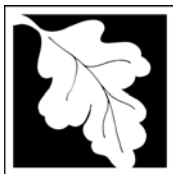
cc: MassDEP Northeast Regional Office

Attachments:

- A – WPA Form 3
- B – Figures
- C – Stormwater Report
- D – Abutter Notification
- E – Filing Fees
- F – Seed Mix Specifications
- G – Site Plans



Attachment A WPA Form 3



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

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Reading

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):

259 and 267 Main Street

a. Street Address

Reading

b. City/Town

01867

c. Zip Code

Latitude and Longitude:

42.514371°

d. Latitude

71.103184°

e. Longitude

Map 12

f. Assessors Map/Plat Number

Lots 39 and 40

g. Parcel /Lot Number

2. Applicant:

Jay

a. First Name

Finnegan

b. Last Name

Stonegate Construction Corp.

c. Organization

273 Corporate Drive, Suite 150

d. Street Address

Portsmouth

e. City/Town

NH

f. State

03801

g. Zip Code

(603) 334-3366

h. Phone Number

i. Fax Number

jfinnegan@finnegananddevelopment.com

j. Email Address

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

Brenda

a. First Name

Van Horn

b. Last Name

259-267 Main Street LLC

c. Organization

53 Mt Vernon Street

d. Street Address

Reading

e. City/Town

MA

f. State

01867

g. Zip Code

h. Phone Number

i. Fax Number

j. Email address

4. Representative (if any):

David

a. First Name

Cowell, PWS

b. Last Name

Hancock Associates

c. Company

315 Elm Street

d. Street Address

Marlborough

e. City/Town

MA

f. State

01752

g. Zip Code

(508) 460-1111

h. Phone Number

i. Fax Number

dcowell@hancockassociates.com

j. Email address

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

\$1,050.00

a. Total Fee Paid

\$512.50

b. State Fee Paid

\$537.50

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

Provided by MassDEP:
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Reading
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A. General Information (continued)

6. General Project Description:

Development of a multi-unit apartment building, portions of which are proposed within Bordering Vegetated Wetlands and Riverfront Area. Compensatory mitigation is proposed through wetland replication and restoration in accordance with performance standards.

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:

Middlesex South	
a. County	b. Certificate # (if registered land)
72882	488 and 496
c. Book	d. Page Number

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
 Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

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

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Reading

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. <input type="checkbox"/> Bank	1. linear feet	2. linear feet
b. <input checked="" type="checkbox"/> Bordering Vegetated Wetland	2,750 perm / 2,090 temp 1. square feet	2,750 replication / 2,090 restored
c. <input type="checkbox"/> 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. <input type="checkbox"/> Bordering Land Subject to Flooding	1. square feet 3. cubic feet of flood storage lost	2. square feet 4. cubic feet replaced
e. <input type="checkbox"/> Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced
f. <input checked="" type="checkbox"/> Riverfront Area	Unnamed USGS mapped perennial stream (inland) 1. Name of Waterway (if available) - specify coastal or inland	

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: 112,107 square feet

4. Proposed alteration of the Riverfront Area:

150 a. total square feet 0 b. square feet within 100 ft. 150 c. square feet between 100 ft. and 200 ft.

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.



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

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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.

<u>Resource Area</u>	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
a. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. <input type="checkbox"/> Land Under the Ocean	_____	
	1. square feet	

	2. cubic yards dredged	
c. <input type="checkbox"/> Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. <input type="checkbox"/> Coastal Beaches	_____	_____
	1. square feet	2. cubic yards beach nourishment
e. <input type="checkbox"/> Coastal Dunes	_____	_____
	1. square feet	2. cubic yards dune nourishment

	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
f. <input type="checkbox"/> Coastal Banks	_____	
	1. linear feet	
g. <input type="checkbox"/> Rocky Intertidal Shores	_____	
	1. square feet	
h. <input type="checkbox"/> Salt Marshes	_____	_____
	1. square feet	2. sq ft restoration, rehab., creation
i. <input type="checkbox"/> Land Under Salt Ponds	_____	
	1. square feet	

	2. cubic yards dredged	
j. <input type="checkbox"/> Land Containing Shellfish	_____	
	1. square feet	
k. <input type="checkbox"/> 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. <input type="checkbox"/> 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



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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

- 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**

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*

- Percentage/acreage of property to be altered:

(a) within wetland Resource Area _____
percentage/acreage

(b) outside Resource Area _____
percentage/acreage

- Assessor's Map or right-of-way plan of site

- 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 <http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/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.



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

- (c) MESA filing fee (fee information available at http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_fee_schedule.htm). 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, http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_exemptions.htm; 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:

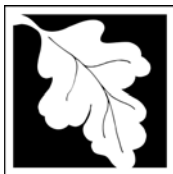
South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: DMF.EnvReview-South@state.ma.us

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@state.ma.us

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.



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

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.

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



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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.

Notice of Intent for 259 & 267 Main Street

a. Plan Title

Hancock Associates

Rene L. Gagnon, P.E.

b. Prepared By

c. Signed and Stamped by

October 8, 2019

1"=30'

d. Final Revision Date

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:

7574

2. Municipal Check Number

October 7, 2019

3. Check date

7571

4. State Check Number

October 7, 2019

5. Check date

Stonegate Construction Corp.

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



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Provided by MassDEP:
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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.

	10/2/19
1. Signature of Applicant <u>Eric S. Kutz, President Stonegate Construction</u>	Date
3. Signature of Property Owner (if different) 	4. Date <u>Oct. 29, 2019</u>
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:

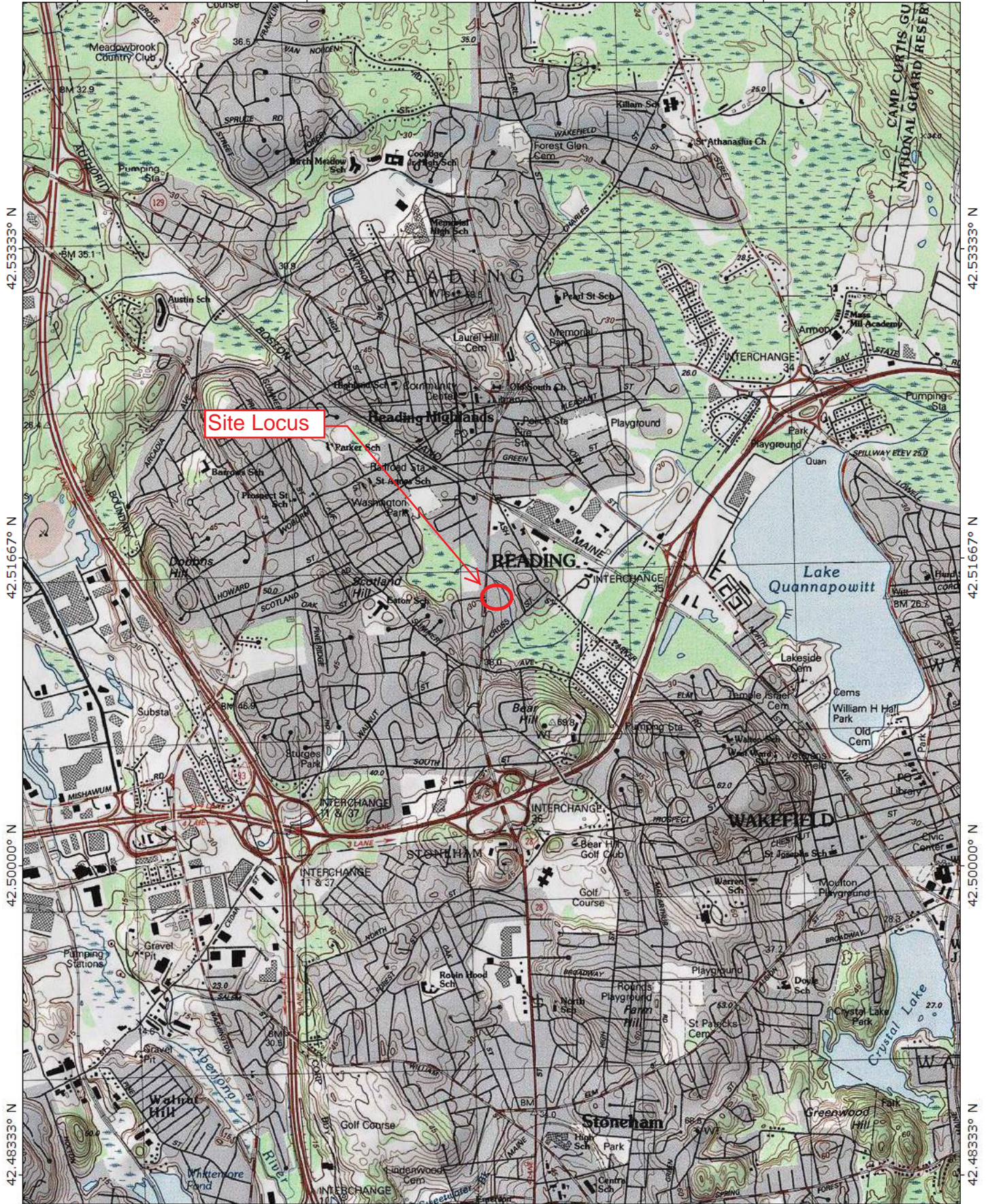
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

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.

Attachment B Figures



Site Locus

42.53333° N

42.51667° N

42.50000° N

42.48333° N

42.53333° N

42.51667° N

42.50000° N

42.48333° N



National Flood Hazard Layer FIRMette



42°31'4.20"N

71°6'29.58"W



USGS The National Map: Orthoimagery. Data refreshed April, 2019. 0 250 500 1,000 1,500 2,000 Feet 1:6,000 42°30'37.68"N 71°5'52.12"W

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

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

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

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

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

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

MAP PANELS	
	Digital Data Available
	No Digital Data Available
	Unmapped

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

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

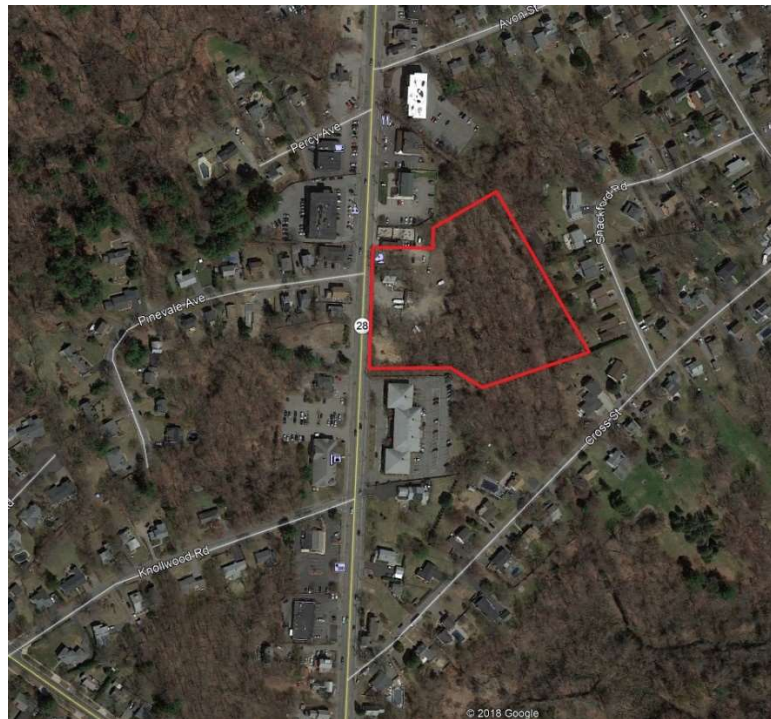
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **10/29/2019 at 11:45:16 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Attachment C Stormwater Report



Stormwater Report
In Support of
Permit Site Plan
for
259 & 267 Main Street
Reading, MA



Prepared By:
Hancock Associates
#20882
Prepared For:
Stonegate Construction Corp.

October 30, 2019

Reference: Site Plan prepared by Hancock Associates dated October 30, 2019

Table of Contents

www.hancockassociates.com

Introduction

Existing Conditions Narrative

Proposed Conditions Narrative

Compliance Documentation

Erosion and Sedimentation Plan

Stormwater Operation and Maintenance Plan (Pollution Prevention)

Appendices

-A. HydroCAD Stormwater Management Calculations

-B. Pre/Post Drainage Maps

-C. Geotechnical Report By KMM Geotechnical Consultants, LLC

-D. Stormwater Management Form and checklist

INTRODUCTION

A Stormwater Report must be submitted to document compliance with the Stormwater Management Standards. The 259 & 267 Main Street project is subject to the Stormwater Management Standards and regulated by the Wetlands Protection Act Regulations, 310 CMR 10.00, and or the 401 Water Quality Certification Regulations. This Stormwater Report has been completed by Hancock Associates to accompany the various permit applications. The Report outlines how the design meets each Standard, providing calculations and information documenting compliance.

Excerpt from MADEP Stormwater Management Standards Chapter 1:

Stormwater runoff results from rainfall and snow melt and represents the single largest source responsible for water quality impairments in the Commonwealth's rivers, lakes, ponds, and marine waters. New and existing development typically adds impervious surfaces and, if not properly managed, may alter natural drainage features, increase peak discharge rates and volumes, reduce recharge to wetlands and streams, and increase the discharge of pollutants to wetlands and water bodies.

The Stormwater Management Standards address water quality (pollutants) and water quantity (flooding, low base flow and recharge) by establishing standards that require the implementation of a wide variety of stormwater management strategies. These strategies include environmentally sensitive site design and LID techniques to minimize impervious surface and land disturbance, source control and pollution prevention, structural BMPs, construction period erosion and sedimentation control, and the long-term operation and maintenance of stormwater management systems.

Applicability of standards is documented as follows:

Excerpt from MADEP Stormwater Management Handbook – Legal Framework for Stormwater Management:

Project proponents and municipal officials should work together to ensure adequate pretreatment prior to discharge to the municipal storm drain system. Municipal separate storm drain systems covered by the MS4 permit can ensure such pretreatment by establishing and implementing adequate post construction stormwater controls as required by that permit.

Excerpt from 974 CMR 4.08 Stormwater Management

4.08 1.a. *All Applications, regardless of whether the project is subject to the Wetlands Protection Act or not, shall design the stormwater management system in compliance with the goals and objectives of the Massachusetts Department of Environmental Protection Stormwater Management Policy (DEP SMP) to the greatest extent possible given the specific site constraints of each site. These apply to industrial, commercial, institutional, residential subdivision, and roadway projects, including site preparation, construction, redevelopment, and on-going*

operation. The Applicant shall submit a completed and endorsed Stormwater Management Form (SMF) that indicates compliance to the greatest extent possible, with the SMP's ten (10) Stormwater Management Standards, as most recently amended. The applicant shall also provide calculations indicating compliance with each standard. Refer to the DEP SMP and its referenced sources for specific application of these stormwater management categories.

EXISTING CONDITIONS

The subject property is located on the east side of Main Street in Reading Massachusetts and is bounded by Main Street to the west, a commercial property to the north, a residential condominium development to the south and a wetlands/stream system at the eastern side of the property. The parcels, designated assessor's Map 12 Lots 39 & 40 total approximately 4.01 acres in land area. The current owner of record is 259-267 Main Street LLC for both parcels.

The parcel currently contains a 1.5 story dwelling/office building with a footprint of approximately 1,500 s.f., an approximately 550 s.f. garage, and associated driveways and parking areas. There are wooded wetlands and a stream that occupy the rear (eastern) portion of the site. The site has previously been in use as an oil supply/storage business.

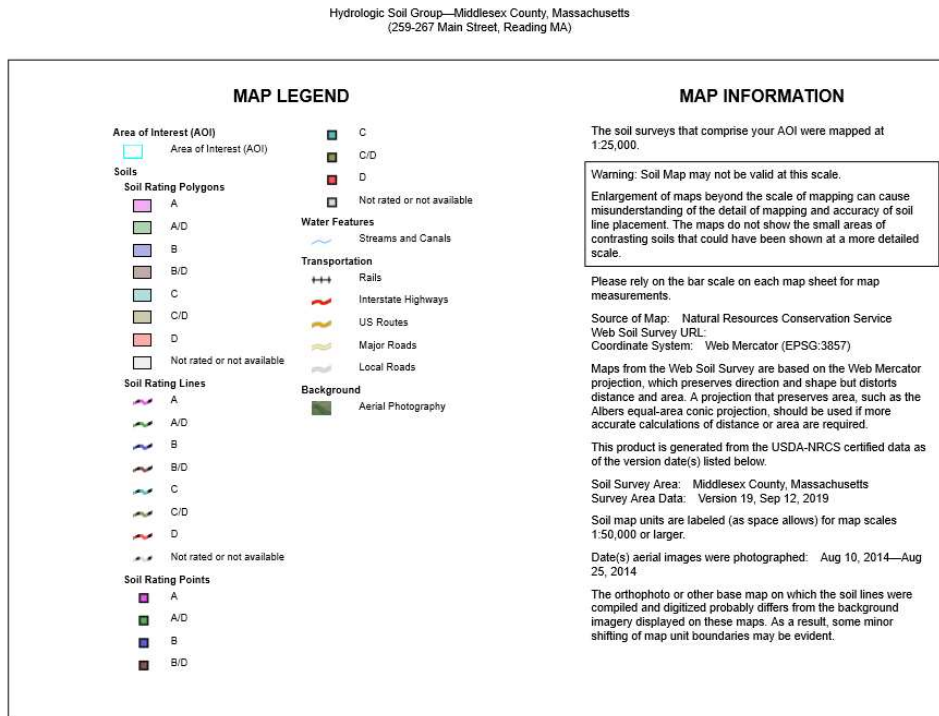
Topography on site ranges from elevation 97.0 (NAVD88) at the western side of the site adjacent to Main Street to an elevation of 87.0 at the eastern side of the parcel at the stream.

Soils on site have been classified by the USDA Natural Resource Conservation Service as Urban land in areas near Main Street and Wareham Loamy Fine Sand (HSG A/D). See NRCS Figures 1 and 2 below. Geotechnical borings were performed on the site in the building location by KMM Geotechnical consultants, LLC (KMM) which revealed the presence of primarily sandy soils. Hancock Associates will perform supplemental soil test pits in the in the location of the infiltration BMPs prior to construction to confirm soil conditions.

Figure 1: NRCS Mapping



Figure 2: NRCS Legend



Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
32B	Wareham loamy fine sand, 0 to 5 percent slopes	A/D	3.2	58.5%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	0.2	3.2%
602	Urban land		2.1	38.3%
Totals for Area of Interest			5.5	100.0%

PROPOSED CONDITIONS:

The Applicant proposes to construct a 3-story residential condominium building that will contain 24 dwelling units. The project will include associated access drives, parking for forty-eight (48) vehicles, pedestrian walkways, drainage and landscaped areas. Thirty-five (35) of the proposed parking spaces will be located within a parking garage located under the building. The project will be served by town water and sewer connections. The proposed development will result in an increase of approximately 21,800 s.f. of impervious area.

Stormwater will be captured via standard deep sump hood catch basins and trench drains and pipe system directing runoff from the new parking/paved areas proposed on-site to a subsurface infiltration system composed of Stormtech SC-740 chambers and an extended dry detention basin. Overflow from the systems will be directed through an overflow outlet and discharge to the exiting wooded wetland areas. Treatment of runoff will be provided via deep sump hooded catch basins, Stormtech isolator rows, and the infiltration/detention systems.

COMPLIANCE DOCUMENTATION:

STANDARD 1:

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Treatment: All runoff is treated.

Stormwater Discharge Velocity: The maximum velocity of proposed outlet pipes is 4.9 fps.

Ability of Ground Surface to Resist Erosion: A riprap apron is proposed to mitigate any potential erosion caused by new outfall.

Standard 1 is met.

STANDARD 2:

An evaluation of post-development runoff rates demonstrating there will not be an increase from the pre-development runoff rate at project extents is presented herein. To prevent storm damage and downstream and off-site flooding, Standard 2 requires that the post-development peak discharge rate is equal to or less than the pre-development rate from the 2-year and the 10-year 24-hour storms. The impact of peak discharges from the 100-year 24-hour storm has been mitigated by also limiting the rates to pre-development rates. Precipitation information has been taken from the latest National Oceanic and Atmospheric Administration (NOAA) Atlas 14, point precipitation frequency estimates.

In the pre- vs post-development drainage analysis, one (1) design point was considered, the existing stream located along the eastern side of the site. The stream is identified as Node 1R – Stream-Pre and Node 2R – Stream Post.

Analysis Point – Stream at east side of site (see table 1)

The entirety of the site currently flows easterly to the existing stream. In the post-development condition, runoff from the entirety of the contributing area will be collected, treated, and controlled via stormwater management systems, a Subsurface Infiltration chamber system and an extended dry detention basin. Post-development rates for all rainfall events are less than or equal to those under pre-development conditions.

Table 1:

	2-year 24-hour Storm (3.31 inches) cubic feet per second	10-year 24-hour Storm (5.21 inches) cubic feet per second	25-year 24-hour Storm (6.40 inches) cubic feet per second	100-year 24-hour Storm (8.23 inches) cubic feet per second
Pre-development to Stream (Node 1R)	0.06	1.31	2.92	6.15
Post-development to Stream (Node 2R)	0.06	1.02	2.47	5.34

Standard 2 is met.

STANDARD 3:

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type.

The Hydrologic Soil Group (HSG) rating is undefined for Urban type soils, and the nearby soil types are classified as HSG A (for drained areas). Also, the Geotechnical report by KMM indicates sandy soils in the area of the proposed building. Therefore, an infiltration rate of 2.41 in/hr has been assumed for the infiltration BMPs per *Table 2.3.3. 1982 Rawls Rates* from *Volume 3* of the Massachusetts Stormwater Management Standards.

Total increase in impervious area = 21,805 sq. ft.

Total new impervious area to recharge facilities = 18,550 sq. ft.

A Soils new Impervious Area = 21,805 sq. ft. x 0.60 inches x 1/12 = 1,091 cubic feet

Capture Area Adjustment:

21,805 sq. ft. / 18,550 sq. ft. = 1.18. (85% of total impervious directed to recharge facilities)

Total Recharge Volume Required = 1091 cubic feet x 1.18 = 1,288 cubic feet

Total volume provided below the outlets = 1,408± cubic feet (see Table 2)

Table 2:

Pond 2P: Subsurface Infiltration System - 21839 Hydr		
Summary Wizards Hydrograph Discharge Storage		
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
93.00	926	0
93.10	926	37
93.20	926	74
93.30	926	111
93.40	926	148
93.50	926	185
93.60	926	261
93.70	926	336
93.80	926	411
93.90	926	485
94.00	926	559
94.10	926	632
94.20	926	705
94.30	926	776
94.40	926	847
94.50	926	918
94.60	926	987
94.70	926	1,055
94.80	926	1,122
94.90	926	1,188
95.00	926	1,253
95.10	926	1,317
95.20	926	1,378
95.30	926	1,438
95.40	926	1,496
95.50	926	1,552
95.60	926	1,606
95.70	926	1,655
95.80	926	1,700
95.90	926	1,741
96.00	926	1,779
96.10	926	1,816
96.20	926	1,853
96.30	926	1,890
96.40	926	1,927
96.50	926	1,964
96.60	926	1,964
96.70	926	1,964

System Volume Below Outlet at Elevation 95.25 = 1,408± cubic feet

Drawdown Analysis

Drawdown time must be less than 72 hours, using the storage volume below the lowest outlet invert. Drawdown time will be calculated for HSG type “A” soil as a factor of safety even though the geotechnical observations indicate “A” type soils. The Rawl's Rate for saturated hydraulic conductivity (2.41 in/hour for HSG "A"-type soil).

$$\text{Stormtech System} = 1,408 \pm \text{ft}^3 / ((2.41 \text{ in/hour} * / 12 \text{ in/ft}) * 387 \pm \text{ft}^2) = 18 \pm \text{hours}$$

Standard 3 is met.

STANDARD 4:

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

Table 3: Treatment Chain – Subsurface Infiltration System

1, 2, & 3		Removal Rate	Remains	
1st Link	Deep Sump Hooded Catch Basin	25%	75.00%	
2nd Link	Isolator Row	84%	12.00%	
3rd Link	Infiltration	80%	2.40%	
Final Rate		97.60%		removal

Table 4: Treatment Chain – Extended Dry Detention Basin

1, 2, & 3		Removal Rate	Remains	
1nd Link	Isolator Row	84%	16.00%	
2nd Link	Extended Dry Detention	50%	8.00%	
Final Rate		92.00%		removal

The site is located within the Zone A of a surface water supply. Thus, a water quality depth of 1.0 inch of Water Quality Volume infiltration has been used for all new-development impervious areas. Additional soil observations shall be performed prior to construction to confirm the soil conditions in the areas of Infiltration BMPs for infiltration rate and depth to estimated seasonal high groundwater table.

Catchbasin Verification.

	<i>tributary impervious area should be less than 1/4 acre</i>	<i>10-yr storm inflow thru grate must not exceed 3 cfs</i>
CB-1	0.10 acres	0.45 cfs
CB-2	0.10 acres	0.5 cfs

Isolator Row Verification

The isolator rows, consisting of Stormtech chambers wrapped in filter fabric have been sized to provide 84% TSS removal per the Stormtech Isolator Row Sizing Chart (Attached) and the DEP's Equivalent Water Quality Peak Flow Rate guidelines:

System 1 (Pretreatment for Subsurface Infiltration)

Time of Concentration, $T_c = 0.083$ Hours
 Unit Peak Discharge, $q_u = 795$ csm/in
 Impervious Surface Area, $A = 0.00067$ mi²
 Water Quality Volume, $WQV = 1.0$ Inches
 Water Quality Flow, $WQF = 0.533$ cfs
 SC-740 Isolator Row Chambers Required = $0.533 \text{ cfs} / 0.15 \text{ cfs} = 4$ Chambers
 Isolator Row Chambers Provided = **11 Chambers**

System 2 (Pretreatment for Extended Dry Detention Basin)

Time of Concentration, $T_c = 0.083$ Hours
 Unit Peak Discharge, $q_u = 795$ csm/in
 Impervious Surface Area, $A = 0.00031$ mi²
 Water Quality Volume, $WQV = 1.0$ Inches
 Water Quality Flow, $WQF = 0.246$ cfs
 SC-310 Isolator Row Chambers Required = $0.246 \text{ cfs} / 0.11 \text{ cfs} = 3$ Chambers
 Isolator Row Chambers Provided = **3 Chambers**

Table 5: Stormtech Isolator Row Sizing



STORMTECH ISOLATOR ROW SIZING CHART					
	SC-310	SC-740	DC-780	MC-3500	MC-4500
Chamber Area (Sq.Ft.)	20	27.8	27.8	43.2	30.1
Treated Flow Rate per chamber (CFS)	0.11	0.15	0.15	0.24	0.17
NOTE: Testing of the Isolator Row completed by Tennessee Tech has been verified by NJCAT and it has shown to have a TSS removal efficiency of 84% for SIL-CO-SIL 250 NJCAT verified Treated Flow Rate (GPM / Sq.Ft.) 2.5					

Standard 4 is met.

STANDARD 5:

Land uses with higher potential pollutant loads.

The site is not a Land Use with Higher Potential Pollutants loads.

Standard 5 is met.

STANDARD 6:

Critical Areas

"Standard 6 applies to discharges within a Zone II, Interim Wellhead Protection Areas or near or to other Critical Areas: Shellfish Growing Areas, Bathing Beaches, Outstanding Resource Waters Special Resource Waters, and Cold-Water Fisheries" per Volume 3: Documenting Compliance with the Massachusetts Stormwater Management Standards Chapter 1.

The site is within a Zone A to a public surface water supply which is classified as a critical area. The stormwater management systems have been designed to treat the 1.0 inch water quality depth.

Standard 6 is met.

STANDARD 7:

Redevelopment

This project is not being proposed as redevelopment.

Standard 7 is met.

STANDARD 8:

Construction Period Controls

See Wetland mitigation plan for construction period erosion & sedimentation controls. Site is over 1 acre, therefore a Construction General Permit (CGP) from the Environmental Protection Agency (EPA) will be required and a Stormwater Pollution Prevention Plan (SWPPP) will be developed and provided prior to construction.

Standard 8 is met.

STANDARD 9:

Operation and Maintenance plan

An Operation and Maintenance Plan has been developed and included at the end of this report.

Standard 9 is met.

STANDARD 10:

Illicit discharges to drainage system

Illicit Discharge Compliance Statement

To the best of my knowledge no illicit discharges currently exist on the site and no future illicit discharge will be allowed, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease.

Signed by Owner

Date

Measures to prevent illicit discharges have been included in this report.

Stonegate Construction Corp. will provide an Illicit Discharge Compliance Statement before stormwater is discharged to the post-construction stormwater BMPs.

EROSION AND SEDIMENTATION PLAN:

Best management practices (BMP) for erosion and sedimentation control are staked wattles, filter fences, hydro seeding, and phased development. Many stormwater BMP technologies (e.g., infiltration technologies) are not designed to handle the high concentrations of sediments typically found in construction runoff and must be protected from construction-related sediment loadings. Construction BMP's **must** be maintained.

In developing the proposed project certain measures will be implemented to minimize impacts erosion and sedimentation could have on surrounding areas. This section addresses items that involve proper construction techniques, close surveillance of workmanship, and immediate response to emergency situations. The developer must be prepared to provide whatever reasonable measures are necessary to protect the environment during construction and to stabilize all disturbed areas as soon as construction ends.

Pre-Construction

1. The contractor shall have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials shall include, but are not limited to wattles, silt fence and crushed stone.
2. The contractor is responsible for erosion control on site and shall utilize erosion control measures where needed, regardless of whether the measures are specified on the plan or in the order of conditions.

Preliminary Site Work

1. Excavated materials should be stockpiled, separating the topsoil for future use on the site. Erosion control shall be utilized along the down slope side of the piles and side slopes shall not exceed 2:1.
2. If intense rainfall is anticipated, the installation of supplemental wattles, silt fences, or armored dikes shall be considered.

Landscaping

1. Landscaping shall occur as soon as possible to provide permanent stabilization of disturbed surfaces.
2. If the season or adverse weather conditions do not allow the establishment of vegetation, temporary mulching with straw, wood chips weighted with snow fence or branches, or other methods shall be provided.
3. A minimum of 4 inches of topsoil shall be placed and its surface smoothed to the specified grades.
4. The use of herbicides is strongly discouraged.
5. Hydro seeding is encouraged for steep slopes. Application rates on slopes greater than 3:1 shall have a minimum seeding rate of 5-lbs/1000 SF. A latex or fiber tackifier shall be used on these slopes at a minimum rate of 50 lbs. of tackifier per 500 gallons of water used.

STORMWATER OPERATION AND MAINTENANCE PLAN (POLLUTION PREVENTION)

Stormwater management system owner: Stonegate Construction Corp.

The party or parties responsible for operation and maintenance: Stonegate Construction Corp.

- **The town of Reading shall be allowed to enter the property at reasonable times and in a reasonable manner for the purpose of inspecting the stormwater system.**
- **The responsible parties shall maintain a log of all operation and maintenance activities, including without limitation, inspections, repairs, replacement and disposal.**
- **All drainage components shall be maintained to function as designed.**

Deep Sump Catch Basins / Trench Drains

Inspect or clean deep sump catch basins four times per year including at the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or when the depth of deposits is greater than or equal to one half the depth from the bottom of the lowest pipe in the basin. Vacuum trucks are to be used to remove trapped sediment and supernatant.

Although catch basin debris often contains concentrations of oil and hazardous materials such as petroleum hydrocarbons and metals, MassDEP classifies them as solid waste. Any contaminated materials must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.00, and handled as hazardous waste. MassDEP regulations prohibit landfills from accepting materials that contain free draining liquids.

Infiltration Structures

Inspect inlets at least twice a year. Remove any debris that might clog the system. Open inspection port and inspect for standing water.

Roof Drain Leaders

Routine roof inspections shall be performed two times per year. The roof shall be kept clean and free of debris, and the roof drainage systems shall be kept clear. Gutters and downspouts shall be cleaned at least twice per year, or more frequently as necessary.

Infiltration BMP

The infiltration BMP (subsurface chamber system) shall be inspected after every major storm for the first few months to ensure it is stabilized and functioning properly. If necessary, corrective action shall be taken until the system functions properly. Inspectors should note how long water remains standing in the inspection port after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for the clogging. Thereafter, inspect the infiltration BMP at least twice per year.

Extended Dry Detention Basin

The extended dry detention basin shall be inspected at least twice per year and during and after every major storm to ensure it is stabilized and functioning properly. If necessary, corrective action shall be taken until the system functions properly. Inspection of the outlet structure, mowing, and removal of trash and debris shall occur twice per year. Sediment shall be removed from the basin at least once every 5 years.

Isolator Row

*See next page for Isolator Row O&M Manual from Stormtech.

**STORMWATER BEST MANAGEMENT PRACTICES (BMP) YEARLY
MAINTENANCE LOG**

See Operation and Maintenance Plan for required frequency.

Site Owner: Stonegate Construction Corp.

Site Address: 259-267 Main Street

Stormwater BMP's On-site: See Below

Deep Sump Catch Basins

Maintenance Schedule: 4 times per year

Date	Inspector	Depth of Sediment	Sediment Disposal Site	Notes

Roof Drain leaders

Maintenance Schedule: 2 times per year

Date	Inspector	Problem Observed	Action taken	Notes

Stormtech Isolator Row / Infiltration Chambers

Maintenance Schedule: 2 times per year

Date	Inspector	Problem Observed	Action taken	Notes

Stormtech Isolator Row / Extended Dry Detention Basin

Maintenance Schedule: 2 times per year

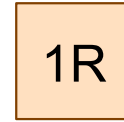
Date	Inspector	Problem Observed	Action taken	Notes

APPENDIX A
HYDROCAD STORMWATER MANAGEMENT CALCULATIONS

APPENDIX A
HYDROCAD STORMWATER MANAGEMENT CALCULATIONS



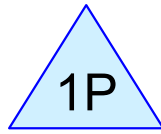
Overland Flow to Stream



Stream-Pre



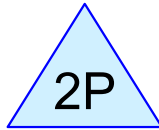
Flow to Extended Dry Detention Basin



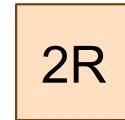
Extended Dry Detention Basin



Flow to Subsurface Infiltration



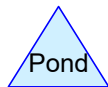
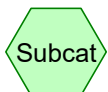
Subsurface Infiltration System



Stream-Post



Remaining Overland Flow to Stream



Routing Diagram for 21839 HydroCAD-20191022-TEST
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 Type III 24-hr 2-year Rainfall=3.31"

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Page 2

Summary for Subcatchment EX1: Overland Flow to Stream

Runoff = 0.06 cfs @ 13.90 hrs, Volume= 1,544 cf, Depth> 0.11"

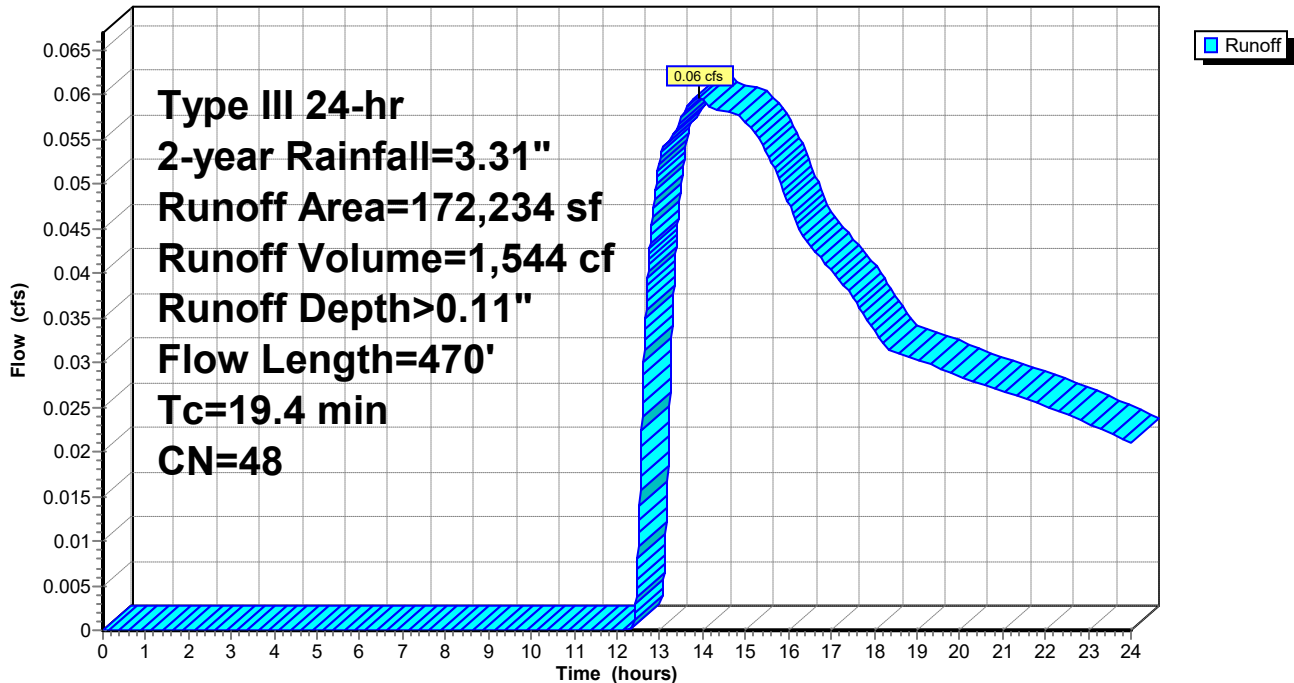
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Rainfall=3.31"

Area (sf)	CN	Description
154,934	43	Woods/grass comb., Fair, HSG A
10,790	96	Gravel surface, HSG A
* 4,423	98	Impervious
* 2,087	98	Roof
172,234	48	Weighted Average
165,724		96.22% Pervious Area
6,510		3.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.10"
0.9	150	0.0330	2.92		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
14.2	270	0.0040	0.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.4	470	Total			

Subcatchment EX1: Overland Flow to Stream

Hydrograph



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Summary for Subcatchment PR1: Flow to Extended Dry Detention Basin

Runoff = 0.19 cfs @ 12.11 hrs, Volume= 912 cf, Depth> 0.45"

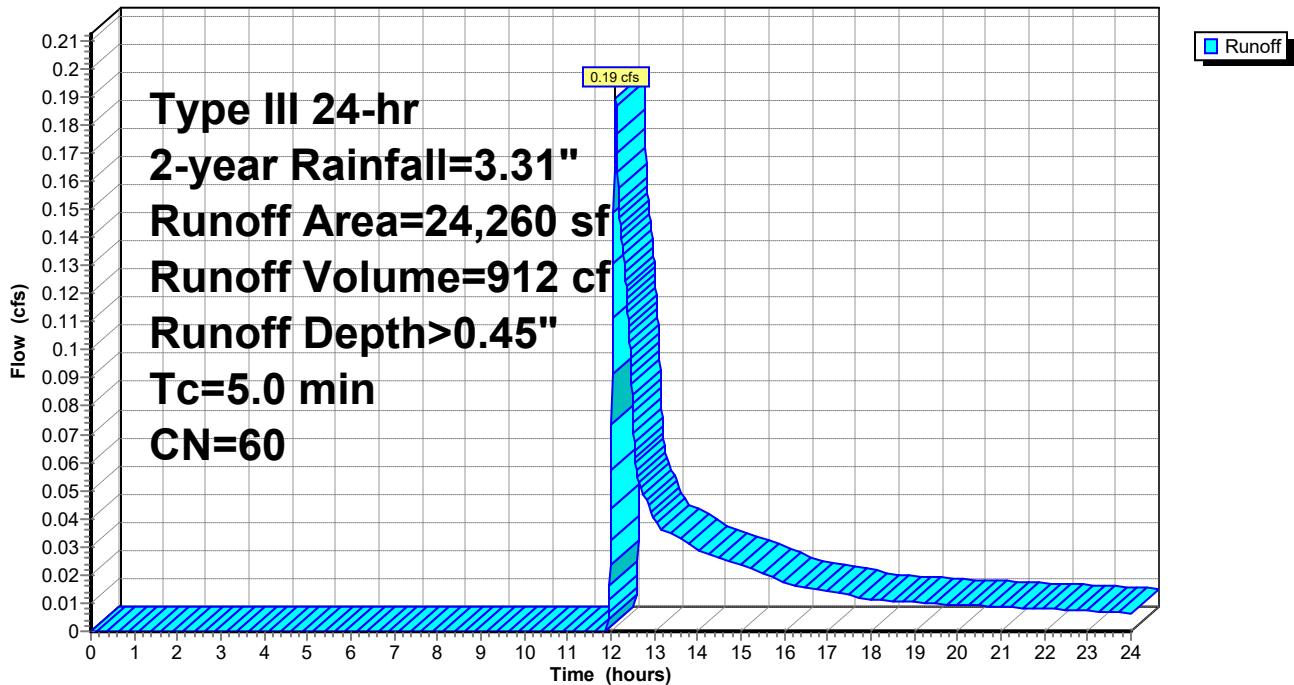
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Rainfall=3.31"

Area (sf)	CN	Description
15,500	39	>75% Grass cover, Good, HSG A
* 8,760	98	Impervious
24,260	60	Weighted Average
15,500		63.89% Pervious Area
8,760		36.11% Impervious Area

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

Subcatchment PR1: Flow to Extended Dry Detention Basin

Hydrograph



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Summary for Subcatchment PR2: Flow to Subsurface Infiltration

Runoff = 1.10 cfs @ 12.08 hrs, Volume= 3,332 cf, Depth> 1.35"

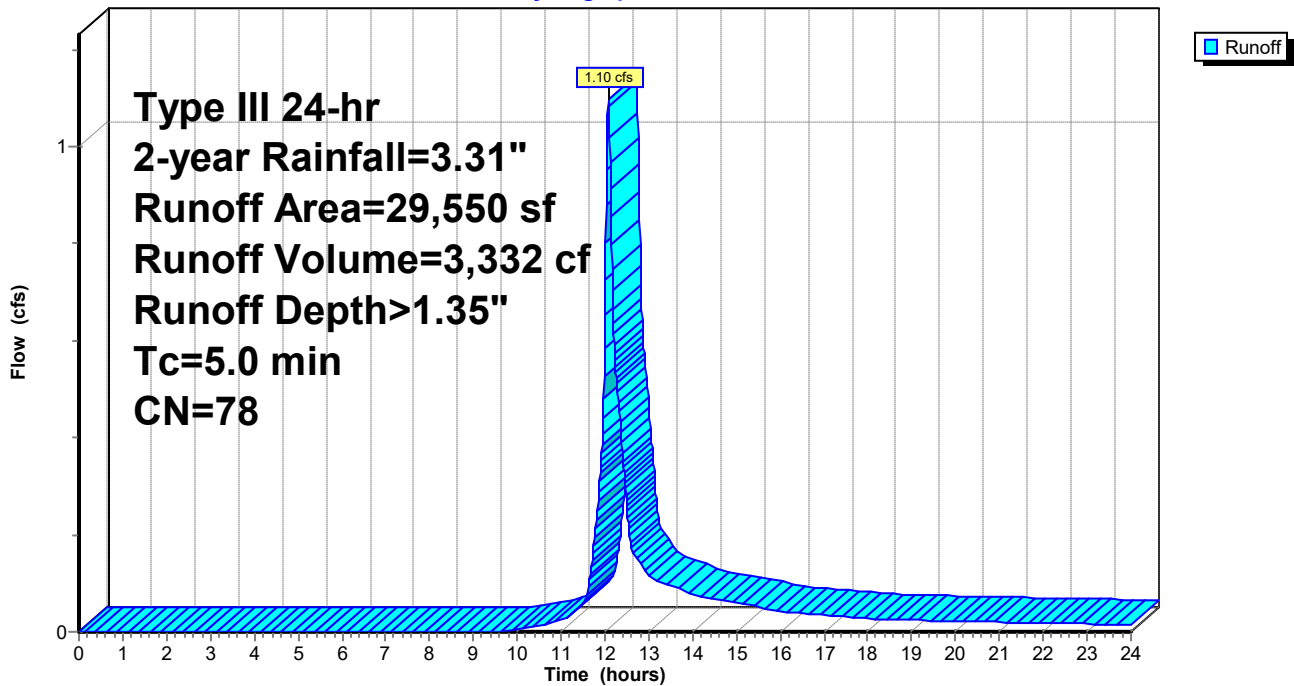
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Rainfall=3.31"

	Area (sf)	CN	Description
	10,000	39	>75% Grass cover, Good, HSG A
*	6,050	98	Impervious
*	13,500	98	Roof
	29,550	78	Weighted Average
	10,000		33.84% Pervious Area
	19,550		66.16% Impervious Area

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

Subcatchment PR2: Flow to Subsurface Infiltration

Hydrograph



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Summary for Subcatchment PR3: Remaining Overland Flow to Stream

Runoff = 0.01 cfs @ 16.85 hrs, Volume= 302 cf, Depth> 0.03"

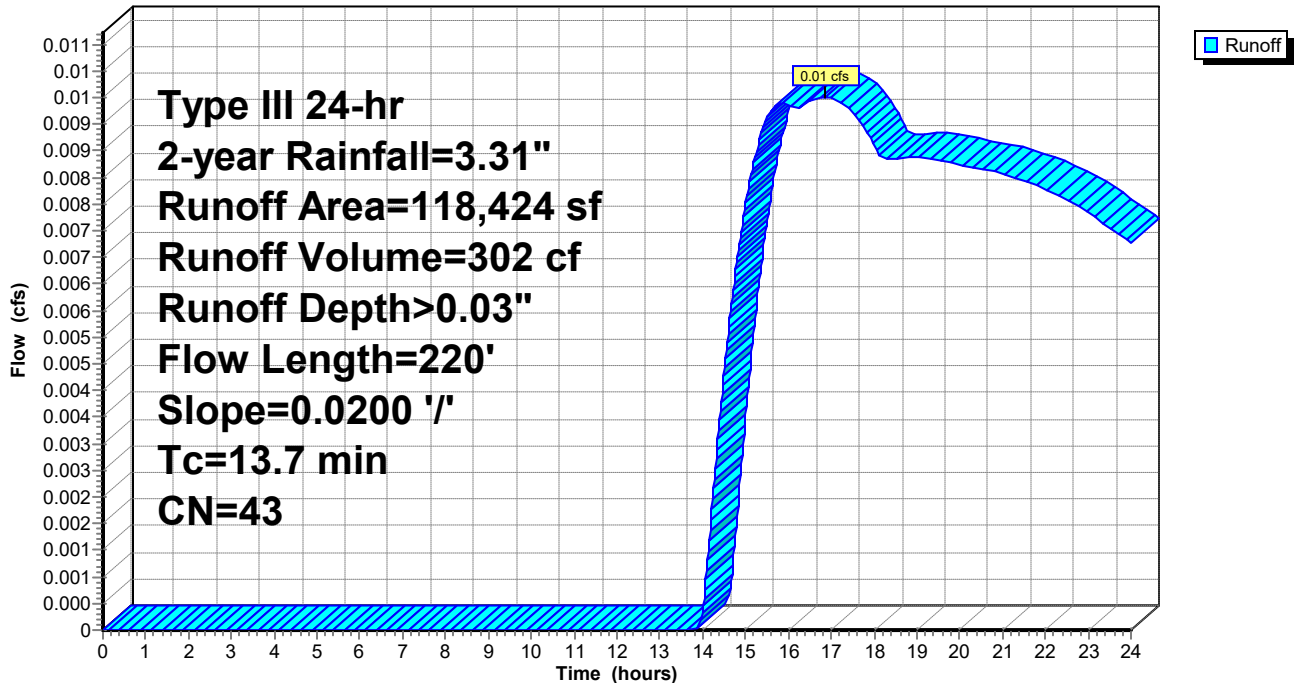
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-year Rainfall=3.31"

Area (sf)	CN	Description
118,424	43	Woods/grass comb., Fair, HSG A
118,424		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	170	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
13.7	220	Total			

Subcatchment PR3: Remaining Overland Flow to Stream

Hydrograph



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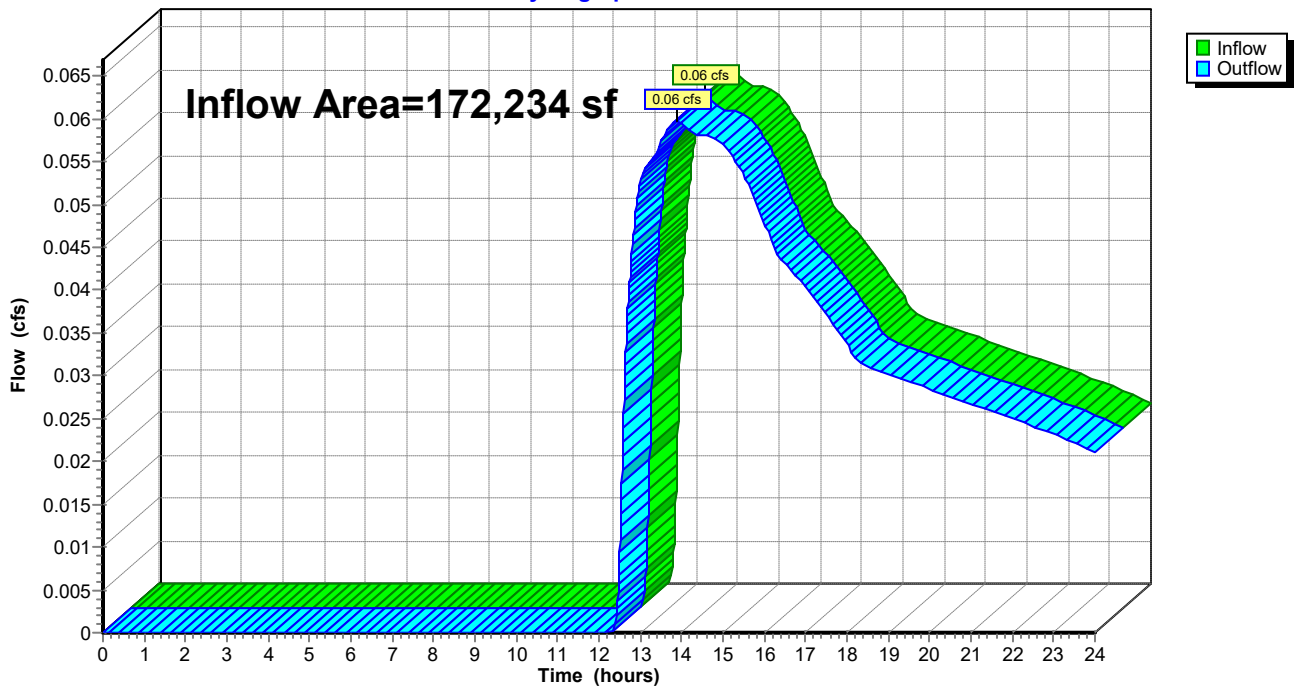
Summary for Reach 1R: Stream-Pre

Inflow Area = 172,234 sf, 3.78% Impervious, Inflow Depth > 0.11" for 2-year event
Inflow = 0.06 cfs @ 13.90 hrs, Volume= 1,544 cf
Outflow = 0.06 cfs @ 13.90 hrs, Volume= 1,544 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: Stream-Pre

Hydrograph



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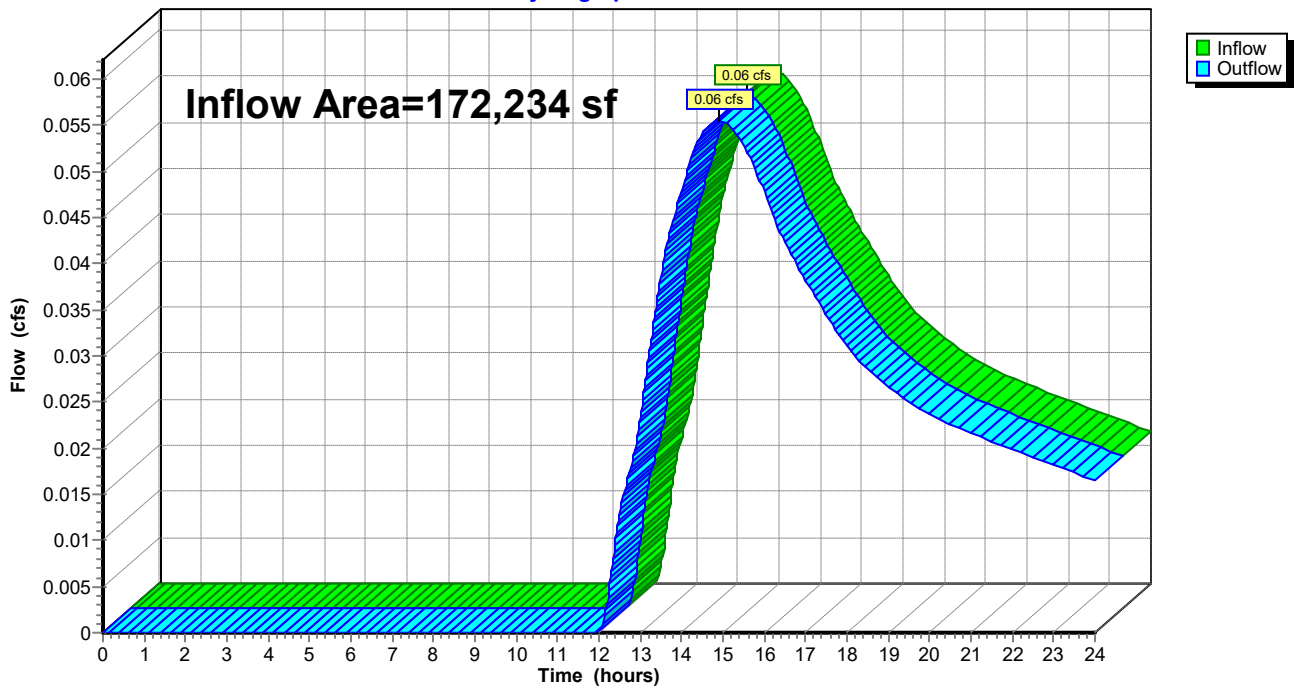
Summary for Reach 2R: Stream-Post

Inflow Area = 172,234 sf, 16.44% Impervious, Inflow Depth > 0.09" for 2-year event
Inflow = 0.06 cfs @ 14.90 hrs, Volume= 1,315 cf
Outflow = 0.06 cfs @ 14.90 hrs, Volume= 1,315 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 2R: Stream-Post

Hydrograph



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Summary for Pond 1P: Extended Dry Detention Basin

Inflow Area = 24,260 sf, 36.11% Impervious, Inflow Depth > 0.60" for 2-year event
Inflow = 0.19 cfs @ 12.11 hrs, Volume= 1,205 cf
Outflow = 0.05 cfs @ 14.43 hrs, Volume= 1,013 cf, Atten= 74%, Lag= 139.1 min
Primary = 0.05 cfs @ 14.43 hrs, Volume= 1,013 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 88.65' @ 14.43 hrs Surf.Area= 3,223 sf Storage= 470 cf

Plug-Flow detention time= 176.0 min calculated for 1,013 cf (84% of inflow)
Center-of-Mass det. time= 110.3 min (1,004.3 - 894.1)

Volume	Invert	Avail.Storage	Storage Description		
#1	88.50'	7,701 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
88.50	3,121	242.7	0	0	3,121
90.50	4,629	273.5	7,701	7,701	4,487

Device	Routing	Invert	Outlet Devices	
#1	Primary	88.50'	4.0" Vert. Orifice/Grate C= 0.600	
#2	Primary	89.50'	4.0' long x 1.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.0' Crest Height	

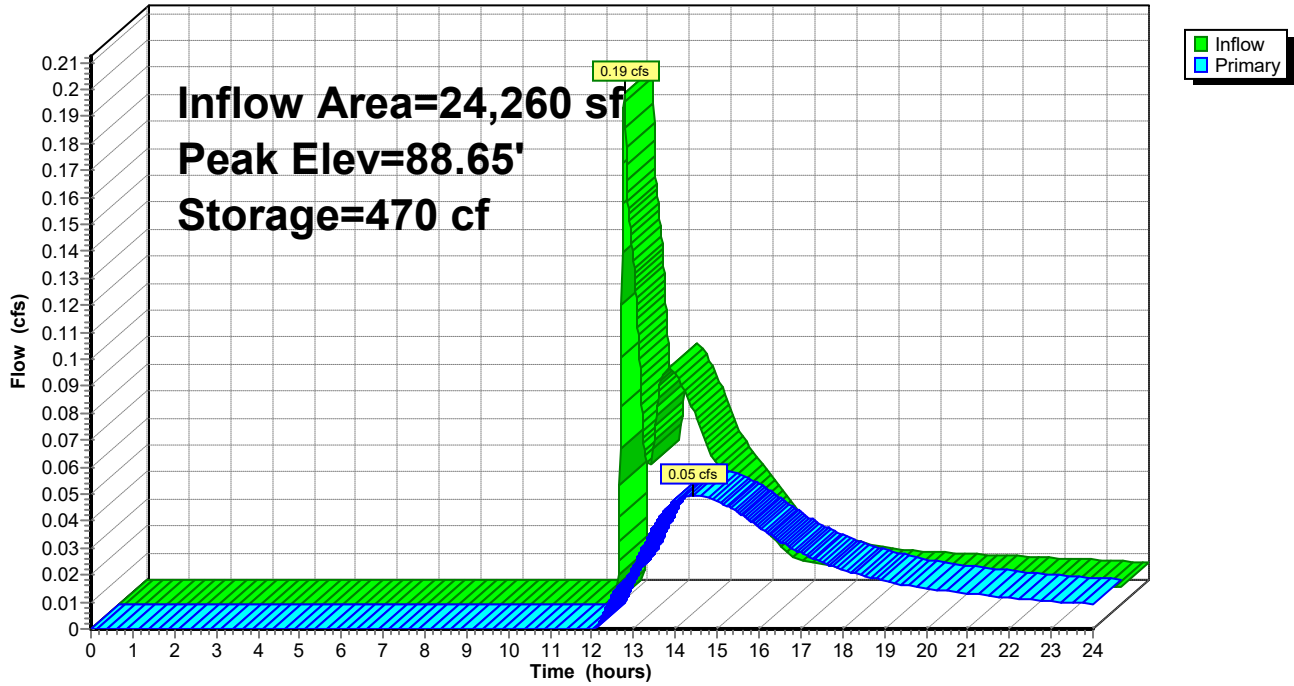
Primary OutFlow Max=0.05 cfs @ 14.43 hrs HW=88.65' (Free Discharge)

1=Orifice/Grate (Orifice Controls 0.05 cfs @ 1.31 fps)

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

Pond 1P: Extended Dry Detention Basin

Hydrograph



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Summary for Pond 2P: Subsurface Infiltration System

Inflow Area = 29,550 sf, 66.16% Impervious, Inflow Depth > 1.35" for 2-year event
 Inflow = 1.10 cfs @ 12.08 hrs, Volume= 3,332 cf
 Outflow = 0.10 cfs @ 13.20 hrs, Volume= 2,722 cf, Atten= 91%, Lag= 67.1 min
 Discarded = 0.05 cfs @ 11.50 hrs, Volume= 2,430 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Secondary = 0.05 cfs @ 13.20 hrs, Volume= 292 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 95.37' @ 13.20 hrs Surf.Area= 926 sf Storage= 1,480 cf

Plug-Flow detention time= 254.1 min calculated for 2,722 cf (82% of inflow)
 Center-of-Mass det. time= 178.9 min (1,024.6 - 845.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	851 cf	20.50'W x 45.16'L x 3.50'H Field A 3,240 cf Overall - 1,114 cf Embedded = 2,126 cf x 40.0% Voids
#2A	93.50'	1,114 cf	ADS_StormTech SC-740 x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 4 rows
		1,964 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	93.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	90.50'	12.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 90.50' / 89.50' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	95.75'	30.0" W x 12.0" H Vert. Orifice/Grate C= 0.600
#4	Secondary	95.25'	8.0" Round Culvert L= 175.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 95.25' / 89.50' S= 0.0329 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.05 cfs @ 11.50 hrs HW=93.04' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
 ↑2=Culvert (Passes 0.00 cfs of 5.35 cfs potential flow)
 ↑3=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.05 cfs @ 13.20 hrs HW=95.37' (Free Discharge)
 ↑4=Culvert (Inlet Controls 0.05 cfs @ 1.18 fps)

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Pond 2P: Subsurface Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 (ADS StormTech® SC-740)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Row Length Adjustment= +0.44' x 6.45 sf x 4 rows

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

6 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 43.16' Row Length +12.0" End Stone x 2 = 45.16' Base Length

4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width

6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

24 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 4 Rows = 1,113.9 cf Chamber Storage

3,240.2 cf Field - 1,113.9 cf Chambers = 2,126.3 cf Stone x 40.0% Voids = 850.5 cf Stone Storage

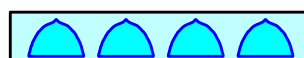
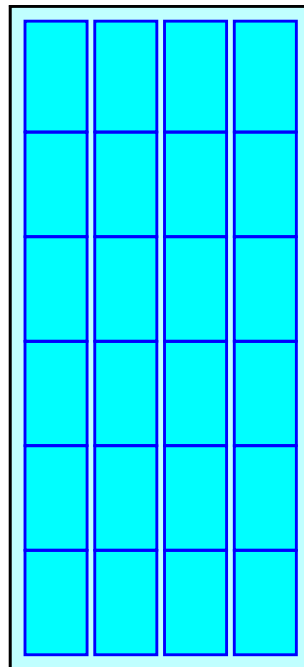
Chamber Storage + Stone Storage = 1,964.4 cf = 0.045 af

Overall Storage Efficiency = 60.6%

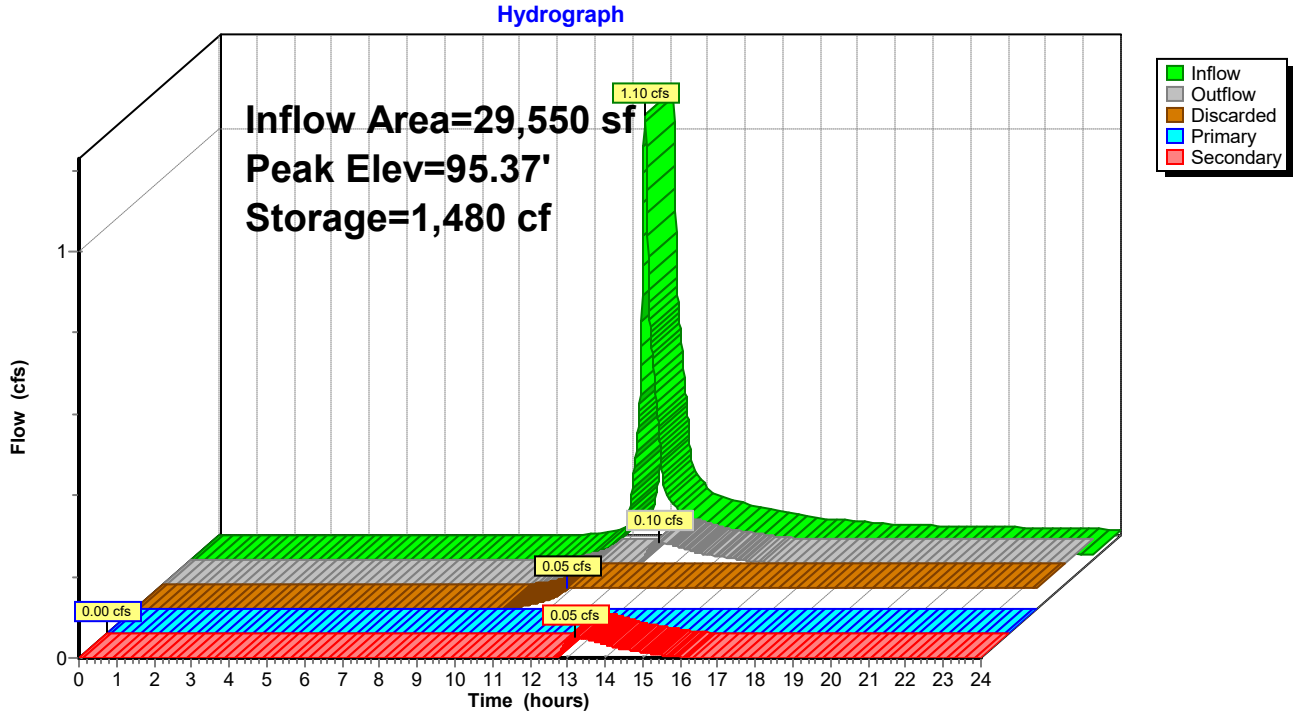
24 Chambers

120.0 cy Field

78.8 cy Stone



Pond 2P: Subsurface Infiltration System



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Summary for Subcatchment EX1: Overland Flow to Stream

Runoff = 1.31 cfs @ 12.40 hrs, Volume= 9,505 cf, Depth> 0.66"

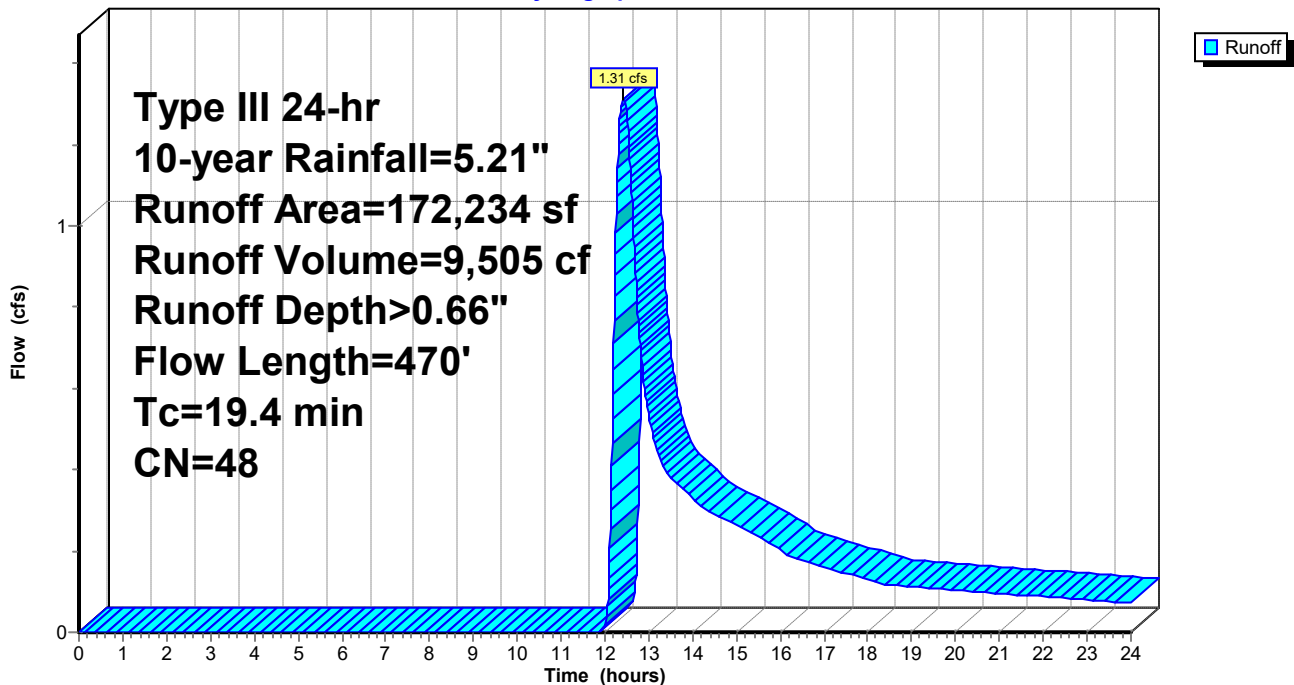
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Rainfall=5.21"

Area (sf)	CN	Description
154,934	43	Woods/grass comb., Fair, HSG A
10,790	96	Gravel surface, HSG A
* 4,423	98	Impervious
* 2,087	98	Roof
172,234	48	Weighted Average
165,724		96.22% Pervious Area
6,510		3.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.10"
0.9	150	0.0330	2.92		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
14.2	270	0.0040	0.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.4	470	Total			

Subcatchment EX1: Overland Flow to Stream

Hydrograph



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Summary for Subcatchment PR1: Flow to Extended Dry Detention Basin

Runoff = 0.88 cfs @ 12.08 hrs, Volume= 2,878 cf, Depth> 1.42"

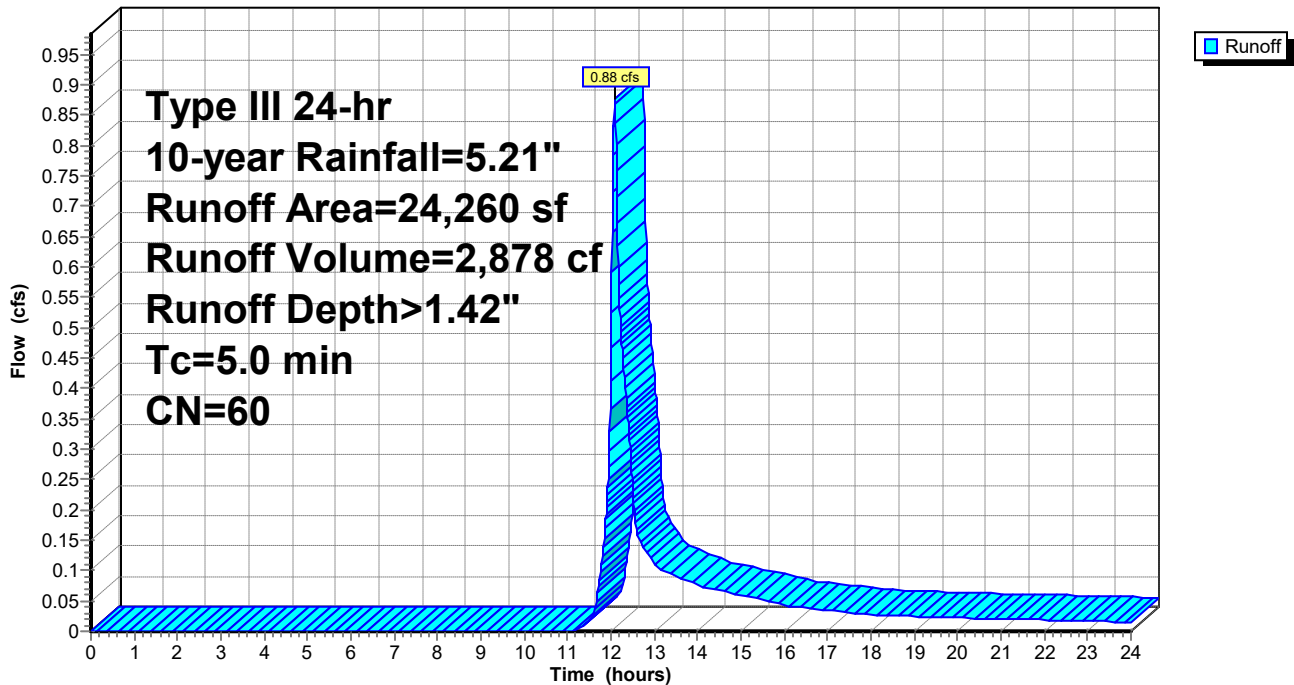
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Rainfall=5.21"

Area (sf)	CN	Description
15,500	39	>75% Grass cover, Good, HSG A
* 8,760	98	Impervious
24,260	60	Weighted Average
15,500		63.89% Pervious Area
8,760		36.11% Impervious Area

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

Subcatchment PR1: Flow to Extended Dry Detention Basin

Hydrograph



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 Type III 24-hr 10-year Rainfall=5.21"

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Summary for Subcatchment PR2: Flow to Subsurface Infiltration

Runoff = 2.38 cfs @ 12.07 hrs, Volume= 7,112 cf, Depth> 2.89"

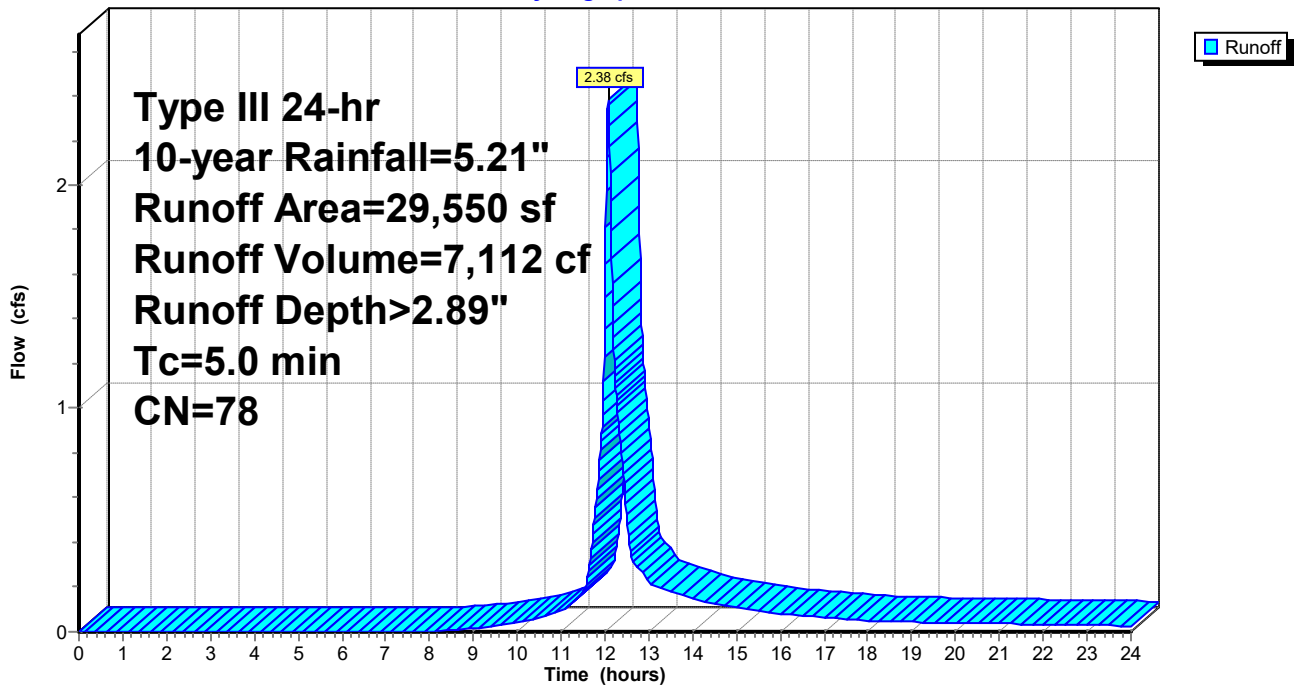
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Rainfall=5.21"

	Area (sf)	CN	Description
	10,000	39	>75% Grass cover, Good, HSG A
*	6,050	98	Impervious
*	13,500	98	Roof
	29,550	78	Weighted Average
	10,000		33.84% Pervious Area
	19,550		66.16% Impervious Area

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

Subcatchment PR2: Flow to Subsurface Infiltration

Hydrograph



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Summary for Subcatchment PR3: Remaining Overland Flow to Stream

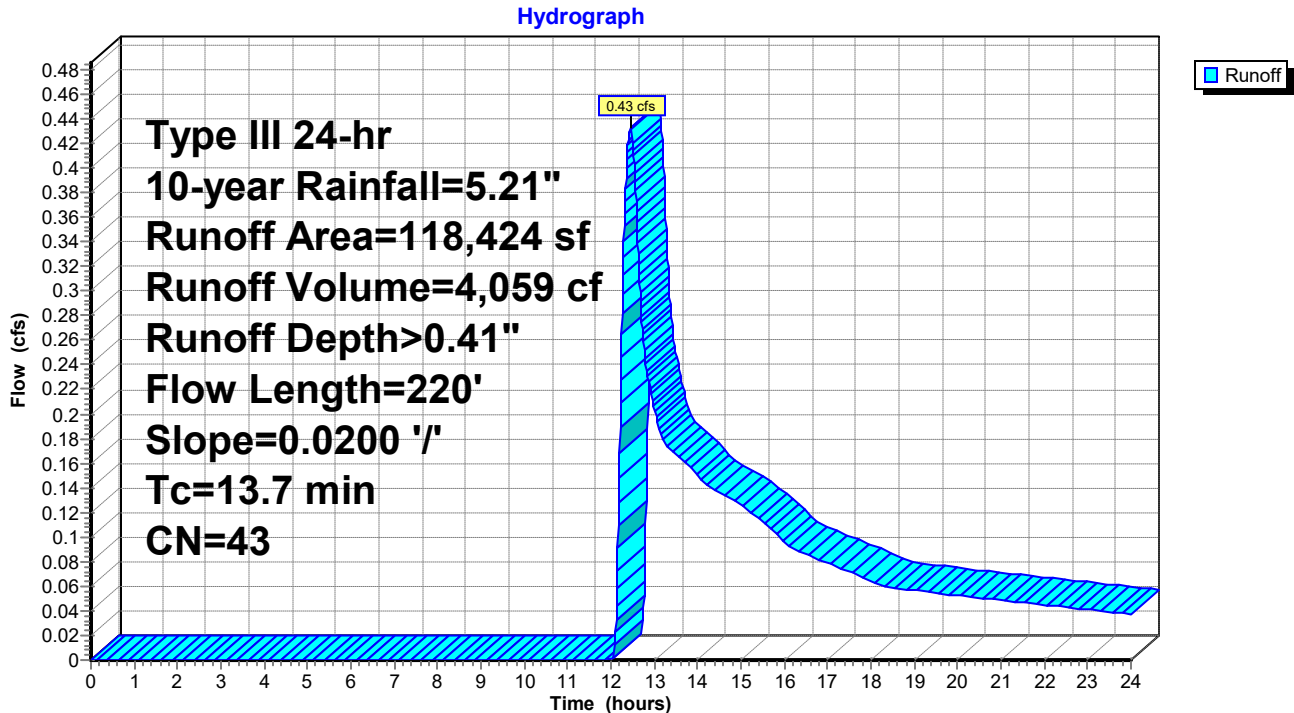
Runoff = 0.43 cfs @ 12.45 hrs, Volume= 4,059 cf, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-year Rainfall=5.21"

Area (sf)	CN	Description
118,424	43	Woods/grass comb., Fair, HSG A
118,424		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	170	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
13.7	220	Total			

Subcatchment PR3: Remaining Overland Flow to Stream



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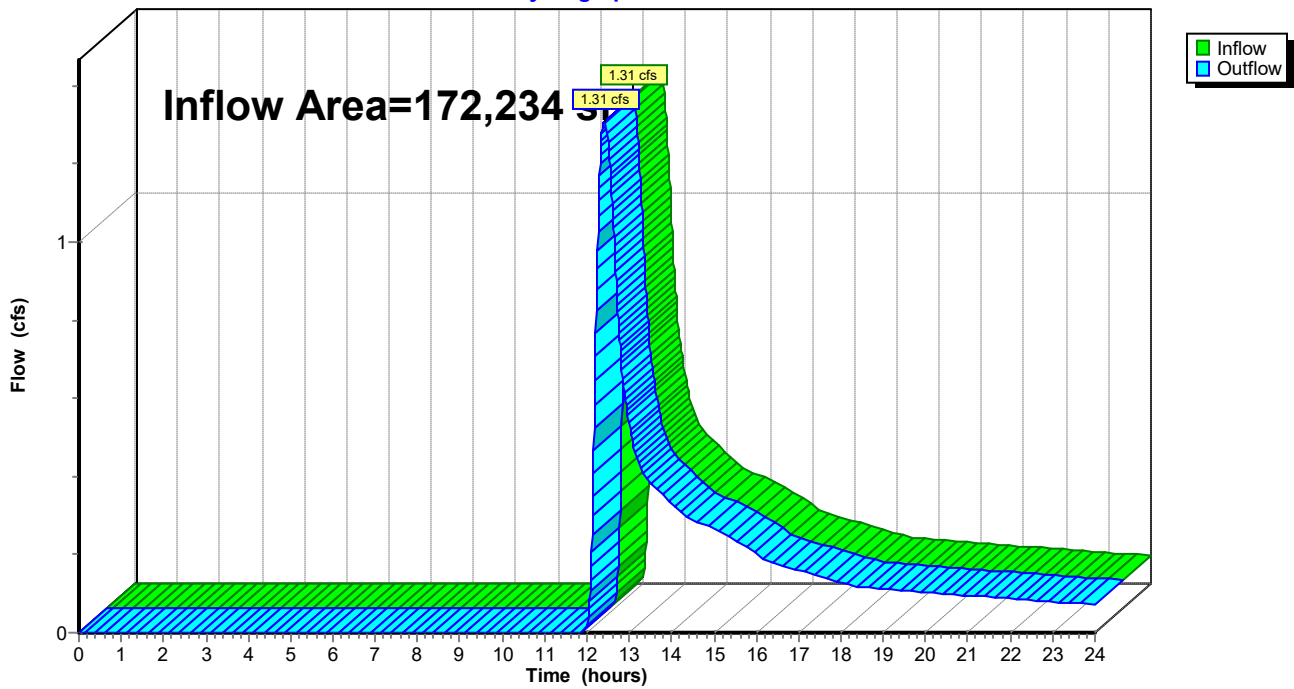
Summary for Reach 1R: Stream-Pre

Inflow Area = 172,234 sf, 3.78% Impervious, Inflow Depth > 0.66" for 10-year event
Inflow = 1.31 cfs @ 12.40 hrs, Volume= 9,505 cf
Outflow = 1.31 cfs @ 12.40 hrs, Volume= 9,505 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: Stream-Pre

Hydrograph



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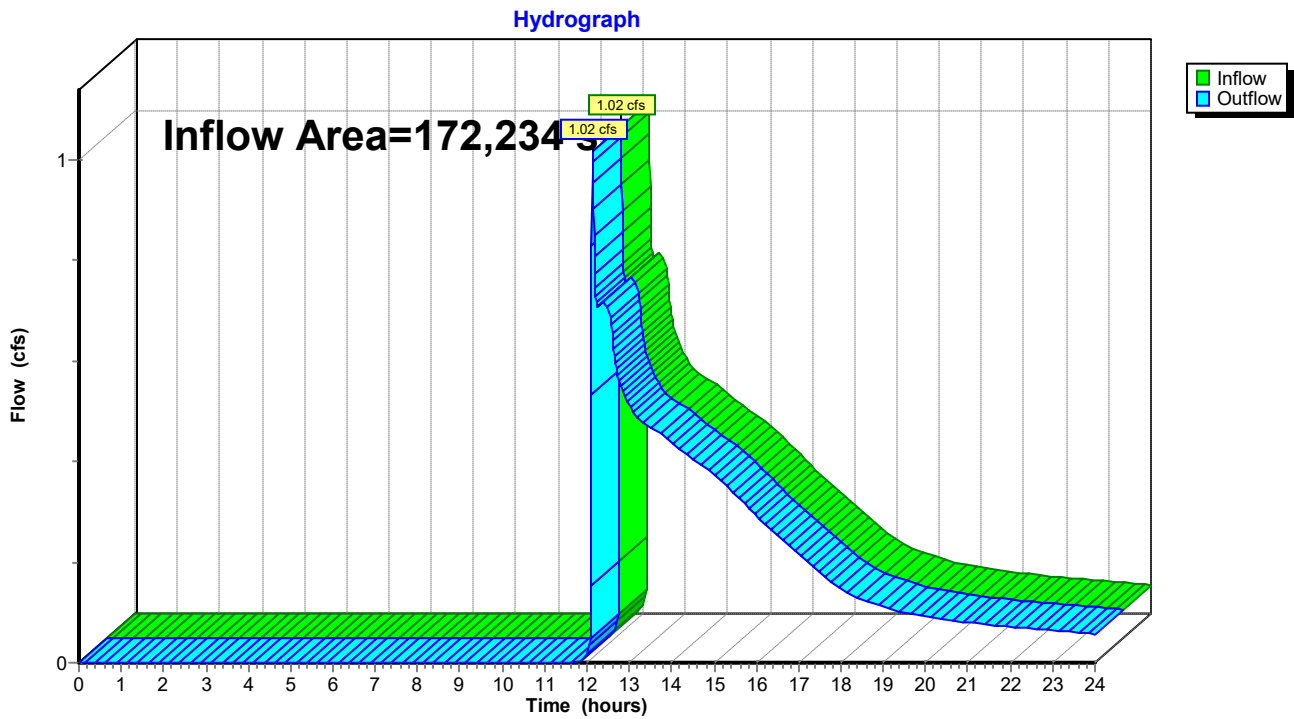
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Summary for Reach 2R: Stream-Post

Inflow Area = 172,234 sf, 16.44% Impervious, Inflow Depth > 0.69" for 10-year event
Inflow = 1.02 cfs @ 12.13 hrs, Volume= 9,955 cf
Outflow = 1.02 cfs @ 12.13 hrs, Volume= 9,955 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 2R: Stream-Post



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Summary for Pond 1P: Extended Dry Detention Basin

Inflow Area = 24,260 sf, 36.11% Impervious, Inflow Depth > 2.87" for 10-year event
 Inflow = 1.86 cfs @ 12.11 hrs, Volume= 5,811 cf
 Outflow = 0.31 cfs @ 13.01 hrs, Volume= 5,522 cf, Atten= 83%, Lag= 53.5 min
 Primary = 0.31 cfs @ 13.01 hrs, Volume= 5,522 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 89.20' @ 13.01 hrs Surf.Area= 3,618 sf Storage= 2,372 cf

Plug-Flow detention time= 119.5 min calculated for 5,519 cf (95% of inflow)
 Center-of-Mass det. time= 94.7 min (925.1 - 830.3)

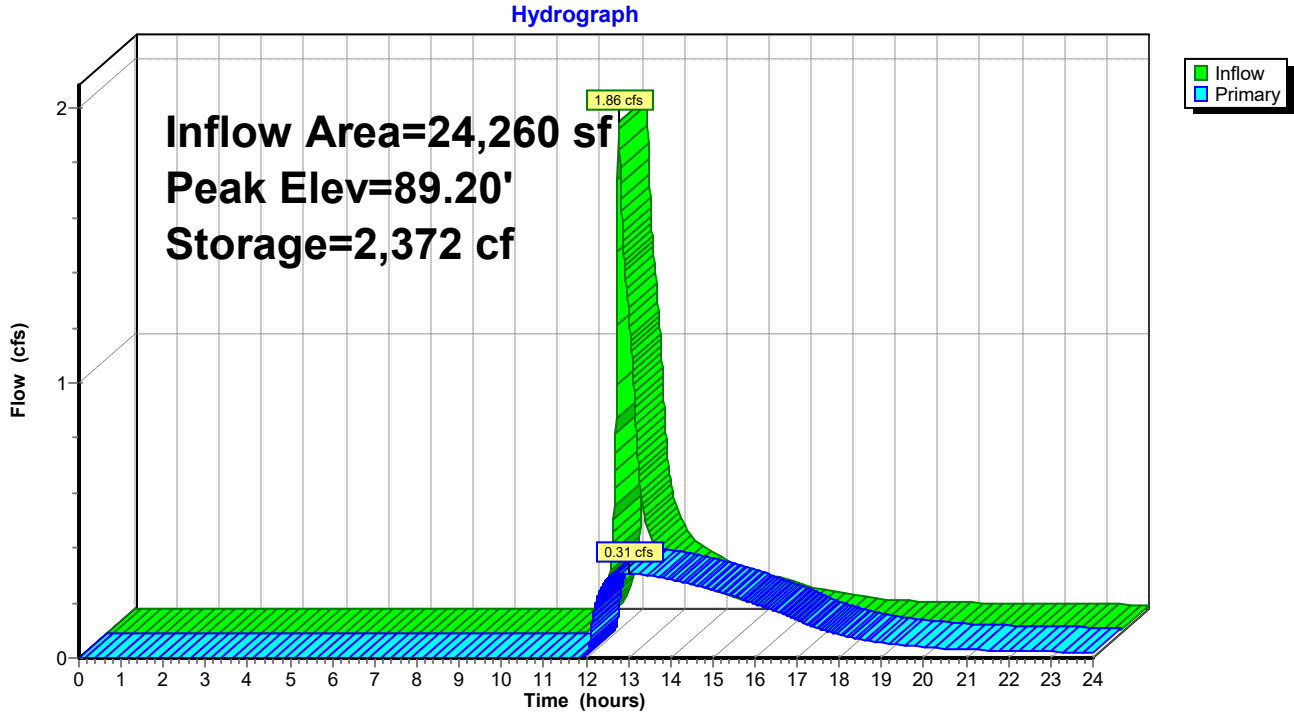
Volume	Invert	Avail.Storage	Storage Description		
#1	88.50'	7,701 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
88.50	3,121	242.7	0	0	3,121
90.50	4,629	273.5	7,701	7,701	4,487

Device	Routing	Invert	Outlet Devices
#1	Primary	88.50'	4.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.50'	4.0' long x 1.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.0' Crest Height

Primary OutFlow Max=0.31 cfs @ 13.01 hrs HW=89.20' (Free Discharge)

- 1=Orifice/Grate (Orifice Controls 0.31 cfs @ 3.53 fps)
- 2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Extended Dry Detention Basin



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Summary for Pond 2P: Subsurface Infiltration System

Inflow Area = 29,550 sf, 66.16% Impervious, Inflow Depth > 2.89" for 10-year event
 Inflow = 2.38 cfs @ 12.07 hrs, Volume= 7,112 cf
 Outflow = 1.97 cfs @ 12.13 hrs, Volume= 6,015 cf, Atten= 17%, Lag= 3.2 min
 Discarded = 0.05 cfs @ 10.36 hrs, Volume= 2,707 cf
 Primary = 0.87 cfs @ 12.13 hrs, Volume= 374 cf
 Secondary = 1.05 cfs @ 12.13 hrs, Volume= 2,933 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 95.98' @ 12.13 hrs Surf.Area= 926 sf Storage= 1,771 cf

Plug-Flow detention time= 124.3 min calculated for 6,012 cf (85% of inflow)
 Center-of-Mass det. time= 58.6 min (882.4 - 823.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	851 cf	20.50'W x 45.16'L x 3.50'H Field A 3,240 cf Overall - 1,114 cf Embedded = 2,126 cf x 40.0% Voids
#2A	93.50'	1,114 cf	ADS_StormTech SC-740 x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 4 rows
		1,964 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	93.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	90.50'	12.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 90.50' / 89.50' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	95.75'	30.0" W x 12.0" H Vert. Orifice/Grate C= 0.600
#4	Secondary	95.25'	8.0" Round Culvert L= 175.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 95.25' / 89.50' S= 0.0329 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.05 cfs @ 10.36 hrs HW=93.04' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.86 cfs @ 12.13 hrs HW=95.98' (Free Discharge)
 ↑**2=Culvert** (Passes 0.86 cfs of 8.44 cfs potential flow)
 ↑**3=Orifice/Grate** (Orifice Controls 0.86 cfs @ 1.53 fps)

Secondary OutFlow Max=1.05 cfs @ 12.13 hrs HW=95.98' (Free Discharge)
 ↑**4=Culvert** (Inlet Controls 1.05 cfs @ 3.02 fps)

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Pond 2P: Subsurface Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 (ADS StormTech® SC-740)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Row Length Adjustment= +0.44' x 6.45 sf x 4 rows

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

6 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 43.16' Row Length +12.0" End Stone x 2 = 45.16' Base Length

4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width

6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

24 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 4 Rows = 1,113.9 cf Chamber Storage

3,240.2 cf Field - 1,113.9 cf Chambers = 2,126.3 cf Stone x 40.0% Voids = 850.5 cf Stone Storage

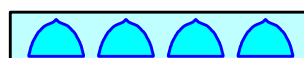
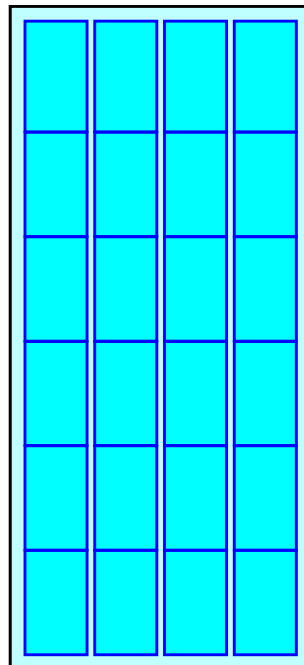
Chamber Storage + Stone Storage = 1,964.4 cf = 0.045 af

Overall Storage Efficiency = 60.6%

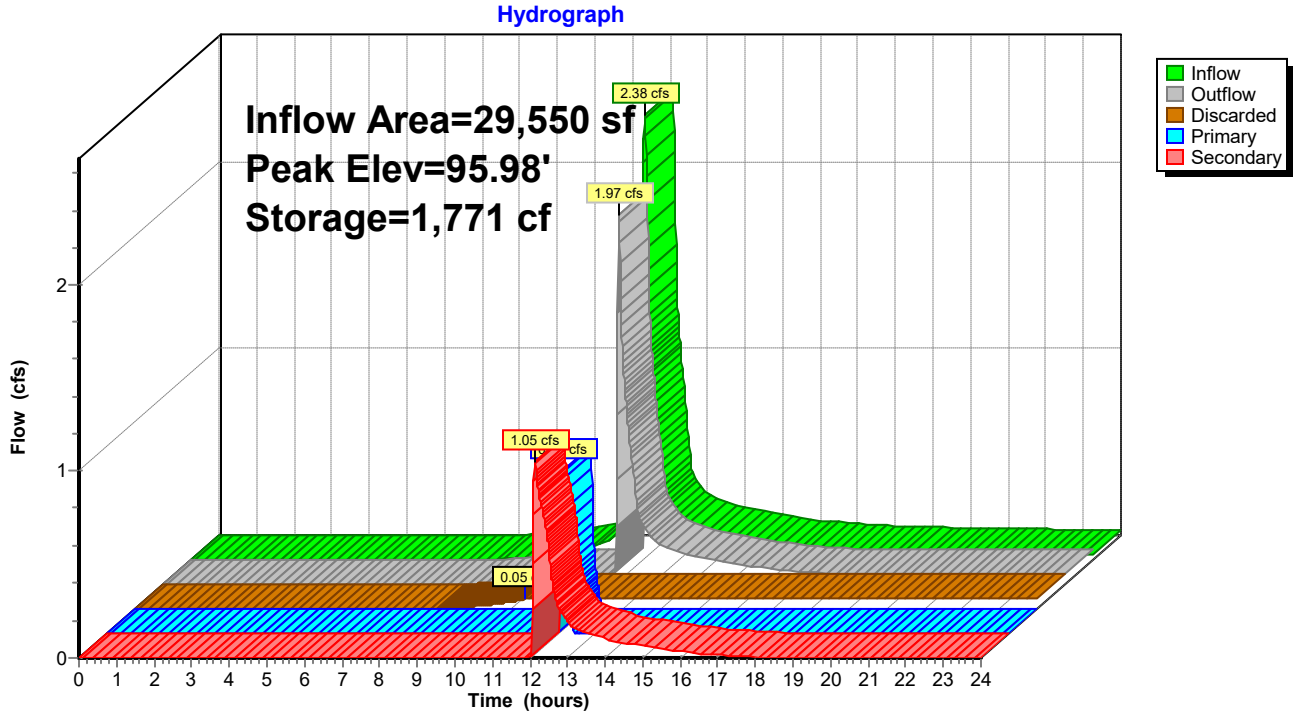
24 Chambers

120.0 cy Field

78.8 cy Stone



Pond 2P: Subsurface Infiltration System



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Summary for Subcatchment EX1: Overland Flow to Stream

Runoff = 2.92 cfs @ 12.33 hrs, Volume= 16,958 cf, Depth> 1.18"

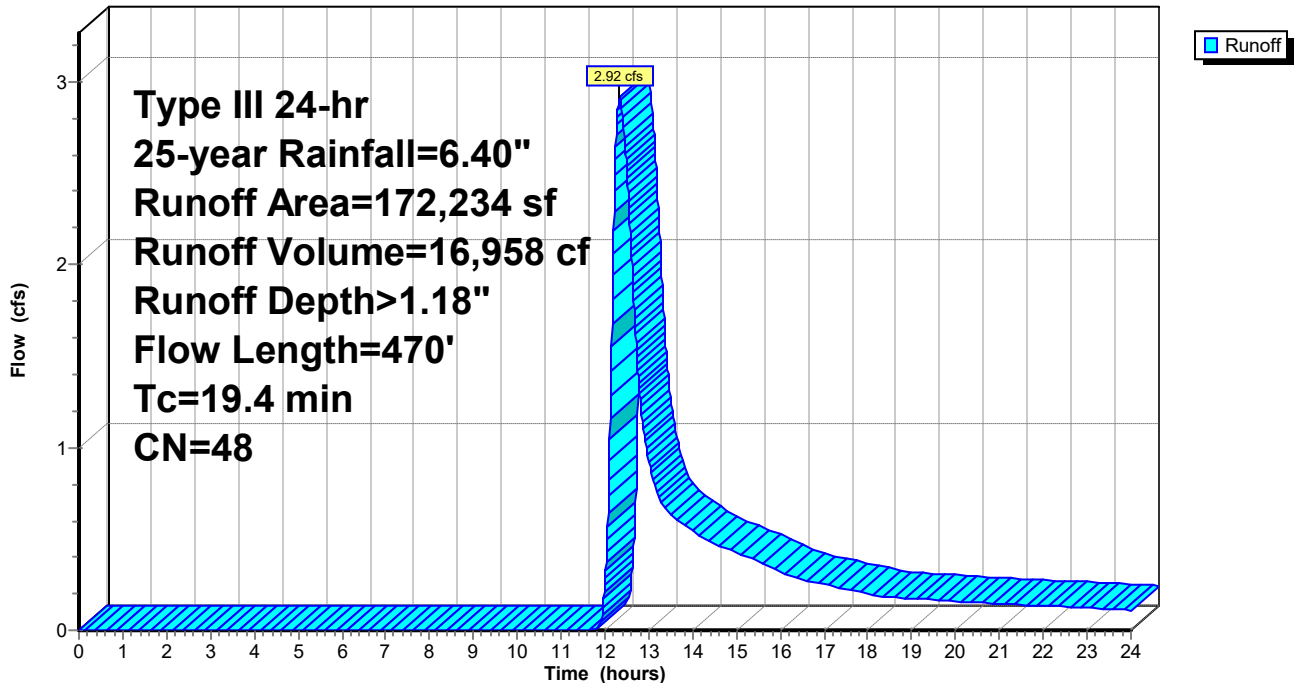
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
154,934	43	Woods/grass comb., Fair, HSG A
10,790	96	Gravel surface, HSG A
* 4,423	98	Impervious
* 2,087	98	Roof
172,234	48	Weighted Average
165,724		96.22% Pervious Area
6,510		3.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.10"
0.9	150	0.0330	2.92		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
14.2	270	0.0040	0.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.4	470	Total			

Subcatchment EX1: Overland Flow to Stream

Hydrograph



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Summary for Subcatchment PR1: Flow to Extended Dry Detention Basin

Runoff = 1.42 cfs @ 12.08 hrs, Volume= 4,418 cf, Depth> 2.19"

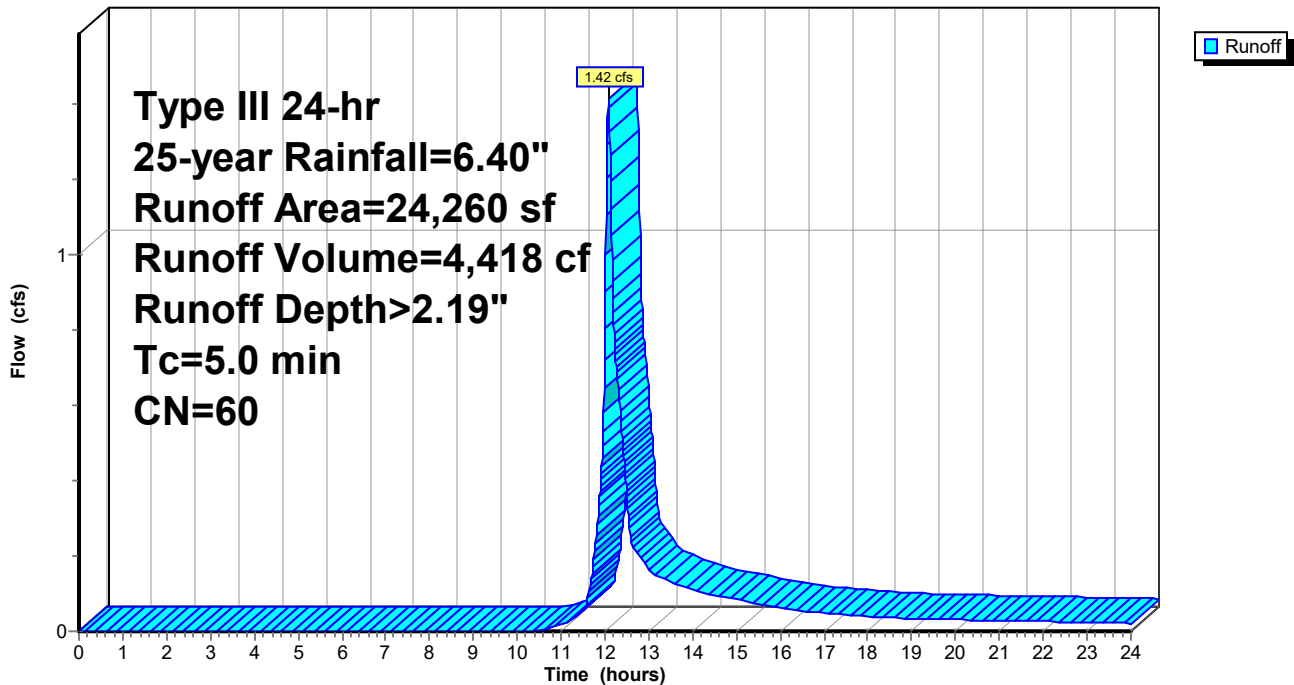
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
15,500	39	>75% Grass cover, Good, HSG A
* 8,760	98	Impervious
24,260	60	Weighted Average
15,500		63.89% Pervious Area
8,760		36.11% Impervious Area

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

Subcatchment PR1: Flow to Extended Dry Detention Basin

Hydrograph



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Summary for Subcatchment PR2: Flow to Subsurface Infiltration

Runoff = 3.24 cfs @ 12.07 hrs, Volume= 9,680 cf, Depth> 3.93"

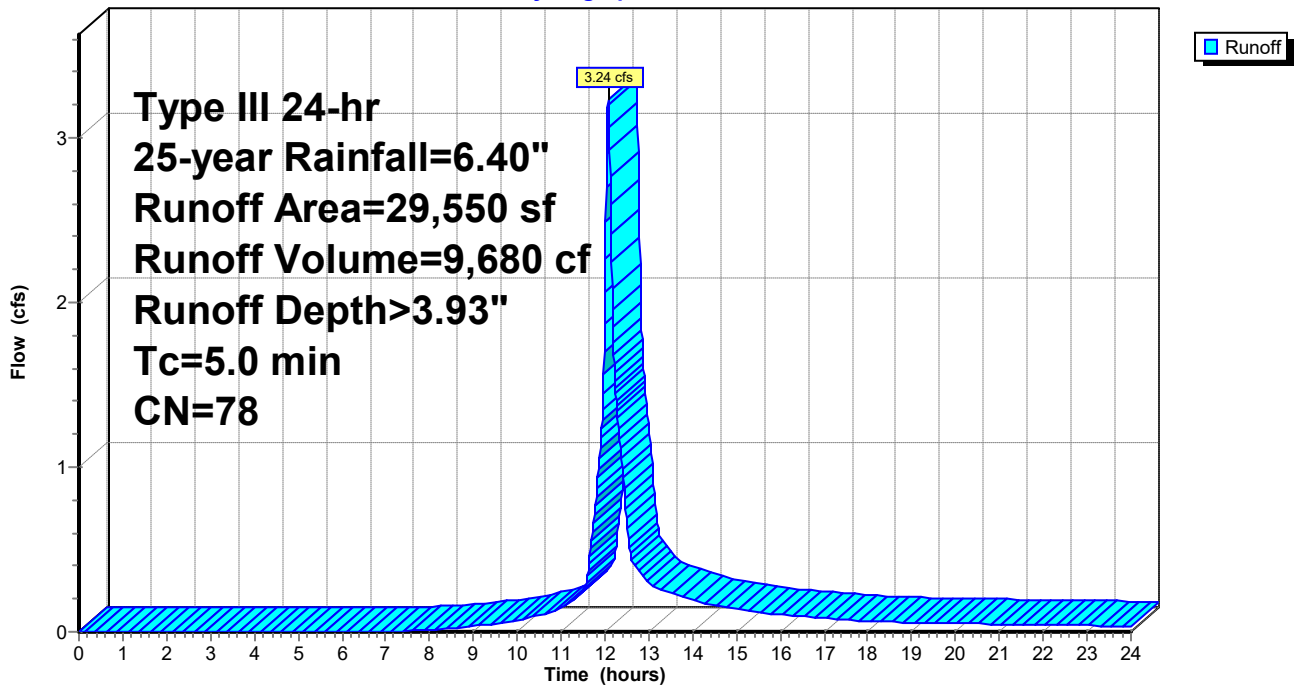
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Rainfall=6.40"

	Area (sf)	CN	Description
	10,000	39	>75% Grass cover, Good, HSG A
*	6,050	98	Impervious
*	13,500	98	Roof
<hr/>			
	29,550	78	Weighted Average
	10,000		33.84% Pervious Area
	19,550		66.16% Impervious Area

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

Subcatchment PR2: Flow to Subsurface Infiltration

Hydrograph



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Summary for Subcatchment PR3: Remaining Overland Flow to Stream

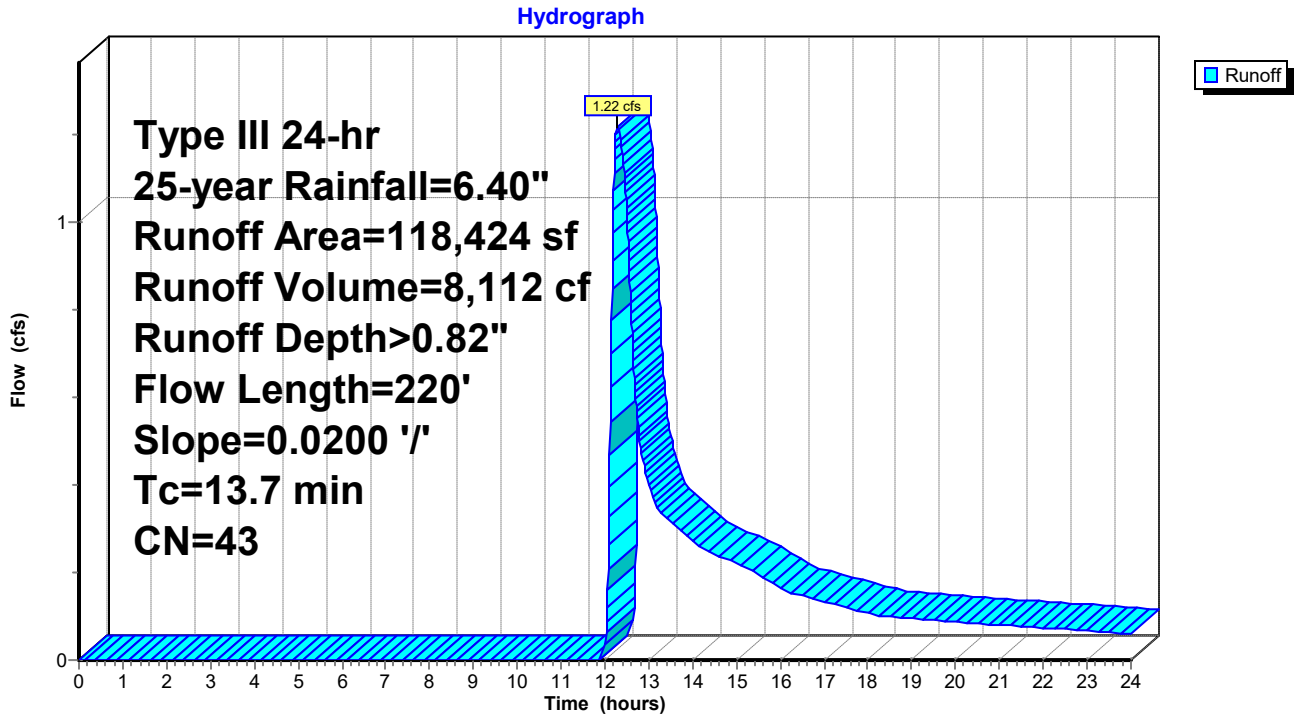
Runoff = 1.22 cfs @ 12.29 hrs, Volume= 8,112 cf, Depth> 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-year Rainfall=6.40"

Area (sf)	CN	Description
118,424	43	Woods/grass comb., Fair, HSG A
118,424		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	170	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
13.7	220	Total			

Subcatchment PR3: Remaining Overland Flow to Stream



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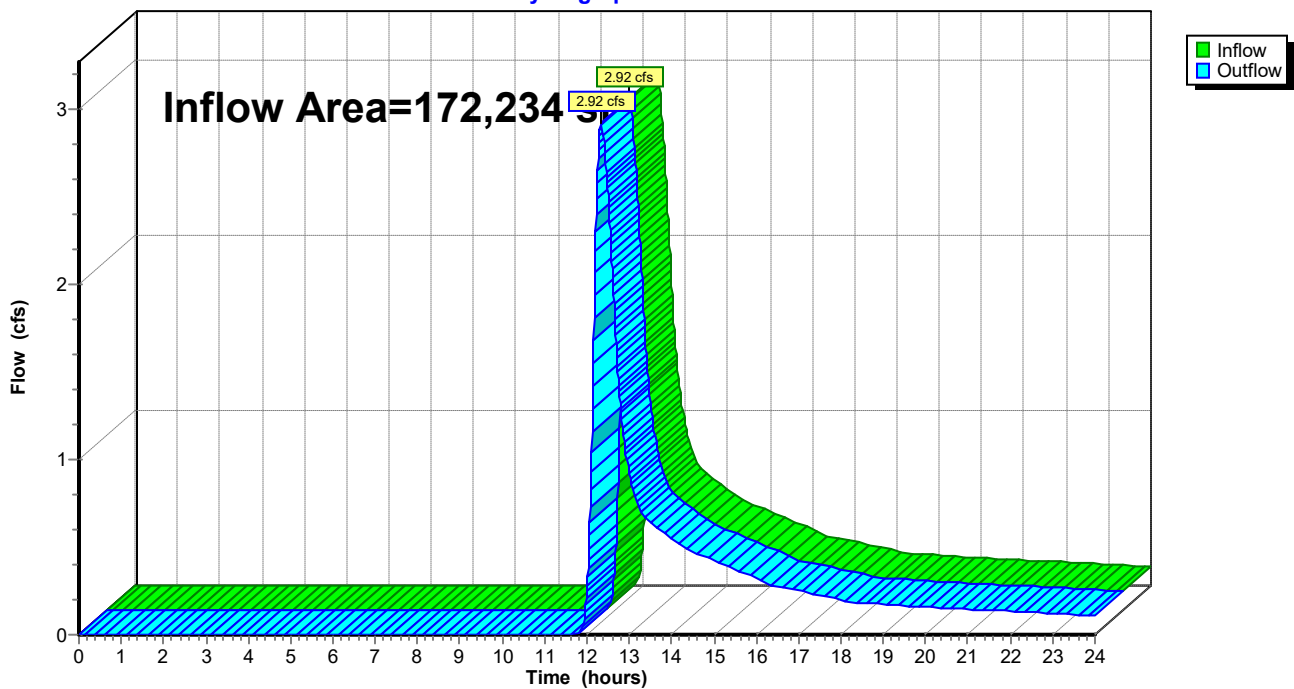
Summary for Reach 1R: Stream-Pre

Inflow Area = 172,234 sf, 3.78% Impervious, Inflow Depth > 1.18" for 25-year event
Inflow = 2.92 cfs @ 12.33 hrs, Volume= 16,958 cf
Outflow = 2.92 cfs @ 12.33 hrs, Volume= 16,958 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: Stream-Pre

Hydrograph



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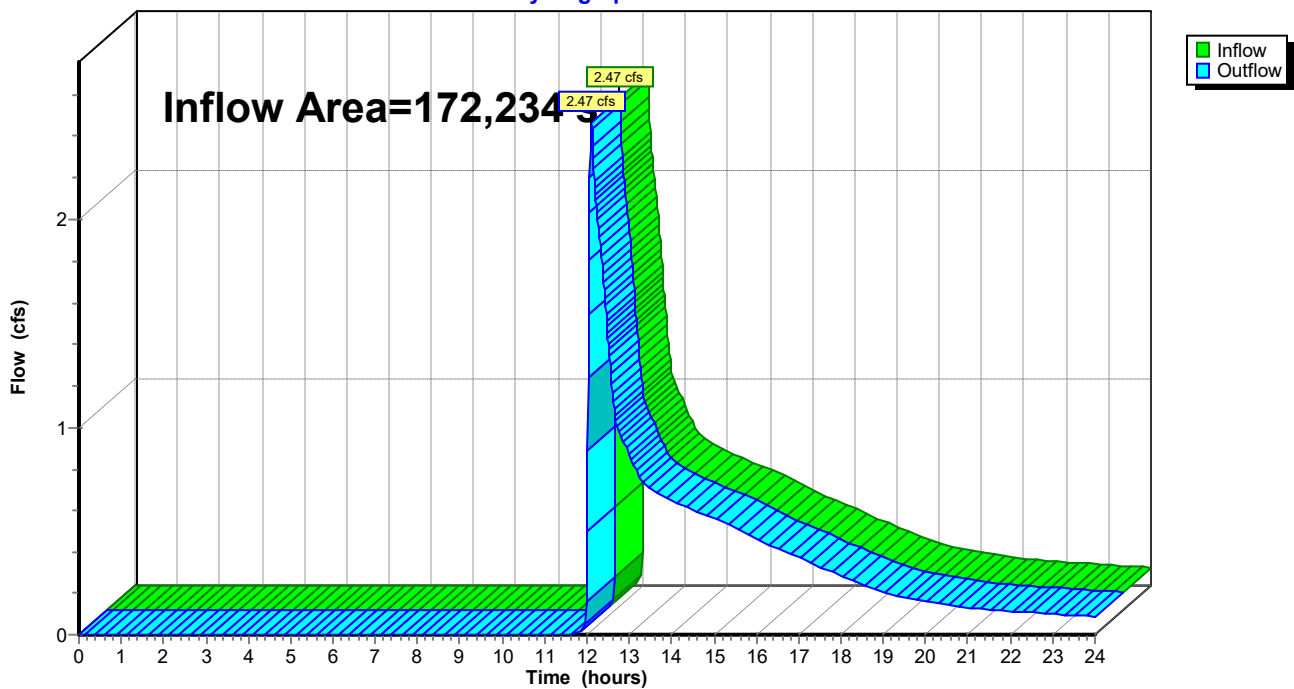
Summary for Reach 2R: Stream-Post

Inflow Area = 172,234 sf, 16.44% Impervious, Inflow Depth > 1.24" for 25-year event
Inflow = 2.47 cfs @ 12.11 hrs, Volume= 17,728 cf
Outflow = 2.47 cfs @ 12.11 hrs, Volume= 17,728 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 2R: Stream-Post

Hydrograph



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Summary for Pond 1P: Extended Dry Detention Basin

Inflow Area = 24,260 sf, 36.11% Impervious, Inflow Depth > 4.31" for 25-year event
 Inflow = 2.66 cfs @ 12.08 hrs, Volume= 8,705 cf
 Outflow = 0.47 cfs @ 12.92 hrs, Volume= 8,359 cf, Atten= 82%, Lag= 50.3 min
 Primary = 0.47 cfs @ 12.92 hrs, Volume= 8,359 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 89.53' @ 12.92 hrs Surf.Area= 3,863 sf Storage= 3,601 cf

Plug-Flow detention time= 128.6 min calculated for 8,356 cf (96% of inflow)
 Center-of-Mass det. time= 108.3 min (937.1 - 828.8)

Volume	Invert	Avail.Storage	Storage Description
#1	88.50'	7,701 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
88.50	3,121	242.7	0	0	3,121
90.50	4,629	273.5	7,701	7,701	4,487

Device	Routing	Invert	Outlet Devices
#1	Primary	88.50'	4.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.50'	4.0' long x 1.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.0' Crest Height

Primary OutFlow Max=0.47 cfs @ 12.92 hrs HW=89.53' (Free Discharge)

↑1=Orifice/Grate (Orifice Controls 0.39 cfs @ 4.48 fps)

└2=Sharp-Crested Rectangular Weir (Weir Controls 0.08 cfs @ 0.60 fps)

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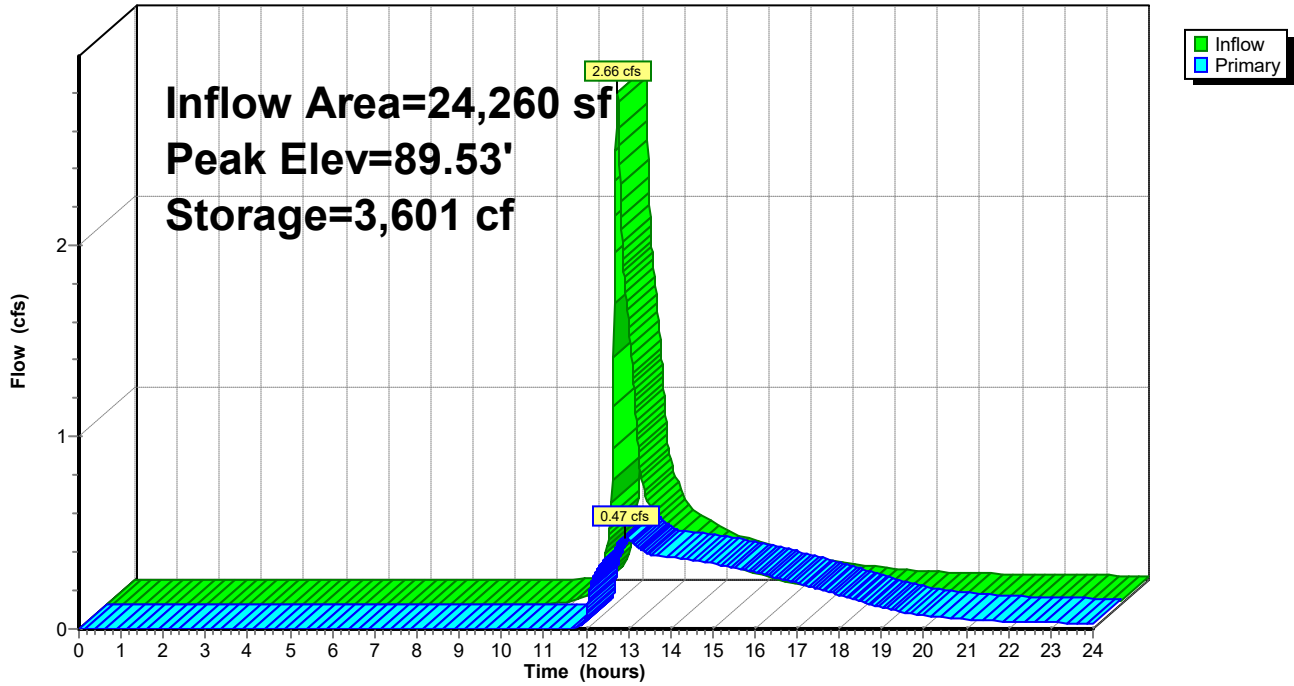
259-267 Main Street Reading, MA
Type III 24-hr 25-year Rainfall=6.40"

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Pond 1P: Extended Dry Detention Basin

Hydrograph



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Summary for Pond 2P: Subsurface Infiltration System

Inflow Area = 29,550 sf, 66.16% Impervious, Inflow Depth > 3.93" for 25-year event
 Inflow = 3.24 cfs @ 12.07 hrs, Volume= 9,680 cf
 Outflow = 3.19 cfs @ 12.09 hrs, Volume= 8,398 cf, Atten= 1%, Lag= 0.8 min
 Discarded = 0.05 cfs @ 9.63 hrs, Volume= 2,853 cf
 Primary = 1.90 cfs @ 12.09 hrs, Volume= 1,257 cf
 Secondary = 1.24 cfs @ 12.09 hrs, Volume= 4,288 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 96.13' @ 12.09 hrs Surf.Area= 926 sf Storage= 1,828 cf

Plug-Flow detention time= 94.0 min calculated for 8,394 cf (87% of inflow)
 Center-of-Mass det. time= 35.0 min (850.0 - 815.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	851 cf	20.50'W x 45.16'L x 3.50'H Field A 3,240 cf Overall - 1,114 cf Embedded = 2,126 cf x 40.0% Voids
#2A	93.50'	1,114 cf	ADS_StormTech SC-740 x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 4 rows
		1,964 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	93.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	90.50'	12.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 90.50' / 89.50' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	95.75'	30.0" W x 12.0" H Vert. Orifice/Grate C= 0.600
#4	Secondary	95.25'	8.0" Round Culvert L= 175.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 95.25' / 89.50' S= 0.0329 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.05 cfs @ 9.63 hrs HW=93.04' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.89 cfs @ 12.09 hrs HW=96.13' (Free Discharge)
 ↑2=Culvert (Passes 1.89 cfs of 8.57 cfs potential flow)
 ↑3=Orifice/Grate (Orifice Controls 1.89 cfs @ 1.98 fps)

Secondary OutFlow Max=1.24 cfs @ 12.09 hrs HW=96.13' (Free Discharge)
 ↑4=Culvert (Inlet Controls 1.24 cfs @ 3.56 fps)

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Type III 24-hr 25-year Rainfall=6.40"

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Pond 2P: Subsurface Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 (ADS StormTech® SC-740)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Row Length Adjustment= +0.44' x 6.45 sf x 4 rows

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

6 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 43.16' Row Length +12.0" End Stone x 2 = 45.16' Base Length

4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width

6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

24 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 4 Rows = 1,113.9 cf Chamber Storage

3,240.2 cf Field - 1,113.9 cf Chambers = 2,126.3 cf Stone x 40.0% Voids = 850.5 cf Stone Storage

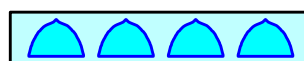
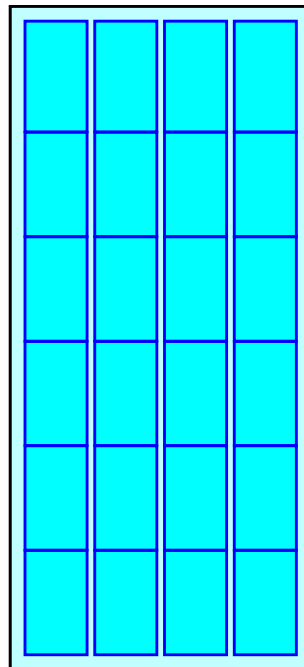
Chamber Storage + Stone Storage = 1,964.4 cf = 0.045 af

Overall Storage Efficiency = 60.6%

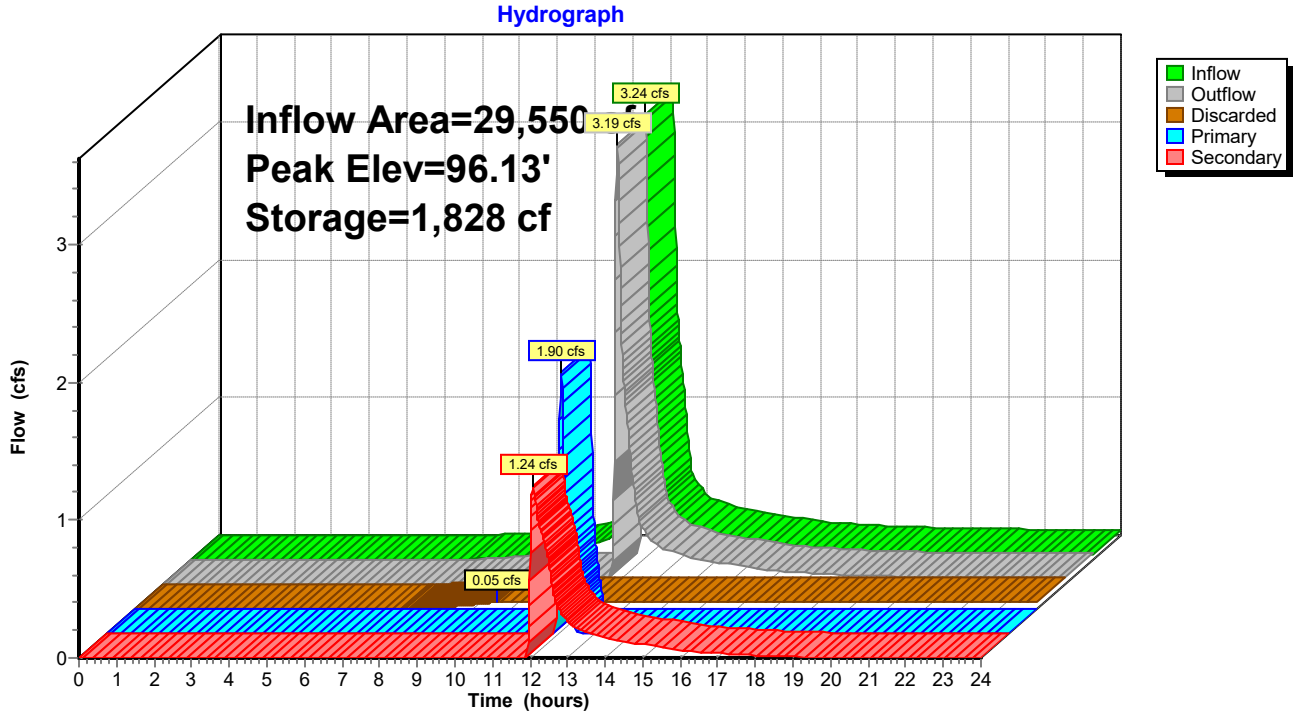
24 Chambers

120.0 cy Field

78.8 cy Stone



Pond 2P: Subsurface Infiltration System



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Summary for Subcatchment EX1: Overland Flow to Stream

Runoff = 6.15 cfs @ 12.31 hrs, Volume= 31,051 cf, Depth> 2.16"

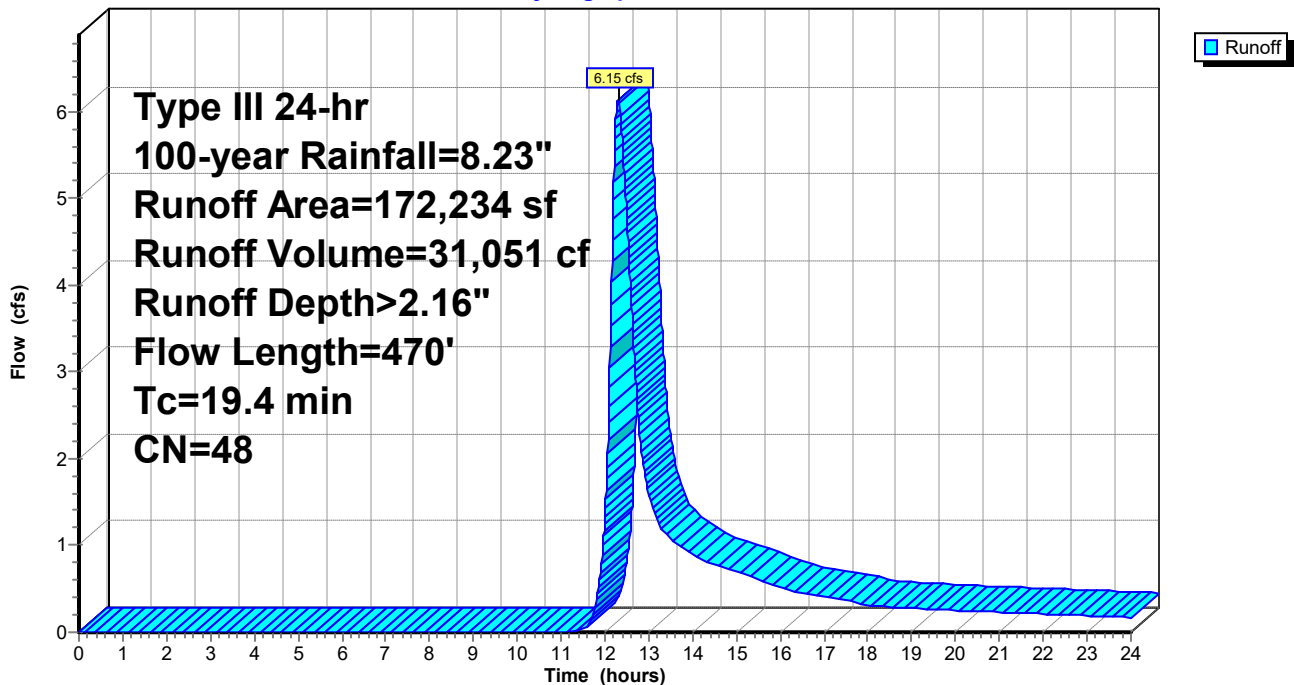
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-year Rainfall=8.23"

Area (sf)	CN	Description
154,934	43	Woods/grass comb., Fair, HSG A
10,790	96	Gravel surface, HSG A
* 4,423	98	Impervious
* 2,087	98	Roof
172,234	48	Weighted Average
165,724		96.22% Pervious Area
6,510		3.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.10"
0.9	150	0.0330	2.92		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
14.2	270	0.0040	0.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.4	470	Total			

Subcatchment EX1: Overland Flow to Stream

Hydrograph



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Summary for Subcatchment PR1: Flow to Extended Dry Detention Basin

Runoff = 2.34 cfs @ 12.08 hrs, Volume= 7,082 cf, Depth> 3.50"

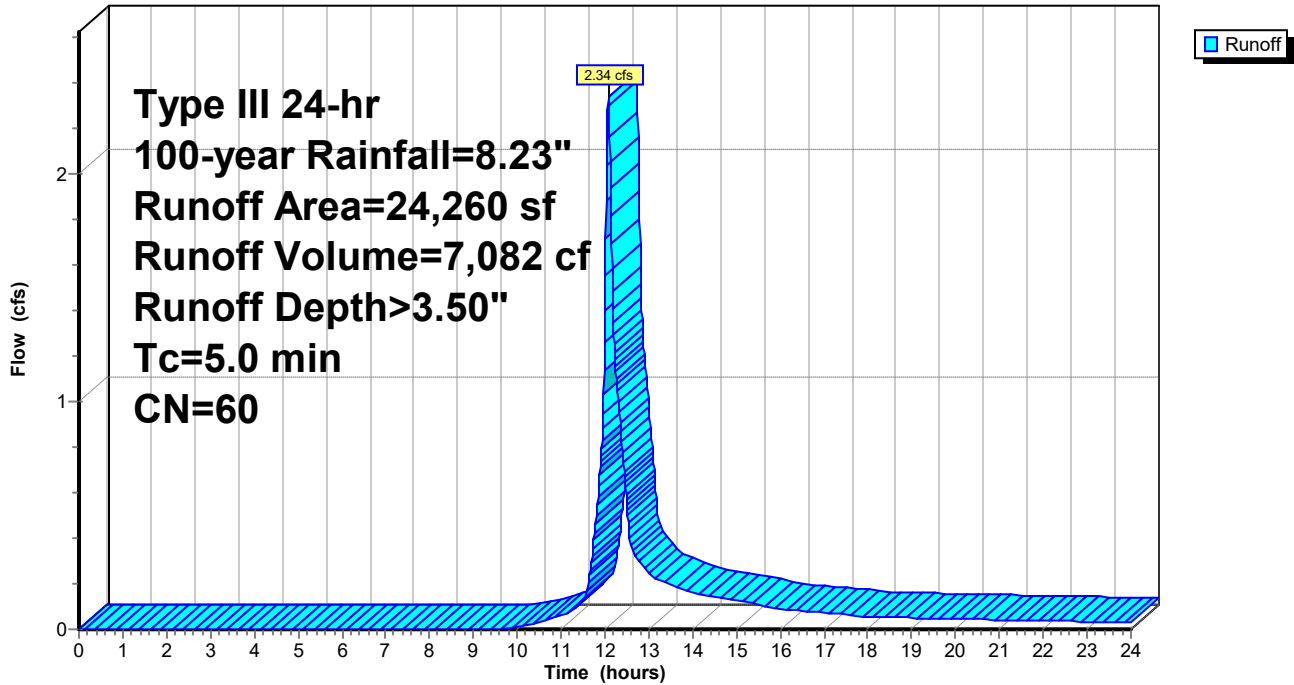
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-year Rainfall=8.23"

Area (sf)	CN	Description
15,500	39	>75% Grass cover, Good, HSG A
* 8,760	98	Impervious
24,260	60	Weighted Average
15,500		63.89% Pervious Area
8,760		36.11% Impervious Area

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

Subcatchment PR1: Flow to Extended Dry Detention Basin

Hydrograph



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Summary for Subcatchment PR2: Flow to Subsurface Infiltration

Runoff = 4.57 cfs @ 12.07 hrs, Volume= 13,788 cf, Depth> 5.60"

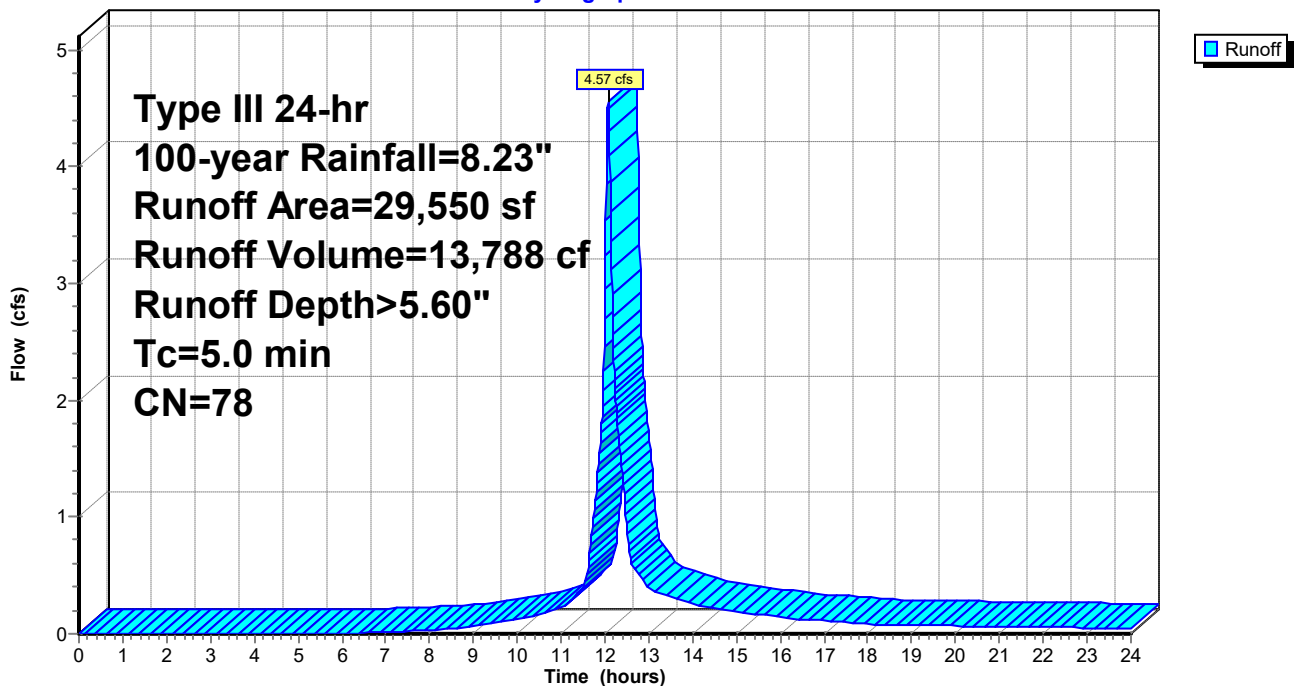
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.23"

	Area (sf)	CN	Description
	10,000	39	>75% Grass cover, Good, HSG A
*	6,050	98	Impervious
*	13,500	98	Roof
<hr/>			
	29,550	78	Weighted Average
	10,000		33.84% Pervious Area
	19,550		66.16% Impervious Area

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

Subcatchment PR2: Flow to Subsurface Infiltration

Hydrograph



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Summary for Subcatchment PR3: Remaining Overland Flow to Stream

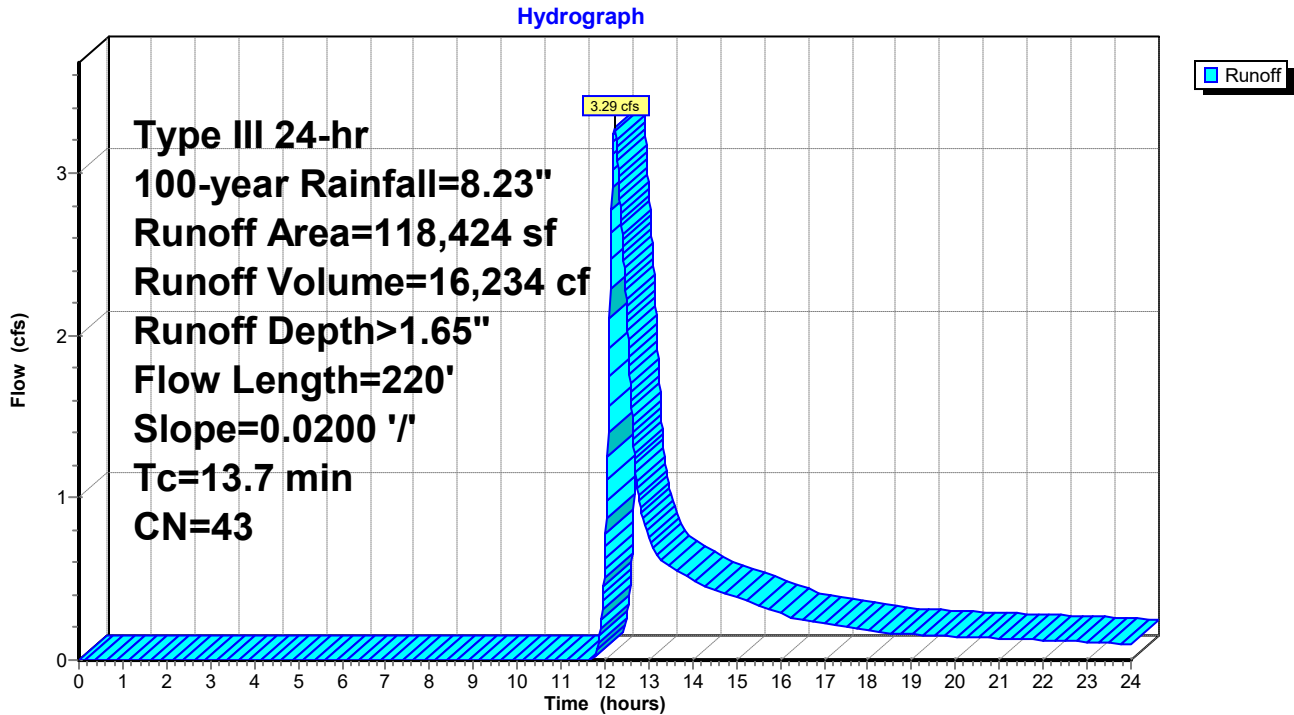
Runoff = 3.29 cfs @ 12.22 hrs, Volume= 16,234 cf, Depth> 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-year Rainfall=8.23"

Area (sf)	CN	Description
118,424	43	Woods/grass comb., Fair, HSG A
118,424		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.10"
1.2	170	0.0200	2.28		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
13.7	220	Total			

Subcatchment PR3: Remaining Overland Flow to Stream



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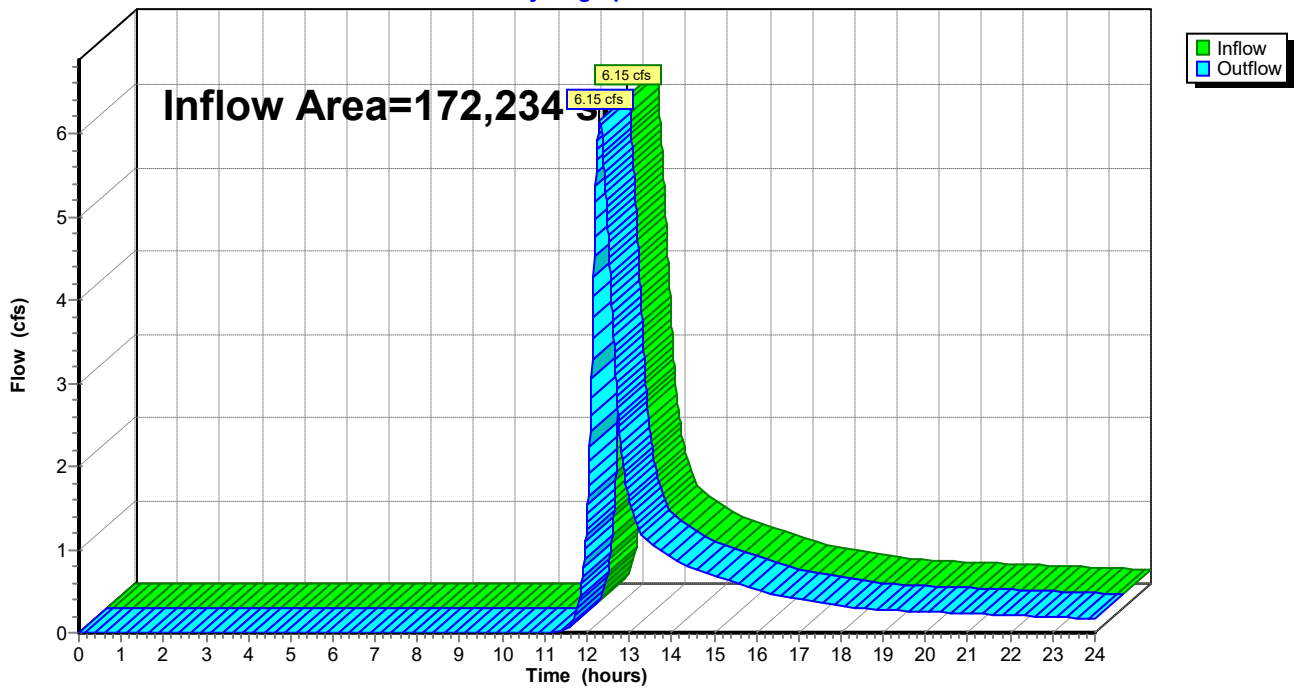
Summary for Reach 1R: Stream-Pre

Inflow Area = 172,234 sf, 3.78% Impervious, Inflow Depth > 2.16" for 100-year event
Inflow = 6.15 cfs @ 12.31 hrs, Volume= 31,051 cf
Outflow = 6.15 cfs @ 12.31 hrs, Volume= 31,051 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 1R: Stream-Pre

Hydrograph



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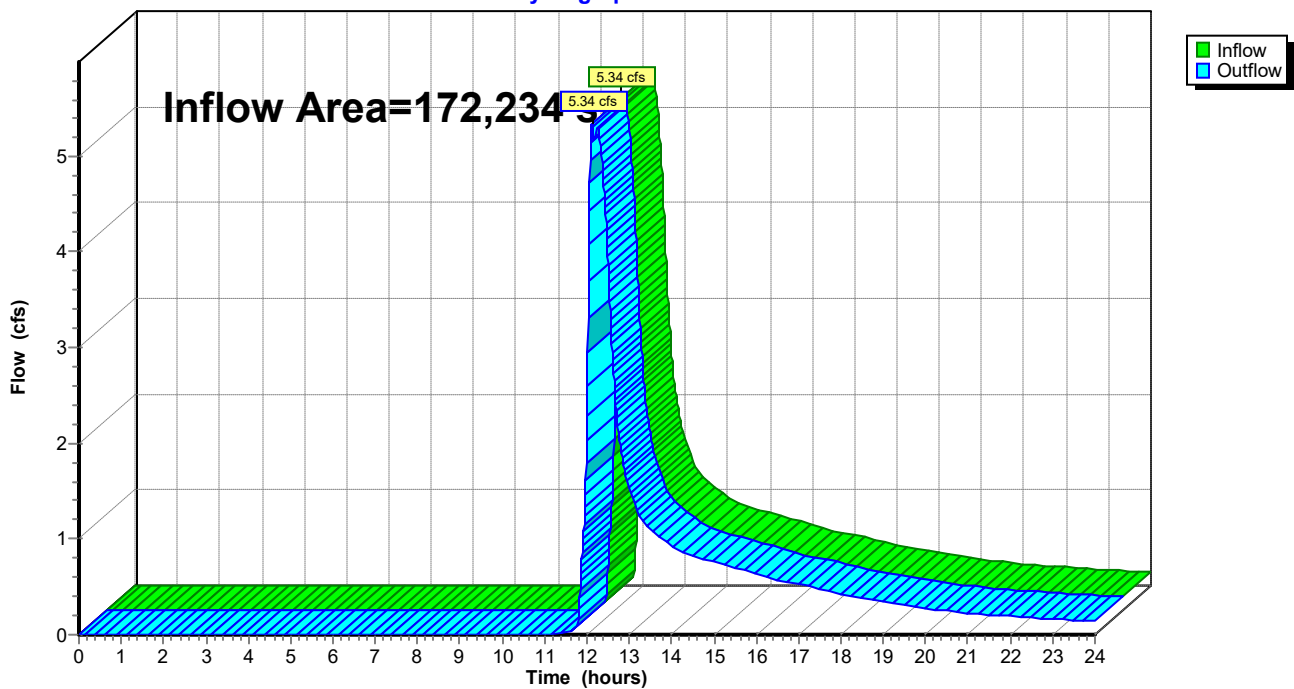
Summary for Reach 2R: Stream-Post

Inflow Area = 172,234 sf, 16.44% Impervious, Inflow Depth > 2.25" for 100-year event
Inflow = 5.34 cfs @ 12.12 hrs, Volume= 32,224 cf
Outflow = 5.34 cfs @ 12.12 hrs, Volume= 32,224 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach 2R: Stream-Post

Hydrograph



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Summary for Pond 1P: Extended Dry Detention Basin

Inflow Area = 24,260 sf, 36.11% Impervious, Inflow Depth > 6.77" for 100-year event
Inflow = 3.74 cfs @ 12.08 hrs, Volume= 13,681 cf
Outflow = 1.67 cfs @ 12.42 hrs, Volume= 13,239 cf, Atten= 55%, Lag= 20.2 min
Primary = 1.67 cfs @ 12.42 hrs, Volume= 13,239 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 89.71' @ 12.42 hrs Surf.Area= 3,995 sf Storage= 4,281 cf

Plug-Flow detention time= 104.9 min calculated for 13,239 cf (97% of inflow)
Center-of-Mass det. time= 87.8 min (916.6 - 828.8)

Volume	Invert	Avail.Storage	Storage Description
#1	88.50'	7,701 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
88.50	3,121	242.7	0	0	3,121
90.50	4,629	273.5	7,701	7,701	4,487

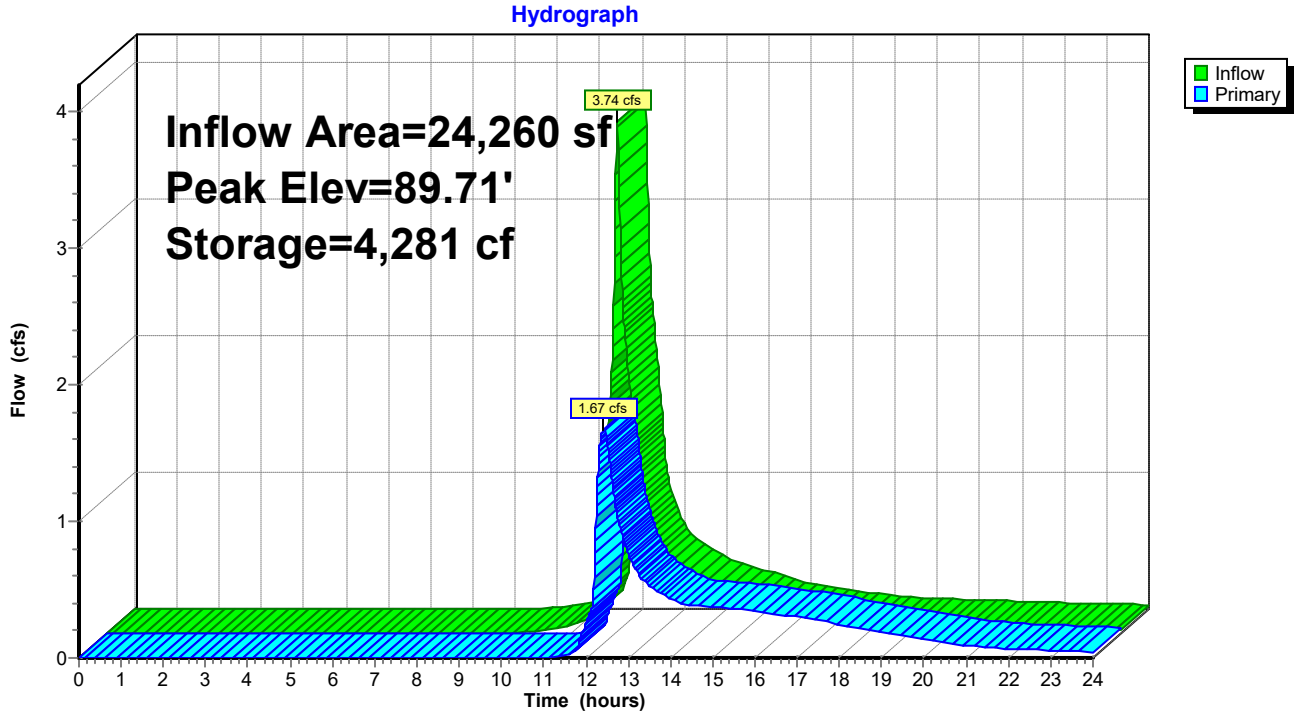
Device	Routing	Invert	Outlet Devices
#1	Primary	88.50'	4.0" Vert. Orifice/Grate C= 0.600
#2	Primary	89.50'	4.0' long x 1.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.0' Crest Height

Primary OutFlow Max=1.67 cfs @ 12.42 hrs HW=89.71' (Free Discharge)

1=Orifice/Grate (Orifice Controls 0.43 cfs @ 4.91 fps)

2=Sharp-Crested Rectangular Weir (Weir Controls 1.24 cfs @ 1.52 fps)

Pond 1P: Extended Dry Detention Basin



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Summary for Pond 2P: Subsurface Infiltration System

Inflow Area = 29,550 sf, 66.16% Impervious, Inflow Depth > 5.60" for 100-year event
 Inflow = 4.57 cfs @ 12.07 hrs, Volume= 13,788 cf
 Outflow = 4.52 cfs @ 12.08 hrs, Volume= 12,384 cf, Atten= 1%, Lag= 0.7 min
 Discarded = 0.05 cfs @ 8.72 hrs, Volume= 3,035 cf
 Primary = 3.07 cfs @ 12.08 hrs, Volume= 2,750 cf
 Secondary = 1.40 cfs @ 12.08 hrs, Volume= 6,599 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 96.28' @ 12.08 hrs Surf.Area= 926 sf Storage= 1,882 cf

Plug-Flow detention time= 71.6 min calculated for 12,379 cf (90% of inflow)
 Center-of-Mass det. time= 22.8 min (827.7 - 804.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	851 cf	20.50'W x 45.16'L x 3.50'H Field A 3,240 cf Overall - 1,114 cf Embedded = 2,126 cf x 40.0% Voids
#2A	93.50'	1,114 cf	ADS_StormTech SC-740 x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 4 rows
		1,964 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	93.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	90.50'	12.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 90.50' / 89.50' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	95.75'	30.0" W x 12.0" H Vert. Orifice/Grate C= 0.600
#4	Secondary	95.25'	8.0" Round Culvert L= 175.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 95.25' / 89.50' S= 0.0329 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.05 cfs @ 8.72 hrs HW=93.04' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=3.06 cfs @ 12.08 hrs HW=96.28' (Free Discharge)
 ↑2=Culvert (Passes 3.06 cfs of 8.69 cfs potential flow)
 ↑3=Orifice/Grate (Orifice Controls 3.06 cfs @ 2.33 fps)

Secondary OutFlow Max=1.40 cfs @ 12.08 hrs HW=96.28' (Free Discharge)
 ↑4=Culvert (Inlet Controls 1.40 cfs @ 4.01 fps)

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Pond 2P: Subsurface Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 (ADS StormTech® SC-740)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

Row Length Adjustment= +0.44' x 6.45 sf x 4 rows

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

6 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 43.16' Row Length +12.0" End Stone x 2 = 45.16' Base Length

4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width

6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

24 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 4 Rows = 1,113.9 cf Chamber Storage

3,240.2 cf Field - 1,113.9 cf Chambers = 2,126.3 cf Stone x 40.0% Voids = 850.5 cf Stone Storage

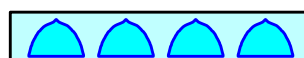
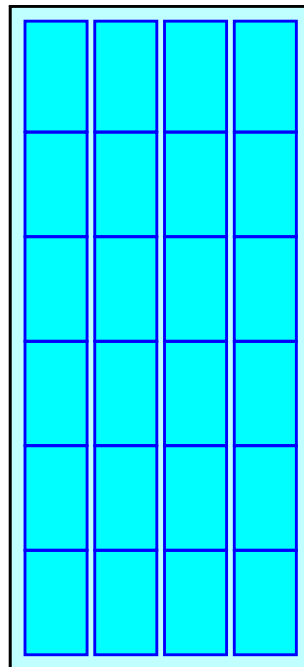
Chamber Storage + Stone Storage = 1,964.4 cf = 0.045 af

Overall Storage Efficiency = 60.6%

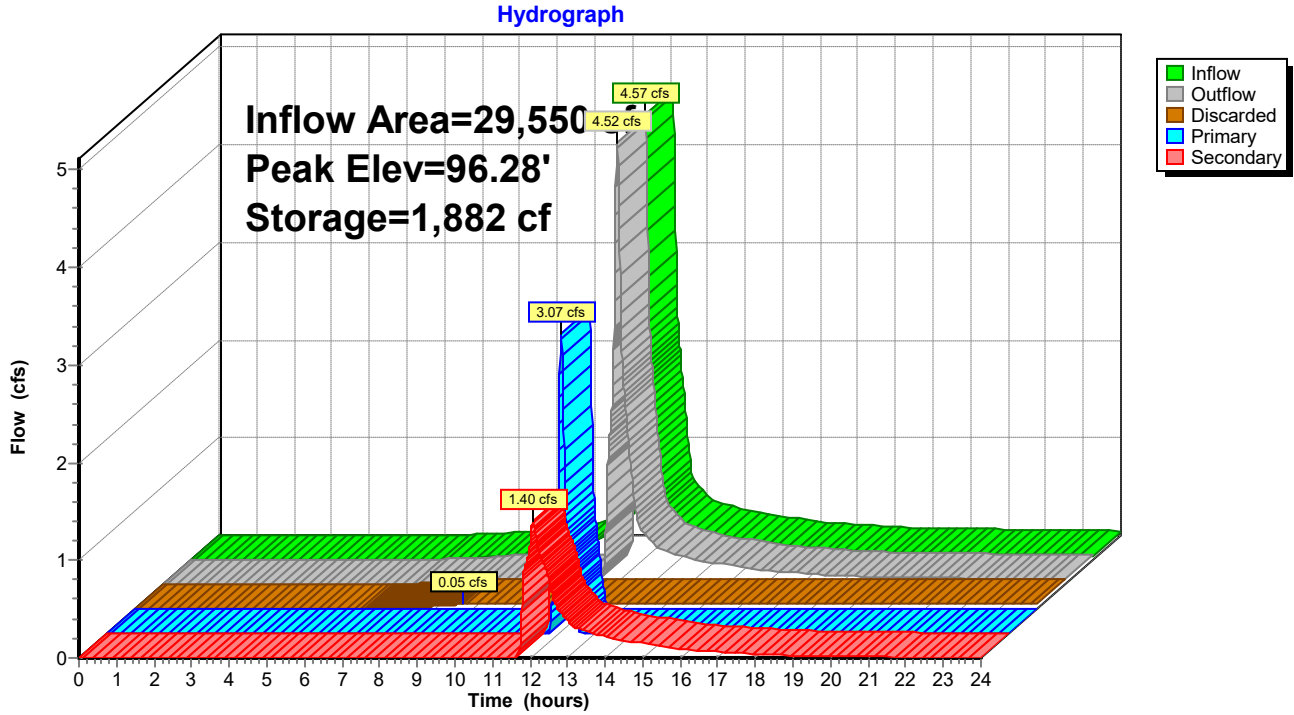
24 Chambers

120.0 cy Field

78.8 cy Stone



Pond 2P: Subsurface Infiltration System



APPENDIX B
PRE/POST DRAINAGE MAPS

HANCOCK
ASSOCIATES

APPENDIX C
GEOTECH REPORT
BY KMM GEOTECHNICAL CONSULTANTS, LLC.

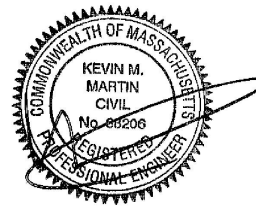
KEVIN M. MARTIN, P.E.
KMM GEOTECHNICAL CONSULTANTS, LLC

7 Marshall Road
Hampstead, NH 03841
603-489-5556 (p)/ 603-489-5558 (f)/781-718-4084(m)
kevinmartinpe@aol.com

MEMORANDUM

TO: Katz Group
273 Corporate Drive, Suite 150
Portsmouth, NH 03801

FROM: Kevin M. Martin, P.E.
Geotechnical Engineer



DATE: May 21, 2019

**RE: PRELIMINARY GEOTECHNICAL SUMMARY
PROPOSED RESIDENTIAL BUILDING
267 MAIN STREET
READING, MASSACHUSETTS**

This memorandum report serves as a preliminary geotechnical summary report for the referenced project. The contents of this memorandum are subject to the attached *Limitations*.

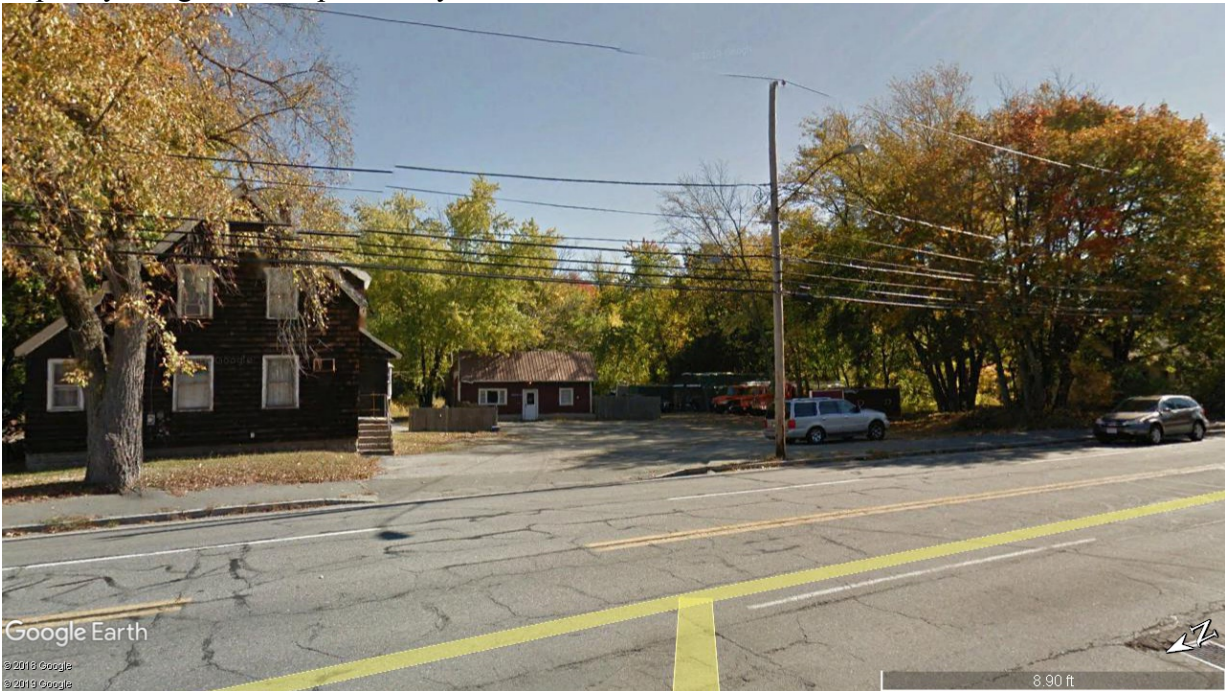
SITE & PROJECT DESCRIPTION

Present site development includes a vacant residence with a detached garage. There was also a former residence which was razed. The remainder of the site includes cleared gravel areas, unmaintained scrub vegetation and/or woodlands. KMM has no other knowledge of past construction, use and/or development of the property except what is visibly apparent or shown on the *Site Plan*. Based on review of the *Site Plan*, grades across the site vary from elevation ≈ 97 -89 ft possessing a gradual downward slope to the east (rear). Shallow wetlands are delineated towards the rear of the site near elevation ≈ 88 -90 ft.

The project includes a new four-story, steel and wood-framed residential building about $\approx 15,000$ ft² in footprint. The plans are still in the conceptual phase. The building is understood to have ground level parking with 3-levels of residential units above. It is intended to support the building on a conventional shallow spread footing foundation (no basement). The ground floor garage slab is expected near elevation ≈ 93 ft. Limited plans were available at this time.

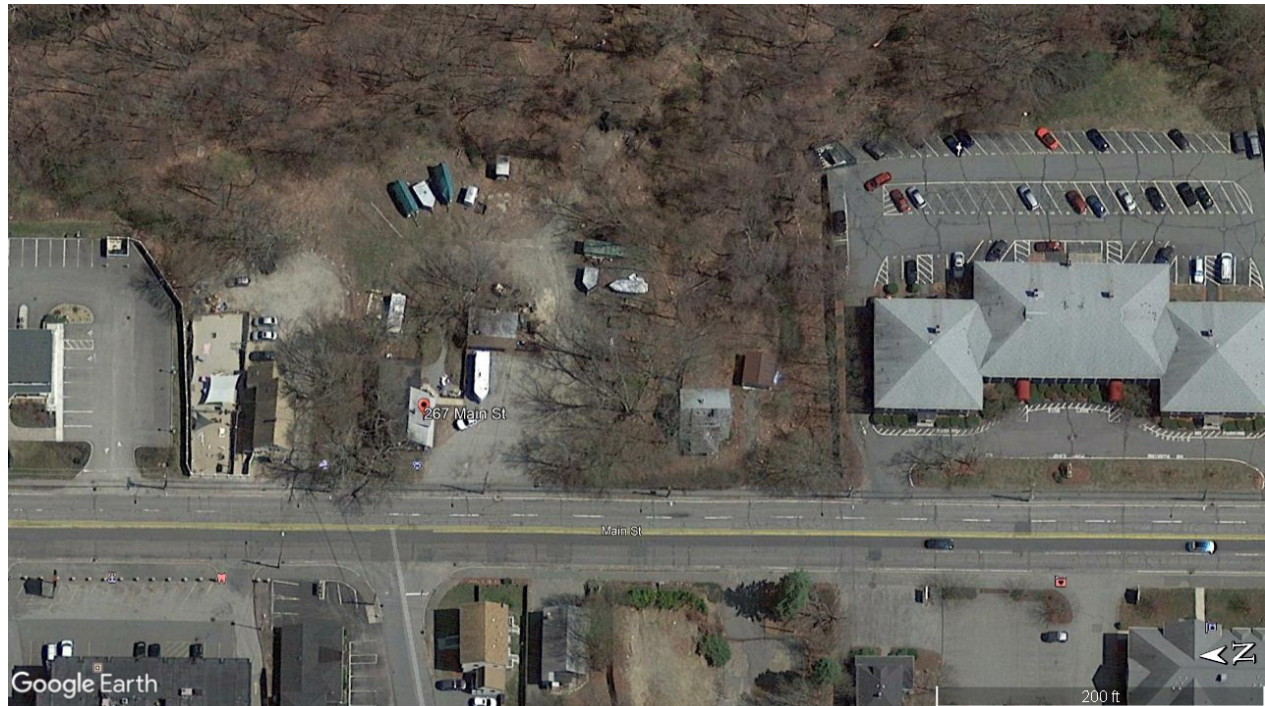
The purpose of this study is to review the subgrade conditions and provide a preliminary geotechnical evaluation related to foundation design and construction per the *Massachusetts State*

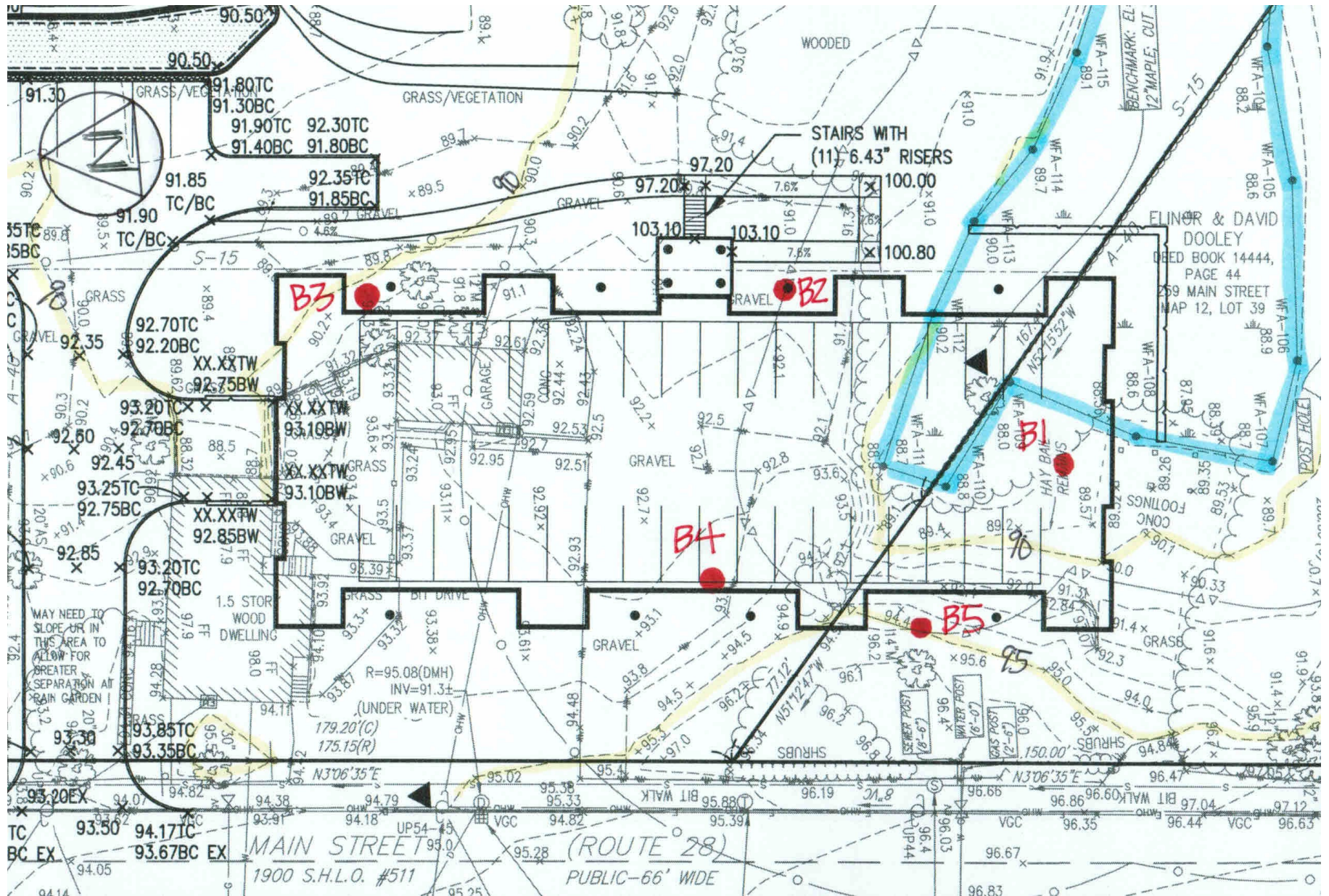
Building Code (MSBC). This study is considered preliminary given lack of definitive plans. This report does not include an environmental assessment relative to oil, gasoline, solid waste and/or other hazardous materials. The environmental conditions of the property should be addressed by others as necessary. This study also does not include review of site design or construction issues such as infiltration systems, excavation support systems, underground utilities, retaining walls, protection of surrounding buildings/utilities, crane pads, temporary shoring or other site and/or temporary design unless specifically addressed herein.





PRESENT CONDITIONS (ABOVE) / APRIL 2007 (BELOW)





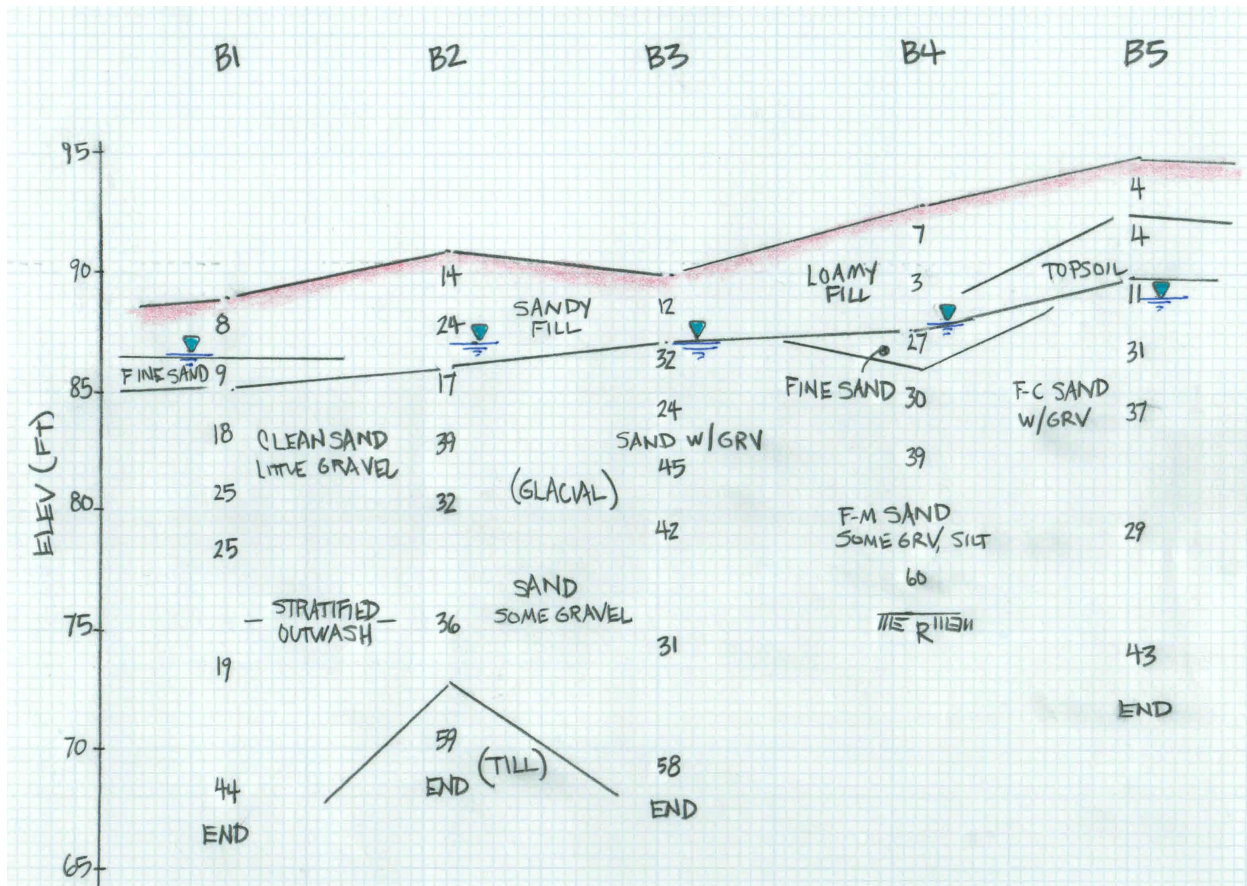
SUBSURFACE EXPLORATION PROGRAM

Test Borings

The exploration program involved five (5) test bores around the proposed pad where accessible. The test bores (B1 to B5) were advanced to refusal depths of $\approx 17-22$ ft utilizing 4 inch hollow stem augers. Soil samples were typically retrieved at no greater than 5 ft intervals with a 2 inch diameter split-spoon sampler. Standard Penetration Tests (SPTs) were performed at the sampling intervals in general accordance with ASTM-D1586 (*Standard Method for Penetration Test and Split-Barrel Sampling of Soils*). Field descriptions and penetration resistance of the soils encountered, observed depth to groundwater, depth to refusal and other pertinent data are contained on the attached *Test Boring Logs*. The attached *Sketch* shows the test bore locations. Building corners and limits were surveyed by others.

SUBSURFACE CONDITIONS

The subgrade conditions below (1) shallow Fill and/or Organic laden soils include (2) Stratified Glacial Outwash deposits then (3) deeper Glacial Till or Refusal. A *Subsurface Profile* depicting the soil and groundwater conditions is attached for review.



SUBSURFACE PROFILE

Shallow Fill and Organic laden soils were encountered at ALL the test holes to depths \approx 2-6 ft below grade (typically \approx 4-5 ft). The Fill varies from Granular Fill to Loamy Fill. The Granular Fill (B2 & B3) appears to be re-worked site soils with a darker color and minor loam. The Loamy Fill includes a dark brown, loamy, silty Sand, trace gravel, roots, organic, rubble, etc. The Loamy Fill was generally loose. Organic soils are present at the surface in wooded and grass areas. Some buried Topsoil & Subsoil were present at B5 to about \approx 6 ft. Other Fill should be expected given the building foundations, intersecting utilities, existing construction and past grading.

The parent site soils consist of a brown, stratified, glacial Outwash. These soils include Clean Sand, Fine Sand, gravelly Sand and/or sandy Gravel with trace to little silt. These soils are clean, granular and well-draining. At depth, there is a Glacial Till encountered at B2 (\approx 20 ft depth). Test bore refusal was only encountered at B4 (\approx 17 ft depth).

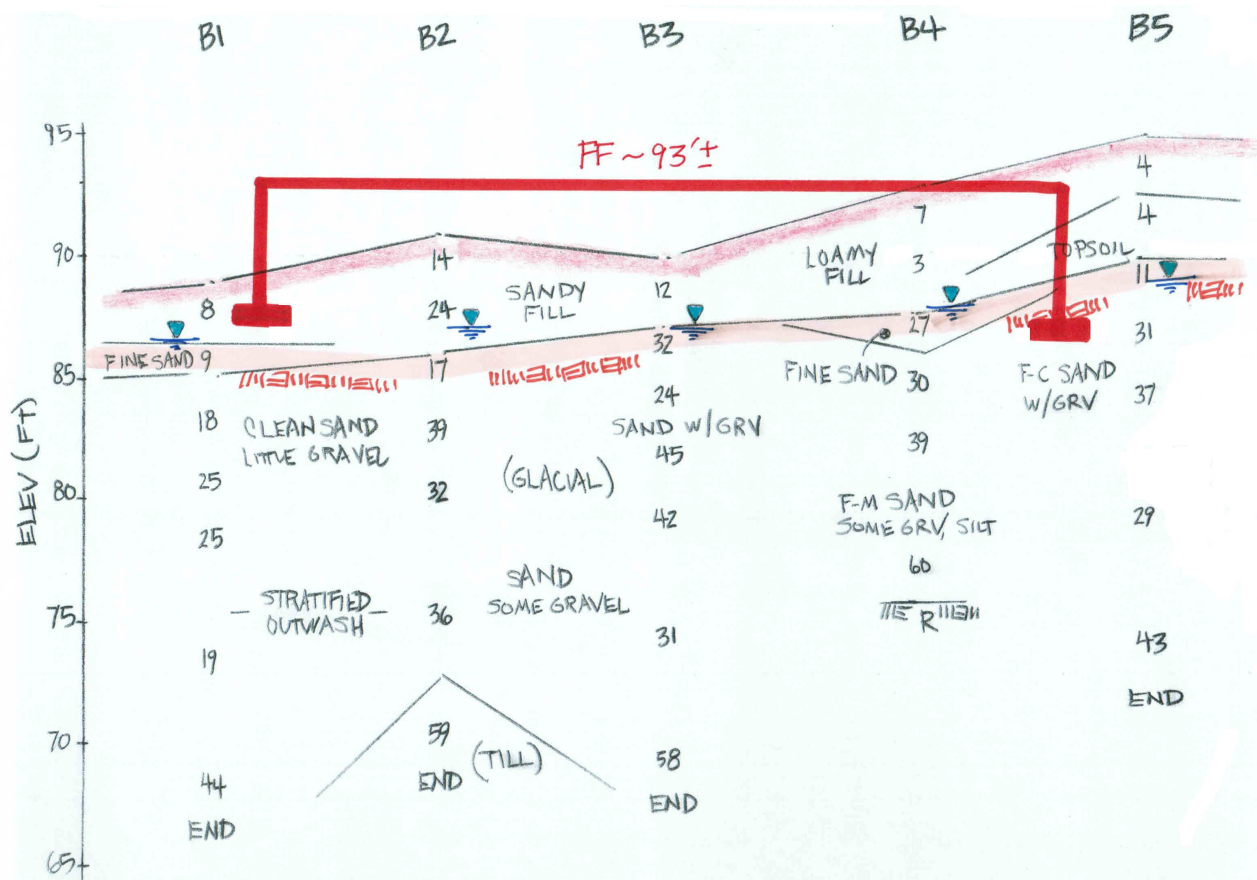
Groundwater was encountered at shallow depths of \approx 2-6 ft in the test holes for this study. Wet and saturated soils were present at these shallow depths. These depths correspond to near elevation \approx 87-89 ft. Shallow wetlands are delineated near elevation \approx 89-90 ft. It should be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, utilities, flooding and other factors differing from the time of the measurements. This study was completed at a time of seasonally normal to high groundwater.

FOUNDATION SUBGRADE RECOMMENDATIONS

The subgrade conditions are favorable for supporting the proposed building on a conventional spread footing foundation. The undocumented Fill & Organic laden soils, however, are **not** considered suitable for foundation support. As such, these soils, abandoned foundations, intersecting utilities and other questionable matter should be fully removed from the building footprint including the *Footing Zone of Influence (FZOI)* to expose the Glacial soils. The *FZOI* is defined as that area extending laterally one foot from the edge of footing then outward and downward at a 1H:1V splay. In most areas, there is expected to be at least \approx 4-5 ft of undocumented Fill and/or Organic laden soils. Structural Fill necessary to achieve foundation grade should conform to the *Specifications* (Table 1).

The parent subgrade soils (Glacial) should be exposed in the foundation areas prior to casting the footings or placing structural fill. It is recommended that the parent subgrade soils be proof-rolled with vibratory densification and exhibit stable and compact conditions. The purpose of the proof-rolling is to densify the site soils and identify potential loose or unstable areas which should be removed as necessary. Proof-rolling should involve at least 4-5 passes with a vibratory compactor (minimum 850 pound static weight) operating at peak energy. During the proof rolling process, the subgrade should be observed by an Engineer to identify areas exhibiting weaving or instability. It will be necessary to remove weakened or unstable soils and replace with a Structural Fill or crushed stone. Proof-rolling should not be used when the subgrade is wet (groundwater, storm water, perched water, etc) as this may result in soil pumping and instability. The contractor should exercise extra precaution to minimize subgrade disturbance in these wet areas. Specifically, the groundwater table should be continuously maintained at least one foot below construction grade until the

backfilling is complete. A base of 3/4-inch minus crushed stone (or larger graded stone) should be placed atop the earthen subgrade if wet conditions and groundwater seepage are present. The stone should be *immediately* placed atop the undisturbed subgrade then tamped with a plate compactor exhibiting stable conditions. The purpose of the stone base is to protect the wet subgrade, facilitate necessary dewatering and provide a dry/stable base upon which to progress foundation construction. Groundwater is typically more problematic if construction occurs during the wetter winter or spring season. The drier summer months are more favorable for groundwater control. Proper groundwater control and storm water management are also necessary to maintain site stability.



CONCEPTUAL SPREAD FOOTING FOUNDATION

The subgrade should ultimately be stable, dewatered, compact and protected from frost throughout construction. Bearing subgrades that become weakened or disturbed due to wet conditions will be rendered unsuitable for structural support. The Contractor shall ultimately be responsible for the means and methods of temporary groundwater control, subgrade protection and site stability during construction. An Engineer from KMM should be scheduled to review the foundation subgrade conditions and preparation during construction.

FOUNDATION DESIGN RECOMMENDATIONS

The footings are expected to gain bearing support atop the parent soils and/or compacted structural fill. Footings may be designed using an allowable bearing capacity of 5 ksf (FS=3). The allowable bearing capacity may be increased a third ($\frac{1}{3}$) when considering transient loads such as wind or seismic. The bearing capacity is contingent upon the perimeter strip footings and isolated column footings being no less than 2 ft and 3 ft in width respectively. For footings less than 3 ft in lateral dimension, the allowable bearing capacity should be reduced to one-third and multiplied by the least lateral footing dimension in feet. Foundation settlement should be less than 1 inch with differential settlement less than $\frac{1}{2}$ inch. The settlement should be elastic and occur during construction. Exterior footings shall be provided with at least 4 ft of frost protection.

The subsurface conditions were reviewed with respect to seismic criteria set forth in the *Massachusetts State Building Code*. Based on the relative density of the soils and the depth to groundwater, the site does not appear susceptible to liquefaction in the event of an earthquake. Based on interpretation of the *Building Code*, the *Site Classification* is “D” (Stable Soil Profile).

It is recommended that a minimum 12-inch base of *Gravel Base Fill* (Table 1) be placed below the garage floor slab for moisture, strength and frost control. The gravel base shall be no less than 12 inches for exterior concrete slabs exposed to frost (≈ 15 inches at ramps and entrances). A vapor retarder should be used below the floor slab dependent upon the floor treatment. A vapor barrier should be specified by others per ACI Standards. A typical vapor retarder includes minimum 10-mil polyethylene or StegoWrap™ with joints lapped 10 inches.

Structural fill necessary within and below the foundation should also conform to the attached *Specifications* (Table 1). The Granular Outwash soils are suitable for re-use as Structural Fill or backfill around the foundation. The Outwash soils are suitable for re-use provided they are segregated from the organic laden soils, are screened of large stones and conform to Specification.

CONSTRUCTION CONCERNS

The contractor should be required to maintain a stable-dewatered subgrade for the building foundation and other concerned areas during construction. Subgrade disturbance may be influenced by excavation methods, moisture, precipitation, groundwater control and construction activities. The glacial outwash soils are not considered vulnerable to disturbance when exposed to wet conditions and construction activities given their good drainage. Steady groundwater seepage, however, will likely disturb these soils if not properly managed during construction. The contractor should take precautions to reduce subgrade disturbance. Such precautions may include diverting storm run-off away from construction areas, reducing traffic in sensitive areas, minimizing the extent of exposed subgrade if inclement weather is forecast, backfilling footings as soon as practicable and maintaining an effective dewatering program. Soils exhibiting weaving or instability should be over-excavated to a competent bearing subgrade then replaced with a free draining structural fill or crushed stone. The moisture concerns are typically more problematic if construction takes place during the winter to spring season or other periods of inclement weather. A protective base of $\frac{3}{4}$ -inch minus crushed stone may be placed at least ≈ 6 inches below and laterally beyond the footing limits for protection

during construction. The stone base is to protect the site soils, facilitate necessary dewatering and provide a dry/stable base upon which to progress foundation construction. The protective base should be considered elective and dependent upon the site conditions. The stone base should be considered necessary if wet conditions are present at footing grade. The protective stone base shall be tamped with a plate compactor and exhibit stable conditions.

The groundwater table will need to be temporarily controlled during construction to complete work in dry conditions and protect the competency of the subgrade. The groundwater table should be continuously maintained at least one foot below construction grade until backfilling is complete. The groundwater is expected to be controlled with conventional sumps and pumps. The temporary sumps should be filtered with stone and fabric and extend at least ≈ 30 inches below construction grade. A ≈ 6 inch lift of $\frac{3}{4}$ -inch minus crushed stone should be placed atop the wet subgrade to protect its competency and facilitate dewatering. The stone base should have positive slope to the sump. Adequate dewatering and storm water management are necessary for maintaining the competency of the site soils. The discharge of the collected water should be reviewed by others.

The subgrade should ultimately be stable, dewatered, compact and protected from frost throughout construction. Bearing subgrades that become weakened or disturbed due to wet conditions will be rendered unsuitable for structural support. The Contractor shall ultimately be responsible for the means and methods of temporary groundwater control, subgrade protection and site stability during construction. An Engineer from KMM should be scheduled to review the foundation subgrade conditions and preparation during construction.

CONSTRUCTION MONITORING

It is recommended that a qualified engineer or representative be retained to review earthwork activities such as the preparation of the foundation bearing subgrade and the placement/compaction of Structural Fill. It is recommended that KMM be retained to provide construction monitoring services. This is to observe compliance with the design concepts presented herein.

CLOSURE

This study was completed for preliminary geotechnical review given lack of definitive plans. Additional geotechnical exploration and engineering may be necessary as the project progresses. The final foundation design shall be completed in accordance with the *Massachusetts State Building Code*.

We trust the contents of this memorandum report are responsive to your needs at this time. Should you have any questions or require additional assistance, please do not hesitate to contact our office.

LIMITATIONS

Explorations

1. The analyses, recommendations and designs submitted in this report are based in part upon the data obtained from preliminary subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.
2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.
3. Water level readings have been made in the test pits and/or test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time the measurements were made.

Review

4. It is recommended that this firm be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the recommendations provided herein.
5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by KMM Geotechnical Consultants, LLC.

Construction

6. It is recommended that this firm be retained to provide geotechnical engineering services during the earthwork phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Use of Report

7. This report has been prepared for the exclusive use of Katz Group in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.
8. This report has been prepared for this project by KMM Geotechnical Consultants, LLC. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to preliminary geotechnical design considerations only.

TABLE 1

Proposed Building
267 Main Street
Reading, MA

Recommended Soil Gradation & Compaction Specifications

Gravel Base Fill (Crushed Gravel Fill)

SIEVE SIZE	PERCENT PASSING BY WEIGHT
3 inch	100
3/4 inch	60-90
No. 4	20-70
No. 200	2-8

NOTE: For minimum 8-inch base below Concrete Floor Slab-on-Grade
For minimum 12-inch base for exterior concrete slabs exposed to frost
For minimum 12-inch base below garage level slab
Shall have less than 12% fines (No. 200 sieve) based on the Sand fraction

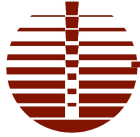
Structural Fill (Gravelly SAND, trace Silt)

SIEVE SIZE	PERCENT PASSING BY WEIGHT
5 inch	100
3/4 inch	50-100
No. 4	20-80
No. 200	0-10

NOTE: For use as structural load support below the foundations
For use as backfill behind unbalanced foundation/retaining walls
A 3/4-inch crushed stone may be used in wet conditions
Shall have less than 20% fines (No. 200 sieve) based on the Sand fraction

Structural Fill placed beneath the foundation should include the *Footing Zone of Influence* which is defined as that area extending laterally one foot from the edge of the footing then outward and downward at a 1H:1V splay. Structural Fill should be placed in loose lifts not exceeding 12 inches for heavy vibratory rollers and 8 inches for vibratory plate compactors. All Structural Fill should be compacted to at least 95 percent of maximum dry density as determined by the Modified Proctor Test (ASTM-D1557). Structural Fill should be compacted within $\pm 3\%$ of optimum moisture content. The adequacy of the compaction efforts should be verified by field density testing which is also a requirement of the *Massachusetts State Building Code*.

TEST BORING LOG



SOIL X, Corp.
 148 Pioneer Drive
 Leominster, MA 01453
 978 840-0391

Site: Proposed Building
267 Main Street
Reading, MA.

BORING B-1

PROJECT NO. 1905032

DATE: May 15, 2019

Ground Elevation: 89 ft+/-
 Date Started: May 14, 2019
 Date Finished: May 14, 2019
 Driller: PG

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATI
5/14/19	2 ft		

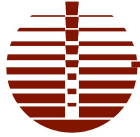
Soil Engineer/Geologist:

Depth Ft.	Casing bl/ft	Sample		Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample
		No	Pen/Rec				
1		1	3"	0'0" – 2'0"	1-4-4-3	3'	Dark Brown, loamy, silty SAND, little organic, trace gravel, root (LOAMY FILL)
		2 2A	3" 6"	2'0" – 3'0" 3'0" – 4'0"	2-1 8-11		
5		3	18"	5'0" – 7'0"	7-8-10-11	5'	Brown, Fine Sand, little silt, wet
		4	21"	7'0" – 9'0"	11-13-12-15		
10		5	21"	10'0" – 12'0"	8-10-15-18		Brown, fine to coarse Sand, trace fine gravel, wet
15		6	18"	15'0" – 17'0"	8-8-11-13		Brown, f-c Sand, trace silt, wet
20		7	21"	20'0" – 22'0"	18-21-23-28		Brown, f-m Sand, little silt Brown, Fine Sand w/ Silt
25							(GLACIAL OUTWASH)
30							Brown, fine to medium Sand, little silt
							End of boring 22 ft Water encountered at 2 ft upon completion

Notes: Hollow Stem Auger Size - 4 1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V	Trace 0 to 10% Little 10 to 20% Some 20 to 35% And 35% to 50%		CASING	SAMPLE	CORE TYPE
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.		ID SIZE (IN)		SS	
		HAMMER WGT (LB)		140 lb.	
		HAMMER FALL (IN)		30"	

TEST BORING LOG



SOIL X, Corp.
 148 Pioneer Drive
 Leominster, MA 01453
 978 840-0391

Site: Proposed Building
267 Main Street
Reading, MA.

BORING B-2

PROJECT NO. 1905032

DATE: May 15, 2019

Ground Elevation: 91 ft+/-
 Date Started: May 14, 2019
 Date Finished: May 14, 2019
 Driller: PG

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATI
5/14/19	4 ft		

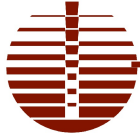
Soil Engineer/Geologist:

Depth Ft.	Casing bl/ft	Sample		Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample
		No	Pen/Rec				
1		1	15"	0'0" – 2'0"	6-7-7-8	5'	Dark Brown, fine to coarse Sand, some gravel, little silt (FILL)
		2	18"	2'0" – 4'0"	8-11-13-26		
5		3	18"	5'0" – 7'0"	6-8-9-11	20'	Grey, fine to medium Sand, little gravel, trace/little silt, wet Brown, f-m Sand, trace silt, wet Brown, f-c Sand, little gravel, trace silt, wet
		4	21"	7'0" – 9'0"	11-18-21-20		
10		5	18"	10'0" – 12'0"	8-13-19-23		Brown, fine to coarse Sand, some gravel, trace silt (STRATIFIED GLACIAL OUTWASH)
15		6	18"	15'0" – 17'0"	16-18-18-21		Brown, f-c Sand, little gravel, trace silt, wet
20		7	18"	20'0" – 22'0"	21-28-31-37		Olive, fine to medium Sand, some gravel, some silt
25							End of Boring 22 ft Water encountered at 4 ft upon completion
30							

Notes: Hollow Stem Auger Size - 4 1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V	Trace 0 to 10%		CASING	SAMPLE	CORE TYPE
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.	Little 10 to 20%	ID SIZE (IN)		SS	
	Some 20 to 35%	HAMMER WGT (LB)		140 lb.	
	And 35% to 50%	HAMMER FALL (IN)		30"	

TEST BORING LOG



SOIL X, Corp.
 148 Pioneer Drive
 Leominster, MA 01453
 978 840-0391

Site: Proposed Building
267 Main Street
Reading, MA.

BORING B-3

PROJECT NO. 1905032

DATE: May 15, 2019

Ground Elevation: 90 ft+/-
 Date Started: May 14, 2019
 Date Finished: May 14, 2019
 Driller: PG

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATI
5/14/19	3 ft		

Soil Engineer/Geologist:

Depth Ft.	Casing bl/ft	Sample		Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample
		No	Pen/Rec				
1		1	6"	0'0" – 2'0"	3-6-6-7	2'	Dark Brown, fine to coarse Sand, little gravel, little silt (FILL)
		2	21"	2'0" – 4'0"	10-14-18-26		Brown, f-c Sand w/ Gravel, wet
5		3	18"	5'0" – 7'0"	10-11-13-13		Brown, f-c Sand & Gravel, wet
		4	21"	7'0" – 9'0"	16-18-27-33		
10		5	21"	10'0" – 12'0"	17-19-23-23		Brown, fine to coarse SAND, little gravel, trace silt, wet
(STRATIFIED GLACIAL OUTWASH)							
15		6	18"	15'0" – 17'0"	15-13-18-22		Brown, f-c Sand, some gravel, trace silt, wet
20		7	18"	20'0" – 22'0"	23-25-33-40		Same
25							End of boring 22 ft Water encountered at 3 ft upon completion
30							

Notes: Hollow Stem Auger Size - 4 1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V	Trace	0 to 10%			CASING	SAMPLE	CORE TYPE
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M	Little	10 to 20%		ID SIZE (IN)		SS	
8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.	Some	20 to 35%		HAMMER WGT (LB)		140 lb.	
	And	35% to 50%		HAMMER FALL (IN)		30"	

TEST BORING LOG



**Site: Proposed Building
267 Main Street
Reading, MA.**

BORING B-4

PROJECT NO. 1905032

DATE: May 15, 2019

Ground Elevation: 93 ft+/-
Date Started: May 14, 2019
Date Finished: May 14, 2019
Driller: PG

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATI
5/14/19	5 ft		

Soil Engineer/Geologist:

Depth ft.	Casing bl/ft	Sample				Strata	Visual Identification of Soil and / or Rock Sample
		No.	Pen/Rec	Depth	Blows/6"		
1		1	15"	0'0" – 2'0"	2-3-4-2	5'	Dark Brown, loamy, silty Sand, little gravel, trace ash, rubble, coal, organic (LOAMY FILL)
		2	12"	2'0" – 4'0"	2-2-1-2		
5		3	18"	5'0" – 7'0"	8-10-17-21	7'	Brown, Fine Sand, little silt., wet
		4	18"	7'0" – 9'0"	22-13-17-18		
10		5	21"	10'0" – 12'0"	16-21-18-22		Brown, fine to medium Sand, some gravel, little silt, wet (STRATIFIED GLACIAL OUTWASH)
15		6	15"	15'0" – 16'9"	21-27-33-100/3"	17'	Same
20							Auger Refusal at 17 ft Water encountered at 5 ft upon completion
25							
30							

Notes: Hollow Stem Auger Size - 4 1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V	Trace 0 to 10% Little 10 to 20% Some 20 to 35% And 35% to 50%	ID SIZE (IN) HAMMER WGT (LB) HAMMER FALL (IN)	CASING	SAMPLE SS 140 lb. 30"	CORE TYPE
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TEST BORING LOG



**Site: Proposed Building
267 Main Street
Reading, MA.**

BORING B-5

PROJECT NO. 1905032

DATE: May 15, 2019

Ground Elevation: 95 ft+/-
Date Started: May 14, 2019
Date Finished: May 14, 2019
Driller: PG

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATI
5/14/19	6 ft		

Soil Engineer/Geologist:

Depth ft.	Casing bl/ft	Sample				Strata	Visual Identification of Soil and / or Rock Sample
		No.	Pen/Rec	Depth	Blows/6"		
1		1	15"	0'0" – 2'0"	1-2-2-3	4'	Dark Brown, loamy silty Sand, trace gravel (LOAMY FILL)
		2	12"	2'0" – 4'0"	2-2-2-3		
5		3	6"	5'0" – 6'0"	3-4	6'	Topsoil Loamy Subsoil, roots
		3A	12"	6'0" – 7'0"	7-10		
		4	21"	7'0" – 9'0"	11-13-18-25		
10		5	21"	10'0" – 12'0"	16-18-19-21		Brown, f-m Sand & Gravel, trace silt, wet (STRATIFIED GLACIAL OUTWASH)
15		6	21"	15'0" – 17'0"	12-13-16-18		Brown, fine to coarse Sand, some gravel, trace silt
20		7	21"	20'0" – 22'0"	18-21-22-31		Same
25							
30							End of Boring at 22 ft Water encountered at 6 ft upon completion

Notes: Hollow Stem Auger Size - 4 1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 - 30 M Dense, 30 - 50 Dense, 50+ V	Trace	0 to 10%	CASING	SAMPLE	CORE TYPE
Cohesive: 0 - 2 V Soft, 2 - 4 Soft, 4 - 8 M	Little	10 to 20%	ID SIZE (IN)	SS	
8 - 15 Stiff, 15 - 30 V. Stiff, 30 + Hard.	Some	20 to 35%	HAMMER WGT (LB)	140 lb.	
	And	35% to 50%	HAMMER FALL (IN)	30"	



APPENDIX D
STORMWATER MANAGEMENT FORM AND CHECKLIST



Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

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

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

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

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

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



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



10/30/19

Signature and Date

Checklist

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

- New development
- Redevelopment
- Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - Site is comprised solely of C and D soils and/or bedrock at the land surface
 - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - Solid Waste Landfill pursuant to 310 CMR 19.000
 - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

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

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



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
 - The ½" or 1" Water Quality Volume or
 - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does **not** cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 9: Operation and Maintenance Plan

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

Standard 10: Prohibition of Illicit Discharges

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

Attachment D Abutter Notification



**TOWN OF READING
16 LOWELL STREET
READING, MA 01867-2693**


**BOARD OF ASSESSORS
TEL.: 781-942-9027
FAX: 781-942-9037**

ABUTTERS LIST

CERTIFICATION

FOR BOARD OF ASSESSORS

VICTOR P. SANTANIELLO, CHIEF APPRAISER


PHILIP CANNIFF, ASSISTANT APPRAISER

DATE:

7/15/2019



**TOWN OF READING
16 LOWELL STREET
READING, MA 01867-2693**

**BOARD OF ASSESSORS
TEL.: 781-942-9027
FAX: 781-942-9037**

March 5, 2019

To whom it may concern;

In an effort to streamline our business practices and desire to decrease turnaround time for taxpayers and other municipal departments, please be advised that effective this date, we the Board of Assessors for the Town of Reading Hereby delegate to the Town Appraiser of the Assessing Department signatory authority of all certified abutter's lists as compiled by the department.

Sincerely,

Reading Board of Assessors


Robert N. Marshall


Michael E. Golden


Brendan Zarechian



Patriot Properties

07/15/2019

8:23:31AM

Reading

Abutters List

Filter Used: DataProperty.AccountNumber in
(2034,1866,1892,1990,2017,2003,1895,2006,2000,1999,1870,1986,2035,1900,1868,1988,2004,2091,2093,2096,2099,2102,2105,2107,2109,2111,2113,2114,2116,2118,2120,2122..

259 and 267 Main St Abutters list

Abutters List

ParcelID	Location	Owner	Co-Owner	Mailing Address	City	State	Zip
011.0-0000-0188.0	KNOLLWOOD RD	CARTER RICHARD M ETAL TRS	C/O COLEMAN LAW OFFICE	248 MAIN ST STE 202	READING	MA	01867
011.0-0000-0189.0	240 MAIN ST	CARTER RICHARD M ETAL TRS	C/O COLEMAN LAW OFFICE	248 MAIN ST STE 202	READING	MA	01867
011.0-0000-0190.0	242 MAIN ST	CARTER RICHARD M ETAL TRS	C/O COLEMAN LAW OFFICE	248 MAIN ST STE 202	READING	MA	01867
011.0-0000-0191.0	248 MAIN ST	COLEMAN CHRISTOPHER E ETAL	CARTER & COLEMAN REAL	248 MAIN STREET	READING	MA	01867
011.0-0000-0192.0	252 MAIN ST	KEHOE JOYCE M		58 SHEFFIELD RD	MELROSE	MA	02176
011.0-0000-0193.0	258 MAIN ST	READING CRE VENTURES LLC		71 DONIZETTI ST	WELLESLEY	MA	02482
011.0-0000-0194.0	262 MAIN ST	READING CRE VENTURES LLC		117 WAVERLY ST	FRAMINGHAM	MA	01702
011.0-0000-0195.0	2 PINEVALE AVE	FARRELL MICHAEL C ETAL TRSTE	FARRELL LYNNE M ETAL TR	1 CHARLES ST UNIT G	READING	MA	01867-1759
011.0-0000-0196.0	10 PINEVALE AVE	MITCHELL KRISTEN E		10 PINEVALE AVENUE	READING	MA	01867
011.0-0000-0197.0	12 PINEVALE AVE	KILLEEN JENNIFER J		12 PINEVALE AVE	READING	MA	01867
011.0-0000-0215.0	16 PERCY AVE	NAKANO TAKAYUKI	FUMIKO NAKANO	16 PERCY AVE	READING	MA	01867
011.0-0000-0218.0	15 PINEVALE AVE	RIBEIRO DEBBIE L		15 PINEVALE AVE	READING	MA	01867
011.0-0000-0219.0	11 PINEVALE AVE	WILLIS DANIEL A	ELISHA W WILLIS	11 PINEVALE AVE	READING	MA	01867
011.0-0000-0220.0	7 PINEVALE AVE	MCKENZIE LINDA J		7 PINEVALE AVE	READING	MA	01867
011.0-0000-0221.0	270 MAIN ST	READING DENTAL, P.C.		270 MAIN STREET	READING	MA	01867
011.0-0000-0222.0	274 MAIN ST	READING INVESTMENTS LLC		PO BOX 6	READING	MA	01867
011.0-0000-0223.0	288 MAIN ST	READING 288 MAIN STREET LLC		24 SUSAN DR	READING	MA	01867
012.0-0000-0026.0	71 CROSS ST	HUNNEFELD PAUL F	KAREN J HUNNEFELD	71 CROSS ST	READING	MA	01867
012.0-0000-0027.0	65 CROSS ST	GRADY KIMBERLY A	ROBERT M GRADY	65 CROSS ST	READING	MA	01867
012.0-0000-0028.0	61 CROSS ST	BROGAN TERENCE W	BROGAN ELLEN M	61 CROSS ST	READING	MA	01867
012.0-0000-0029.0	57 CROSS ST	CROTTY PAUL D	CROTTY KATHLEEN M	57 CROSS ST	READING	MA	01867
012.0-0000-0030.0	51 CROSS ST	EAGLESTON KRISTEN A	RICHARD W EAGLESTON JR	51 CROSS ST	READING	MA	01867
012.0-0000-0035.0	231 MAIN ST	BERTONE MARIO TRUSTEE	MARIO BERTONE TRUST	231 MAIN ST	READING	MA	01867
012.0-0000-0036.0	38 CROSS ST	PACILLO MARILYN A		38 CROSS STREET	READING	MA	01867
012.0-0000-0037.0	32 CROSS ST	CRANDLEMIRE CHARLES P II	RADONNA L CRANDLEMIRE	32 CROSS ST	READING	MA	01867
012.0-0000-0039.0	259 MAIN ST	DOOLEY DAVID L	DOOLEY ELINOR	267 MAIN ST	READING	MA	01867
012.0-0000-0040.0	267 MAIN ST	DOOLEY ELINOR	DAVID DOOLEY	267 MAIN ST	READING	MA	01867
012.0-0000-0041.0	271 MAIN ST	BASTERI JUDITH	ANTON MELCHIONDA	271 MAIN ST	READING	MA	01867
012.0-0000-0042.0	281 MAIN ST	GWT HAVEN REALTY LLC		281 MAIN ST FLR 2	READING	MA	01867
012.0-0000-0043.0	285 MAIN ST	BAGEL A R M LLC		79 NORTH MAIN ST	ANDOVER	MA	01810
012.0-0000-0045.0	34 AVON ST	MEDEIROS MARK	MEDEIROS DANICA	34 AVON STREET	READING	MA	01867
012.0-0000-0046.0	30 AVON ST	CLARK LYNN H		30 AVON ST	READING	MA	01867
012.0-0000-0047.0	26 AVON ST	JONES GREGORY S	SARA AMIRO JONES	26 AVON ST	READING	MA	01867
012.0-0000-0048.0	18 AVON ST	KAVOOSI RICK S	FARAH HOSSEINI	18 AVON ST	READING	MA	01867
012.0-0000-0058.0	21 SHACKFORD RD	KARCHEM TALIA J	BLOM ADAM R	21 SHACKFORD RD	READING	MA	01867
012.0-0000-0060.0	24 SHACKFORD RD	GEORGOPOULOS CONSTANTINE	MARIA GEORGOPOULOS	24 SHACKFORD RD	READING	MA	01867
012.0-0000-0067.0	40 SHACKFORD RD	GARDNER RICHARD W	FERREN CARLEY D	40 SHACKFORD RD	READING	MA	01867
012.0-0000-0068.0	72 CROSS ST	BEUCLER MARK	ELIZABETH BEUCLER	72 CROSS ST	READING	MA	01867
012.0-0000-0069.0	78 CROSS ST	SUMNER PAUL E TRUSTEE	SUMNER DIANE L TRUSTEE	78 CROSS ST	READING	MA	01867
012.0-0000-0070.0	32 SHACKFORD RD	HIGGINS NOEL B	MARY T HIGGINS	32 SHACKFORD RD	READING	MA	01867
012.0-0000-0071.0	29 SHACKFORD RD	CERASUOLO CAROL ANN		29 SHACKFORD RD	READING	MA	01867
012.0-0000-0072.0	33 SHACKFORD RD	CERASUOLO MARC	CERASUOLO GIUSEPPINA C	33 SHACKFORD RD	READING	MA	01867
012.0-0000-0073.0	37 SHACKFORD RD	CAMERANO JOHN JR	DENISE A CAMERANO	37 SHACKFORD RD	READING	MA	01867
012.0-0000-0074.0	41 SHACKFORD RD	LUNDBOHN ROBERT M	LUNDBOHN MICHELLE R	41 SHACKFORD RD	READING	MA	01867

Abutters List

ParcelID	Location	Owner	Co-Owner	Mailing Address	City	State	Zip
012.0-0000-0075.0	45 SHACKFORD RD	SPINAZZOLA DAVID M	TARYN L SPINAZZOLA	45 SHACKFORD RD	READING	MA	01867
012.0-0000-0076.0	62 CROSS ST	MCCAFFERTY JUDITH M		62 CROSS ST	READING	MA	01867
012.0-0000-0077.0	56 CROSS ST	ARMSTRONG KERI M		56 CROSS ST	READING	MA	01867
012.0-0000-0078.0	CROSS ST	PACILLO MARILYN A TRUSTEE	MAP REALTY TRUST	38 CROSS ST	READING	MA	01867
012.0-0701-0079.0	237 MAIN ST A1	KELLY ROBIN M		237 MAIN ST APT #A1	READING	MA	01867
012.0-0702-0079.0	237 MAIN ST A2	METRAKAS CHRYSALIA K		237 A-2 MAIN ST	READING	MA	01867
012.0-0703-0044.0	295 MAIN ST 1	DEGENNARO BENJAMIN III		P O BOX 444	TEWKSBURY	MA	01876
012.0-0703-0079.0	237 MAIN ST A3	BREAULT STEPHEN		237 MAIN ST UNIT 3A	READING	MA	01867
012.0-0704-0044.0	295 MAIN ST 2	CROAL SHERRI-LYNN		8 HEMENWAY AVE	MELROSE	MA	02176
012.0-0704-0079.0	237 MAIN ST A4	LAROSA JOSEPH A	PAMELA J LAROSA	17 KINGS ROW	NORTH READING	MA	01864
012.0-0705-0044.0	295 MAIN ST 3	SERRAO ROSA (LE)	SERRAO MARISOL ETAL TR	17 BROOK STREET	READING	MA	01867
012.0-0705-0079.0	237 MAIN ST A5	TRAN KEN		237 MAIN ST APT A-5	READING	MA	01867
012.0-0706-0044.0	295 MAIN ST 4	NGUYEN NANCY	NGUYEN WASHINGTON TE	295 MAIN STREET UNIT 4	READING	MA	01867
012.0-0706-0079.0	237 MAIN ST A6	LUO JIANYING		42 CROOKED POND DR	BOXFORD	MA	01921
012.0-0707-0044.0	295 MAIN ST 5	XIA JIAN	HUANG DONGXU	295 MAIN ST UNIT 5	READING	MA	01867
012.0-0707-0079.0	237 MAIN ST A7	HUANG ANTHONY YT	TIAN LIAN HUANG	313 ASH ST	READING	MA	01867
012.0-0708-0044.0	295 MAIN ST 6	LEACH JASON 1/2	LYSIK LINDA ETAL 1/2	16 SHERWOOD ROAD	MELROSE	MA	02176
012.0-0708-0079.0	237 MAIN ST A8	KNIGHT MAUREEN M		237 MAIN ST UNIT A8	READING	MA	01867
012.0-0709-0044.0	295 MAIN ST 7	CASSESSO ROBERT JR TRUSTEE	RMC READING REALTY TRU	528 NORTH AVE	WAKEFIELD	MA	01880
012.0-0709-0079.0	237 MAIN ST A9	SARNO LOUISE		237 MAIN ST A9	READING	MA	01867
012.0-0710-0044.0	295 MAIN ST 8	MURILLO DORA TRUSTEE	DORA MURILLO TRUST	295 MAIN ST UNIT 8	READING	MA	01867
012.0-0710-0079.0	237 MAIN ST A10	ANCH NORTH LLC		186 COUNTY RD	READING	MA	01867
012.0-0711-0079.0	237 MAIN ST A11	BOLIS ROBERT W		237 MAIN ST APT #A11	READING	MA	01867
012.0-0712-0044.0	295 MAIN ST 9	DIBELLA GREGORY J	CAROLYN M DIBELLA	295 MAIN ST UNIT 9	READING	MA	01867
012.0-0712-0079.0	237 MAIN ST A12	DEVECIS ELLEN F		237 MAIN ST UNIT A-12	READING	MA	01867
012.0-0713-0044.0	295 MAIN ST 10	CHRISTIAN ROBERT B		PO BOX 415	MEDFORD	MA	02155
012.0-0713-0079.0	239 MAIN ST B1	TEEHAN MARGARET M	TEEHAN EDWARD R JR	2 RUSSETT ROAD	BEDFORD	MA	01730
012.0-0714-0044.0	295 MAIN ST 11	HARTE PAULINE M		295 MAIN ST UNIT 11	READING	MA	01867
012.0-0714-0079.0	239 MAIN ST B2	SHARIFI JUSTIN		239 MAIN ST UNIT B2	READING	MA	01867
012.0-0715-0044.0	295 MAIN ST 12	MASUCCI SHARON M		295 MAIN ST UNIT 12	READING	MA	01867
012.0-0715-0079.0	239 MAIN ST B4	POLLACK LINDA B ETAL TRUSTEE	LINDA B POLLACK FAMILY T	7 HOOVER AVE	PEABODY	MA	01960
012.0-0716-0044.0	295 MAIN ST 12A	ZHANG JIANHONG		186 PETER SPRING RD	CONCORD	MA	01742
012.0-0716-0079.0	239 MAIN ST B5	HOLLAND JOHN J	HOLLAND JOSEPHINE A	45 HOWARD ST	READING	MA	01867
012.0-0717-0044.0	295 MAIN ST 14	DOREN JANICE G		295 MAIN ST APT #14	READING	MA	01867
012.0-0717-0079.0	239 MAIN ST B6	SHAFFER MICHAEL W ETAL TRUS	SHAFFER TRUST OF 2009	239 MAIN ST UNIT 6-B	READING	MA	01867
012.0-0718-0044.0	295 MAIN ST 15	SCHNEIDER NICOLE		42 WESTGATE CROSSING	NASHUA	NH	03061
012.0-0718-0079.0	239 MAIN ST B7	YUAN LING BAO		239 MAIN ST B7	READING	MA	01867
012.0-0719-0044.0	295 MAIN ST 16	YABOUJIAN RAFFI		295 MAIN ST UNIT 16	READING	MA	01867
012.0-0719-0079.0	239 MAIN ST B8	CURTIS GLENN T ETAL TRUSTEES	CURTIS FAMILY BELMONT A	127 MOUNTAIN ROAD	CONCORD	NH	03301
012.0-0720-0044.0	295 MAIN ST 17	EAST MIDDLESEX ASSOC FOR	RETARDED CITIZENS, INC.	20 GOULD ST	READING	MA	01867
012.0-0720-0079.0	239 MAIN ST B9	SOLIMINI LANCE M		3 DIANE DRIVE	WOBURN	MA	01801
012.0-0721-0044.0	295 MAIN ST 18	MCDERMOTT RYAN		295 MAIN ST #18	READING	MA	01867
012.0-0721-0079.0	239 MAIN ST B10	CALABRO JANET A		5 WASHINGTON ST APT D10	READING	MA	01867
012.0-0722-0044.0	295 MAIN ST 19	LAU YUEN CHI		295 MAIN ST UNIT 19	READING	MA	01867

Abutters List

ParcelID	Location	Owner	Co-Owner	Mailing Address	City	State	Zip
012.0-0722-0079.0	239 MAIN ST B11	HEDEGOR BEVERLY J		239 MAIN ST APT#B11	READING	MA	01867
012.0-0723-0044.0	295 MAIN ST 20	MUKHERJEE BARUN	MON MUKHERJEE	295 MAIN ST #20	READING	MA	01867
012.0-0723-0079.0	239 MAIN ST B12	CALLAHAN COLIN P		39 MYSTIC AVE	MELROSE	MA	02176
012.0-0724-0044.0	295 MAIN ST 21	APOSTOLOU ANDREAS		295 MAIN ST UNIT 21	READING	MA	01867
012.0-0724-0079.0	241 MAIN ST C1	MCCRACKEN D PATRICK	KELLY M O`LEARY	35 PINEVALE ROAD	READING	MA	01867
012.0-0725-0044.0	295 MAIN ST 22	LYONS MICHAEL		295 MAIN ST UNIT 22	READING	MA	01867
012.0-0725-0079.0	241 MAIN ST C2	BARRY LOIS TRUSTEE	BELMONT ARMS REALTY TF	241 MAIN ST UNIT C2	READING	MA	01867
012.0-0726-0044.0	295 MAIN ST 23	TAGGART VIRGINIA M		295 MAIN ST #23	READING	MA	01867
012.0-0726-0079.0	241 MAIN ST C3	LANDRY MICHELE L		241 MAIN STREET UNIT C3	READING	MA	01867
012.0-0727-0044.0	295 MAIN ST 24	ANTOUNIAN ALEXANDER	ANTOUNIAN HAGOP	48 WEBSTER RD	LEXINGTON	MA	02420
012.0-0727-0079.0	241 MAIN ST C5	FILLIO NANCY E		241 MAIN ST #C-5	READING	MA	01867
012.0-0728-0044.0	295 MAIN ST 25	CUTONE MARY		295 MAIN ST UNIT 25	READING	MA	01867
012.0-0728-0079.0	241 MAIN ST C6	CRAM BRIAN M		241 MAIN ST UNIT C-6	READING	MA	01867
012.0-0729-0044.0	295 MAIN ST 26	CASALI DANA		295 MAIN ST UNIT #26	READING	MA	01867
012.0-0729-0079.0	241 MAIN ST C7	DIMINICO DEANNA F		241 MAIN ST UNIT 7-C	READING	MA	01867
012.0-0730-0044.0	295 MAIN ST 27	WALSH WILLIAM J		295 MAIN ST UNIT 27	READING	MA	01867
012.0-0730-0079.0	241 MAIN ST C8	DESHAIES JANET E		25 FRANCIS ST	NORTH READING	MA	01864
012.0-0731-0044.0	295 MAIN ST 28	FULA JOSEPH FERNANDO		295 MAIN ST UNIT 28	READING	MA	01867
012.0-0731-0079.0	241 MAIN ST C9	STINCHFIELD PETER W	MACCIOLI DENISE E	241 MAIN ST UNIT C9	READING	MA	01867
012.0-0732-0044.0	295 MAIN ST 29	LOMBARDI PAUL L		295 MAIN ST APT #29	READING	MA	01867
012.0-0732-0079.0	241 MAIN ST C10	ROCCO MARK C		241 MAIN ST APT #C10	READING	MA	01867
012.0-0733-0044.0	295 MAIN ST 30	JACKSON WALTER T JR		295 MAIN ST UNIT 30	READING	MA	01867
012.0-0733-0079.0	241 MAIN ST C11	ANCH NORTH LLC		186 COUNTY RD	READING	MA	01867
012.0-0734-0079.0	241 MAIN ST C12	BALL RAYMOND F III		241 MAIN ST UNIT C-12	READING	MA	01867
012.0-0735-0079.0	243 MAIN ST D1	MCKENNA ROBERT TRUSTEE	ROBERT MCKENNA TRUST	243 MAIN ST #D1	READING	MA	01867
012.0-0736-0079.0	243 MAIN ST D2	GARDNER STEPHEN	GARDNER BRENDA	243 MAIN ST UNIT #2D	READING	MA	01867
012.0-0737-0079.0	243 MAIN ST D3	ZHANG JINGWU	WU KE	30 ORCHARD PARK DR	READING	MA	01867
012.0-0738-0079.0	243 MAIN ST D4	D`ONOFRIO JUDITH A TRUSTEE	THE JUDITH A D`ONOFRIO T	16 OXBOW LN	BURLINGTON	MA	01803
012.0-0739-0079.0	243 MAIN ST D5	SHARRA DHESPINA		243 MAIN ST UNIT D5	READING	MA	01867
012.0-0740-0079.0	243 MAIN ST D6	SAADE JOSEPH E		243 MAIN ST UNIT 6D	READING	MA	01867
012.0-0741-0079.0	243 MAIN ST D7	TSARTSIDIS IOANNIS		243 MAIN ST UNIT 7D	READING	MA	01867
012.0-0742-0079.0	243 MAIN ST D8	PHLORIDIS KATHLEEN		31 SOUTH BEDFORD ST	BURLINGTON	MA	01803-4512
012.0-0743-0079.0	243 MAIN ST D9	NOVYTSKA TATYANA		243 MAIN ST UNIT 9D	READING	MA	01867
012.0-0744-0079.0	243 MAIN ST D10	CHANDRASEKAR SUJATHA		6 SHACKFORD RD	READING	MA	01867
012.0-0745-0079.0	243 MAIN ST D11	OLEARY JAMES		243 MAIN ST UNIT D11	READING	MA	01867
012.0-0746-0079.0	243 MAIN ST D12	MEDAPATI LAKSHIMI K	MEDAPATI RAVIRAM TE	24 RAYMOND BLVRD	PARSIPANNY	NJ	07054

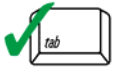
End of Report

Attachment E Filing Fees



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:

259 and 267 Main Street Reading
 a. Street Address b. City/Town
7571 \$512.50
 c. Check number d. Fee amount

2. Applicant Mailing Address:

Jay Finnegan
 a. First Name b. Last Name
Stonegate Construction Corp.
 c. Organization
273 Corporate Drive, Suite 150
 d. Mailing Address
Portsmouth NH 03801
 e. City/Town f. State g. Zip Code
(603) 334-3366 jfinnegan@finnegandevlopment.com
 h. Phone Number i. Fax Number j. Email Address

3. Property Owner (if different):

Brenda Van Horn
 a. First Name b. Last Name
259-267 Main Street LLC
 c. Organization
53 Mt Vernon Street
 d. Mailing Address
Reading MA 01867
 e. City/Town f. State g. Zip Code
 h. Phone Number i. Fax Number j. Email Address

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

B. Fees

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
Category 3.b.	1	\$1,050.00	\$1,050.00
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Step 5/Total Project Fee:			\$1,050.00

Step 6/Fee Payments:

Total Project Fee:	\$1,050.00
State share of filing Fee:	\$512.50
City/Town share of filing Fee:	\$537.50
	a. Total Fee from Step 5
	b. 1/2 Total Fee less \$12.50
	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.)

Attachment F Seed Mix Specifications

NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002

PHONE: 413-548-8000 FAX 413-549-4000

EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Wetmix (Wetland Seed Mix)

Botanical Name	Common Name	Indicator
<i>Carex vulpinoidea</i>	Fox Sedge	OBL
<i>Carex scoparia</i>	Blunt Broom Sedge	FACW
<i>Carex lurida</i>	Lurid Sedge	OBL
<i>Carex lupulina</i>	Hop Sedge	OBL
<i>Poa palustris</i>	Fowl Bluegrass	FACW
<i>Bidens frondosa</i>	Beggar Ticks	FACW
<i>Scirpus atrovirens</i>	Green Bulrush	OBL
<i>Asclepias incarnata</i>	Swamp Milkweed	OBL
<i>Carex crinita</i>	Fringed Sedge	OBL
<i>Vernonia noveboracensis</i>	New York Ironweed	FACW+
<i>Juncus effusus</i>	Soft Rush	FACW+
<i>Aster lateriflorus (Symphyotrichum lateriflorum)</i>	Starved/Calico Aster	FACW
<i>Iris versicolor</i>	Blue Flag	OBL
<i>Glyceria grandis</i>	American Mannagrass	OBL
<i>Mimulus ringens</i>	Square Stemmed Monkey Flower	OBL
<i>Eupatorium maculatum (Eutrochium maculatum)</i>	Spotted Joe Pye Weed	OBL

PRICE PER LB. \$135.00 MIN. QUANTITY 1 LBS. TOTAL: \$135.00

APPLY: 18 LBS/ACRE :2500 sq ft/lb

The New England Wetmix (Wetland Seed Mix) contains a wide variety of native seeds that are suitable for most wetland restoration sites that are not permanently flooded. All species are best suited to moist ground as found in most wet meadows, scrub shrub, or forested wetland restoration areas. The mix is well suited for detention basin borders and the bottom of detention basins not generally under standing water. The seeds will not germinate under inundated conditions. If planted during the fall months the seed mix will germinate the following spring. During the first season of growth several species will produce seeds while other species will produce seeds after the second growing season. Not all species will grow in all wetland situations. This mix is comprised of the wetland species most likely to grow in created/restored wetlands and should produce more than 75% ground cover in two full growing seasons.

The wetland seeds in this mix can be sown by hand, with a hand-held spreader, or hydro-seeded on large or hard to reach sites. Lightly rake to insure good seed-to-soil contact. Seeding can take place on frozen soil, as the freezing and thawing weather of late fall and late winter will work the seed into the soil. If spring conditions are drier than usual watering may be required. If sowing during the summer months supplemental watering will likely be required until germination. A light mulch of clean, weed free straw is recommended.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is \$/bulk pound, FOB warehouse, Plus SH and applicable taxes.

NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002

PHONE: 413-548-8000 FAX 413-549-4000

EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Erosion Control/Restoration Mix for Dry Sites

Botanical Name	Common Name	Indicator
<i>Elymus canadensis</i>	Canada Wild Rye	FACU+
<i>Festuca rubra</i>	Red Fescue	FACU
<i>Lolium multiflorum</i>	Annual Ryegrass	
<i>Lolium perenne</i>	Perrenial Ryegrass	
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Panicum virgatum</i>	Switch Grass	FAC
<i>Sorghastrum nutans</i>	Indian Grass	UPL

PRICE PER LB. \$18.00 MIN. QUANTITY 5 LBS. **TOTAL:** \$90.00 APPLY: 35 LBS/ACRE :1250 sq ft/lb

The New England Erosion Control/Restoration Mix For Dry Sites provides an appropriate selection of native and naturalized grasses to ensure that dry and recently disturbed sites will be quickly revegetated and the soil surface stabilized. It is an appropriate seed mix for road cuts, pipelines, steeper slopes, and areas requiring quick cover during the ecological restoration process. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper soil-seed contact. Best results are obtained with a Spring or late Summer seeding. Late Spring through Mid-Summer seeding will benefit from a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering will be required. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free seed bed is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is \$/bulk pound, FOB warehouse, Plus SH and applicable taxes.

NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002

PHONE: 413-548-8000 FAX 413-549-4000

EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Conservation/Wildlife Mix

Botanical Name	Common Name	Indicator
<i>Elymus virginicus</i>	Virginia Wild Rye	FACW-
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Andropogon gerardii</i>	Big Bluestem	FAC
<i>Festuca rubra</i>	Red Fescue	FACU
<i>Sorghastrum nutans</i>	Indian Grass	UPL
<i>Panicum virgatum</i>	Switch Grass	FAC
<i>Chamaecrista fasciculata</i>	Partridge Pea	FACU
<i>Desmodium canadense</i>	Showy Tick Trefoil	FAC
<i>Asclepias tuberosa</i>	Butterfly Milkweed	NI
<i>Bidens frondosa</i>	Beggar Ticks	FACW
<i>Eupatorium purpureum (Eutrochium maculatum)</i>	Purple Joe Pye Weed	FAC
<i>Rudbeckia hirta</i>	Black Eyed Susan	FACU-
<i>Aster pilosus (Symphyotrichum pilosum)</i>	Heath (or Hairy) Aster	UPL
<i>Solidago juncea</i>	Early Goldenrod	

PRICE PER LB. \$39.50 MIN. QUANTITY 2 LBS. **TOTAL:** \$79.00

APPLY: 25 LBS/ACRE :1750 sq ft/lb

The New England Conservation/Wildlife Mix provides a permanent cover of grasses, wildflowers, and legumes for both good erosion control and wildlife habitat value. The mix is designed to be a no maintenance seeding, and is appropriate for cut and fill slopes, detention basin side slopes, and disturbed areas adjacent to commercial and residential projects.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is \$/bulk pound, FOB warehouse, Plus SH and applicable taxes.

NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002

PHONE: 413-548-8000 FAX 413-549-4000

EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Wildflower Mix

Botanical Name	Common Name	Indicator
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Sorghastrum nutans</i>	Indian Grass	UPL
<i>Chamaecrista fasciculata</i>	Partridge Pea	FACU
<i>Elymus virginicus</i>	Virginia Wild Rye	FACW-
<i>Elymus canadensis</i>	Canada Wild Rye	FACU+
<i>Festuca rubra</i>	Red Fescue	FACU
<i>Asclepias tuberosa</i>	Butterfly Milkweed	NI
<i>Vernonia noveboracensis</i>	New York Ironweed	FACW+
<i>Oenothera biennis</i>	Evening Primrose	FACU-
<i>Aster novae-angliae (Symphyotrichum novae-anglia)</i>	New England Aster	FACW-
<i>Rudbeckia hirta</i>	Black Eyed Susan	FACU-
<i>Solidago juncea</i>	Early Goldenrod	
<i>Eupatorium fistulosum (Eutrochium fistulosum)</i>	Hollow-Stem Joe Pye Weed	FACW
<i>Aster lateriflorus (Symphyotrichum lateriflorum)</i>	Starved/Calico Aster	FACW

PRICE PER LB. \$75.00 MIN. QUANTITY 1 LBS. TOTAL: \$75.00 APPLY: 23 LBS/ACRE :1900 sq ft/lb

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is \$/bulk pound, FOB warehouse, Plus SH and applicable taxes.

Attachment G Site Plans