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 s.40)

Lower Basin Barracks Modernization

Boston, Massachusetts

Submitted to:

City of Boston Conservation Commission
1 City Hall Square, Room 709
Boston, MA 02201

and

MassDEP Northeast Regional Office
205B Lowell Street
Wilmington, Massachusetts 01887

Submitted by:

Massachusetts Division of Capital Asset Management and Maintenance on Behalf of the Department of Conservation and Recreation and the Massachusetts State Police

Prepared by:

Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, Massachusetts 01754

In Association with:
Finegold Alexander Architects
Copley Wolff Design Group
Samiotes Consultants, Inc.
STV Construction, Inc.

December 5, 2018

Epsilon ASSOCIATES INC.

December 5, 2018

City of Boston Conservation Commission
1 City Hall Square, Room 709
Boston, MA 02201

Subject: **Notice of Intent**
Lower Basin Barracks Modernization Project, Boston, MA

Dear Conservation Commission Members:

On behalf The Massachusetts Division of Capital Asset Management and Maintenance (DCAMM), the Massachusetts Department of Conservation and Recreation (DCR), and the Massachusetts State Police, Epsilon Associates, Inc. is pleased to submit the attached Notice of Intent for the renovation, modernization, and expansion of the DCR 1908 Lower Basin Barracks building at the intersection of Charles River Dam Road and Storrow Drive, and the conversion of much of the paved portions of the site to landscaped public open space. Together, these activities and improvements constitute the Lower Basin Barracks Modernization Project (the Project).

Work activities associated with the Project building and landscape improvements subject to the Massachusetts Wetland Protection Act will be limited to an area of the 100-foot buffer zone of the resource area "Bank," but benefits in the form of increased pervious area, improved stormwater runoff quality, and enhanced groundwater recharge should accrue to the nearby waters of the Charles River Basin. The Project has been designed to comply with the Wetlands Protection Act Regulations (310 CMR 10.00 *et seq.*), the Massachusetts Stormwater Standards as a redevelopment project, and the Boston Conservation Commission's policy on resiliency. Please refer to the attached Notice of Intent and supporting documents.

Please contact me directly at (978) 461-6248, or via email at amagee@epsilonassociates.com to schedule a site inspection or with questions regarding this correspondence. Thank you for your attention to this matter.

Sincerely,
EPSILON ASSOCIATES, INC.

Andrew D. Magee
Principal

cc: MassDEP – NERO
encl.

3 Mill & Main Place, Suite 250
Maynard, MA 01754
www.epsilonassociates.com

The Commonwealth of Massachusetts
Department of State Police

CHARLES D. BAKER
GOVERNOR

KARYN E. POLITO
LIEUTENANT GOVERNOR

DANIEL BENNETT
SECRETARY

COLONEL KERRY A. GILPIN
SUPERINTENDENT

November 28, 2018

Conservation Commission
City of Boston
1 City Hall Square, Room 709
Boston, MA 02201

Subject: **Notice of Intent**
Lower Basin Barracks Modernization Project, Boston, MA

Dear Conservation Commission Members:

The Massachusetts State Police are aware of, consent to, and fully support, the filing of a Notice of Intent under the *Massachusetts Wetlands Protection Act* for the Lower Basin Barracks Modernization Project. The Massachusetts State Police (MSP), in collaboration with the Massachusetts Department of Conservation and Recreation (DCR), and the Massachusetts Division of Capital Asset Management and Maintenance (DCAMM), are eager to proceed with the implementation of the proposed improvements to the site and building. The modernized barracks will enable the MSP to continue to support DCR and provide public safety services for the Charles River Reservation and the Charles River Basin waters.

Thank you for your review of this Project.

Sincerely,

Colonel Kerry A. Gilpin, Superintendent
Massachusetts State Police

EC: Elizabeth Minnis, AIA, Deputy Commissioner of Planning, DCAMM
Patrice Kish, Acting Director of Planning, DCR
Catherine Walsh, Senior Project Manager, DCAMM

Altaf Mulla, AIA, Senior Project Manager, DCAMM
Carol Meeker, Deputy General Counsel, DCAMM
Michelle Small, Chief Administrative Officer, POL
John Cronin, Deputy Chief Administrative Officer, POL
Paul Hession, Director of Facilities, POL

Massachusetts Department of Environmental Protection
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Lower Basin Barracks Modernization
Boston, Massachusetts

Submitted to:

City of Boston Conservation Commission
1 City Hall Square, Room 709
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and

MassDEP Northeast Regional Office
205B Lowell Street
Wilmington, Massachusetts 01887

Submitted by:

Massachusetts Division of Capital Asset Management and Maintenance on Behalf of the
Department of Conservation and Recreation and the Massachusetts State Police

Prepared by:

Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, Massachusetts 01754

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December 5, 2018

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ATTACHMENT G – PROJECT PLANS

WPA Form 3

Notice of Intent

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

Boston
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):

250 Leverett Circle — a. Street Address
Boston — b. City/Town
02114 — c. Zip Code

Latitude and Longitude:
42d 21' 59.329" North — d. Latitude
71d 4' 8.817" West — e. Longitude

0300942000 — f. Assessors Map/Plat Number
g. Parcel /Lot Number

2. Applicant:

Elizabeth — a. First Name
Minnis — b. Last Name
Massachusetts Division of Capital Asset Management and Maintenance on behalf of the Department of Conservation and Recreation and the Massachusetts State Police
One Ashburton Place, 15th Floor — d. Street Address
Boston — e. City/Town
MA — f. State
02108 — g. Zip Code
857-204-1566 — h. Phone Number
i. Fax Number
liz.minnis@state.ma.us — j. Email Address

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

Patrice — a. First Name
Kish — b. Last Name
Massachusetts Department of Conservation and Recreation — c. Organization
251 Causeway Street, Suite 700 — d. Street Address
Boston — e. City/Town
MA — f. State
02114 — g. Zip Code
617-626-1378 — h. Phone Number
i. Fax Number
patrice.kish@state.ma.us — j. Email address

4. Representative (if any):

Andrew — a. First Name
Magee — b. Last Name
Epsilon Associates, Inc. — c. Company
3 Mill & Main Place, Suite 250 — d. Street Address
Maynard — e. City/Town
MA — f. State
01754 — g. Zip Code
978-897-7100 — h. Phone Number
978-897-0099 — i. Fax Number
amagee@epsilonassociates.com — j. Email address

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

2,012.50 — a. Total Fee Paid
512.50 — b. State Fee Paid
$1,500 (City fee schedule) — c. City/Town Fee Paid

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A. General Information (continued)

6. General Project Description:

The Project anticipates the renovation and expansion of the DCR 1908 Lower Basin Barracks building, the demolition of the 1937 Stop Plank Garage, relocation of the existing tennis courts to North Point Park, elimination of DCR on-site parking, and the conversion of much of the paved portions of the site to landscaped public open space.

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

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

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

1. ☐ Yes ☒ No

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

2. Limited Project Type

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

8. Property recorded at the Registry of Deeds for:

a. County	b. Certificate # (if registered land)
Suffolk	
Charles River Basin Commission Taking #14 Book 3388 Page 323 and …	Metropolitan Parks Commission Taking #1063 Book 6575 Page 142

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. *Buffer Zone to Bank
2. ☒** Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas). **Riverfront Area: Exempt Activity per 310 CMR 10.58(6)(i)

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.

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

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

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

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☐ Bordering Land Subject to Flooding	1. square feet 3. cubic feet of flood storage lost	2. square feet 4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☒ Riverfront Area	Charles River Basin - 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: 14,550* square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
14,550*	14,550*	0

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.

* Riverfront Area: Exempt Activity per 310 CMR 10.58(6)(i)

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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.

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

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

4. ☐ Restoration/Enhancement

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

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

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

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

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

   a. ☐ Yes ☒ No

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

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

   2017
   b. Date of map

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

   c. Submit Supplemental Information for Endangered Species Review*

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

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

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

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

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

   (b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see 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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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

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

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

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

   b. ACEC

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

   a. ☐ Yes ☒ No

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

   a. ☐ Yes ☒ No

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

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

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

      2. ☒ A portion of the site constitutes redevelopment

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

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

      1. ☐ Single-family house

      2. ☐ Emergency road repair

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

D. Additional Information

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

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

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

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

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

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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.

See Attachment G, Project Plans
a. Plan Title

b. Prepared By

c. Signed and Stamped by

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:

37457
2. Municipal Check Number

11/19/2018
3. Check date

37456
4. State Check Number

11/19/2018
5. Check date

Epsilon Associates, Inc.
6. Payor name on check: First Name

7. Payor name on check: Last Name

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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.

1. Signature of Applicant

2. Date: 11.20.18

3. Signature of Property Owner (if different)

4. Date: 11.2.18

5. Signature of Representative (if any)

6. Date: 21 November 2018

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 A

Project Narrative

ATTACHMENT A - PROJECT NARRATIVE

The Massachusetts Division of Capital Asset Management and Maintenance (DCAMM), on behalf of the Department of Conservation and Recreation (DCR) and the Massachusetts State Police (MSP), is proposing the renovation, modernization, and expansion of the DCR 1908 Lower Basin Barracks building (a.k.a. the Lower Lock Gatehouse), the demolition of the 1937 Stop Plank Garage, the relocation of the existing on-site tennis courts to North Point Park immediately north of the Old Charles River Dam, elimination of DCR on-site parking, and the conversion of much of the paved portions of the site to landscaped public open space. Together, these activities and improvements constitute the Lower Basin Barracks Modernization Project (the Project).

Certain work associated with Lower Basin Barracks Modernization Project will occur within the 100-foot buffer zone of a resource area subject to protection under the Massachusetts Wetlands Protection Act (WPA); specifically, "Bank" (inland). This Notice of Intent (NOI) is being submitted to the City of Boston Conservation Commission under the WPA to demonstrate the Project's compliance with the performance stands of the WPA and its associated regulations at 310 CMR 10.00.

1.0 Existing Conditions

The Lower Basin Barracks Modernization Project site is located within the "Lower" Basin of the DCR Charles River Reservation, at the intersection of Charles River Dam Road and the westbound lane of Storrow Drive at Leverett Circle. The site is approximately 2.21 acres in area and includes the approximately 16,968 gross-square-foot Lower Basin Barracks building and the 2,405 gross-square-foot Stop Plank Garage. The site is primarily paved, but also includes two tennis courts. Vehicular access to the site is via driveway entrances on Charles River Dam Road and the westbound lane of Storrow Drive. A locus map for the Project site is presented in Figure 1, Site *Locus - USGS Map*, while an aerial photograph identifying the principle features of the site is presented in Figure 2, *Site Locus – Vertical Aerial Photograph* (figures are presented in Attachment B, *Figures*). An existing conditions survey plan of the site is included in Attachment G*, Project Plans.*

As can be seen in Figures 1 and 2, the Project site borders the "old lock" of the Old Charles River Dam and extends southwestward into the freshwater Charles River Basin. The site edge is comprised of a vertical concrete retaining wall along the length of the old lock, which converts to a vertical concrete and stone retaining wall where the site extends southward beyond the mouth of the old lock.

The Charles River Basin at this location is a freshwater body, but was tidally influenced prior to the construction of the Old Charles River Dam and locks system. Under the current regime, the river is maintained as a freshwater resource, with the water level in the basin upstream of the dam kept relatively constant.

2.0 Site Context and Use

The existing conditions of the Project site may be best understood in the context of the development of the Charles River Basin, dating to the construction of the Old Charles River Dam in 1910. As shown on Figure 2, the Lower Basin Barracks Modernization Project site encompasses three structures – the Lower Lock Gatehouse and the Upper Lock Gatehouse, which were built to house the gates, pumps, and mechanisms to operate the old lock gear, and the Stop Plank Garage, which was added in 1937 to house stop plank operations associated with flood control in the Charles River Basin. Soon after opening, the buildings were occupied for use as a police station and then by the Metropolitan District Police for the purposes of maintaining and patrolling the new Charles River Reservation and waters. The Massachusetts State Police have occupied the Lower Lock Gatehouse building as a DCR tenant since 1992, and continue the former Metropolitan District Police function of maintaining public safety along the Charles River Reservation waterway and roadways. Meanwhile, the Stop Plank Garage has been utilized by the DCR flood control operations group for the storage of stoplogs, baffles, hardware, and tools related to the manipulation of waters at the dams along the Charles River (and Mystic and Neponset Rivers), as well as the parkway pump stations along Storrow Drive, Soldiers Field Road, Soldiers Field Road Extension, and Memorial Drive. Finally, the tower of the Lower Lock Gatehouse continues to be utilized by the Massachusetts Department of Transportation (MassDOT), also as a DCR tenant, as the control room for the recently rebuilt Craigie Drawbridge.

The Massachusetts State Police (MSP) is the principal statewide law enforcement agency in the Commonwealth, comprised of approximately 2,200 sworn officers and 500 civilian personnel who serve the citizens of the Commonwealth. The primary mission of the MSP is to provide policing directed at achieving safer roadways and reducing crime through investigations, education and patrol services, and to provide leadership and resources during natural disasters, civil disorders, and critical incidents. The MSP also have primary responsibility for public safety and law enforcement on DCR parkland.

A state-wide system of thirty-two barracks provides a base of operations for the MSP. The Lower Basin Barracks Modernization Project proposes the modernization and continued MSP use of the existing Lower Lock Gatehouse building, and the consolidation of the MSP Brighton Barracks with the Lower Basin Barracks. The Brighton Barracks, which is currently temporarily housed in leased space at 46 Leo M. Birmingham Parkway in Brighton, has responsibility for the river roads and parks in Watertown on the Memorial Drive side of the river, and in Allston on the Storrow Drive side of the river. Under the proposed consolidation, the MSP Lower Basin Barracks will have responsibility for patrolling the Charles River and Charles River Basin from Leverett Circle to Newton Lower Falls. The consolidation of these two stations will result in operational efficiencies, a more coordinated police response along the river-ways, and improved safety for the public parks, boathouses, boat ramps, and bridges along the Charles River and Charles River Basin.

While the primary purpose of the Lower Basin Barracks Modernization Project is the continuation of the existing use of the Lower Lock Gatehouse building as the MSP Lower Basin Barracks, the site improvements associated with this Project will also result in the preservation and expansion of an integral part of the DCR parkland within the Charles River Basin. The Esplanade Association, a community group dedicated to restoring and enhancing the Charles River Reservation, has articulated as a guiding principle in the "*Esplanade 20/20*" vision document the goal to "*preserve and restore the best historic settings, buildings, and sites*," of which the Lower Lock Gatehouse building and Lower Basin Barracks Modernization Project site are key. The Massachusetts Historical Commission (MHC) notes that the Lower Lock Gatehouse structure is a significant contributing element to the Charles River Basin District, which is listed in the National Register of Historic Places.

3.0 Project Description

The Lower Basin Barracks Modernization Project anticipates the renovation and expansion of the historic Lower Lock Gatehouse (the Lower Basin Barracks building), the demolition of the Stop Plank Garage, and the conversion of much of the paved portions of the site to landscaped public open space. While improvements to the Upper Lock Gatehouse are being contemplated, none are proposed as part of this Project. The Lower Lock Gatehouse building and the site landscaping improvements proposed as part of the Lower Basin Barracks Modernization Project are described below.

3.1 Building Improvements

The Lower Basin Barracks Modernization Project site occupies a prominently visible location in the Lower Charles River Basin, and provides an opportunity for the development of a public facility that appropriately balances functionality and visual appeal. Rehabilitation of the historic structure and surrounding setting to serve future needs will be complemented with a building addition and low impact site development tailored to this environmentally sensitive context. To this end, the architectural and landscape components of the Project have been designed so as to recognize the Charles River Reservation as one of Boston's treasures and major public recreational amenities.

The Lower Lock Gatehouse building was originally designed as the quarters for the locks tenders, complete with living, dining, and dormitory quarters and a machine shop. Soon after opening, the tender's quarters were taken over for use as a police station, and the use of the building as a public safety facility continues to this day. The MSP have occupied the Lower Lock Gatehouse building as DCR tenants since 1992 as a result of the merger with the Metropolitan District Police.

The Lower Lock Gatehouse building is deemed structurally sound, but has outdated mechanical and plumbing systems, as well as significant accessibility and life safety deficiencies. Built in 1908 and added to several times thereafter, the two-story loadbearing

masonry building and four-story tower consists of approximately 16,968 gross-square-feet. The building is in fair to good condition, although it lacks any kind of thermal insulation system. Recent roof repairs have been undertaken to avert further water damage that has taken a toll on the brick exterior, as well as the interior finishes of the building. Meanwhile, the mechanical and plumbing systems in the building are aged, in fair to poor condition, the electrical service is inadequate, the structure is not equipped with a sprinkler system, and the life safety features are substandard.

The Stop Plank Garage building was constructed in 1937 and is a loadbearing masonry building that encompasses approximately 2,405 gross-square-feet and a loft. The two-story, hipped-roof, yellow brick structure is in generally fair to poor condition. The roof is missing entirely along a section along the ridge line, and the slate roof is in poor condition and in need of replacement. Continued water infiltration is causing ongoing deterioration to the structure. Building systems are old, and there are no thermal insulation, fire protection or life safety systems in the building. As proposed, this structure will be demolished and the DCR flood management equipment and activities therein will be transferred to the existing Fens Gatehouse at the intersection of Charlesgate and Storrow Drive.

The proposed expansion of the Lower Lock Gatehouse building will consist of an approximately 4,042 gross-square-foot, single story addition paralleling the western length of the existing building. A photograph of the existing structure and a rendering of the proposed addition as seen from the old lock are presented in Figure 3, *Existing Barracks and Proposed Building Addition*. Meanwhile, the number of parking spaces onsite will be decreased from 75 to 22, with much of the former parking area, as well as the footprint area of the Stop Plank Garage, converted to landscaped public open space. A site plan showing the expanded Lower Basin Barracks building footprint and the re-configured parking and open space landscaping is presented in Figure 4, *Revitalized Lower Basin Barracks Site and Landscape Plan*. A more detailed landscaping plan is presented as Plan L-100, *Site Plan*, in Attachment G.

The renovated and expanded Lower Basin Barracks building is being sized to provide sufficient capacity for the consolidated Lower Basin and Brighton MSP Barracks, with space for current and projected mission requirements. The building will also include an approximately 598 square-foot multi-purpose meeting room which will be used for occasional MSP briefings, but will also be available for public meetings scheduled by neighborhood and local interest groups. Accessible public restrooms available around the clock will also be provided. One of the important features of the proposed modernized barracks is the inclusion of a sally port, which will enhance the safe and secure transfer of detainees between MSP vehicles and the barrack's holding facility in all weather conditions, with increased protection for officers and the public.

The tower in the Lower Lock Gatehouse building accommodates the MassDOT drawbridge operator and this function will remain in uninterrupted operation at this location during the construction phase of the Project. Other personnel accommodated in this building will be relocated to temporary quarters prior to and/or during construction.

3.2 Landscape Improvements

The Project anticipates considerable improvements to the Lower Basin Barracks Modernization Project site, including improved pedestrian access and an expansion of the public parkland area of the Charles River Reservation. The proposed improvements to the site landscape are described below.

As can be seen in Figure 2, most of the Lower Basin Barracks Modernization Project site is currently paved or occupied by the three existing buildings. There is limited public access to the site, other than for parking, and essentially no public access to the water's edge along the old lock. In contrast, under the proposed plan more than half of the site will be designated as landscaped public open space, including lawn area, cross-site pedestrian ways, and a linear riverside path running along a portion of the site's edge along the old lock (see Figure 4). This substantial increase in landscaped public open space is the direct result of the reduction of parking spaces from the current 75 to 22, the relocation of the tennis courts to the North Point Park, and the removal of the Stop Plank Garage. The conversion of this significant portion of the site to landscaped open space with a spacious lawn has the effect of opening-up and expanding the Charles River Reservation, both to pedestrian access along the riverfront as well as visual access to the waterway.

The landscaping plan has been designed to create pedestrian connections through the site in multiple directions. The existing perimeter sidewalks along Charles River Dam Road and Storrow Drive will be maintained in their current location, but will be modified at the corner so as to create a safe pedestrian-friendly link to the proposed Leverett Circle Pedestrian Bridge (a separate project being undertaken by MassDOT). Meanwhile, a new pedestrian link will be created along the driveway entrance on Charles River Dam Road that will allow a more direct access to the new lawn along the historic old lock and beyond to the Charlesbank Playground, the Teddy Ebersol's Red Sox Fields, the Hatch Shell and the upper stretches of the Esplanade. This new pathway will fork near the center of the Project site, continuing westward into the Esplanade along Storrow Drive, or northward to the new Harborwalk section along the old lock. The Paul Dudley White bicycle path will continue uninterrupted along the length of the Project site and turn the corner on to the Charles River Dam Road.

The extent of the landscaping improvements is maximized as a result of the demolition of the Stop Plank Garage, tennis courts, and paved parking area, and the placement of the proposed building addition in a manner which creates a compact footprint for the future Lower Basin Barracks building. Other building addition alternatives that were considered included placing the addition at a right angle to either the northern or southern end of the

existing building, parallel and adjacent to the old lock, or parallel to Storrow Drive, but essentially bisecting the site. In both alternatives, the result was to push the parking and service areas out into the area now being proposed as lawn/open space. More significantly, doing so also created a physical and visual barrier to the water's edge of the site. The building and landscaping layout presented herein concentrates the MSP activities associated with the building to the area immediately around the building, maximizes the expansion of the landscaped open spaces of the Charles River Reservation into the former paved portions of the site, and reduces the extent of impervious surface.

3.3 Sustainability and Resiliency Improvements

The proposed building expansion is being designed in accordance with the June 2017 "*DCAMM Statewide Resilience Master Plan"* and so as to meet the requirements of Massachusetts LEED Plus criteria. Meanwhile, the renovation of the existing building will bring that portion of the barracks facility up to and beyond current building code. Although not located in a FEMA mapped floodplain, the Project will also respond to its proximity to the Charles River Basin with an appropriate level of building and site resiliency measures. Specific goals for the Project regarding sustainability and resiliency include the following:

- Baseline Goals – Meet all applicable Executive Order 484 requirements and Massachusetts LEED Plus criteria.

- Stretch Goals – Incorporate sustainable features to reduce energy, water and carbon emissions to the maximum extent possible within the Project budget constraints.

Figure 5, *Lower Basin Barracks Modernization Project Resiliency Plan*, identifies the key resiliency and sustainability improvements proposed for the building and site, as developed for the site in accordance with the *DCAMM Statewide Resilience Master Plan*. Principal among these as relates to the Project's location within the 100-foot buffer zone of inland Bank and the associated waters of the Charles River Basin are the proposed green roof for the major portion of the building addition and the inclusion of an extensive bioretention area in association with the site's stormwater management improvements (see Section 5.2, *Review of Stormwater Management Standards*).

In addition to the above discussion, the Boston Conservation Commission also requires applicants to submit a completed Boston Planning & Development Agency (BPDA) "*Climate Resiliency Report Summary"* with the NOI. The outline of the report summary was developed in association with the 2017 BPDA Board-approved "*Climate Resiliency - Review Policy Update,*" and replaces the prior "*Climate Change Resiliency and Preparedness Checklist."* The updated policy reflects the findings and recommendations of the Boston Research Advisory Group and the *Climate Ready Boston* report, and Mayor Martin J. Walsh's Carbon Neutral 2050 goal. Although the Project is not subject to City of Boston Zoning, a *Climate Resiliency Report Summary* has been prepared for the Project and is included as Attachment E, *Climate Resiliency Report Summary*, of this NOI.

4.0 Wetland Resources, Flood Zones, and Sea Level Rise

While the Project site is located adjacent to the waters of the Charles River Basin, and more specifically, the freshwater Charles River Basin above the Old Charles River Dam, on-site areas subject to jurisdiction under the Massachusetts Wetlands Protection Act (WPA) are limited to the 100-foot buffer zone of the WPA resource area "Bank." Figure 6, *Environmental Resources – Lower Basin Barracks Project Site*, shows the relationship of the site to the waters of the Charles River Basin and to the Bank of the old lock and Basin, while the following sections review the relationship of the Project activities to these resource areas.

4.1 Wetland Resource Areas

The Lower Basin Barracks Modernization Project site is located proximate to several wetland resources within which work is regulated under the Massachusetts WPA. These include (1) the concrete and granite block walls marking the shoreline of the old lock and the Charles River Basin, defined by the WPA regulations at §10.04 and §10.54(2) as "*Bank (inland)*;" (2) the land under the waters of the old lock and Charles River Basin, defined by the WPA regulations as "*Land Under Water Bodies and Waterways*;" and (3) areas identified as subject to flooding in a flood event with a 100-year recurrence interval (a flood event with a one percent chance of occurring in any given year), referred to as "*Land Subject to Flooding*." However, as noted above, work associated with the Project will not occur within any of these resource areas; rather WPA jurisdiction associated with the Project is limited to the work occurring within the 100-foot buffer zone of the resource area "Bank."

In addition to the 100-foot buffer zone of Bank, work along the Charles River Basin in Boston would typically be assumed to be subject to the Riverfront Area provisions of the WPA. Along the Charles River Basin in Boston, the Riverfront Area is defined as encompassing the land area within 25 feet of the mean annual high water line of the river (see Figure 6). However, pursuant to §10.58(6)(i) of the WPA regulations, projects subject to Chapter 91 licensing are not subject to the Riverfront Area provisions of the WPA regulations. In that the Project site is comprised entirely of filled tidelands subject to Chapter 91, a Chapter 91 license will be required for the Project; hence the Project is not subject to the Riverfront Area provisions of the WPA regulations.

4.1.1 Bank (Inland)

Bank is defined in the WPA regulations at §10.54(2)(a) as *"the portion of the land surface which normally abuts and confines a water body."* At the Lower Basin Barracks Modernization Project site, the granite block and concrete walls of the old lock and Charles River Basin function as the Bank of those water bodies. The upper boundary of Bank is defined in the regulations at §10.54(2)(c) as "… *the first observable break in slope or the mean annual flood level, whichever is lower*." Given that the 100-year flood level does not

extend onto the Lower Basin Barracks site (see Section 4.2, below), and that the mean annual flood level is lower, "Bank" on-site does not extend to the top of the granite block wall marking the edge of the site. Hence, work associated with the Project will occur only within the 100-foot buffer zone of the Bank resource area. The limits of the 100-foot Bank buffer zone are shown on Figure 6.

4.1.2 Land Under Water Bodies and Waterways

Land Under Water Bodies and Waterways is defined in the WPA regulations at §10.56(2)(a) as *"the land beneath any creek, river, stream, pond, or lake."* The boundary of Land Under Water Bodies and Waterways is the mean annual low water level.

The Project does not entail any work within the waters of the Charles River Basin and, hence, does not entail work within Land Under Water Bodies and Waterways. There is no buffer zone associated with Land Under Water Bodies and Waterways.

4.1.3 Land Subject to Flooding (Bordering)

Bordering Land Subject to Flooding is defined in the WPA regulations at §10.57(1)(a)1 as *"an area which floods from a rise in a bordering waterway or water body."* Generally, the regulations address those lands identified as located "*within the 100 year floodplain*." The 100-year flood elevation for the Charles River Basin proximate to the Project site as mapped by the Federal Emergency Management Agency (FEMA) extends to elevation 4 feet North American Vertical Datum (NAVD), or 10.46 feet Boston City Base (BCB) (FEMA Flood Insurance Rate Map 25025C0077J, Revised March 16, 2016). Figure 7, *FEMA Flood Insurance Rate Map*, shows the extent and elevation of the flood zone proximate to the Project site as mapped by FEMA. As shown thereon, neither the 100-year nor the 500-year flood plain extends onto the Project site. The FEMA mapping is supported by a recent field survey that indicates that site elevations range from slightly more than 13.5 feet to slightly more than 19.0 feet BCB, or 3.0 to 8.5 feet above the 100-year flood elevation predicted by FEMA (see *Existing Conditions Plan* in Attachment G).

The Project does not entail any work within the 100-year flood elevation as mapped by FEMA and, hence, does not entail work within Land Subject to Flooding. There is no buffer zone associated with Land Subject to Flooding.

4.2 Flood Zones and Sea Level Rise

As noted above, the Project site generally lies at an elevation 3.0 to 8.5 feet above the current FEMA estimate for 100-year flood conditions. In assessing future flood elevations in light of potential sea level rise, Section E of the above-referenced *Climate Resiliency Report Summary* utilizes the BPDA online "*Sea Level Rise - Flood Hazard Area"* mapping tool and makes recommendation as to design elevations for future flood events. The mapping tool indicates a *"Sea Level Rise – Base Flood Elevation"* (SLR–BFE) for the Project site in the area of the Lower Basin Barracks building as 14.9 feet BCB, with a SLR-BFE for the remainder of

the site of 16.7 feet BCB. The Report Summary then suggests that designers calculate a "*Sea Level Design Flood Elevation" by adding … 24 inches of freeboard for critical facilities and infrastructure and any ground floor residential units*." For the purpose of the BPDA mapping tool "*critical facilities and infrastructure"* are defined to include police stations. This would suggest a *Sea Level Design Flood Elevation* of 18.7 feet BCB for the Project building.

5.0 Mitigation Measures and Compliance with the Wetland Protection Regulations

The Lower Basin Barracks Modernization Project is being designed and will be constructed in compliance with the WPA as regards work in the 100-foot buffer zone of the WPA resource area "Bank," as well as in consideration of future flood elevations and sea level rise.

5.1 Proposed Work within the Buffer Zone of Inland Bank

Per the WPA regulations, work within the buffer zone of any resource area should not adversely impact the ability of that resource area to perform its presumed functions. For Bank, these presumed functions are identified at §10.54(4)(a) as "*1. the physical stability of the Bank; 2. the water carrying capacity of the existing channel within the Bank; 3. ground water and surface water quality; 4. the capacity of the Bank to provide breeding habitat, escape cover and food for fisheries*;" and "*5. the capacity of the Bank to provide important wildlife habitat functions*."

In that no work is proposed for the Bank proper, none of the presumed functions of the Bank will be adversely impacted. Indeed, the proposed improvements, and in particular the conversion of much of the site from impervious pavement to pervious lawn and landscaped areas and the introduction of stormwater management improvements designed in accordance with the Massachusetts Department of Environmental Protection (MassDEP) Massachusetts Stormwater Standards, should result in improvements to local groundwater and surface water quality. The proposed stormwater management improvements to the site are reviewed below, as are the mitigation measures designed to insure protection of the site banks and the adjacent waters of the Charles River Basin during site construction activities.

5.2 Review of Stormwater Management

Compliance with the MassDEP Stormwater Management Standards is required in association with the WPA public interest in providing for the "*prevention of pollution*." The Project will comply with the Massachusetts Stormwater Management Standards to the maximum extent practicable consistent with its status as a Redevelopment Project as defined in Standard 7 of the standards. A completed *Stormwater Report* is presented in Attachment F, *Stormwater Report*. A construction period and post-construction period

erosion control and operation and maintenance plan is included in Appendix 4, *Construction Period Pollution Prevention Plan and Erosion Control Operation and Maintenance Plan*, of the *Stormwater Report*.

The stormwater management system proposed for the Lower Basin Barracks Modernization site includes detention and infiltration systems that have been properly sized to manage site stormwater. The Project will allow for the restoration of the land surface, grading for proper stormwater management, and the introduction of areas of new vegetation and pervious landscaping. Site and stormwater management improvements will improve the quality of runoff from the site and will provide a net benefit to the quality of the waters of the Charles River Basin. The Project has been designed to fully comply with the Massachusetts Stormwater Management Standards. A summary of the Project's compliance with the standards is presented below, with more detailed information presented in the above-referenced *Stormwater Report*.

Standard 1: Untreated Stormwater. The Project's stormwater management system has been is designed so that stormwater conveyances (outfalls/discharges) do not discharge untreated stormwater into, or cause erosion to, wetlands or waters. Therefore Standard #1 is met.

Standard 2: Post-development Peak Discharge Rates. The Project as proposed will result in a significant decrease in impervious area. The stormwater management system has been designed so that there is no increase in post construction discharge rates from the site. Therefore Standard #2 is met.

Standard 3: Recharge to Groundwater. The 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 (BMPs), and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the MassDEP *Massachusetts Stormwater Handbook*.

Based on the reduction of impervious area, the total required recharge volume of the site is 0 cubic feet. However, the volume of water contained within the bioretention system below the outlet is 5,041 cubic feet, resulting in an even further improvement to groundwater discharge over the existing conditions. Therefore Standard #3 is met.

Standard 4: Total Suspended Solids (TSS) Removal. The BMPs selected to remove TSS from the impervious areas of this site include pea gravel diaphragms, a bioretention basin, a drainage channel, and a grass filter strip. These use of these BMPs results in an 80 percent TSS removal from both the rooftop and parking lot runoff. Therefore Standard #4 is met.

Standard 5: Higher Potential Pollutant Loads. The Project site does not contain "Land Uses with Higher Potential Pollutant Loads" as defined by the standards. Therefore Standard #5 is met.

Standard 6: Protection of Critical Areas. The site is not located within a critical area as defined by the standards. Critical areas as defined by the standards include Outstanding Resource Waters (ORW) as designated in 314 CMR 4.00, Special Resource Waters as designated in 314 CMR 4.00, recharge areas for public water supplies as defined in 310 CMR 22.02 (Zone Is, Zone IIs and Interim Wellhead Protection Areas for groundwater sources and Zone As for surface water sources), bathing beaches as defined in 105 CMR 445.000, cold-water fisheries as defined in 314 CMR 9.02 and 310 CMR 10.04, and shellfish growing areas as defined in 314 CMR 9.02 and 310 CMR 10.04. None of these areas is located on or proximate to the site. Therefore Standard #6 is met.

Standard 7: Redevelopment Projects. Due to the decrease in overall impervious area, as well as the preservation of the existing main building, the Project is considered a redevelopment project. Regardless, all of the Stormwater Management Standards will be met as if the Project was deemed new construction.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control. The proposed construction period and post-construction period erosion control and operation and maintenance plan for the site is presented in Appendix 4 of the attached *Stormwater Report*. The objectives of the erosion control plan are to control erosion at its source with temporary control structures, minimize the runoff from areas of disturbance, and de-concentrate and distribute stormwater runoff through natural vegetation before discharge to critical zones such as streams or wetlands. Soil erosion control does not begin with the perimeter sediment trap. It begins at the source of the sediment, the disturbed land areas, and extends down to the control structure.

The soil erosion control plan will be enacted in order to protect the resource areas during construction, and with the objective of controlling the vulnerability of the soil to the erosion process or the capability of moving water to detach soil particles during the construction phase(s). The erosion control devices will remain in place until all exposed areas have been stabilized with vegetation or impervious surfaces.

Therefore Standard #8 is met.

Standard 9: Operation/Maintenance Plan. A *Construction Period Pollution Prevention Plan and Erosion Control Operation and Maintenance Plan* for both construction and post-development stormwater controls has been developed and is presented in Appendix 4 of the *Stormwater Report*. The plan includes the owner(s); the parties responsible for operation and maintenance; the schedule for inspection and maintenance; and routine and non-routine maintenance tasks. Therefore Standard #9 is met.

Standard 10: Illicit Discharges. The Project will not result in the creation of any illicit connections or discharges. Therefore Standard #10 is met.

5.3 Construction Period Mitigation Measures

Construction period stormwater management, including erosion and control plans, is detailed in the *Operations and Maintenance Plan* of the above-referenced *Stormwater Report*. In addition to stormwater management, the Project will include measures to control dust and vehicular emissions. To this end, the construction contract(s) will require contractors to use a number of measures to reduce dust and vehicle emissions, and to generally minimize impacts from construction vehicles and equipment, including:

- Use of wetting agents where and when needed.
- Use of covered trucks to move aggregate material.
- Minimization of exposed storage of debris on-site.
- Monitoring of construction practices to minimize unnecessary transfers and mechanical disturbances of loose materials.
- Storage of aggregate materials away from the areas of greatest pedestrian activity, where and when possible.
- Establishment of a stabilized site entrance at the exit gate to prevent dirt from being tracked on the street.
- Cleaning of streets and sidewalks regularly to minimize dust accumulations.
- Use of appropriate mufflers on equipment, and proper maintenance of intake and exhaust mufflers.
- Use of muffling enclosures on continuously-operating equipment (e.g., air compressors and welding generators).
- Use of quieter construction operations, techniques, and equipment, where feasible.
- Scheduling of equipment operations to keep average noise levels low, synchronize noisiest operations with times of highest ambient noise levels, and maintain relatively uniform noise levels.
- Turning off idling equipment.
- Use of shielding or distance to separate noisy equipment from sensitive receptors.

5.4 Resiliency and Sustainability

The Lower Basin Barracks Modernization Project is committed to the advancement of sustainable and environmentally conscious design and construction. To that end, the Project is being designed in accordance with the June 2017 "*DCAMM Statewide Resilience Master Plan,"* and as to achieve certifiability under the United States Green Business Council (USGBC) Leadership in Green Energy and Environmental Design (LEED) v4 rating system. In addition, the Project is taking a multi-disciplinary and pro-active approach to designing the buildings and site infrastructure for flood resilience, and is embracing the recommendations outlined in the City of Boston *Climate Ready Boston* report.

To achieve the above recommendations for flood resiliency, the Project is being designed with flood-proofed foundation walls and raised window sills to levels at or above the suggested BPDA Sea Level Rise - Design Flood Elevation. Similarly, all new critical infrastructure for both the renovated building (including pumps, electrical service and distribution, and other life safety equipment) are being located at levels above the Sea Level Rise - Design Flood Elevation. Meanwhile, the emergency generator and generator fuel tanks will be placed on an exterior pad with surrounding walls extending above the Sea Level Rise - Design Flood Elevation.

Similarly, the Project design incorporates measures to minimize the effects of extreme precipitation events and droughts. The Project's stormwater management system has been designed in compliance with the MassDEP Stormwater Management Standards so as to reduce the existing peak rates and volumes of stormwater runoff from the site, and to promote recharge to the greatest extent practicable. The Project will increase the pervious area on the site from the existing condition and introduce a bioswale stormwater retention area, thereby creating additional infiltration capacity on the site. At the same time, the Project will address potential drought impacts by reducing the amount of water used both within the buildings and across the site. No site irrigation will be installed, and only the planter at the building will be watered as needed. To minimize the Project's susceptibility to drought conditions, the landscape design incorporates native and adaptive plant materials. Meanwhile, the Project will include low-flow fixtures and water conserving appliances to the extent feasible to minimize the amount of water used by the building's occupants.

The Project design incorporates a number of measures to minimize the impact of high temperature events, including the planting of additional shade trees and reduction of impervious surfaces, improvements to the building envelope, the installation of higher performance lighting and controls, including automatic LED lighting control, the incorporation of energy recovery ventilation, and the specifying of a green roof on the building addition to minimize the heat island effect.

6.0 Summary and Conclusion

The Lower Basin Barracks Modernization Project entails the renovation, modernization, and expansion of the DCR 1908 Lower Basin Barracks building, the demolition of the 1937 Stop Plank Garage, the relocation of the existing tennis courts to North Point Park, elimination of DCR parking, and the conversion of much of the paved portions of the site to pervious, landscaped public open space.

A portion of the site is located within the 100-foot buffer zone of the wetland resource area "Bank." No other wetland resource areas or wetland buffer zones are located on the site.

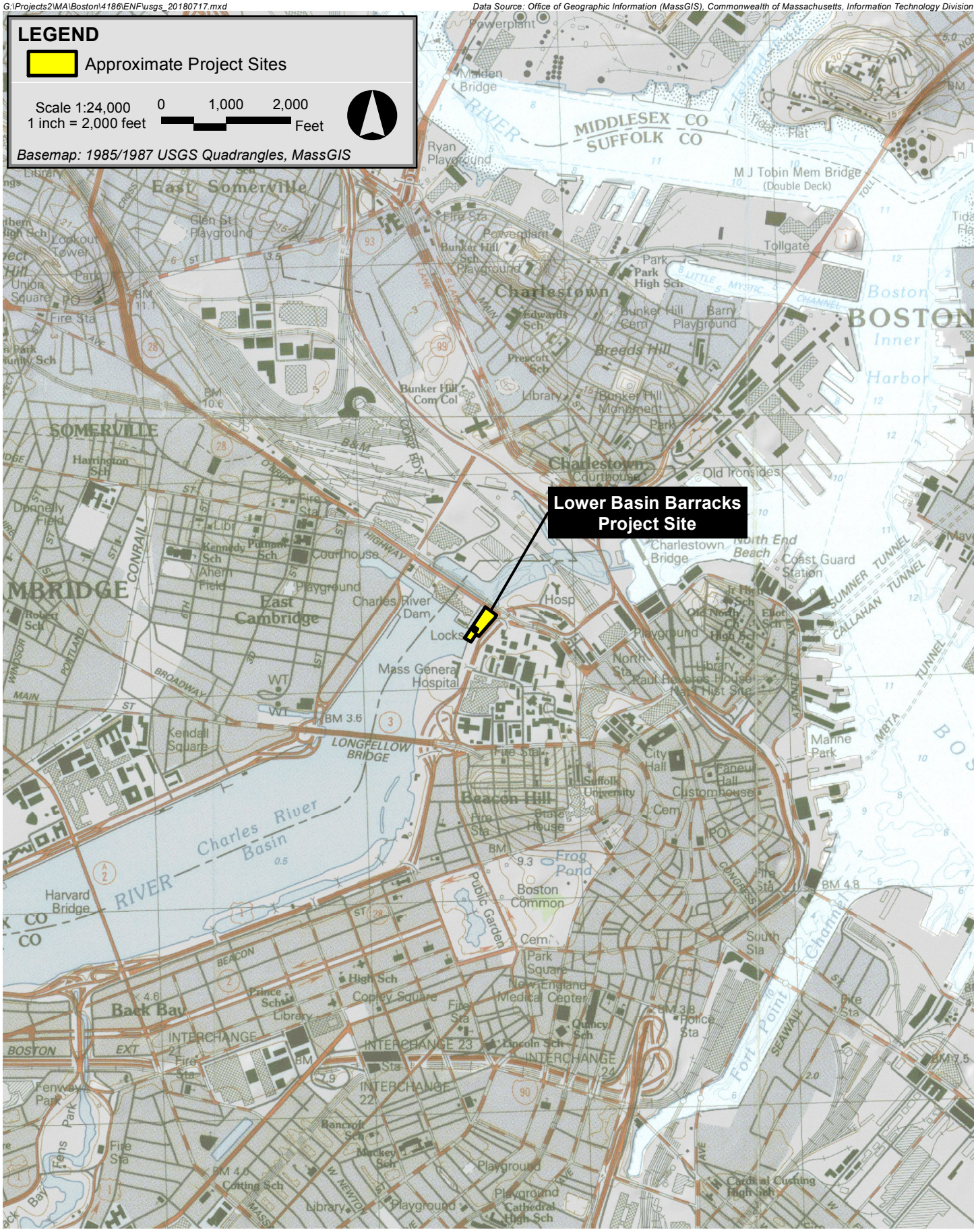
The Project will not impact the ability of the Bank to serve the functions presumed under the WPA. Specifically, the physical stability and the water carrying capacity of the existing channel within the Bank will be preserved, and the local groundwater and surface water quality will be improved. As a manmade, vertical stonewall structure, the capacity of the Bank to provide breeding habitat, escape cover and food for fisheries and/or to provide important wildlife habitat functions is likely limited, but to the degree the Bank provides these functions, they will be preserved.

The Project building expansion is being designed as to meet the requirements of LEED certifiable, and as demonstrated above, complies with the applicable Massachusetts WPA regulations. In addition, the Project building and site are being designed to address potential sea level rise and to address the effects of extreme precipitation events, droughts and high temperature events.

Finally, the current site is essentially entirely paved. The re-development of the site will allow for the restoration of the land surface, grading for proper stormwater control, the introduction of areas of pervious cover and subsurface recharge infrastructure, and vegetated landscaping.

Attachment B

Figures

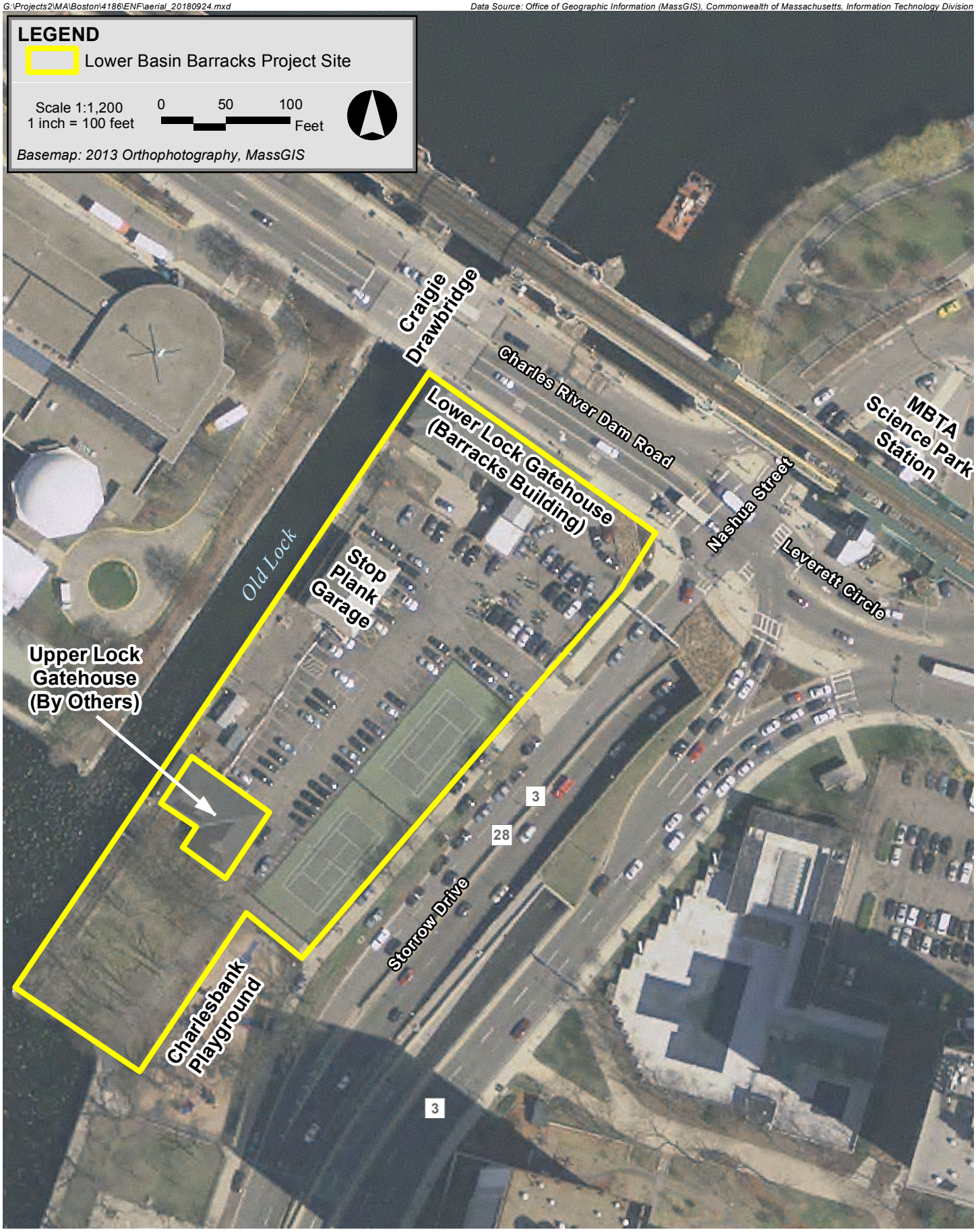


Lower Basin Barracks Modernization Boston, Massachusetts

Epsilon Associates Inc.

Figure 1

Site Locus - USGS Map



Lower Basin Barracks Modernization Boston, Massachusetts

Epsilon Associates Inc.

Figure 2

Site Locus - Vertical Aerial Photograph

Photograph of Existing Building Condition – View from Northwest

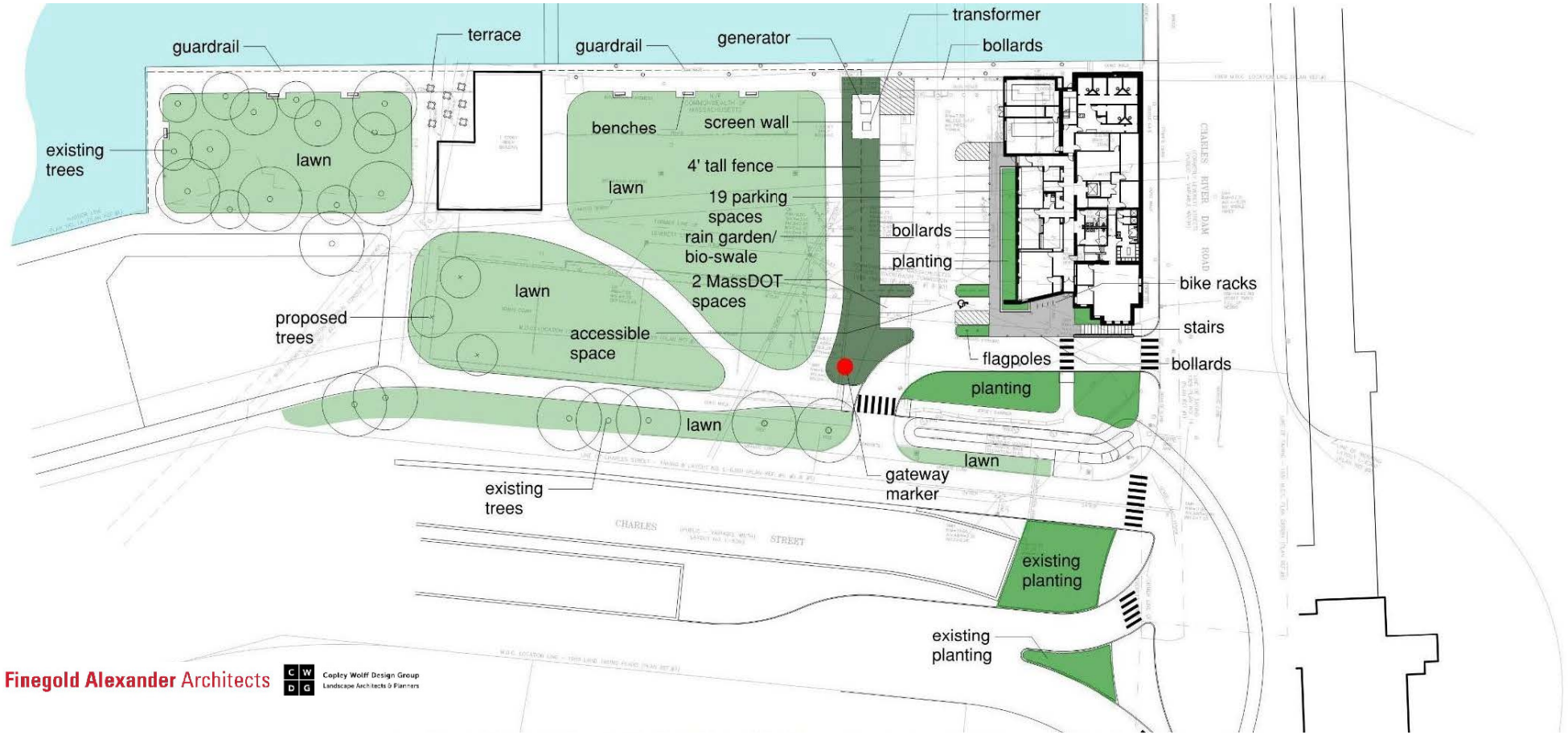
Rendering of Proposed Building Condition – View from Northwest

Lower Basin Barracks Modernization Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 3

Existing Barracks and Proposed Building Addition

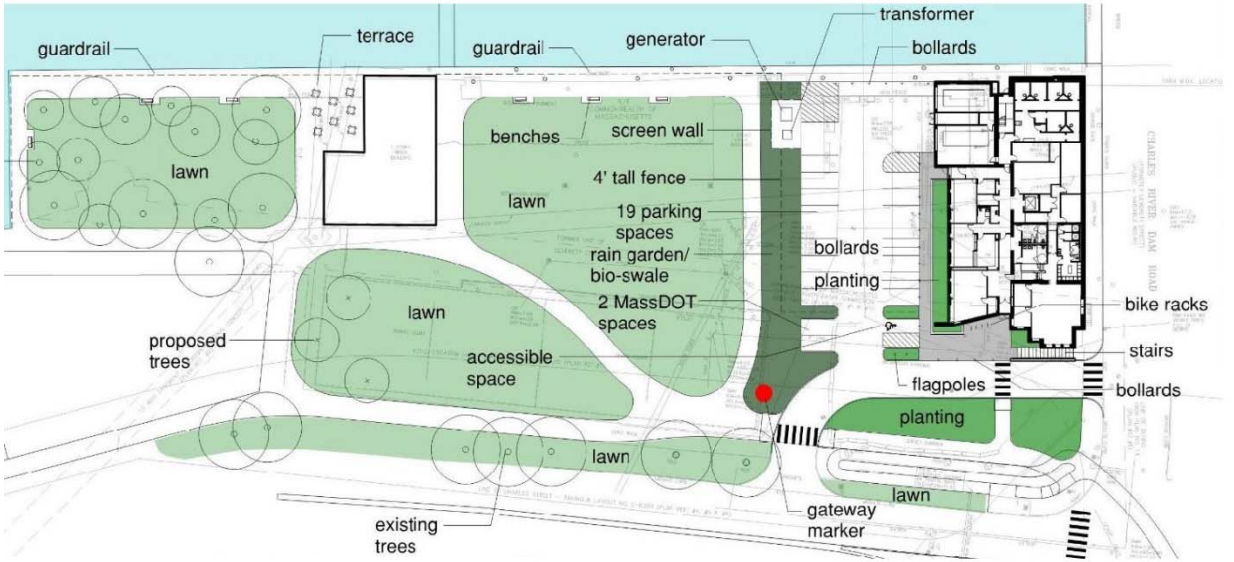


Lower Basin Barracks Modernization Boston, Massachusetts

Epsilon Associates Inc.

Figure 4

Revitalized Lower Basin Barracks Site and Landscape Plan



Exterior Site Features and Grounds

- Extensive bioretention area
- Transformer and backup generator elevated to projected 100 year storm event in 2070

Architectural Building Components

- Extensive green roof
- Elevated glazed openings
- Existing roof to be replaced
- Shaded south/ west facing glazing
- Ground Level elevated to projected 100 year storm event in 2070

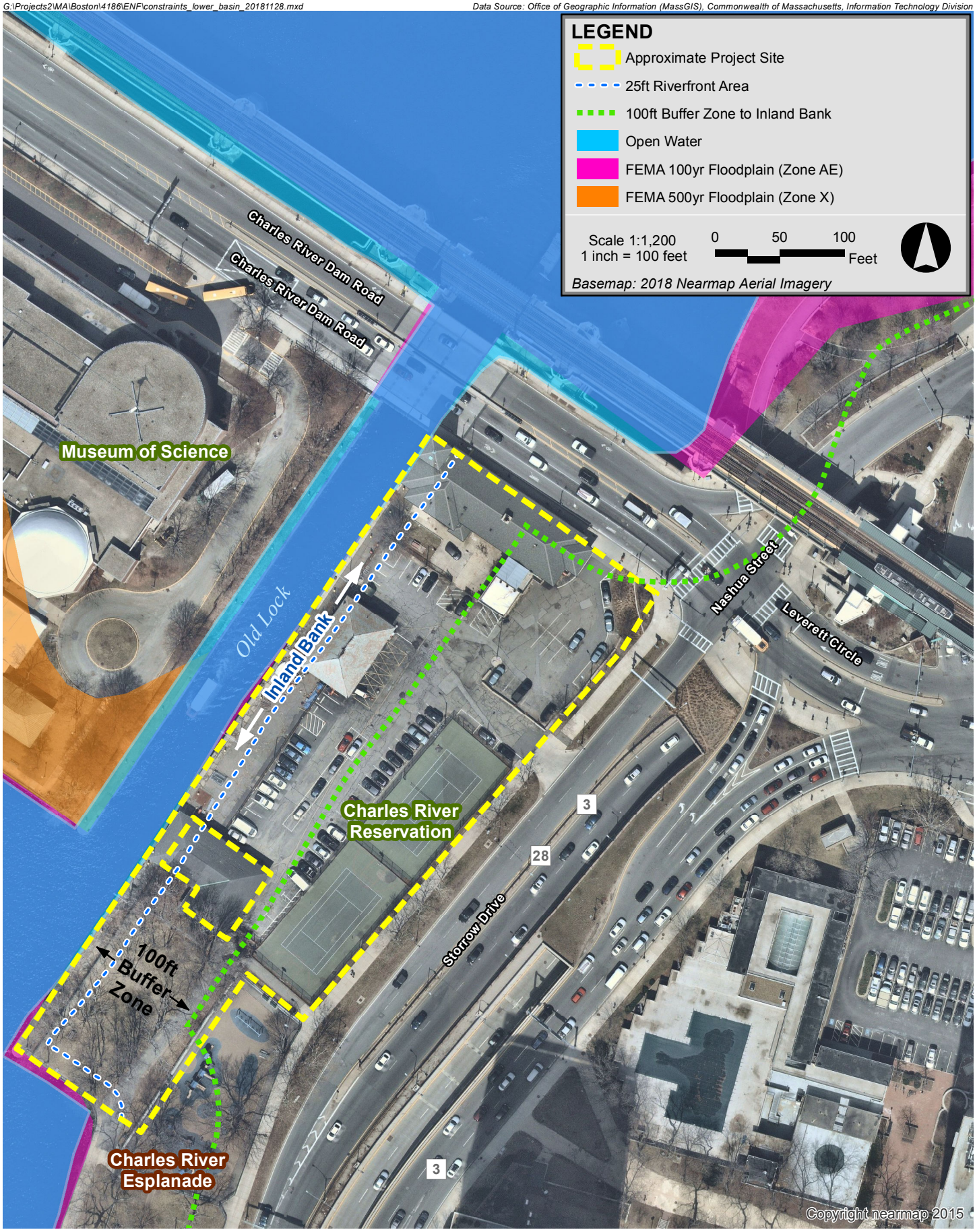
Mechanical Building Systems

- Mechanical equipment located on second floor
- Heat recovery units used
- High efficiency VRF system
- Elevated Cooling Towers

Electrical Building Systems

- Electrical equipment located on the second floor

Lower Basin Barracks Modernization Boston, Massachusetts

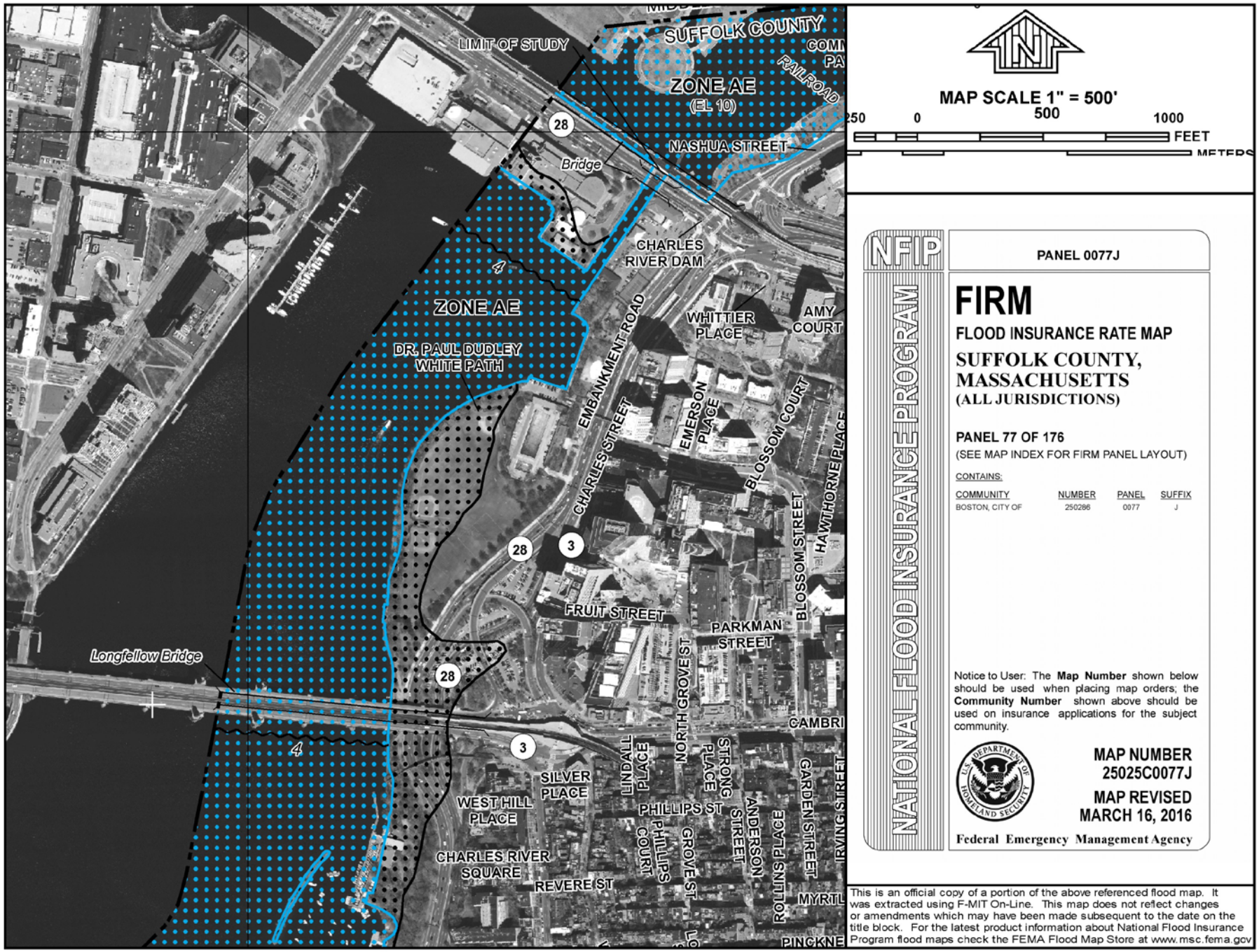


Lower Basin Barracks Modernization Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 6

Environmental Resources - Lower Basin Barracks Project Site



Lower Basin Barracks Modernization Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 7

FEMA Flood Insurance Rate Map

Attachment C

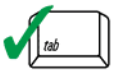
Filing Fee Information

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:

250 Leverett Circle	Boston
a. Street Address	b. City/Town
37456	$512.50 - State Fee
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Elizabeth	Minnis
a. First Name	b. Last Name

Massachusetts Division of Capital Asset Management and Maintenance on behalf of the Department of Conservation and Recreation and the Massachusetts State Police
One Ashburton Place, 15th Floor
d. Mailing Address

Boston	MA	02108
e. City/Town	f. State	g. Zip Code

857-204-1566		liz.minnis@state.ma.us
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

Patrice	Kish
a. First Name	b. Last Name

Massachusetts Department of Conservation and Recreation
c. Organization
251 Causeway Street, Suite 700
d. Mailing Address

Boston	MA	02114
e. City/Town	f. State	g. Zip Code

617-626-1378		patrice.kish@state.ma.us
h. Phone Number	i. Fax Number	j. Email Address

B. Fees

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

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

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

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

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

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

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

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

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

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
3.b.	1	$1,050	$1,050

Step 5/Total Project Fee:	$1,050 - State fee schedule only
Step 6/Fee Payments:	
Total Project Fee:	$1,050 - State fee schedule only
State share of filing Fee:	$512.50 b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	$1,500 - City Fee Schedule

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 D

Abutter Notification Information

Affidavit of Service
Under The Massachusetts Wetlands Protection Act

We ("Epsilon"), hereby certify under the pains and penalties of perjury that on **December 5, 2018** Epsilon Associates, Inc. gave notification to abutters in compliance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the DEP Guide to Abutter Notification dated April 8, 1994 and 310 CMR 10.05(4)(a), in connection with the following matter:

> A **Notice of Intent** filed under the Massachusetts Wetland Protection Act by the **Massachusetts Division of Capital Asset Management and Maintenance, on behalf of the Department of Conservation and Recreation and the Massachusetts State Police,** on December 5, 2018 for property located at 250 Leverett Circle in Boston, MA.

The form of notification and a list of the abutters to whom it was given and their addresses are attached to this Affidavit of Service.

December 5, 2018

Andrew D. Magee
Principal

Notification to Abutters

Under the Massachusetts Wetland Protection Act

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, you are hereby notified of the following:

a) The name of the applicant is: **Massachusetts Division of Capital Asset Management and Maintenance (DCAMM), on behalf of the Massachusetts Department of Conservation and Recreation (DCR) and the Massachusetts State Police (MSP).**

b) The applicant has filed a **Notice of Intent ("NOI") application with the Boston Conservation Commission, seeking permission to alter an Area Subject to Protection under the Wetlands Protection Act (MGL c. 131 s. 40).**

c) The address of the lot where the activity is proposed is **250 Leverett Circle, Boston, Massachusetts**

d) The work proposed: **The Project entails the renovation and expansion of the DCR 1908 Lower Basin Barracks building, the demolition of the 1937 Stop Plank Garage, relocation of the existing tennis courts to North Point Park, elimination of DCR on-site parking, and the conversion of much of the paved portions of the site to landscaped public open space.**

e) Copies of the Notice of Intent may be examined at the **Boston Conservation Department Office at Boston City Hall, One City Hall Square, Room 709, Boston.**

f) Or Applicant's representative's phone number: **(978) 897-7100 (Andrew Magee).**

g) The hearing date is scheduled for **December 19, 2018**. Additional information regarding the time and place of the public hearing may be obtained by calling the Boston Conservation Commission office at **(617) 635-3850**.

h) Person sending this notification (applicant, representative or other)

Name: **EPSILON ASSOCIATES, INC. (Attn. Andrew Magee)**
Address: **3 MILL & MAIN PLACE, SUITE 250**
Town: **MAYNARD** State: **MA** **Zip: 01754**
Telephone: **(978) 897-7100**

NOTES :

- Notice of the public hearing, including date, time and place will be published at least five (5) days in advance in a newspaper of general circulation.
- Notice of the public hearing, including date, time and place will be posted in the City Hall not less than forty-eight hours in advance.
- You may also contact the Northeast Regional Office of the Department of Environmental Protection at (978) 694-3200 for more information about this application.

LIST OF ABUTTERS NOTIFIED OF PUBLIC HEARING

Notice of Intent Application
250 Leverett Circle, Boston

PID	OWNER	ADDRESSEE	MLG_ADDRESS	MLG_CITYSTATE	MLG_ZIP	LOC_ADDRESS	LOC_CITY	LOC_ZIPCO
0301290001 (Charles River Dam)	COMMWLTH OF MASS		LEVERETT	BOSTON MA	02114	8 CHARLES RIVER	BOSTON	02114
301290002	MUSEUM OF SCIENCE	C/O JOHN SLAKEY/ VP FINANCE	SCIENCE PARK	BOSTON MA	02114	8 CHARLES RIVER	BOSTON	02114
0301931000 (Nashua Street Park)	COMMONWLTH OF MASS		NASHUA	BOSTON MA	02114	NASHUA ST	BOSTON	02114
0301935003 (Nashua Street Park)	COMMWLTH OF MASS		CHARLES	BOSTON MA	02114	CHARLES ST	BOSTON	02114
0300944000 (Longfellow Bridge)	COMMWLTH OF MASS		CAMBRIDGE	BOSTON MA	02114	CAMBRIDGE ST	BOSTON	02114
300445010	DONT LOOK BACK LLC	C/O LARRY KAMINSKY	7550 WISCONSIN 10TH FL	BETHESDA MD	20814	215 CHARLES ST	BOSTON	02114

Attachment E

Climate Resiliency Report Summary

boston planning & development agency

Climate Resiliency Checklist

NOT FOR FILING

NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

A.1 - Project Information

Project Name:	Lower Basin Barracks Modernization project – MA State Police			
Project Address:	Esplanade at Leverett Circle			
Project Address Additional:	250 Leverett Circle, Boston , MA			
Filing Type (*select*)	*Initial (PNF, EPNF, NPC or other substantial filing)* *Design / Building Permit (prior to final design approval), or* *Construction / Certificate of Occupancy (post construction completion)*			
Filing Contact	*Name:* Ellen Anselone	*Company:* *Finegold Alexander Architects*	*Email:* eka@faainc.com	*Phone:* *617-227-9272*
Is MEPA approval required	Yes/~~no~~		*Date : TBD*	

A.3 - Project Team

Owner / Developer:	DCR/ DCAMM – State of MA.
Architect:	Finegold Alexander Architects
Engineer:	STV Construction, Inc
Sustainability / LEED:	The Green Engineer, Inc.
Permitting:	Epsilon Associates, Inc.
Construction Management:	T.B.D

A.3 - Project Description and Design Conditions

List the principal Building Uses:	MA State Police Barracks
List the First Floor Uses:	Control desk, report writing, detention, exercise room, sally port, lockers and community room.
List any Critical Site Infrastructure and or Building Uses:	Central police barracks for Esplanade. Major Boston roadway security.

Site and Building:

Site Area:	*106,650 SF*	Building Area:	*19,560 SF*
Building Height:	*38 Ft*	Building Height:	*2 Stories*
Existing Site Elevation – Low:	*13.5 Ft BCB*	Existing Site Elevation – High:	*24.0 Ft BCB*
Proposed Site Elevation – Low:	*15.0 Ft BCB*	Proposed Site Elevation – High:	*24.0 Ft BCB*
Proposed First Floor Elevation:	*16.0 Ft BCB*	Below grade levels:	*0 Stories*

Article 37 Green Building:

LEED Version - Rating System :	LEED V4	LEED Certification:	*Target* *Yes* / ~~*No*~~
Proposed LEED rating:	~~*Certified*~~/Silver/ ~~*Gold/Platinum*~~	Proposed LEED point score:	*TBD Pts.*

Building Envelope

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Roof:	*40 (R)*	Exposed Floor:	*23.8 (R)*
Foundation Wall:	*23.8 (R)*	Slab Edge (at or below grade):	*23.8 (R)*

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall & Spandrel Assembly:	*.59 (%)*	Wall & Spandrel Assembly Value:	*.01 (U)*
Area of Framed & Insulated / Standard Wall:	*79.86 (%)*	Wall Value	*24.07 (R)*
Area of Vision Window:	*10.93 %*	Window Glazing Assembly Value:	*.37 (U)*
		Window Glazing SHGC:	*(SHGC)*
Area of Doors:	*8.62 %*	Door Assembly Value:	*.125 (U)*

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined			
Annual Electric:	*(kWh)*	Peak Electric:	*(kW)*
Annual Heating:	*(MMbtu/hr)*	Peak Heating:	*(MMbtu)*
Annual Cooling:	*(Tons/hr)*	Peak Cooling:	*(Tons)*
Energy Use - Below ASHRAE 90.1 - 2013:	*%*	Have the local utilities reviewed the building energy performance?:	*Yes / no*
Energy Use - Below Mass. Code:	*%*	Energy Use Intensity:	*(kBtu/SF)*

Back-up / Emergency Power System

Electrical Generation Output:	*80 (kW)*	Number of Power Units:	1
System Type:	*(kW)*	Fuel Source:	Diesel

Emergency and Critical System Loads (in the event of a service interruption)

Electric:	*36 (kW)*	Heating:	*(MMbtu/hr)*
		Cooling:	*(Tons/hr)*

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing GHG emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon neutrality by 2050 new buildings performance will need to progressively improve to net carbon zero and positive.

B.1 – GHG Emissions - Design Conditions

For this Filing - Annual Building GHG Emissions: *(Tons)*

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

Energy modeling performed during study for selection of preferred mechanical equipment. Ongoing LEED planning process.

Describe building specific passive energy efficiency measures including orientation, massing, envelop, and systems:

Retrofit of circa 1908 building. New systems, insulations, windows and roof. Addition of green roof on new addition.

Describe building specific active energy efficiency measures including equipment, controls, fixtures, and systems:

Energy recovery ventilators, variable refrigerant flow heating and cooling, lighting controls.

Describe building specific load reduction strategies including on-site renewable, clean, and energy storage systems:

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

Describe any energy efficiency assistance or support provided or to be provided to the project:

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

C - Extreme Heat Events

Annual average temperature in Boston increased by about 2˚F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low:	*Deg.*	Temperature Range - High:	*Deg.*
Annual Heating Degree Days:		Annual Cooling Degree Days	

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90°:	#	Days – Above 100°:	#
Number of Heatwaves / Year:	#	Average Duration of Heatwave (Days):	#

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

Concrete sidewalks with a SR of at least 0.28.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

Partial Green roof to offset the heat island effect.

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

Diesel back-up power, high efficiency electric heat-pump based heating and cooling systems.

D - Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25". There is a significant probability that this will increase to at least 6" by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

D.1 – Extreme Precipitation - Design Conditions

10 Year, 24 Hour Design Storm:	*4 In.*

Describe all building and site measures for reducing storm water run-off:

Green roof, extensive Bioretention basin, deep sump catch basin(s), overall increase in pervious grassed areas throughout the site.

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

Rain water harvesting, bioretention basin, and green roof.

E – Sea Level Rise and Storms

Under any plausible greenhouse gas emissions scenario, sea levels in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Is any portion of the site in a FEMA SFHA?	~~Yes~~ / No	What Zone:	A, AE, AH, AO, AR, A99, V, VE
		Current FEMA SFHA Zone Base Flood Elevation:	*10.46 Ft BCB*

Is any portion of the site in a BPDA Sea Level Rise - Flood Hazard Area? Use the online BPDA SLR-FHA Mapping Tool to assess the susceptibility of the project site.	*Yes* / ~~No~~

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented on the BPDA Sea Level Rise - Flood Hazard Area (SLR-FHA) map, which depicts a modeled 1% annual chance coastal flood event with 40 inches of sea level rise (SLR). Use the online BPDA SLR-FHA Mapping Tool to identify the highest Sea Level Rise - Base Flood Elevation for the site. The Sea Level Rise - Design Flood Elevation is determined by adding either 24" of freeboard for critical facilities and infrastructure and any ground floor residential units OR 12" of freeboard for other buildings and uses.

Sea Level Rise - Base Flood Elevation:	*16.7 Ft BCB*		
Sea Level Rise - Design Flood Elevation:	*18.7 Ft BCB*	First Floor Elevation:	*16.0 Ft BCB*
Site Elevations at Building:	*15.0-24.0 Ft BCB*	Accessible Route Elevation:	*24.0 Ft BCB*

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Street and sidewalk access above SLR-DFE, window sills above SLR-DFE, utility pads above DFE and electric equipment at 2nd floor. Salt tolerant plant material.

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

Electrical equipment at 2nd floor, emergency generator and transformer above SLR-DFE, and temporary barriers can be used.

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Generator and electric protected, back flow preventers and portable toilets.

Describe any strategies that would support rapid recovery after a weather event:

Protection from water intrusion, equipment location, emergency power.

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Future adaption could involve raising of sea wall, added bioswales.

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

Raising the first floor and / or blocking all openings at that level.

A pdf and word version of the Climate Resiliency Checklist is provided for informational use and off-line preparation of a project submission. NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

For questions or comments about this checklist or Climate Change best practices, please contact: John.Dalzell@boston.gov

Attachment F

Stormwater Report

LOWER BASIN BARRACKS MODERNIZATION
BOSTON, MASSACHUSETTS

STORMWATER REPORT

Prepared for:
Boston Public Works
1 City Hall Square, Room 714
Boston, MA 02201

Applicant:
Division of Capital Asset Management and Maintenance
1 Ashburton Place, 15th Floor
Boston, MA 02108

Architect:
Finegold Alexander & Associates Inc.
77 North Washington Street #7
Boston, MA 02114

Landscape Architect:
Copley Wolff Design Group, Inc.
10 Post Office Square, Suite 1315
Boston, MA 02109

Environmental Consultant:
Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, MA 01754

Surveyor:
WSP USA, Inc.
155 Main Dunstable Rd, Suites 120 & 125
Nashua, NH 03060

Civil Engineer:
Samiotes Consultants, Inc.
20 A Street
Framingham, Massachusetts 01701

November 2018

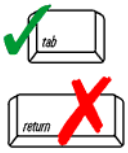
TABLE OF CONTENTS

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

---

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

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

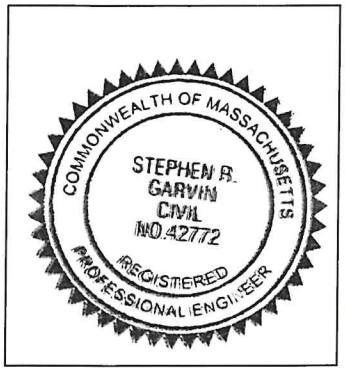
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Signature and Date 11/16/18

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): Peagravel diaphragm, grass filter strip

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 Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

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

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

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.

MASSACHUSETTS STATE POLICE – LOWER BASIN BARRACKS STORMWATER MANAGEMENT NARRATIVE

NOVEMBER 2018

Introduction

Project Description:
The Lower Basin Barracks Modernization Project anticipates the renovation and expansion of the historic Lower Lock Gatehouse (the Lower Basin Barracks building), the demolition of the Stop Plank Garage, and the conversion of much of the paved portions of the site to landscaped public open space. While improvements to the Upper Lock Gatehouse are being contemplated, none are proposed as part of this Project.

The Project anticipates considerable improvements to the Lower Basin Barracks Modernization Project site, including improved pedestrian access and an expansion of the public parkland area of the Esplanade. In the proposed plan, more than half of the site will be designated as landscaped public open space, including lawn area, cross-site pedestrian ways, and a linear riverside path running along a portion of the length of the site's edge along the Charles River locks canal. This substantial increase in landscaped public open space is the direct result of the reduction of impervious parking area, the relocation of the tennis courts to an alternative location in the Lower Charles River Basin, and the removal of the Stop Plank Garage.

Existing Conditions

The Lower Basin Barracks Modernization Project site is located within the Lower Basin of the Charles River Reservation, at the intersection of Charles River Dam Road and the westbound lane of Storrow Drive. The site is approximately 2.21 acres in area. The site is primarily paved, including two tennis courts and a large parking lot.

The project site is bounded by the Charles River canal to the west, Charles River Dam Road to the north, Storrow Drive and the Leverett Circle intersection to the east, and the Esplanade Park to the south. The existing ground surface is relatively flat, with a slight northwesterly pitch from the sidewalk along Storrow Drive at elevation 17, down to the top of the retaining wall at the edge of the Charles River at elevation 14.

Sketch H-1.0 illustrates the existing pervious and impervious cover, topography, protectable resource areas, vegetation/ woods inside the limit of proposed work, times of concentration, and routing of existing stormwater flows.

Existing Stormwater Management:
The existing drain system on the site consists of traditional pipes and catch basins. Stormwater within the majority of the parking lot is collected by a series of catch basins and area drains, and then piped into the MWRA Sewer interceptor. The southwestern portion of this watershed area drains directly into the Charles River through overland flow (XWS-1). The sidewalk along Charles River Dam Road at the north of the site, as well as a small portion of the sidewalk and grass strip to the east along Storrow Drive is collected within the roadway drainage system, which is piped to an outfall (SDO 15) into the Charles River (XWS-2).

Soils:
Soil boundaries were established using the USCS soil web survey and verified by a geotechnical report prepared by McPhail Associates dated September 1, 2017. Soils on the site consist of hydrological "C" and "D" soils, and are composed primarily of urban fill material over layers of organic silt and marine clay. Copies of the soil survey maps, geotechnical report, and boring logs are included in the Appendix.

Proposed Conditions

The Lower Basin Barracks Modernization Project anticipates the renovation and expansion of the historic Lower Lock Gatehouse (the Lower Basin Barracks building), the demolition of the Stop Plank Garage. The proposed expansion of the Lower Lock Gatehouse building will consist of approximately 4,042 gross-square-foot, single story addition paralleling the western length of the existing building.

As part of the project majority of the existing paved areas such as the parking lot and tennis courts will be converted to landscaped public open space. A smaller parking lot will be located in front of the new addition on the south side of the building, with a Bioretention basin installed adjacent to it, to provide the necessary stormwater storage and treatment for the parking lot and roof runoff. To the south of the parking and Bioretention area, new bituminous concrete walkways will be built to provide an accessible walkabout park area for the public to enjoy, and provide access to the Esplanade.

Proposed Stormwater Management System:
The proposed stormwater system will consist of a Bioretention area, which will collect runoff from the proposed parking lot and roof leaders (PWS-2 & PWS-3). The parking lot is graded to allow the stormwater runoff from the parking lot to sheet either directly into the Bioretention area or towards the drainage channel that outlets into the Bioretention area. The stormwater runoff receives pretreatment from the pea stone diaphragm and the grassed filter strip. Stormwater that does not infiltrate within the Bioretention area, outlets via a grate located within the Bioretention area and into the municipal system. A portion of the proposed roof is intended to be a dedicated green roof system, however this stormwater design is assuming the entire roof to be impervious, in order to remain conservative in the design approach. The roof runoff that is not utilized as part of the green roof system will outlet into the bioretention area.

Proposed Stormwater Control Systems:
The following are the proposed Best Management Practices (BMP's) and Low Impact Development (LID) stormwater control systems to be used on the site to improve water quality:

Vegetated Filter Strips: Vegetated filter strips, also known as filter strips, grass buffer strips and grass filters, are uniformly graded vegetated surfaces (i.e., grass or close-growing native vegetation) that receive runoff from adjacent impervious areas. Vegetated filter strips are used to pretreat sheet flow or small concentrated flows from roads, highways, and small parking lots. Vegetated filter strips are designed to slow runoff velocities, trap sediment, and promote infiltration, thereby reducing runoff volumes.

Drainage Channel: Drainage channels are traditional vegetated open channels that are designed to provide for non-erosive conveyance. Drainage channels are designed to have sufficient capacity to convey runoff safely during large storm events without causing erosion. Drainage channels are suitable for residential and institutional areas of low to moderate density. The percentage of impervious cover in the contributing areas must be relatively small. Drainage channels can also be used in parking lots to

break up areas of impervious cover. Along the edge of roadways, drainage channels can be used in place of curb and gutter systems.

Bioretention Basins: Bioretention is a technique that uses soils, plants, and microbes to treat stormwater before it is infiltrated and/or discharged. Bioretention cells (also called rain gardens in residential applications) are shallow depressions filled with sandy soil topped with a thick layer of mulch and planted with dense native vegetation. Stormwater runoff is directed into the cell via pipes or sheet flow. The runoff percolates through the soil media that acts as a filter. There are two types of bioretention cells: Filtering bioretention areas, and Infiltration bioretention areas configured to recharge groundwater (in addition to acting as a filter). Bioretention areas remove pollutants through filtration, microbe activity, and uptake by plants. Contact with the soil and roots provides water quality treatment better than conventional infiltration structures. Studies indicate that bioretention areas can remove from 80% to 90% of TSS. If properly designed and installed, bioretention areas remove phosphorus, nitrogen, metals, organics, and bacteria to varying degrees. Bioretention areas help reduce stress in watersheds that experience severe low flows due to excessive impervious cover.

Methodology/ Procedure

Objective:
The objective of the stormwater management for the site was to mitigate any increase in peak storm hydrology runoff rates due to the construction of the proposed project and remove total suspended solids (TSS) prior to the discharge point.

Watershed Routing:

Existing Watersheds:

Ex-Watershed-1 (XWS-1): This watershed covers almost the entire existing site, with the exception of the portion of sidewalks and surrounding area along Storrow Drive and Charles River Dam Road. This watershed includes the existing buildings, parking lot, tennis courts, as well as the grassed area in the southwest corner of the site. A small portion of the runoff from the parking lot is collected in local drains that connect to the MWRA sewer, while the rest of the watershed is assumed to sheet off directly to the Charles River.

Ex-Watershed-2 (XWS-2): This watershed consists of the sidewalk and surrounding grassed areas along Storrow Drive and Charles River Dam Road. The runoff sheets off into the roadways and is collected by the storm drain systems within them.

Proposed Watersheds:

P-Watershed-1 (PWS-1): This watershed consists of the paved walkways and grass fields that will replace the existing parking lot and tennis courts in the southwest portion of the site. The runoff from this watershed is either collected by existing drainage that is piped to an outfall just upstream, or flows overland into the Charles River directly.

P-Watershed-2 (PWS-2: This watershed consists of the new (smaller) parking lot, as well as the surrounding vegetated area, and the Bioretention area. The stormwater runoff from this watershed sheets into the Bioretention area (receiving pre-treatment via a pea stone diaphragm located at the edge of the parking lot) with an overflow outlet structure that ties into the municipal system.

P-Watershed-3 (PWS-3): This watershed consists of the roof of the proposed building. As part of the project, a portion of the roof is proposed to be a green roof. As part of the hydrology model, the entire roof has been modeled as impervious to be conservative. The roof runoff is routed to the Bioretention area.

P-Watershed-4 (PWS-4): This watershed consists of the sidewalk and surrounding grassed areas along Storrow Drive and Charles River Dam Road. The runoff sheets off into the roadways and is collected by the storm drain systems within them.

See the Existing and Proposed Hydrology Plans (H-1.0 & H-2.0) in Appendix C for the delineated Watersheds.

Analysis:

The analysis was based on the pre and post development peak discharge rates at the point of analysis. The proposed construction will result in a decrease in impervious area, therefore the proposed stormwater management system is designed to hold the water volume collected by the impervious area during the 1″ storm.

Results of Analysis

Through the use of the HydroCAD Software, the curve numbers, times of concentration, and peak discharge rates were determined for both the existing conditions and the proposed conditions. The results of the study show that the post-development rates of runoff are reduced when compared to the existing peak rates at the points of analysis.

As shown in Table 1 below, due to the decrease in impervious area as well as the addition of stormwater BMPs, the post development peak rates of runoff from the site will be mitigated.

Table 1 – POA (Total Site)
Peak Rates of Runoff (cfs)

	2-year storm	10-year storm	100-year storm
Existing	6.85	9.79	15.39
Proposed	3.41	5.67	13.85

Boston Water & Sewer Commission Standards

Standard #1: Green Infrastructure/Low Impact Development

For all new and reconstruction projects in the City of Boston, it is mandatory to retain stormwater on site. A volume of runoff equal to one inch of rainfall times the total impervious area on site must be infiltrated prior to discharge to a storm drain or a combined sewer system.

The total impervious area in the proposed condition is 59,929 sf.

(59,929 square feet)(1inch) ÷ (12 inches/1 foot) = 4,994 cubic feet.

Design volume = 5,000 cf

The bioretention system is designed to hold **5,041 cf** of storage under the outlet invert of 13.35.

Therefore, the BWSC Standard is met.

Massachusetts Stormwater Management Standards

Standard #1: Untreated Stormwater

The project is designed so that stormwater conveyances (outfalls/discharges) do not discharge untreated stormwater into, or cause erosion to, wetlands or waters.

Therefore Standard #1 is met.

Standard #2: Post-development peak discharge rates

The proposed project will result in a decrease in impervious area. The proposed stormwater management system has been designed so that there is no increase in post construction discharge rates from the site.

Therefore Standard #2 is met.

Standard #3: Recharge to groundwater

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post- development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Soil types have been identified based on the information contained in the Soil Report. We have determined that the soils are consistent with Hydrologic soil type "D" which requires runoff to be infiltrated (as listed in the table below) from new impervious areas.

The proposed development will result in a decrease in impervious area in the "D" soil areas.

Existing Site Impervious Area in "D" Soils: 98,665 sf
Proposed Site Impervious Area in "D" Soils: 61,943 sf
Total **reduction** in Impervious Area: 36,722 sf

Total required recharge volume: **0 cf**

Due to the overall decrease in impervious area associated with this project, the groundwater recharge requirement will be met regardless of the infiltration system. However, the volume of water contained

within the bioretention system below the outlet is **5,041 cf,** resulting in an even further improvement to groundwater discharge over the existing conditions.
Therefore Standard #3 is met.

Standard #4: TSS removal

The BMP's selected to remove TSS from impervious areas for this include: pea gravel diaphragms, bioretention basin, drainage channel, and grass filter strip.

PWS-2: Parking Lot
Peagravel: pretreatment
Grass channel: (1.00)(1.00-0.00)= 1.00 TSS
Bioretention: (1.00)(1.00-0.80)= 0.20 TSS
Total TSS Removal= 80%

Therefore Standard #4 is met.

Standard #5: Higher potential pollutant loads

The project site does not contain Land Uses with Higher Potential Pollutant Loads.

Therefore Standard #5 is met.

Standard #6: Protection of critical areas

Critical areas are defined based on the Massachusetts Stormwater Handbook and Wetland Protection Act as: Outstanding Resource Waters (ORW) as designated in 314 CMR 4.00, Special Resource Waters as designated in 314 CMR 4.00, recharge areas for public water supplies as defined in 310 CMR 22.02 (Zone Is, Zone IIs and Interim Wellhead Protection Areas for groundwater sources and Zone As for surface water sources), bathing beaches as defined in 105 CMR 445.000, cold-water fisheries as defined in 314 CMR 9.02 and 310 CMR 10.04, and shellfish growing areas as defined in 314 CMR 9.02 and 310 CMR 10.04.

The site is **not** located within critical areas. Therefore Standard #6 is met.

Standard #7: Redevelopment projects

Due to the decrease in overall impervious area, as well as the preservation of the existing main building, the project is considered a redevelopment, however all the standards will be met as if it were new construction.

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

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

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

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

The erosion and sediment control plan to be in place during the construction phase is detailed in the Civil Plans. (See Sheet C-1.1, Demolition & Erosion Control Plan).

Therefore Standard #8 is met.

Standard #9: Operation/maintenance plan

An operation and maintenance plan for both construction and post-development stormwater controls has been developed. The plan includes owner(s); parties responsible for operation and maintenance; schedule for inspection and maintenance; routine and non-routine maintenance tasks. A copy of the O&M is included in the Appendix.

Therefore Standard #9 is met.

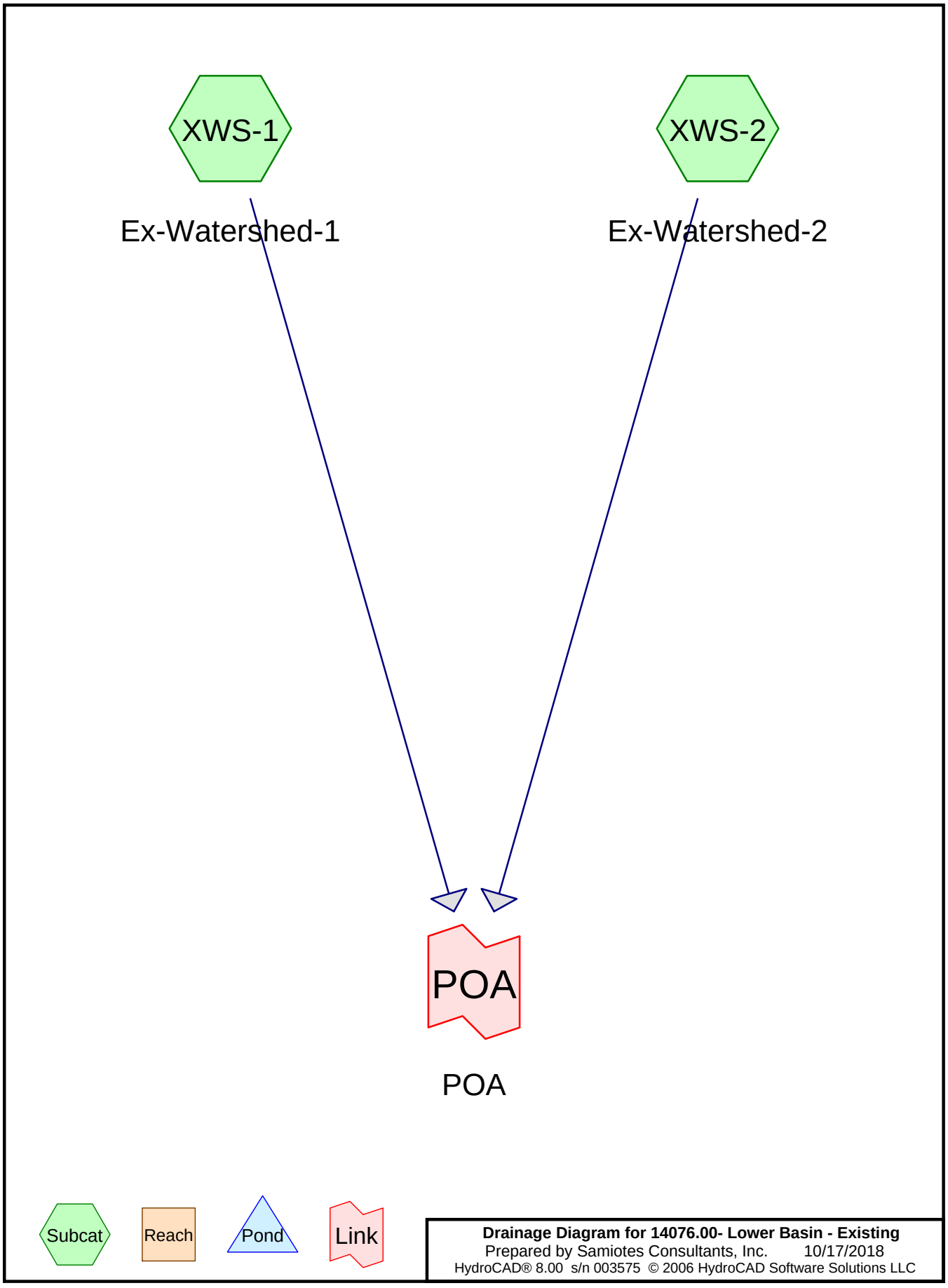
Standard #10: All illicit discharges to the stormwater management system are prohibited

It is not anticipated that there will be any illicit discharges for the project.

Therefore Standard #10 is met.

TABLE OF APPENDICES

APPENDIX A:
EXISTING & PROPOSED HYDROLOGY REPORT



Drainage Diagram for 14076.00- Lower Basin - Existing
Prepared by Samiotes Consultants, Inc. 10/17/2018

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcats)
371	86	Woods/grass comb., Poor, HSG D (XWS-1)
17,948	89	<50% Grass cover, Poor, HSG D (XWS-1,XWS-2)
98,665	98	Paved parking & roofs (XWS-1,XWS-2)
116,984		

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment XWS-1: Ex-Watershed-1 Runoff Area=103,026 sf Runoff Depth=2.86"
Flow Length=67' Slope=0.0043 '/' Tc=11.0 min CN=97 Runoff=6.16 cfs 24,525 cf

Subcatchment XWS-2: Ex-Watershed-2 Runoff Area=13,958 sf Runoff Depth=2.54"
Tc=5.0 min CN=94 Runoff=0.95 cfs 2,959 cf

Link POA: POA Inflow=6.85 cfs 27,484 cf
Primary=6.85 cfs 27,484 cf

Total Runoff Area = 116,984 sf Runoff Volume = 27,484 cf Average Runoff Depth = 2.82"
15.66% Pervious Area = 18,319 sf 84.34% Impervious Area = 98,665 sf

Subcatchment XWS-1: Ex-Watershed-1

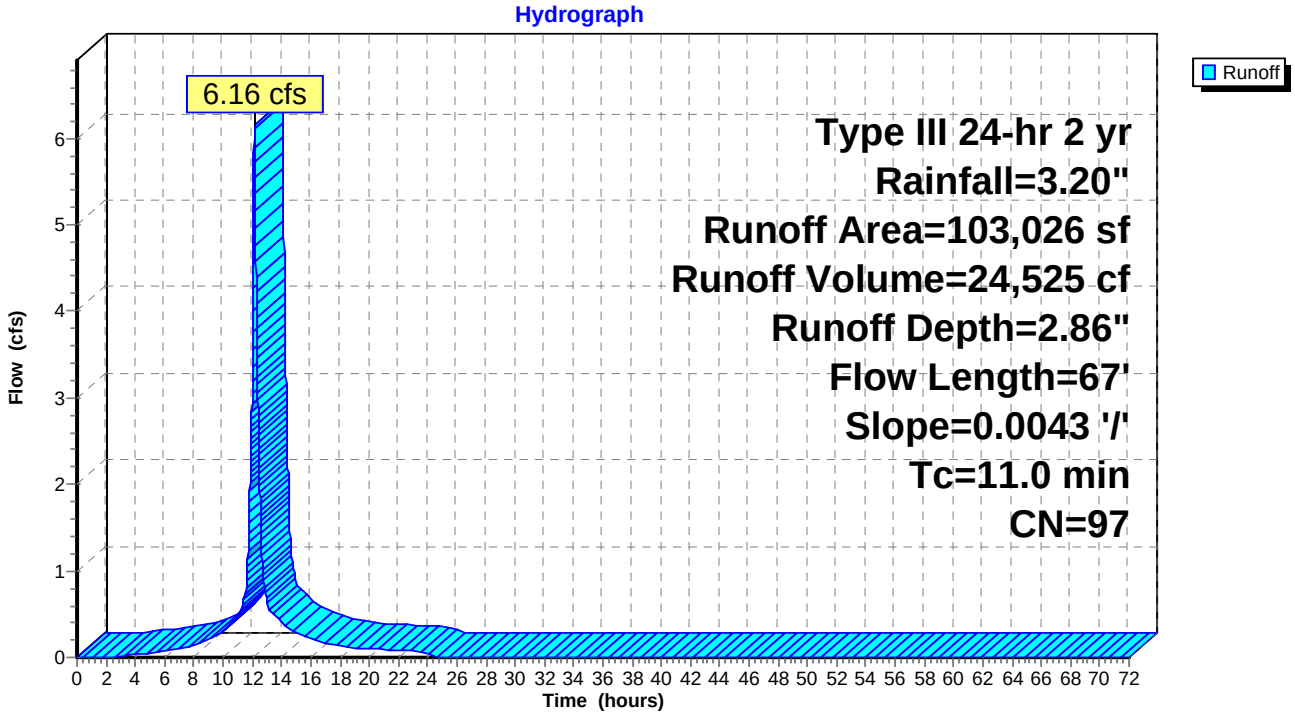
Runoff = 6.16 cfs @ 12.14 hrs, Volume= 24,525 cf, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
11,756	89	<50% Grass cover, Poor, HSG D
371	86	Woods/grass comb., Poor, HSG D
90,899	98	Paved parking & roofs
103,026	97	Weighted Average
12,127		Pervious Area
90,899		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0043	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	17	0.0043	0.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.0	67	Total			

Subcatchment XWS-1: Ex-Watershed-1



Subcatchment XWS-2: Ex-Watershed-2

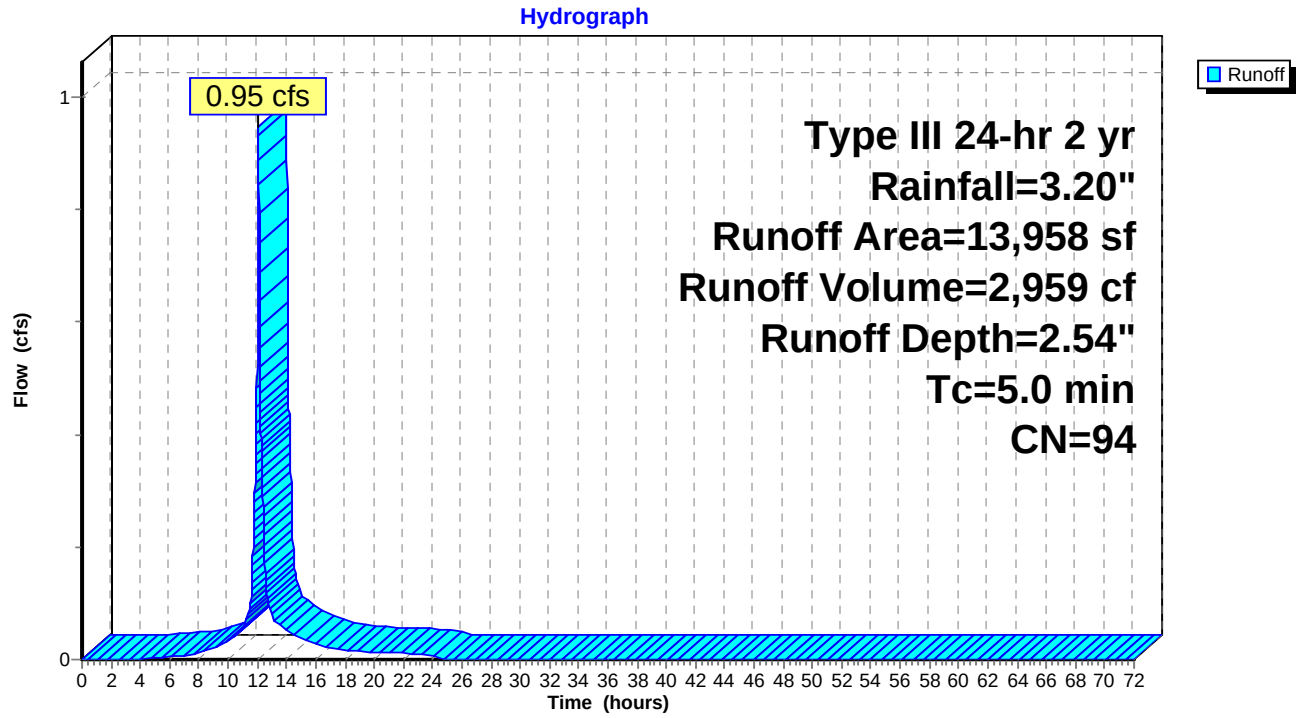
Runoff = 0.95 cfs @ 12.07 hrs, Volume= 2,959 cf, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
7,766	98	Paved parking & roofs
6,192	89	<50% Grass cover, Poor, HSG D
13,958	94	Weighted Average
6,192		Pervious Area
7,766		Impervious Area

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

Subcatchment XWS-2: Ex-Watershed-2

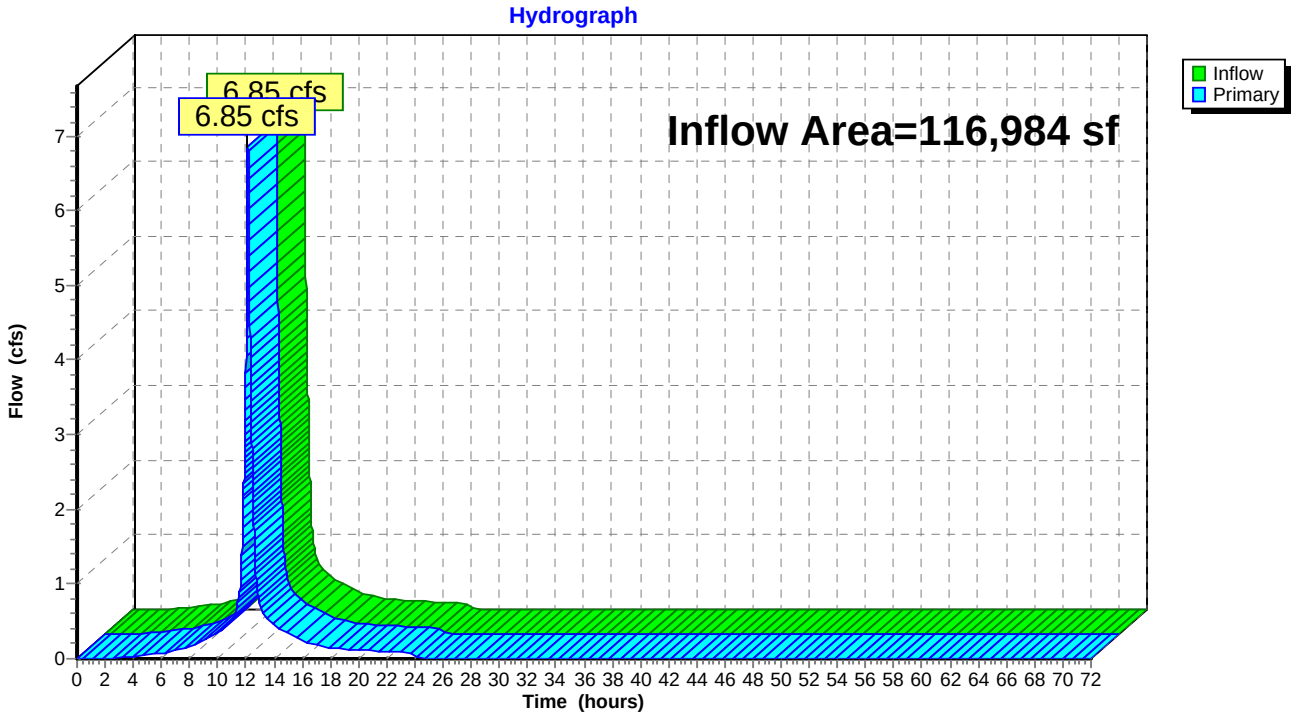


Link POA: POA

Inflow Area = 116,984 sf, Inflow Depth = 2.82" for 2 yr event
Inflow = 6.85 cfs @ 12.14 hrs, Volume= 27,484 cf
Primary = 6.85 cfs @ 12.14 hrs, Volume= 27,484 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: POA



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment XWS-1: Ex-Watershed-1 Runoff Area=103,026 sf Runoff Depth=4.15"
Flow Length=67' Slope=0.0043 '/' Tc=11.0 min CN=97 Runoff=8.78 cfs 35,621 cf

Subcatchment XWS-2: Ex-Watershed-2 Runoff Area=13,958 sf Runoff Depth=3.82"
Tc=5.0 min CN=94 Runoff=1.39 cfs 4,438 cf

Link POA: POA Inflow=9.79 cfs 40,059 cf
Primary=9.79 cfs 40,059 cf

Total Runoff Area = 116,984 sf Runoff Volume = 40,059 cf Average Runoff Depth = 4.11"
15.66% Pervious Area = 18,319 sf 84.34% Impervious Area = 98,665 sf

Subcatchment XWS-1: Ex-Watershed-1

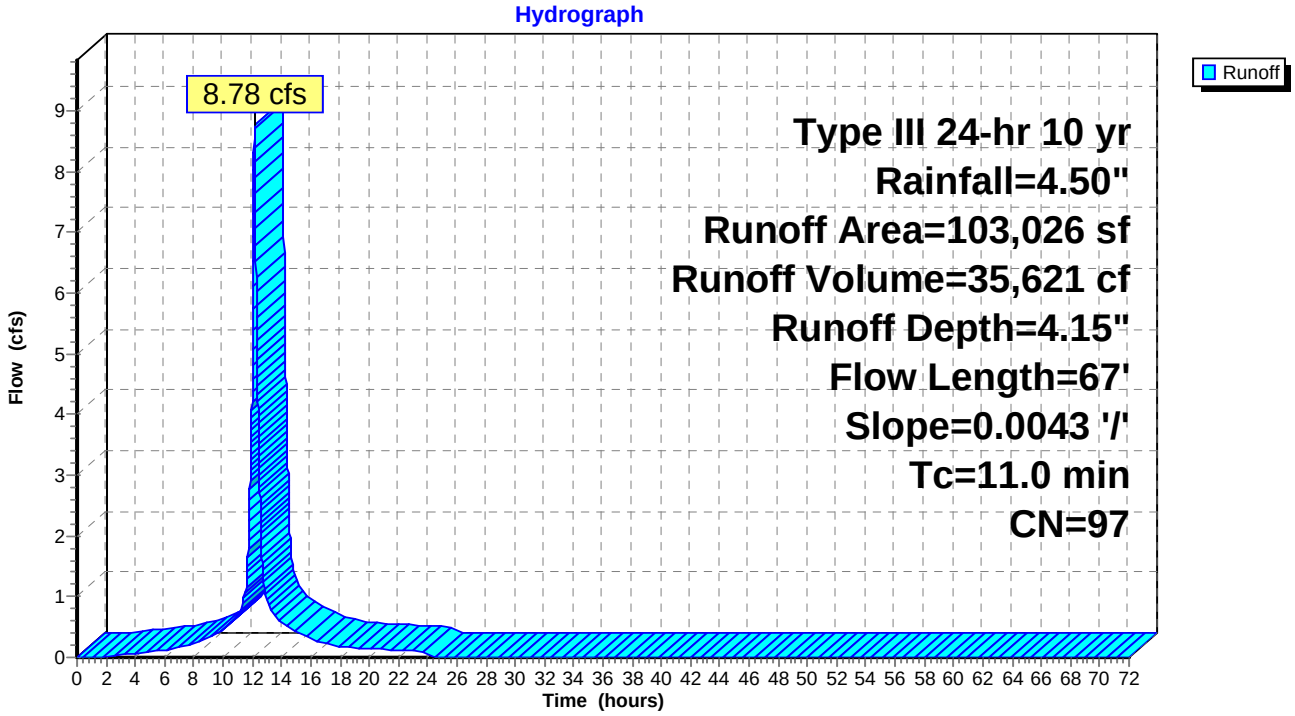
Runoff = 8.78 cfs @ 12.14 hrs, Volume= 35,621 cf, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
11,756	89	<50% Grass cover, Poor, HSG D
371	86	Woods/grass comb., Poor, HSG D
90,899	98	Paved parking & roofs
103,026	97	Weighted Average
12,127		Pervious Area
90,899		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0043	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	17	0.0043	0.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.0	67	Total			

Subcatchment XWS-1: Ex-Watershed-1



Subcatchment XWS-2: Ex-Watershed-2

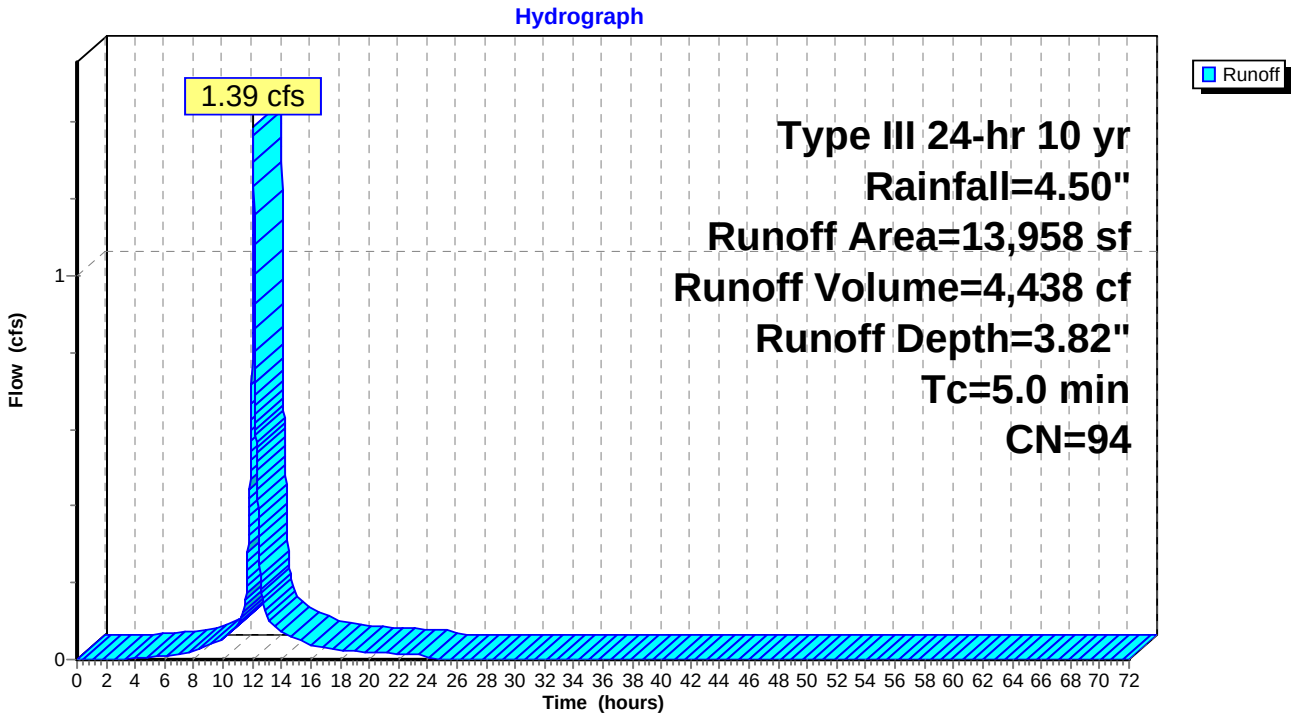
Runoff = 1.39 cfs @ 12.07 hrs, Volume= 4,438 cf, Depth= 3.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
7,766	98	Paved parking & roofs
6,192	89	<50% Grass cover, Poor, HSG D
13,958	94	Weighted Average
6,192		Pervious Area
7,766		Impervious Area

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

Subcatchment XWS-2: Ex-Watershed-2

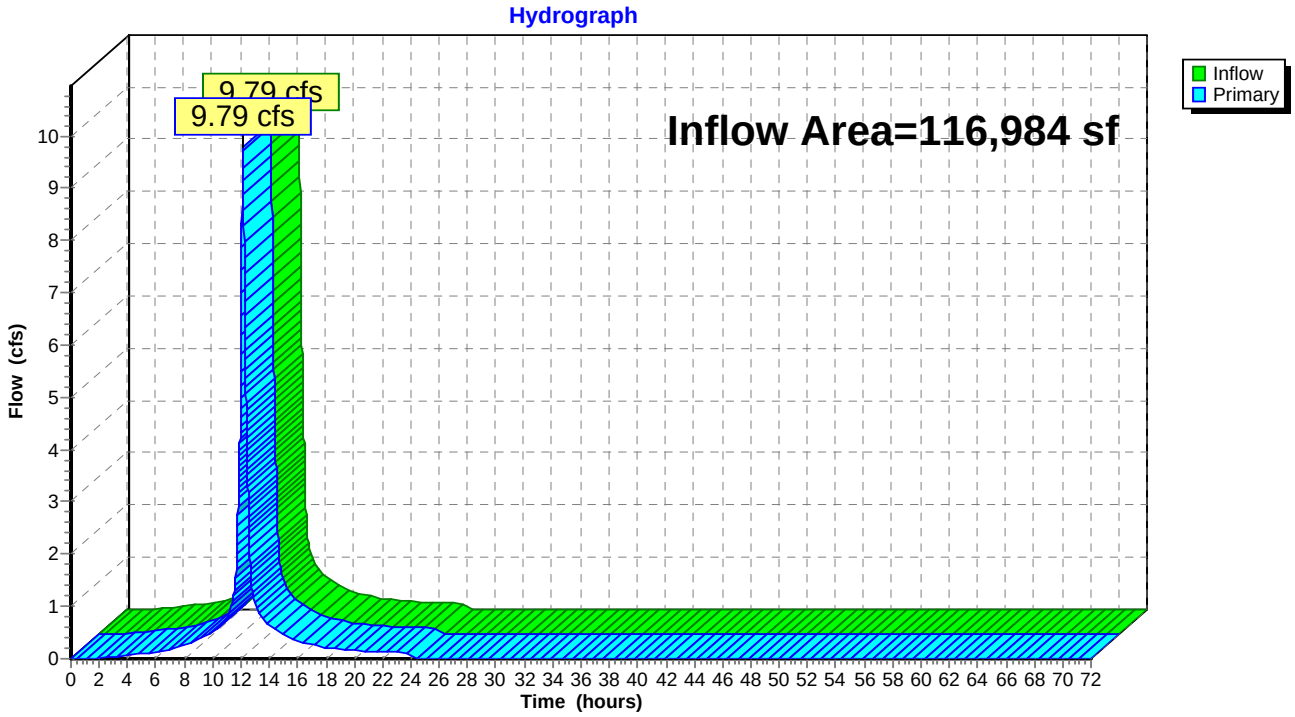


Link POA: POA

Inflow Area = 116,984 sf, Inflow Depth = 4.11" for 10 yr event
Inflow = 9.79 cfs @ 12.14 hrs, Volume= 40,059 cf
Primary = 9.79 cfs @ 12.14 hrs, Volume= 40,059 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: POA



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment XWS-1: Ex-Watershed-1 Runoff Area=103,026 sf Runoff Depth=5.05"
Flow Length=67' Slope=0.0043 '/' Tc=11.0 min CN=97 Runoff=10.59 cfs 43,321 cf

Subcatchment XWS-2: Ex-Watershed-2 Runoff Area=13,958 sf Runoff Depth=4.70"
Tc=5.0 min CN=94 Runoff=1.69 cfs 5,470 cf

Link POA: POA Inflow=11.81 cfs 48,791 cf
Primary=11.81 cfs 48,791 cf

Total Runoff Area = 116,984 sf Runoff Volume = 48,791 cf Average Runoff Depth = 5.00"
15.66% Pervious Area = 18,319 sf 84.34% Impervious Area = 98,665 sf

Subcatchment XWS-1: Ex-Watershed-1

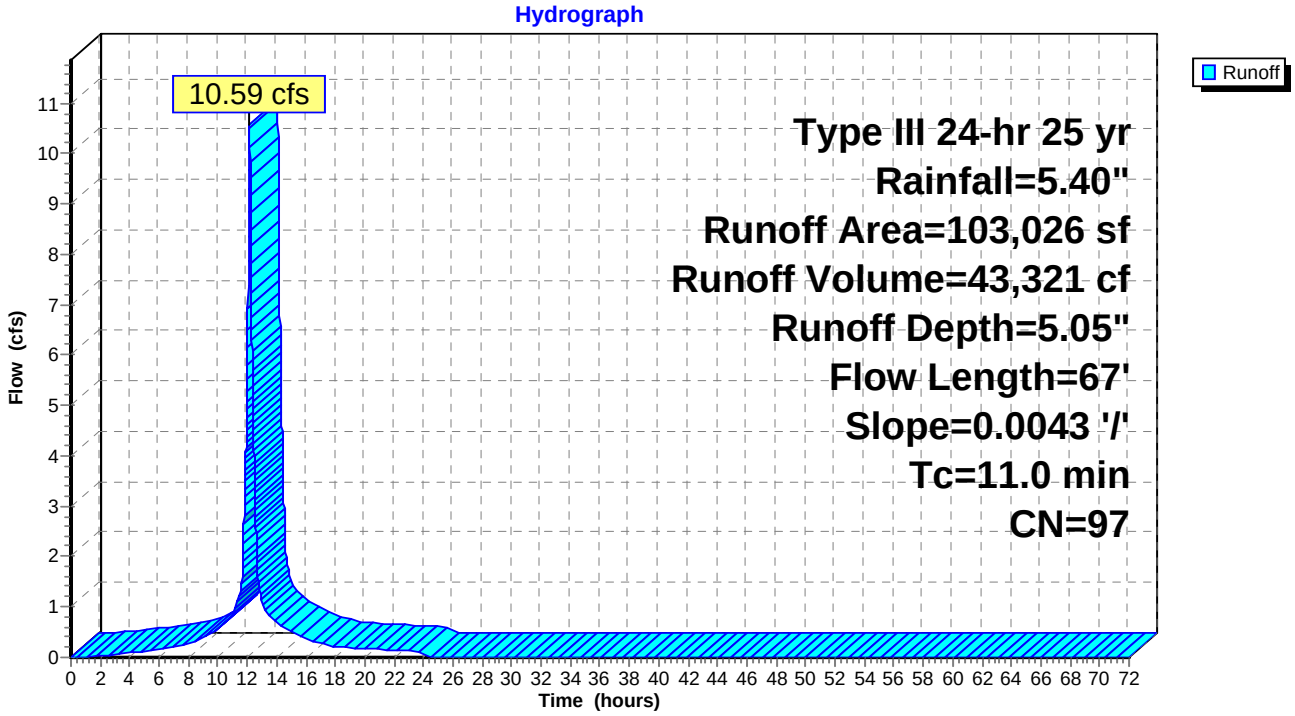
Runoff = 10.59 cfs @ 12.14 hrs, Volume= 43,321 cf, Depth= 5.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
11,756	89	<50% Grass cover, Poor, HSG D
371	86	Woods/grass comb., Poor, HSG D
90,899	98	Paved parking & roofs
103,026	97	Weighted Average
12,127		Pervious Area
90,899		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0043	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	17	0.0043	0.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.0	67	Total			

Subcatchment XWS-1: Ex-Watershed-1



Subcatchment XWS-2: Ex-Watershed-2

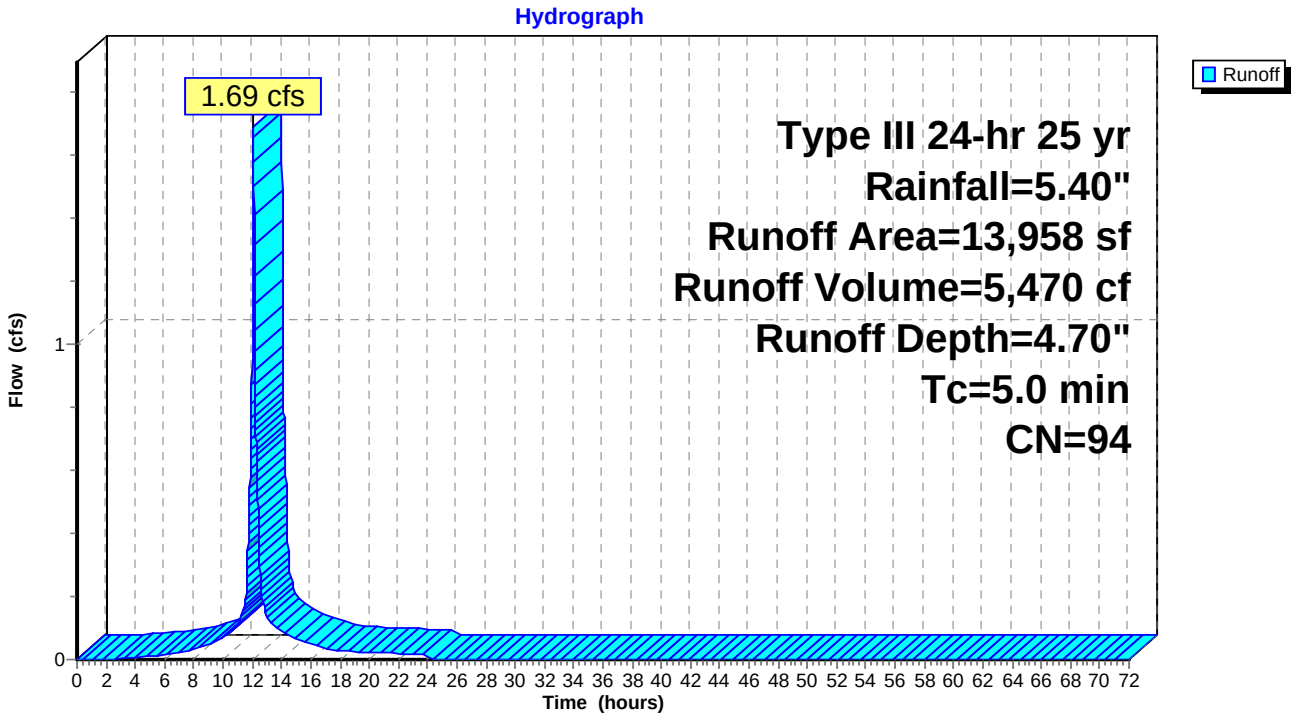
Runoff = 1.69 cfs @ 12.07 hrs, Volume= 5,470 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
7,766	98	Paved parking & roofs
6,192	89	<50% Grass cover, Poor, HSG D
13,958	94	Weighted Average
6,192		Pervious Area
7,766		Impervious Area

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

Subcatchment XWS-2: Ex-Watershed-2

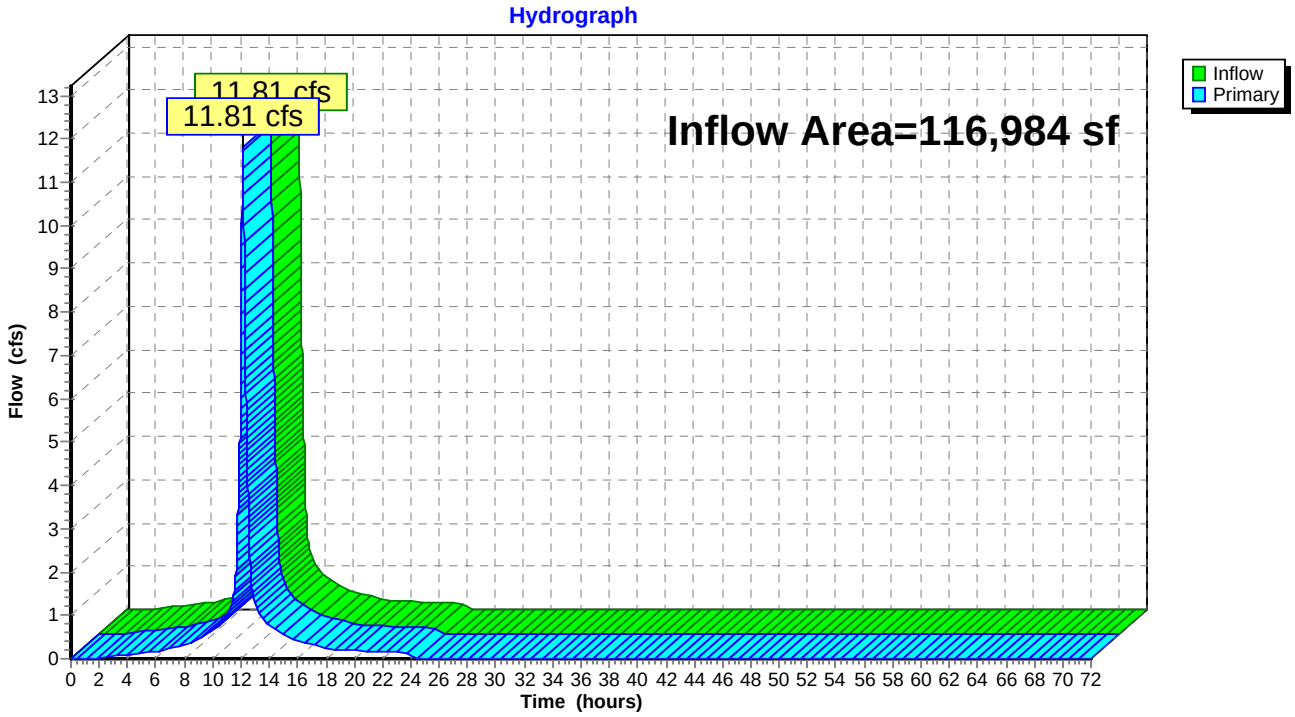


Link POA: POA

Inflow Area = 116,984 sf, Inflow Depth = 5.00" for 25 yr event
Inflow = 11.81 cfs @ 12.14 hrs, Volume= 48,791 cf
Primary = 11.81 cfs @ 12.14 hrs, Volume= 48,791 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: POA



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment XWS-1: Ex-Watershed-1 Runoff Area=103,026 sf Runoff Depth=6.64"
Flow Length=67' Slope=0.0043 '/' Tc=11.0 min CN=97 Runoff=13.79 cfs 57,025 cf

Subcatchment XWS-2: Ex-Watershed-2 Runoff Area=13,958 sf Runoff Depth=6.29"
Tc=5.0 min CN=94 Runoff=2.23 cfs 7,314 cf

Link POA: POA Inflow=15.39 cfs 64,340 cf
Primary=15.39 cfs 64,340 cf

Total Runoff Area = 116,984 sf Runoff Volume = 64,340 cf Average Runoff Depth = 6.60"
15.66% Pervious Area = 18,319 sf 84.34% Impervious Area = 98,665 sf

Subcatchment XWS-1: Ex-Watershed-1

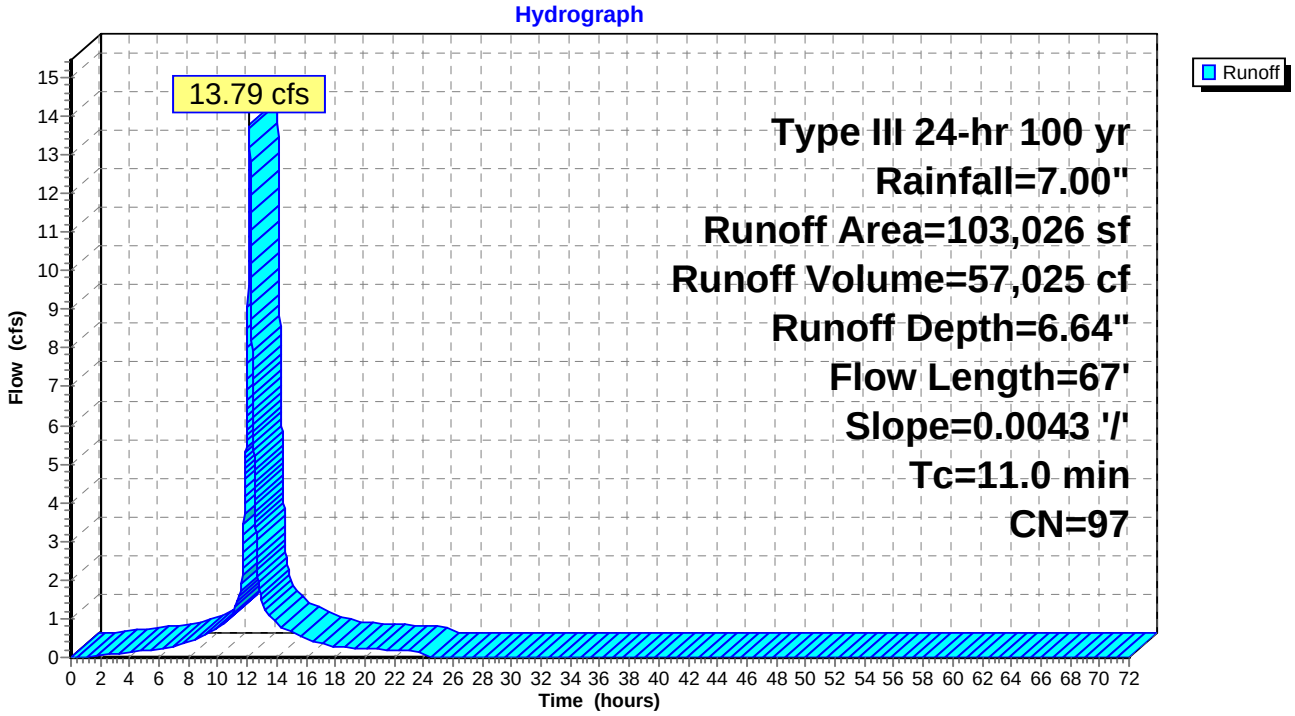
Runoff = 13.79 cfs @ 12.14 hrs, Volume= 57,025 cf, Depth= 6.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
11,756	89	<50% Grass cover, Poor, HSG D
371	86	Woods/grass comb., Poor, HSG D
90,899	98	Paved parking & roofs
103,026	97	Weighted Average
12,127		Pervious Area
90,899		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0043	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	17	0.0043	0.46		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.0	67	Total			

Subcatchment XWS-1: Ex-Watershed-1



Subcatchment XWS-2: Ex-Watershed-2

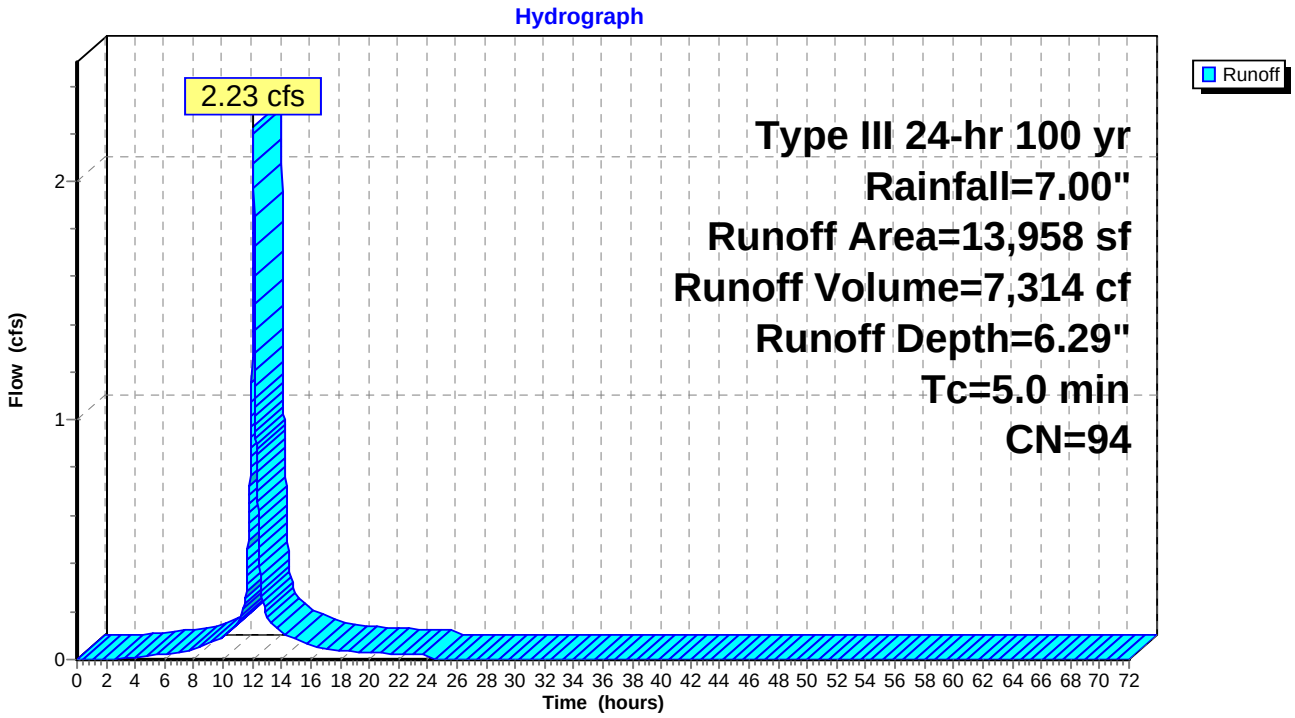
Runoff = 2.23 cfs @ 12.07 hrs, Volume= 7,314 cf, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
7,766	98	Paved parking & roofs
6,192	89	<50% Grass cover, Poor, HSG D
13,958	94	Weighted Average
6,192		Pervious Area
7,766		Impervious Area

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

Subcatchment XWS-2: Ex-Watershed-2

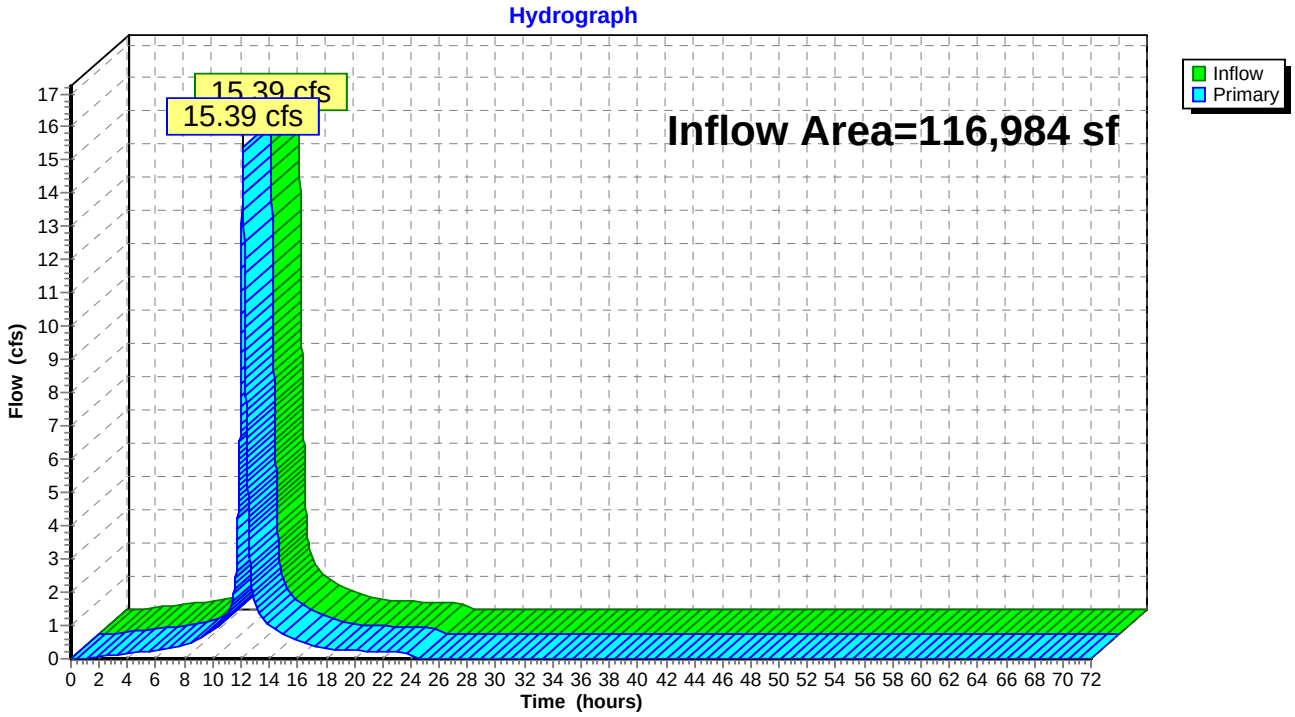


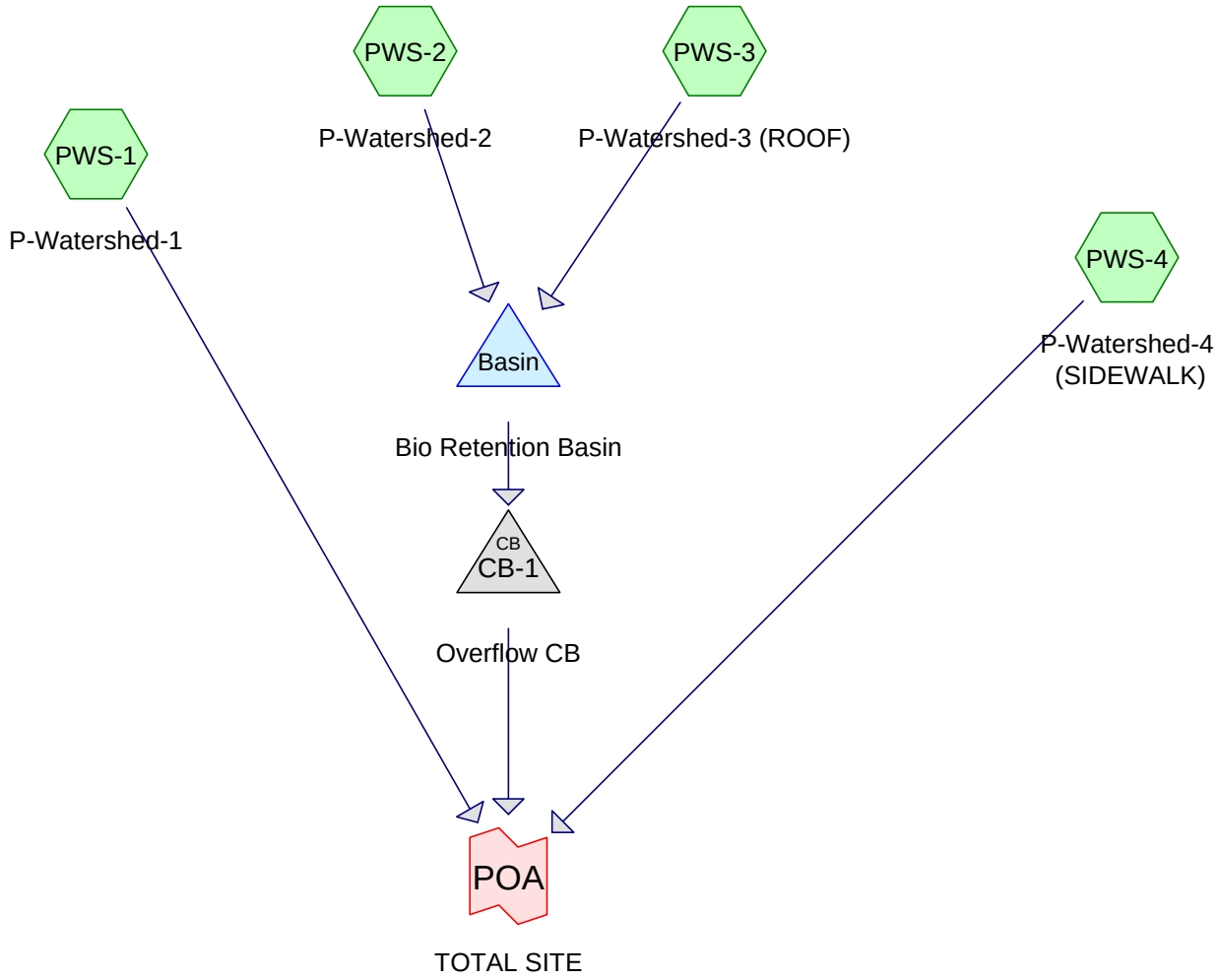
Link POA: POA

Inflow Area = 116,984 sf, Inflow Depth = 6.60" for 100 yr event
Inflow = 15.39 cfs @ 12.14 hrs, Volume= 64,340 cf
Primary = 15.39 cfs @ 12.14 hrs, Volume= 64,340 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: POA





Subcat Reach Pond Link

Drainage Diagram for 14076.00- Lower Basin - Proposed
Prepared by Samiotes Consultants, Inc. 10/17/2018

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcats)
3,031	77	Brush, Fair, HSG D (PWS-2)
51,652	80	>75% Grass cover, Good, HSG D (PWS-1,PWS-2,PWS-4)
358	91	(Peastone Diaphragm), HSG D (PWS-2)
61,943	98	Paved parking & roofs (PWS-1,PWS-2,PWS-3,PWS-4)
116,984		

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS-1: P-Watershed-1 Runoff Area=56,308 sf Runoff Depth=1.91"
Tc=11.0 min CN=87 Runoff=2.45 cfs 8,985 cf

Subcatchment PWS-2: P-Watershed-2 Runoff Area=30,120 sf Runoff Depth=2.17"
Flow Length=73' Tc=9.0 min CN=90 Runoff=1.57 cfs 5,443 cf

Subcatchment PWS-3: P-Watershed-3 (ROOF) Runoff Area=10,366 sf Runoff Depth=2.97"
Tc=5.0 min CN=98 Runoff=0.77 cfs 2,563 cf

Subcatchment PWS-4: P-Watershed-4 (SIDEWALK) Runoff Area=20,190 sf Runoff Depth=2.26"
Tc=5.0 min CN=91 Runoff=1.25 cfs 3,800 cf

Pond Basin: Bio Retention Basin Peak Elev=13.39' Storage=5,234 cf Inflow=2.23 cfs 8,007 cf
Discarded=0.01 cfs 1,704 cf Primary=0.18 cfs 2,446 cf Outflow=0.19 cfs 4,150 cf

Pond CB-1: Overflow CB Peak Elev=10.02' Inflow=0.18 cfs 2,446 cf
10.0" x 63.0' Culvert Outflow=0.18 cfs 2,446 cf

Link POA: TOTAL SITE Inflow=3.41 cfs 15,230 cf
Primary=3.41 cfs 15,230 cf

Total Runoff Area = 116,984 sf Runoff Volume = 20,791 cf Average Runoff Depth = 2.13"
47.05% Pervious Area = 55,041 sf 52.95% Impervious Area = 61,943 sf

Subcatchment PWS-1: P-Watershed-1

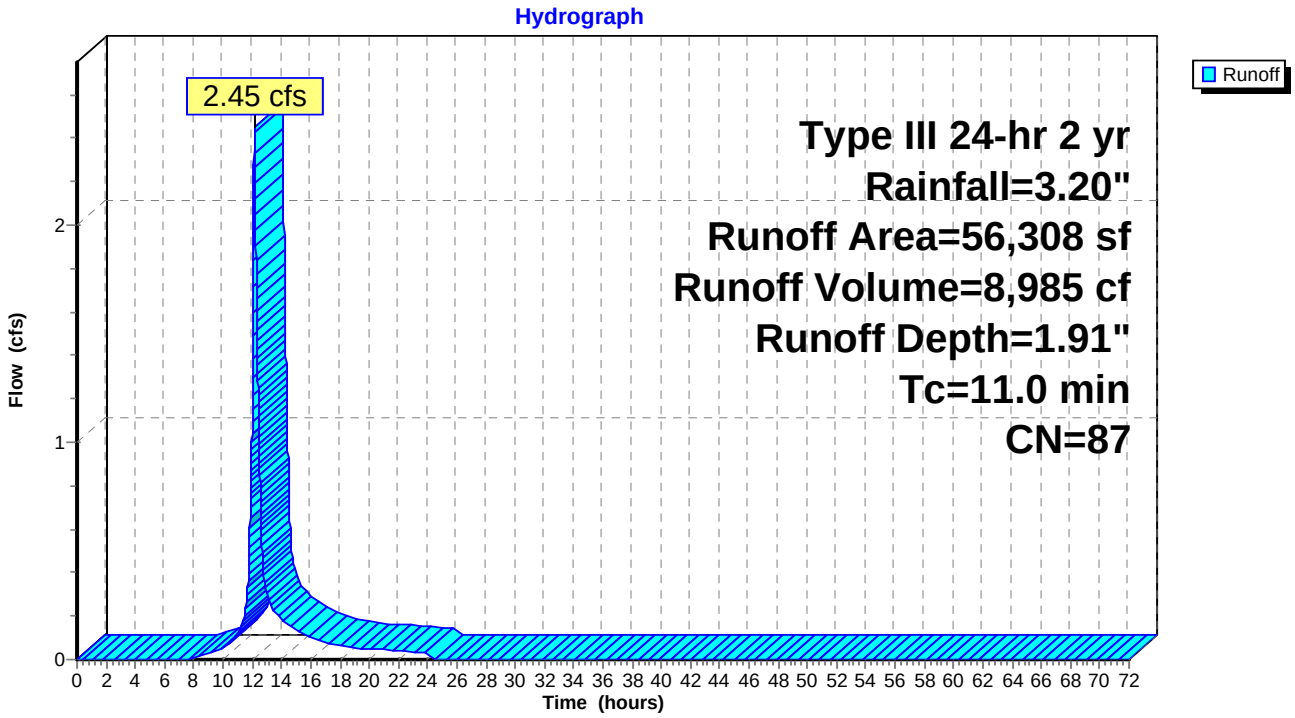
Runoff = 2.45 cfs @ 12.15 hrs, Volume= 8,985 cf, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
21,632	98	Paved parking & roofs
34,676	80	>75% Grass cover, Good, HSG D
56,308	87	Weighted Average
34,676		Pervious Area
21,632		Impervious Area

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

Subcatchment PWS-1: P-Watershed-1



Subcatchment PWS-2: P-Watershed-2

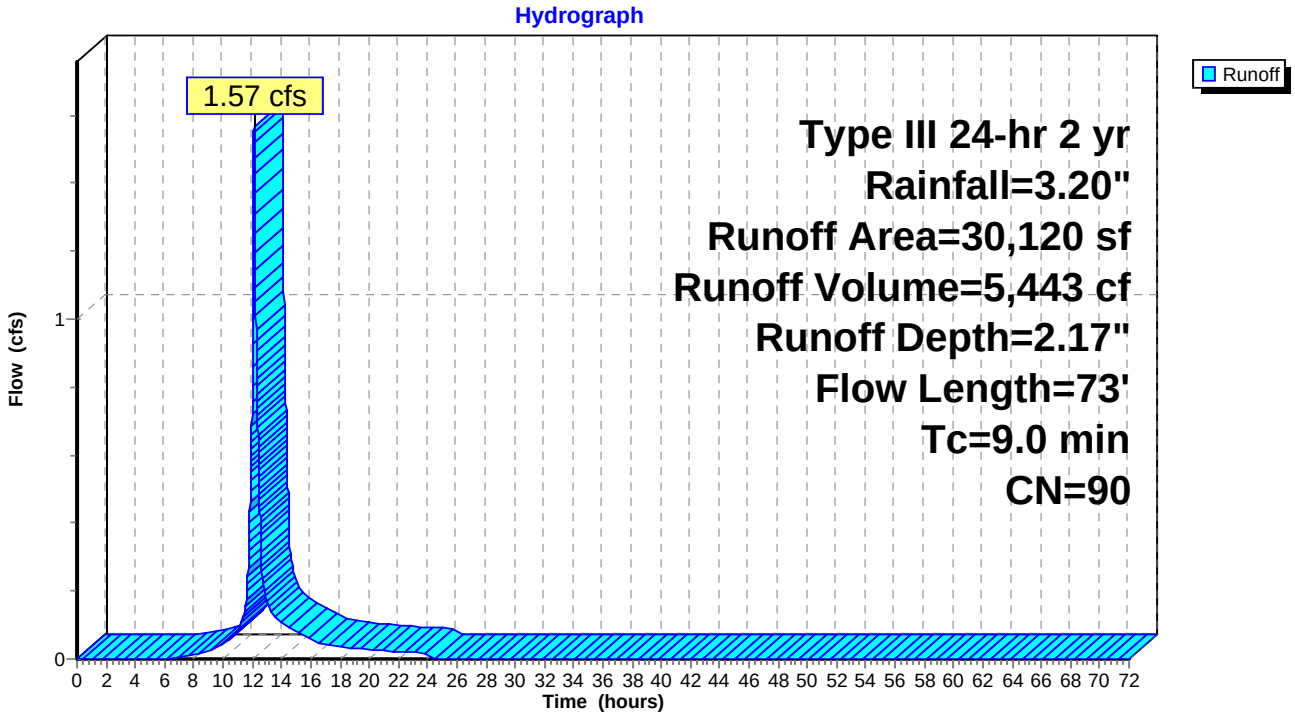
Runoff = 1.57 cfs @ 12.13 hrs, Volume= 5,443 cf, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
17,698	98	Paved parking & roofs
358	91	(Peastone Diaphragm), HSG D
3,031	77	Brush, Fair, HSG D
9,033	80	>75% Grass cover, Good, HSG D
30,120	90	Weighted Average
12,422		Pervious Area
17,698		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	22	0.0110	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
4.9	28	0.0090	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	23	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.0	73	Total			

Subcatchment PWS-2: P-Watershed-2



Subcatchment PWS-3: P-Watershed-3 (ROOF)

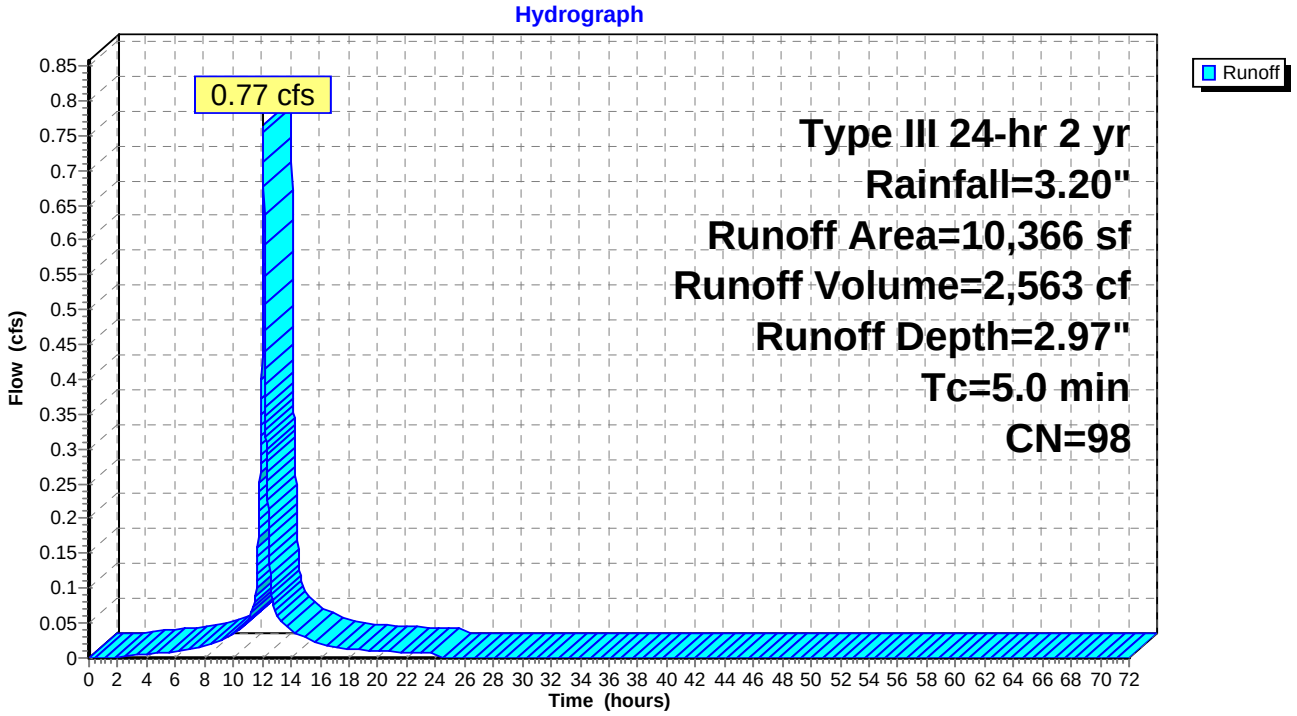
Runoff = 0.77 cfs @ 12.07 hrs, Volume= 2,563 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
10,366	98	Paved parking & roofs
10,366		Impervious Area

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

Subcatchment PWS-3: P-Watershed-3 (ROOF)



Subcatchment PWS-4: P-Watershed-4 (SIDEWALK)

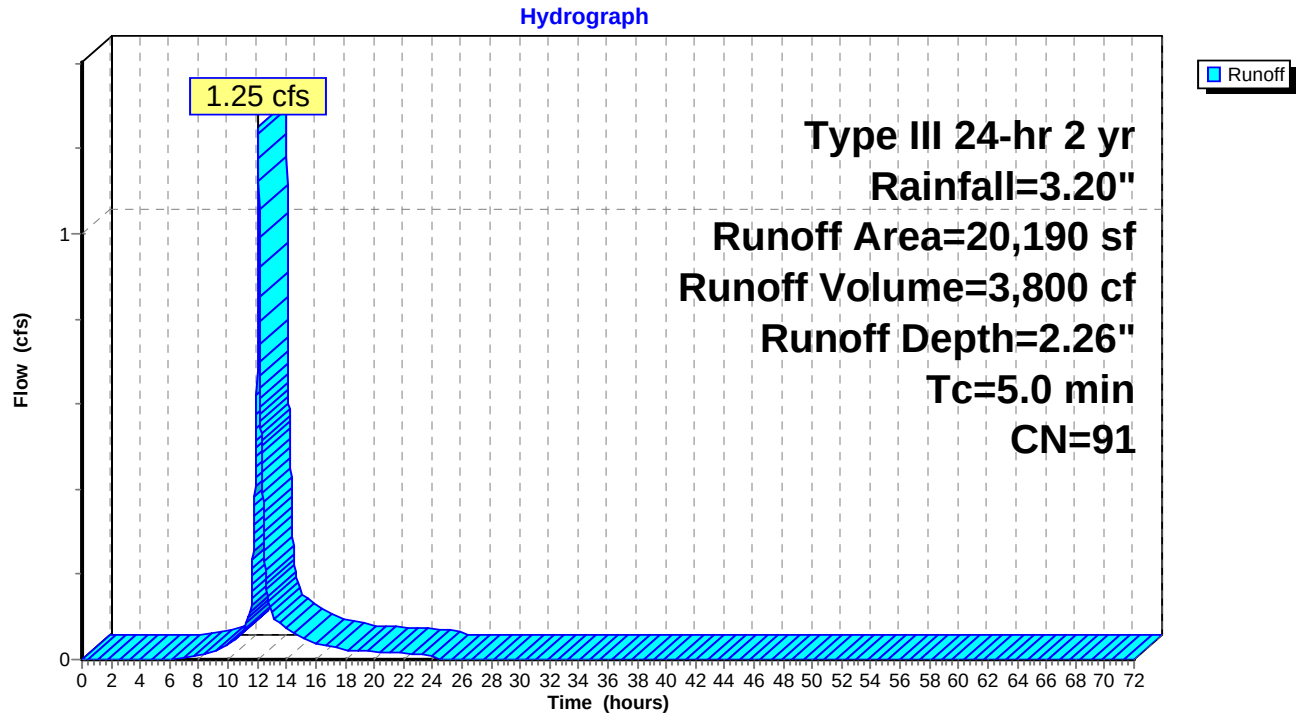
Runoff = 1.25 cfs @ 12.07 hrs, Volume= 3,800 cf, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

Area (sf)	CN	Description
12,247	98	Paved parking & roofs
7,943	80	>75% Grass cover, Good, HSG D
20,190	91	Weighted Average
7,943		Pervious Area
12,247		Impervious Area

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

Subcatchment PWS-4: P-Watershed-4 (SIDEWALK)



Pond Basin: Bio Retention Basin

Inflow Area = 40,486 sf, Inflow Depth = 2.37" for 2 yr event
Inflow = 2.23 cfs @ 12.10 hrs, Volume= 8,007 cf
Outflow = 0.19 cfs @ 13.33 hrs, Volume= 4,150 cf, Atten= 92%, Lag= 73.2 min
Discarded = 0.01 cfs @ 13.33 hrs, Volume= 1,704 cf
Primary = 0.18 cfs @ 13.33 hrs, Volume= 2,446 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 13.39' @ 13.33 hrs Surf.Area= 3,744 sf Storage= 5,234 cf

Plug-Flow detention time= 850.8 min calculated for 4,150 cf (52% of inflow)
Center-of-Mass det. time= 735.8 min (1,528.1 - 792.3)

Volume	Invert	Avail.Storage	Storage Description
#1	11.49'	6,664 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

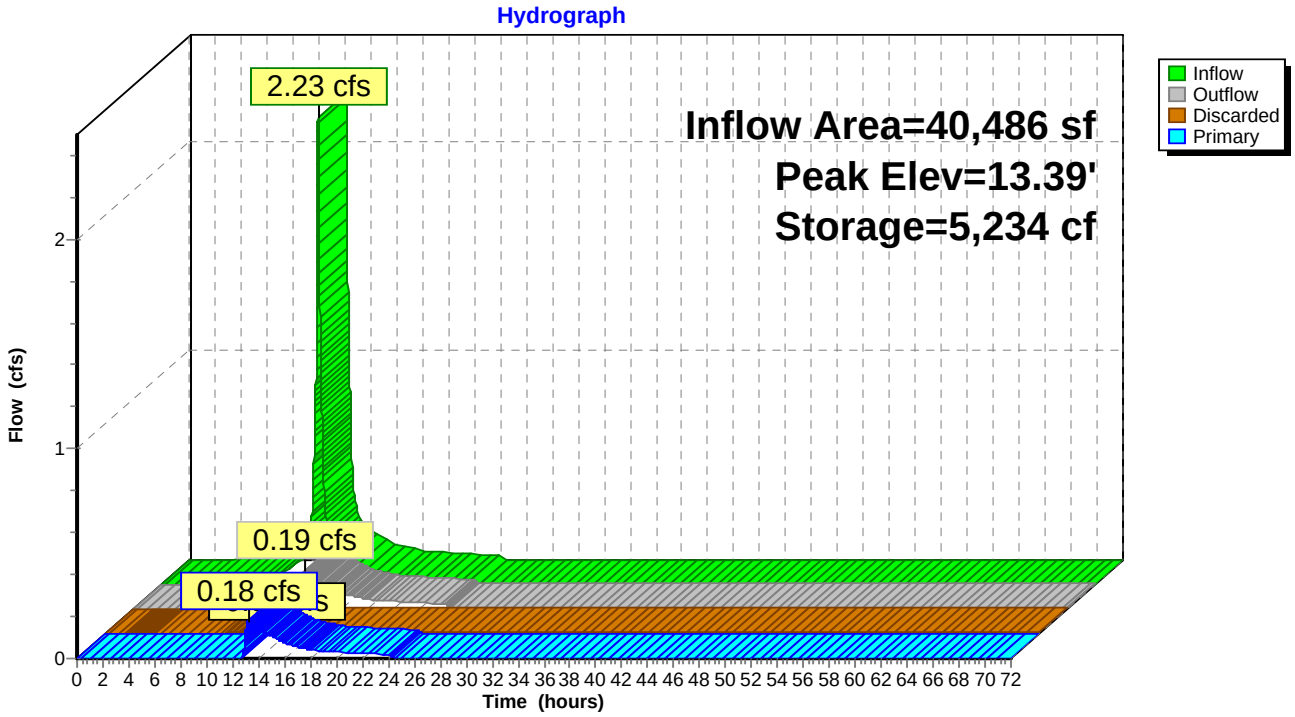
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
11.49	0	0	0
11.50	1,791	9	9
12.00	2,428	1,055	1,064
13.00	3,193	2,811	3,874
13.75	4,247	2,790	6,664

Device	Routing	Invert	Outlet Devices
#1	Primary	13.35'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Discarded	0.00'	**0.090 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 13.33 hrs HW=13.39' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.18 cfs @ 13.33 hrs HW=13.39' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 0.18 cfs @ 0.67 fps)

Pond Basin: Bio Retention Basin



Pond CB-1: Overflow CB

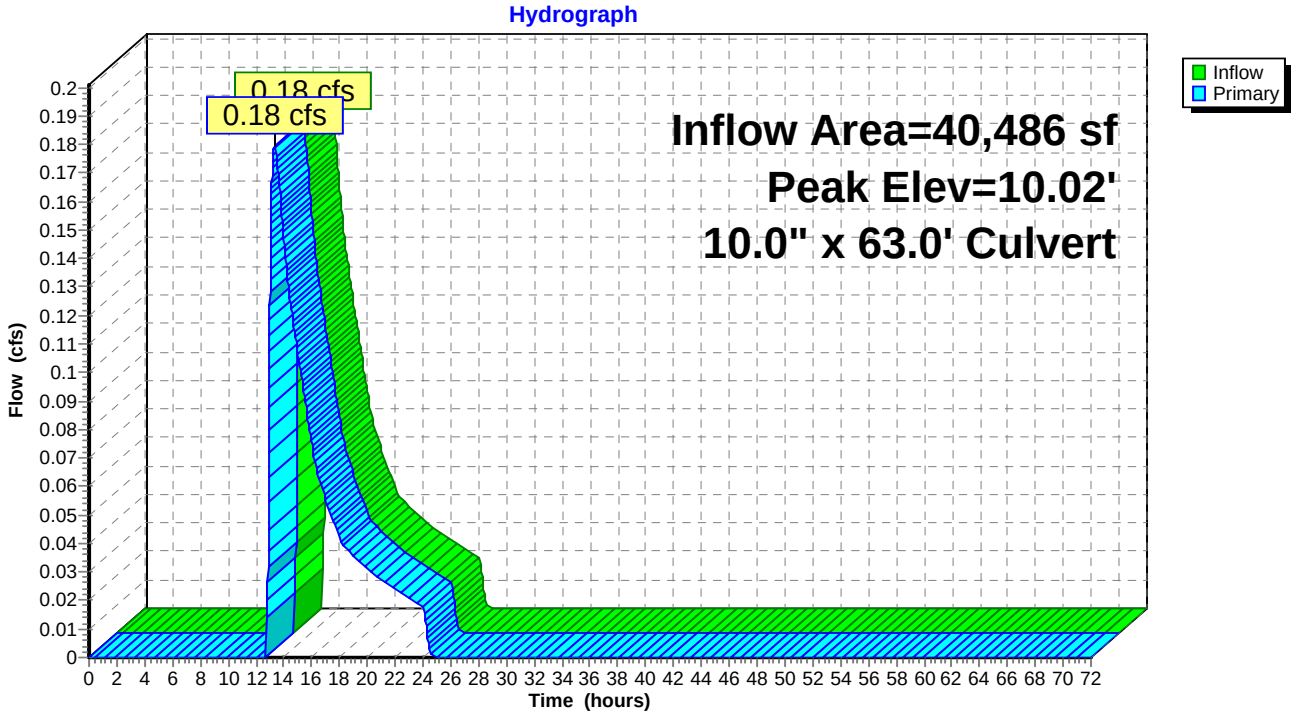
Inflow Area = 40,486 sf, Inflow Depth = 0.72" for 2 yr event
Inflow = 0.18 cfs @ 13.33 hrs, Volume= 2,446 cf
Outflow = 0.18 cfs @ 13.33 hrs, Volume= 2,446 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.18 cfs @ 13.33 hrs, Volume= 2,446 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 10.02' @ 13.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	9.84'	**10.0" x 63.0' long Culvert** RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 6.64' S= 0.0508 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=0.18 cfs @ 13.33 hrs HW=10.02' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.18 cfs @ 2.00 fps)

Pond CB-1: Overflow CB

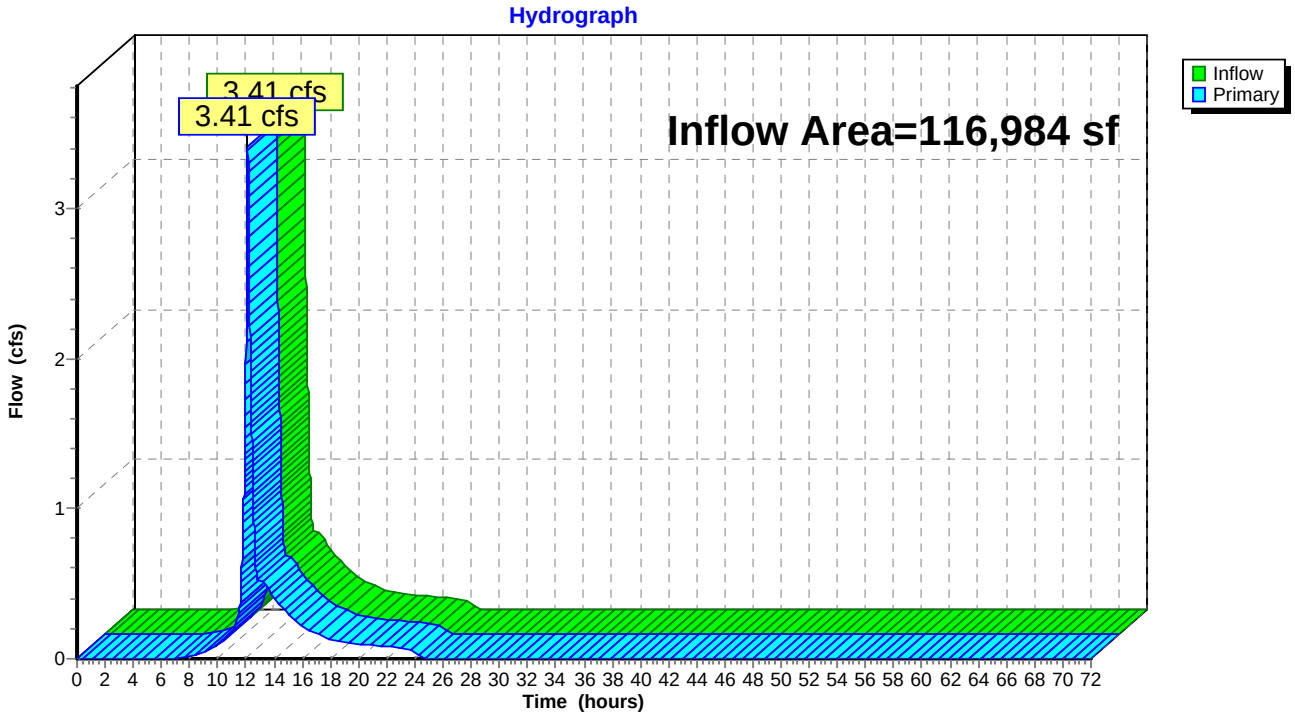


Link POA: TOTAL SITE

Inflow Area = 116,984 sf, Inflow Depth = 1.56" for 2 yr event
Inflow = 3.41 cfs @ 12.12 hrs, Volume= 15,230 cf
Primary = 3.41 cfs @ 12.12 hrs, Volume= 15,230 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: TOTAL SITE



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS-1: P-Watershed-1 Runoff Area=56,308 sf Runoff Depth=3.10"
Tc=11.0 min CN=87 Runoff=3.93 cfs 14,541 cf

Subcatchment PWS-2: P-Watershed-2 Runoff Area=30,120 sf Runoff Depth=3.40"
Flow Length=73' Tc=9.0 min CN=90 Runoff=2.42 cfs 8,523 cf

Subcatchment PWS-3: P-Watershed-3 (ROOF) Runoff Area=10,366 sf Runoff Depth=4.26"
Tc=5.0 min CN=98 Runoff=1.08 cfs 3,683 cf

Subcatchment PWS-4: P-Watershed-4 (SIDEWALK) Runoff Area=20,190 sf Runoff Depth=3.50"
Tc=5.0 min CN=91 Runoff=1.90 cfs 5,885 cf

Pond Basin: Bio Retention Basin Peak Elev=13.54' Storage=5,795 cf Inflow=3.36 cfs 12,207 cf
Discarded=0.01 cfs 1,729 cf Primary=1.68 cfs 6,618 cf Outflow=1.68 cfs 8,347 cf

Pond CB-1: Overflow CB Peak Elev=10.48' Inflow=1.68 cfs 6,618 cf
10.0" x 63.0' Culvert Outflow=1.68 cfs 6,618 cf

Link POA: TOTAL SITE Inflow=5.67 cfs 27,044 cf
Primary=5.67 cfs 27,044 cf

Total Runoff Area = 116,984 sf Runoff Volume = 32,633 cf Average Runoff Depth = 3.35"
47.05% Pervious Area = 55,041 sf 52.95% Impervious Area = 61,943 sf

Subcatchment PWS-1: P-Watershed-1

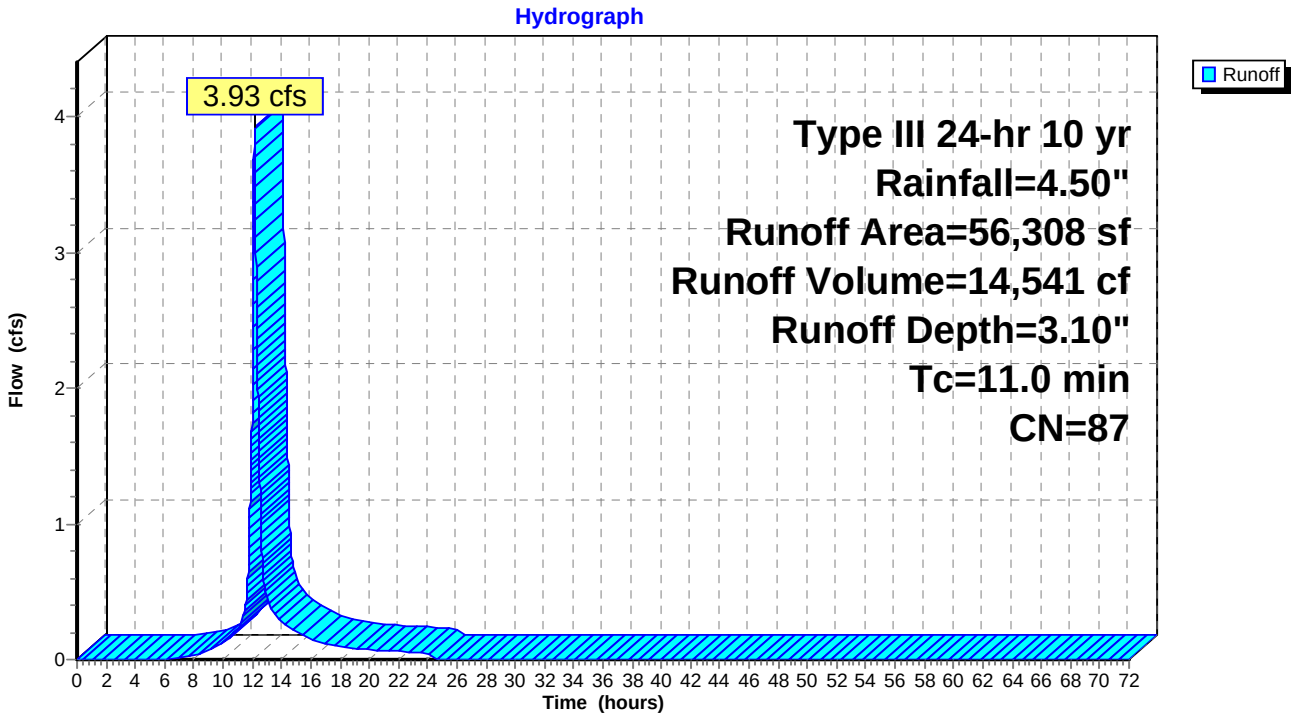
Runoff = 3.93 cfs @ 12.15 hrs, Volume= 14,541 cf, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
21,632	98	Paved parking & roofs
34,676	80	>75% Grass cover, Good, HSG D
56,308	87	Weighted Average
34,676		Pervious Area
21,632		Impervious Area

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

Subcatchment PWS-1: P-Watershed-1



Subcatchment PWS-2: P-Watershed-2

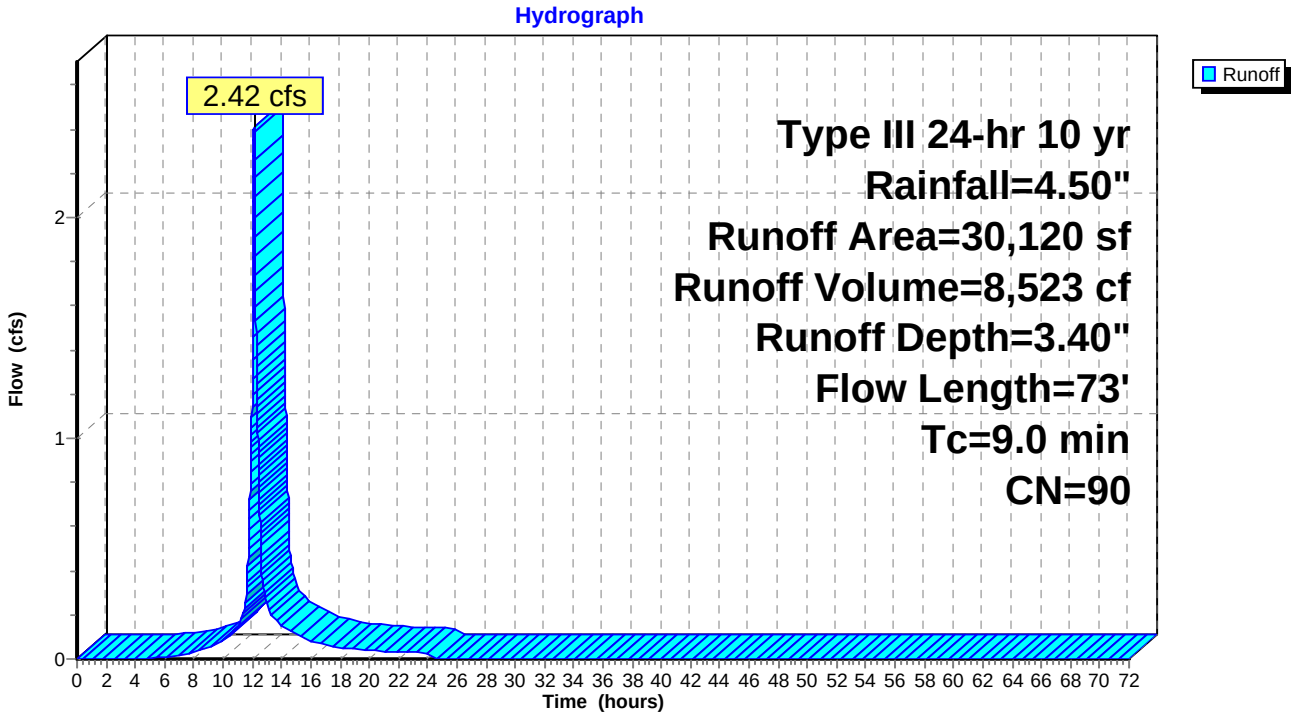
Runoff = 2.42 cfs @ 12.12 hrs, Volume= 8,523 cf, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
17,698	98	Paved parking & roofs
358	91	(Peastone Diaphragm), HSG D
3,031	77	Brush, Fair, HSG D
9,033	80	>75% Grass cover, Good, HSG D
30,120	90	Weighted Average
12,422		Pervious Area
17,698		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	22	0.0110	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
4.9	28	0.0090	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	23	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.0	73	Total			

Subcatchment PWS-2: P-Watershed-2



Subcatchment PWS-3: P-Watershed-3 (ROOF)

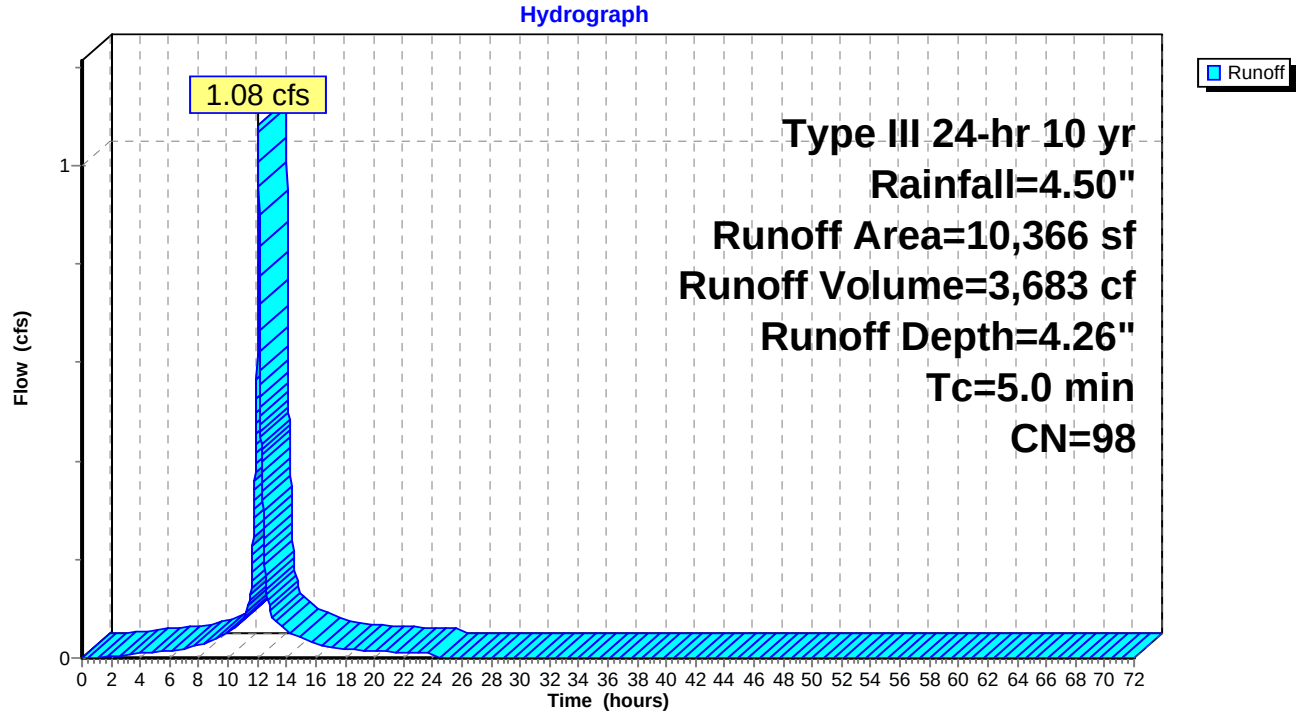
Runoff = 1.08 cfs @ 12.07 hrs, Volume= 3,683 cf, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
10,366	98	Paved parking & roofs
10,366		Impervious Area

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

Subcatchment PWS-3: P-Watershed-3 (ROOF)



Subcatchment PWS-4: P-Watershed-4 (SIDEWALK)

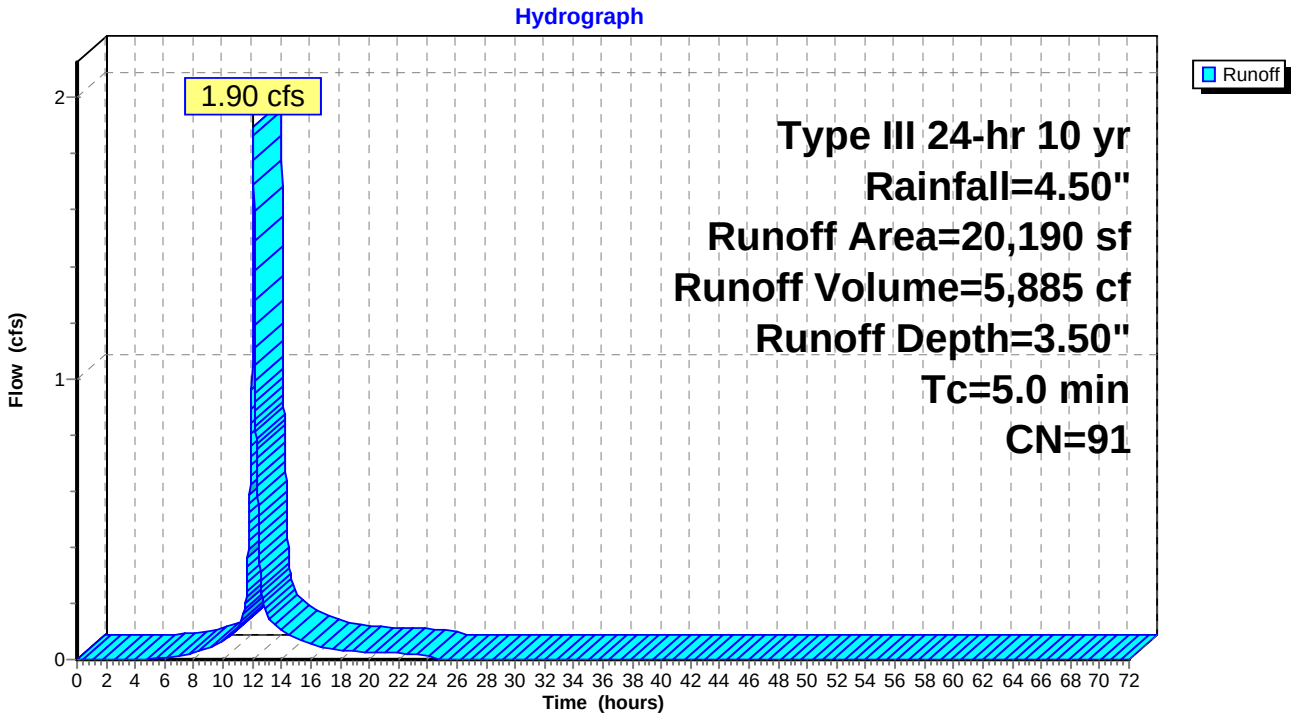
Runoff = 1.90 cfs @ 12.07 hrs, Volume= 5,885 cf, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
12,247	98	Paved parking & roofs
7,943	80	>75% Grass cover, Good, HSG D
20,190	91	Weighted Average
7,943		Pervious Area
12,247		Impervious Area

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

Subcatchment PWS-4: P-Watershed-4 (SIDEWALK)



Pond Basin: Bio Retention Basin

Inflow Area = 40,486 sf, Inflow Depth = 3.62" for 10 yr event
Inflow = 3.36 cfs @ 12.10 hrs, Volume= 12,207 cf
Outflow = 1.68 cfs @ 12.30 hrs, Volume= 8,347 cf, Atten= 50%, Lag= 11.7 min
Discarded = 0.01 cfs @ 12.30 hrs, Volume= 1,729 cf
Primary = 1.68 cfs @ 12.30 hrs, Volume= 6,618 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 13.54' @ 12.30 hrs Surf.Area= 3,949 sf Storage= 5,795 cf

Plug-Flow detention time= 484.9 min calculated for 8,347 cf (68% of inflow)
Center-of-Mass det. time= 389.3 min (1,171.8 - 782.6)

Volume	Invert	Avail.Storage	Storage Description
#1	11.49'	6,664 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

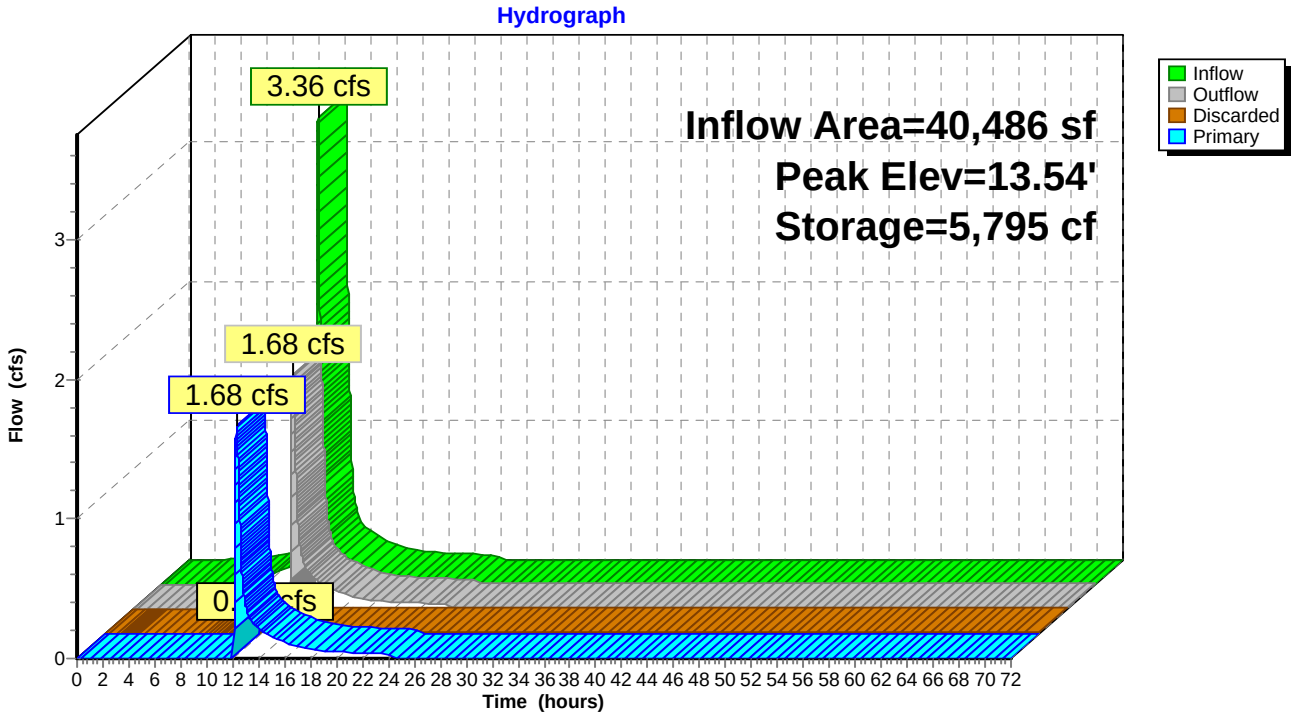
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
11.49	0	0	0
11.50	1,791	9	9
12.00	2,428	1,055	1,064
13.00	3,193	2,811	3,874
13.75	4,247	2,790	6,664

Device	Routing	Invert	Outlet Devices
#1	Primary	13.35'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Discarded	0.00'	**0.090 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.30 hrs HW=13.54' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.67 cfs @ 12.30 hrs HW=13.54' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 1.67 cfs @ 1.42 fps)

Pond Basin: Bio Retention Basin



Pond CB-1: Overflow CB

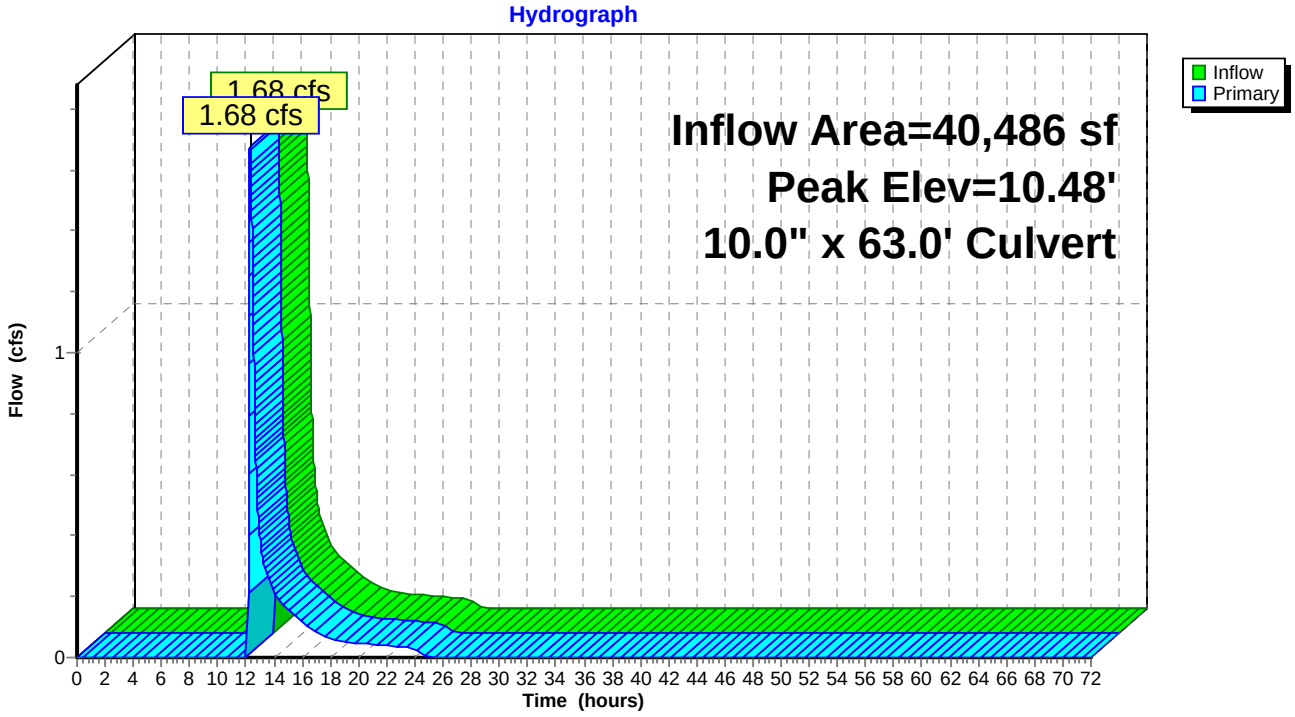
Inflow Area = 40,486 sf, Inflow Depth = 1.96" for 10 yr event
Inflow = 1.68 cfs @ 12.30 hrs, Volume= 6,618 cf
Outflow = 1.68 cfs @ 12.30 hrs, Volume= 6,618 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.68 cfs @ 12.30 hrs, Volume= 6,618 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 10.48' @ 12.30 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	9.84'	**10.0" x 63.0' long Culvert** RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 6.64' S= 0.0508 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=1.68 cfs @ 12.30 hrs HW=10.48' (Free Discharge)
1=Culvert (Inlet Controls 1.68 cfs @ 3.72 fps)

Pond CB-1: Overflow CB

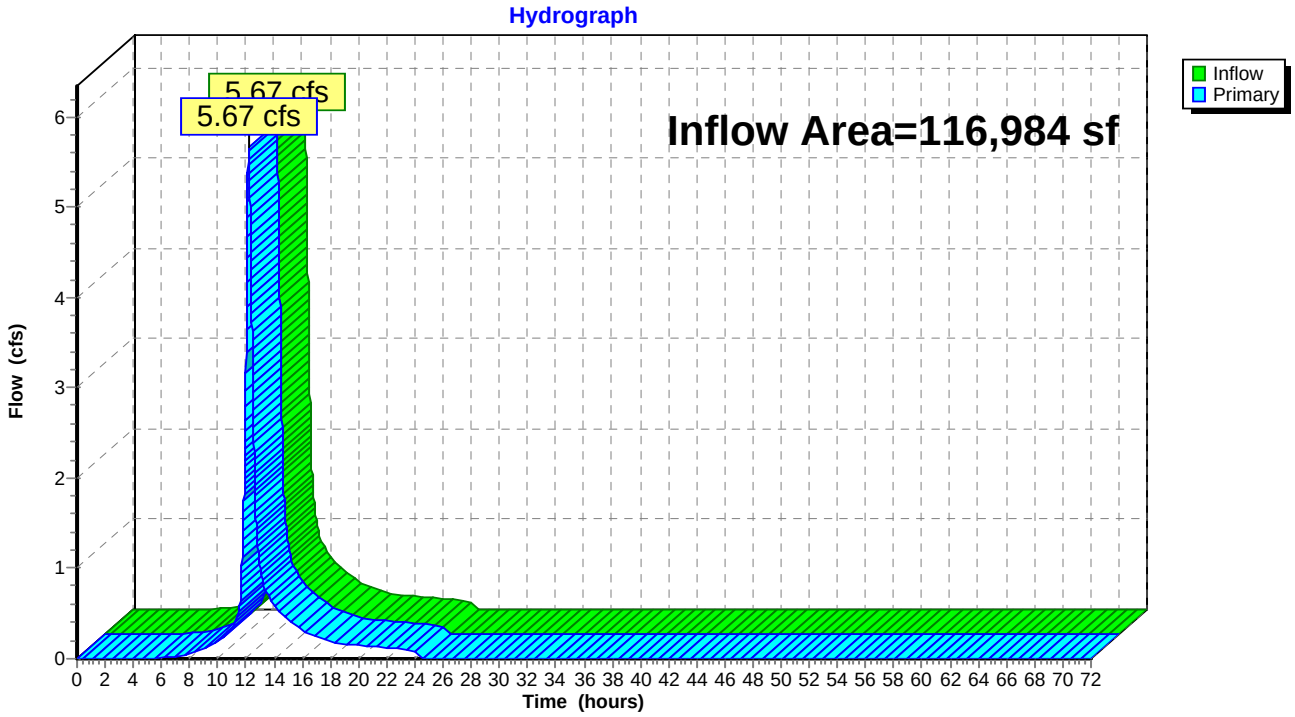


Link POA: TOTAL SITE

Inflow Area = 116,984 sf, Inflow Depth = 2.77" for 10 yr event
Inflow = 5.67 cfs @ 12.20 hrs, Volume= 27,044 cf
Primary = 5.67 cfs @ 12.20 hrs, Volume= 27,044 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: TOTAL SITE



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS-1: P-Watershed-1 Runoff Area=56,308 sf Runoff Depth=3.95"
Tc=11.0 min CN=87 Runoff=4.96 cfs 18,513 cf

Subcatchment PWS-2: P-Watershed-2 Runoff Area=30,120 sf Runoff Depth=4.26"
Flow Length=73' Tc=9.0 min CN=90 Runoff=3.00 cfs 10,700 cf

Subcatchment PWS-3: P-Watershed-3 (ROOF) Runoff Area=10,366 sf Runoff Depth=5.16"
Tc=5.0 min CN=98 Runoff=1.30 cfs 4,460 cf

Subcatchment PWS-4: P-Watershed-4 (SIDEWALK) Runoff Area=20,190 sf Runoff Depth=4.37"
Tc=5.0 min CN=91 Runoff=2.34 cfs 7,355 cf

Pond Basin: Bio Retention Basin Peak Elev=13.63' Storage=6,175 cf Inflow=4.13 cfs 15,160 cf
Discarded=0.01 cfs 1,742 cf Primary=3.08 cfs 9,556 cf Outflow=3.09 cfs 11,298 cf

Pond CB-1: Overflow CB Peak Elev=11.00' Inflow=3.08 cfs 9,556 cf
10.0" x 63.0' Culvert Outflow=3.08 cfs 9,556 cf

Link POA: TOTAL SITE Inflow=9.36 cfs 35,424 cf
Primary=9.36 cfs 35,424 cf

Total Runoff Area = 116,984 sf Runoff Volume = 41,027 cf Average Runoff Depth = 4.21"
47.05% Pervious Area = 55,041 sf 52.95% Impervious Area = 61,943 sf

Subcatchment PWS-1: P-Watershed-1

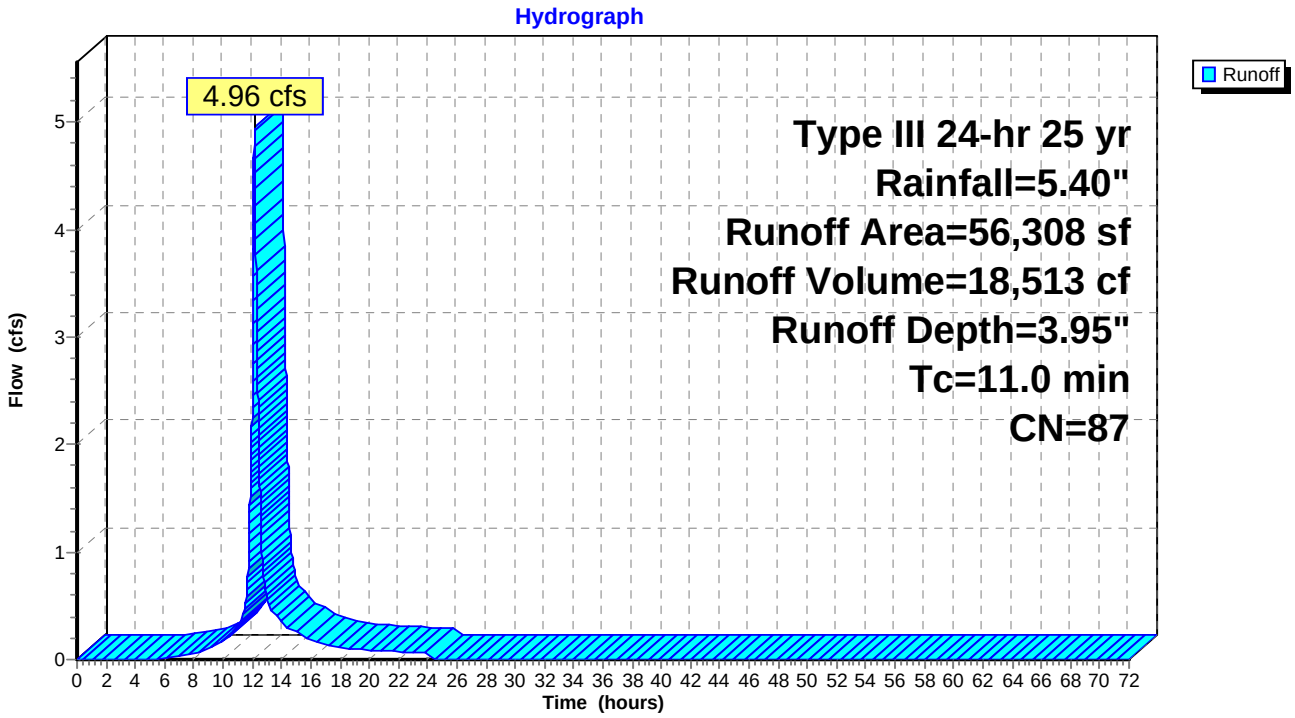
Runoff = 4.96 cfs @ 12.15 hrs, Volume= 18,513 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
21,632	98	Paved parking & roofs
34,676	80	>75% Grass cover, Good, HSG D
56,308	87	Weighted Average
34,676		Pervious Area
21,632		Impervious Area

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

Subcatchment PWS-1: P-Watershed-1



Subcatchment PWS-2: P-Watershed-2

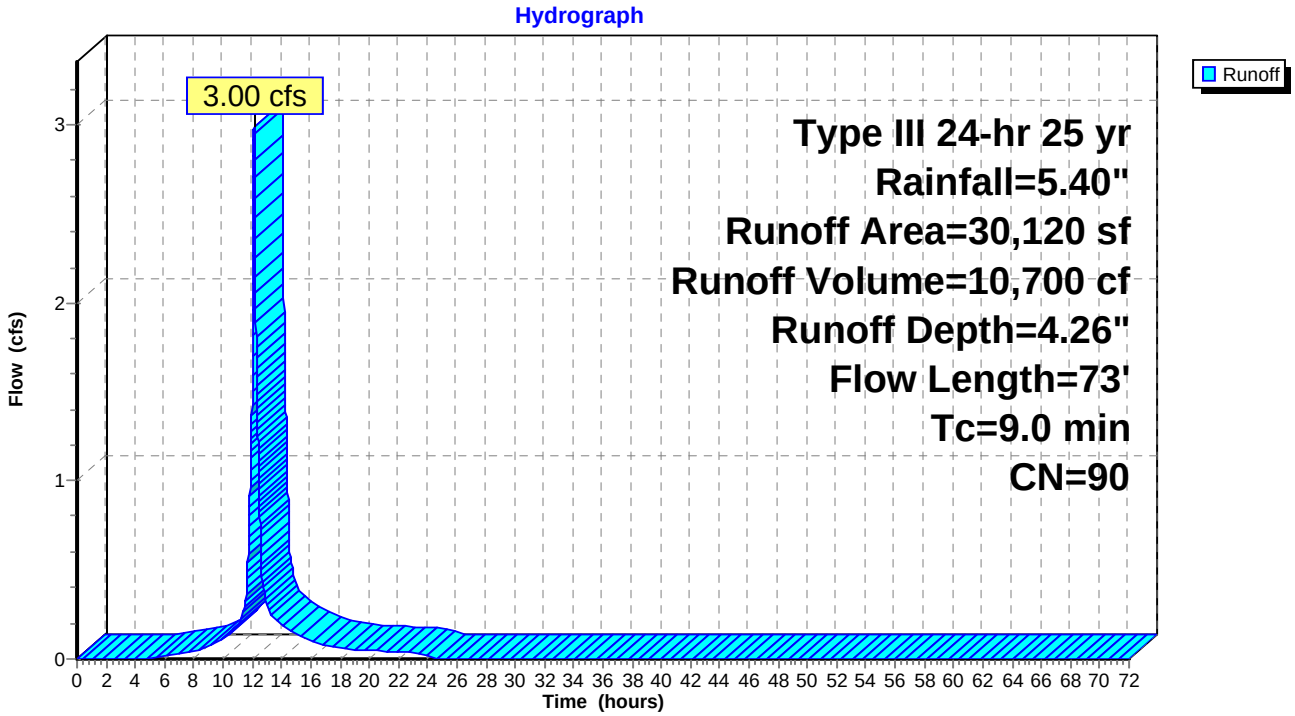
Runoff = 3.00 cfs @ 12.12 hrs, Volume= 10,700 cf, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
17,698	98	Paved parking & roofs
358	91	(Peastone Diaphragm), HSG D
3,031	77	Brush, Fair, HSG D
9,033	80	>75% Grass cover, Good, HSG D
30,120	90	Weighted Average
12,422		Pervious Area
17,698		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	22	0.0110	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
4.9	28	0.0090	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	23	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.0	73	Total			

Subcatchment PWS-2: P-Watershed-2



Subcatchment PWS-3: P-Watershed-3 (ROOF)

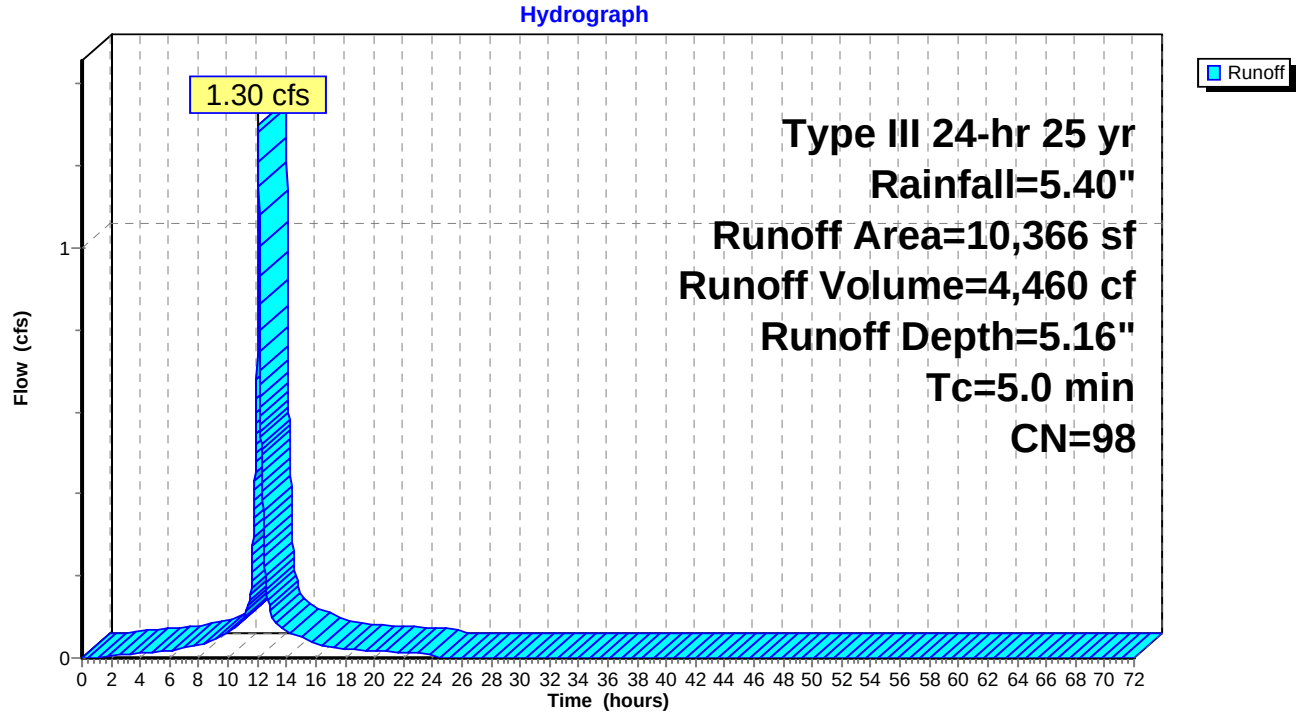
Runoff = 1.30 cfs @ 12.07 hrs, Volume= 4,460 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
10,366	98	Paved parking & roofs
10,366		Impervious Area

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

Subcatchment PWS-3: P-Watershed-3 (ROOF)



Subcatchment PWS-4: P-Watershed-4 (SIDEWALK)

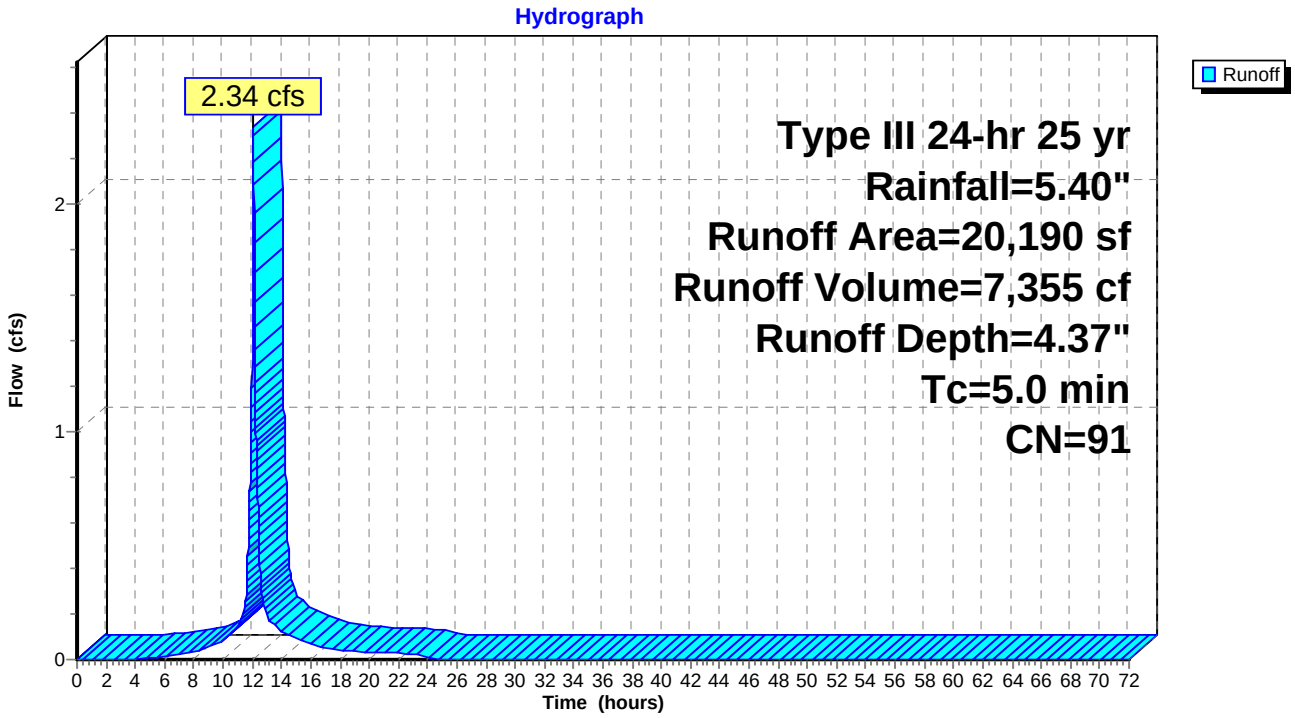
Runoff = 2.34 cfs @ 12.07 hrs, Volume= 7,355 cf, Depth= 4.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

Area (sf)	CN	Description
12,247	98	Paved parking & roofs
7,943	80	>75% Grass cover, Good, HSG D
20,190	91	Weighted Average
7,943		Pervious Area
12,247		Impervious Area

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

Subcatchment PWS-4: P-Watershed-4 (SIDEWALK)



Pond Basin: Bio Retention Basin

Inflow Area = 40,486 sf, Inflow Depth = 4.49" for 25 yr event
Inflow = 4.13 cfs @ 12.10 hrs, Volume= 15,160 cf
Outflow = 3.09 cfs @ 12.19 hrs, Volume= 11,298 cf, Atten= 25%, Lag= 5.3 min
Discarded = 0.01 cfs @ 12.19 hrs, Volume= 1,742 cf
Primary = 3.08 cfs @ 12.19 hrs, Volume= 9,556 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 13.63' @ 12.19 hrs Surf.Area= 4,082 sf Storage= 6,175 cf

Plug-Flow detention time= 385.2 min calculated for 11,296 cf (75% of inflow)
Center-of-Mass det. time= 299.2 min (1,076.9 - 777.7)

Volume	Invert	Avail.Storage	Storage Description
#1	11.49'	6,664 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

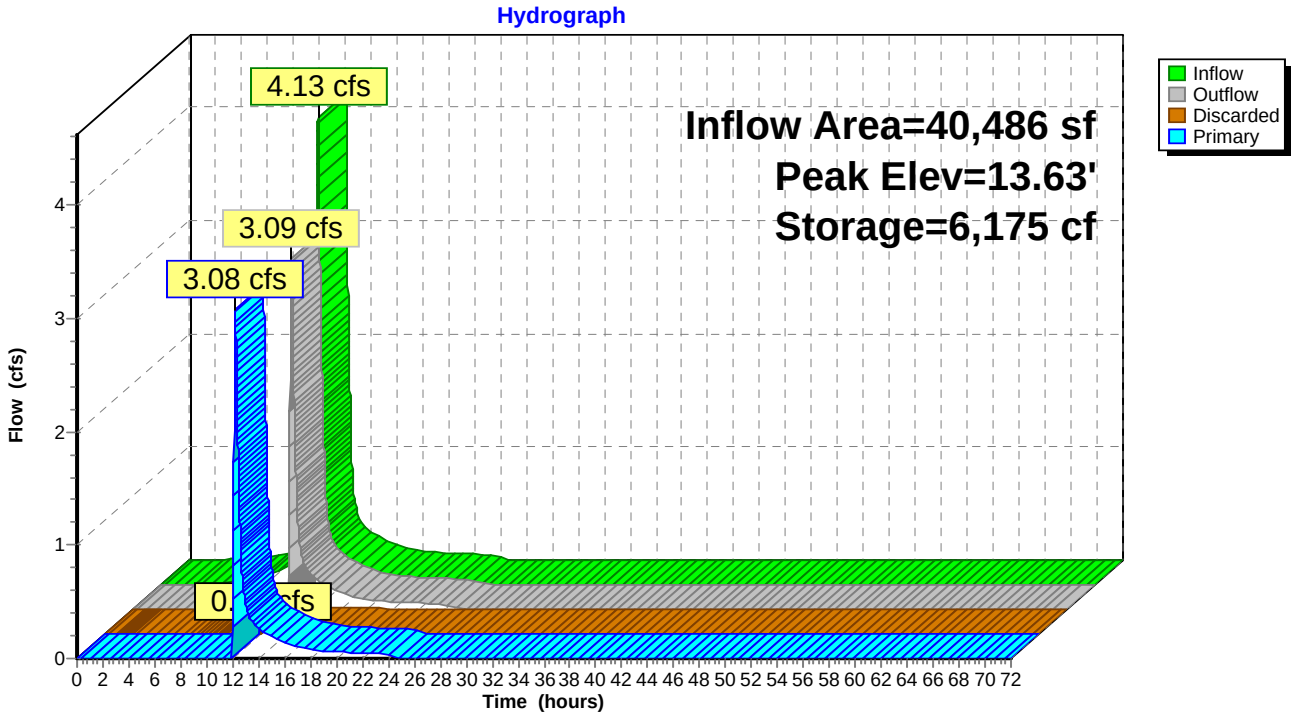
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
11.49	0	0	0
11.50	1,791	9	9
12.00	2,428	1,055	1,064
13.00	3,193	2,811	3,874
13.75	4,247	2,790	6,664

Device	Routing	Invert	Outlet Devices
#1	Primary	13.35'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Discarded	0.00'	**0.090 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.19 hrs HW=13.63' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=3.08 cfs @ 12.19 hrs HW=13.63' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 3.08 cfs @ 1.74 fps)

Pond Basin: Bio Retention Basin



Pond CB-1: Overflow CB

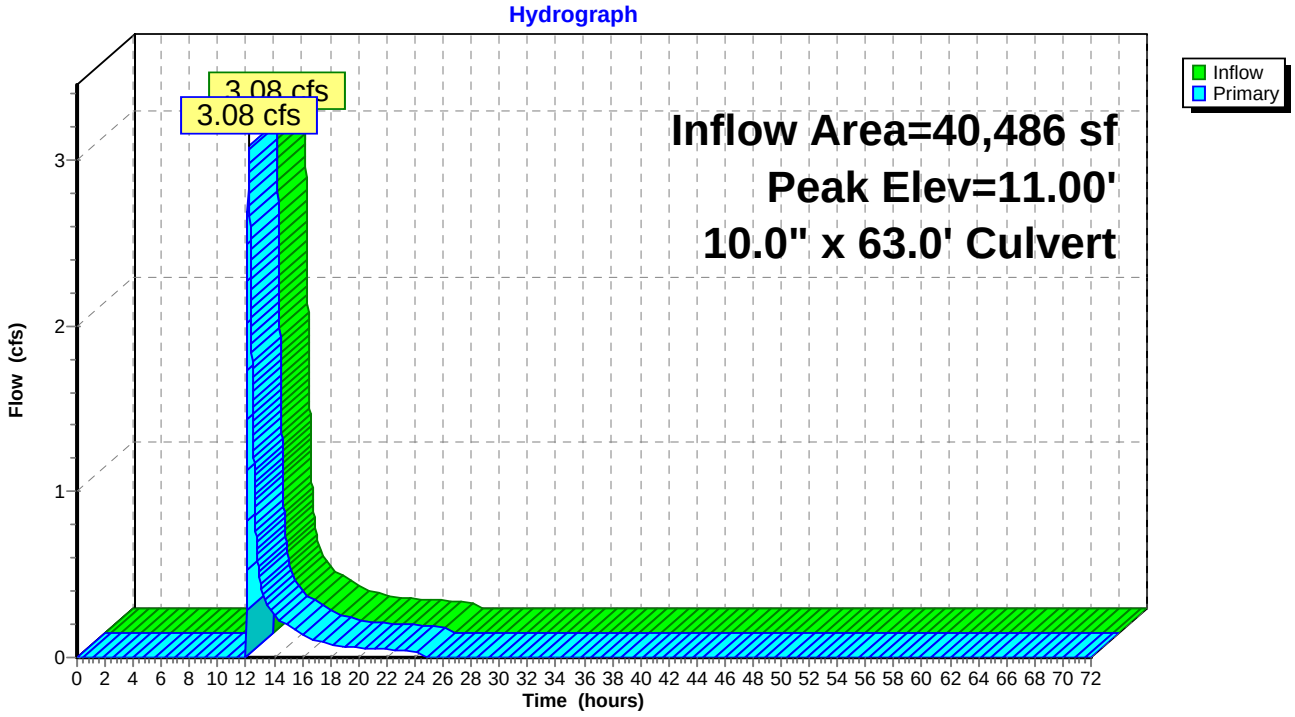
Inflow Area = 40,486 sf, Inflow Depth = 2.83" for 25 yr event
Inflow = 3.08 cfs @ 12.19 hrs, Volume= 9,556 cf
Outflow = 3.08 cfs @ 12.19 hrs, Volume= 9,556 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.08 cfs @ 12.19 hrs, Volume= 9,556 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 11.00' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	9.84'	**10.0" x 63.0' long Culvert** RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 6.64' S= 0.0508 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=3.08 cfs @ 12.19 hrs HW=11.00' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.08 cfs @ 5.65 fps)

Pond CB-1: Overflow CB

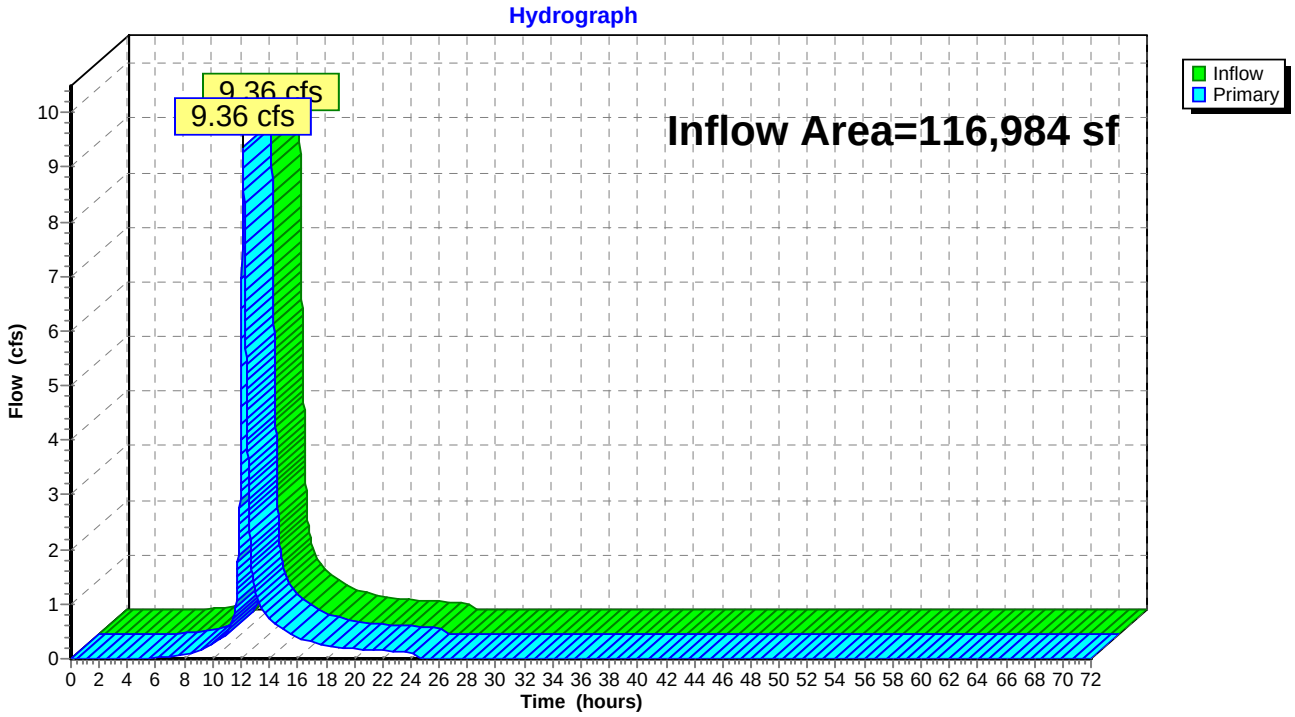


Link POA: TOTAL SITE

Inflow Area = 116,984 sf, Inflow Depth = 3.63" for 25 yr event
Inflow = 9.36 cfs @ 12.15 hrs, Volume= 35,424 cf
Primary = 9.36 cfs @ 12.15 hrs, Volume= 35,424 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: TOTAL SITE



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWS-1: P-Watershed-1 Runoff Area=56,308 sf Runoff Depth=5.48"
Tc=11.0 min CN=87 Runoff=6.79 cfs 25,711 cf

Subcatchment PWS-2: P-Watershed-2 Runoff Area=30,120 sf Runoff Depth=5.82"
Flow Length=73' Tc=9.0 min CN=90 Runoff=4.03 cfs 14,616 cf

Subcatchment PWS-3: P-Watershed-3 (ROOF) Runoff Area=10,366 sf Runoff Depth=6.76"
Tc=5.0 min CN=98 Runoff=1.69 cfs 5,840 cf

Subcatchment PWS-4: P-Watershed-4 (SIDEWALK) Runoff Area=20,190 sf Runoff Depth=5.94"
Tc=5.0 min CN=91 Runoff=3.13 cfs 9,992 cf

Pond Basin: Bio Retention Basin Peak Elev=13.73' Storage=6,586 cf Inflow=5.50 cfs 20,456 cf
Discarded=0.01 cfs 1,760 cf Primary=4.84 cfs 14,832 cf Outflow=4.85 cfs 16,593 cf

Pond CB-1: Overflow CB Peak Elev=12.08' Inflow=4.84 cfs 14,832 cf
10.0" x 63.0' Culvert Outflow=4.84 cfs 14,832 cf

Link POA: TOTAL SITE Inflow=13.85 cfs 50,535 cf
Primary=13.85 cfs 50,535 cf

Total Runoff Area = 116,984 sf Runoff Volume = 56,159 cf Average Runoff Depth = 5.76"
47.05% Pervious Area = 55,041 sf 52.95% Impervious Area = 61,943 sf

Subcatchment PWS-1: P-Watershed-1

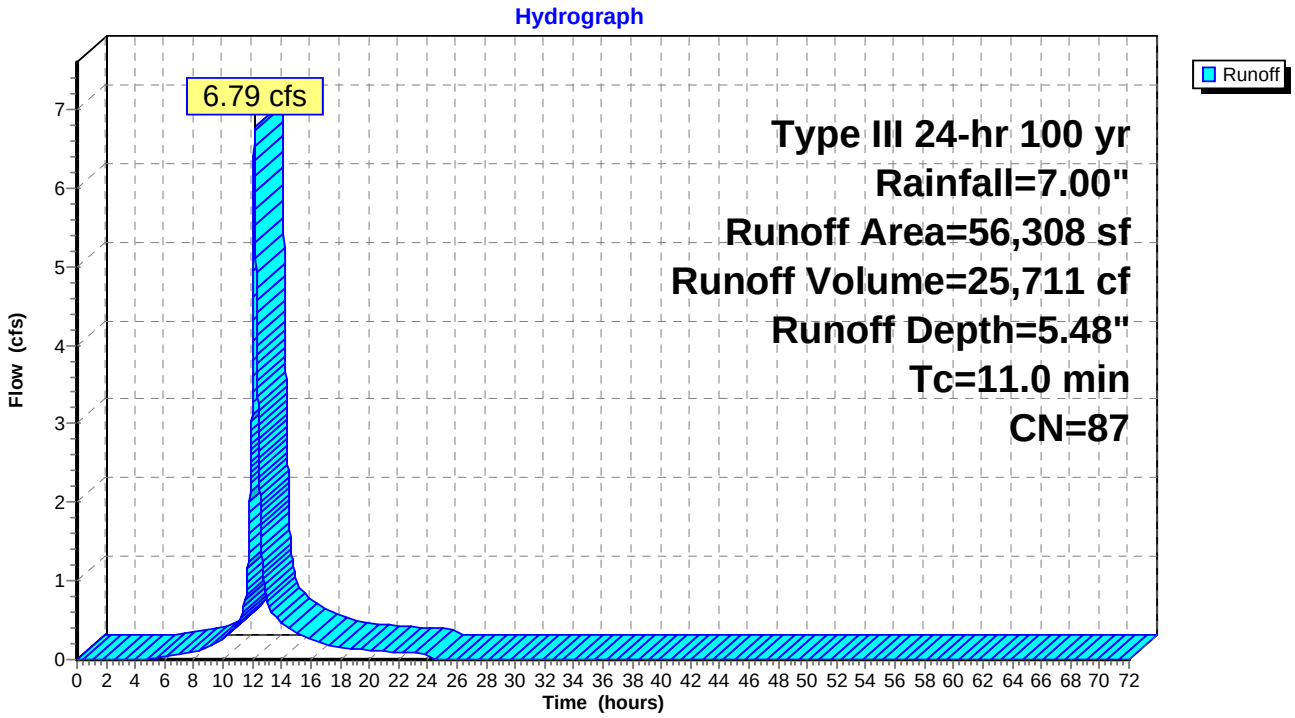
Runoff = 6.79 cfs @ 12.15 hrs, Volume= 25,711 cf, Depth= 5.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
21,632	98	Paved parking & roofs
34,676	80	>75% Grass cover, Good, HSG D
56,308	87	Weighted Average
34,676		Pervious Area
21,632		Impervious Area

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

Subcatchment PWS-1: P-Watershed-1



Subcatchment PWS-2: P-Watershed-2

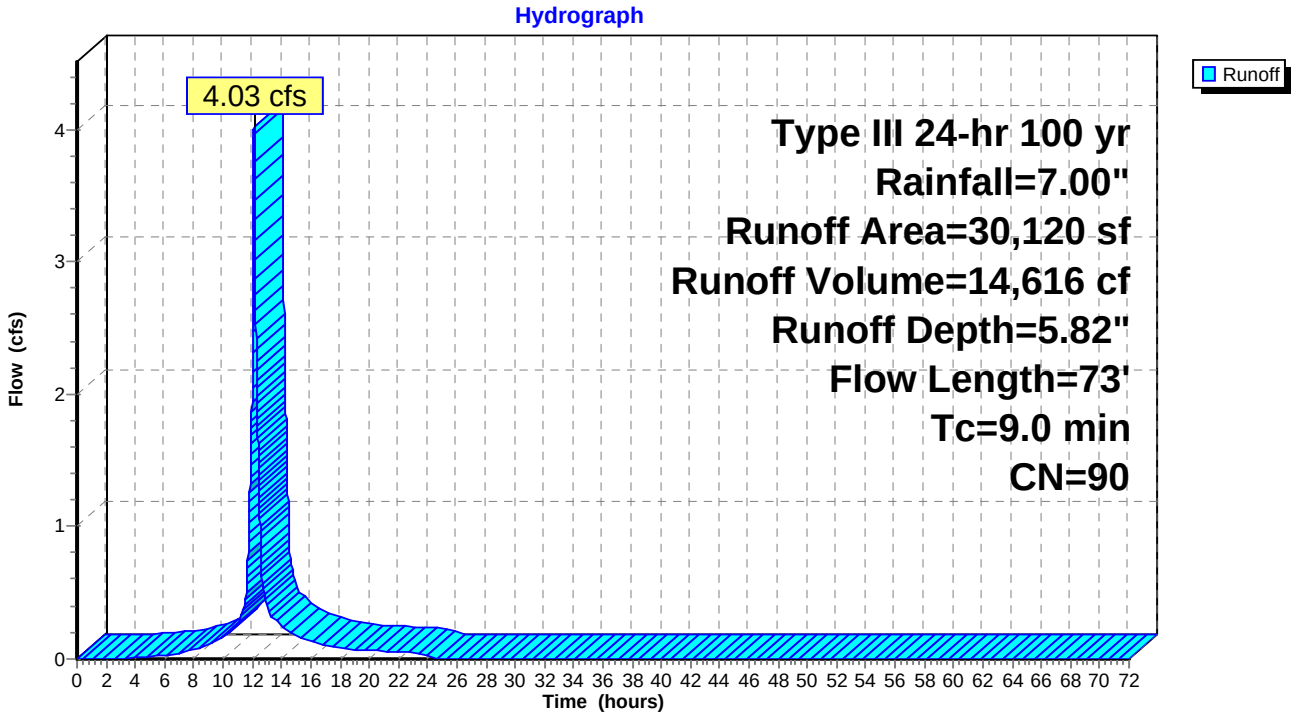
Runoff = 4.03 cfs @ 12.12 hrs, Volume= 14,616 cf, Depth= 5.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
17,698	98	Paved parking & roofs
358	91	(Peastone Diaphragm), HSG D
3,031	77	Brush, Fair, HSG D
9,033	80	>75% Grass cover, Good, HSG D
30,120	90	Weighted Average
12,422		Pervious Area
17,698		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	22	0.0110	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
4.9	28	0.0090	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.4	23	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.0	73	Total			

Subcatchment PWS-2: P-Watershed-2



Subcatchment PWS-3: P-Watershed-3 (ROOF)

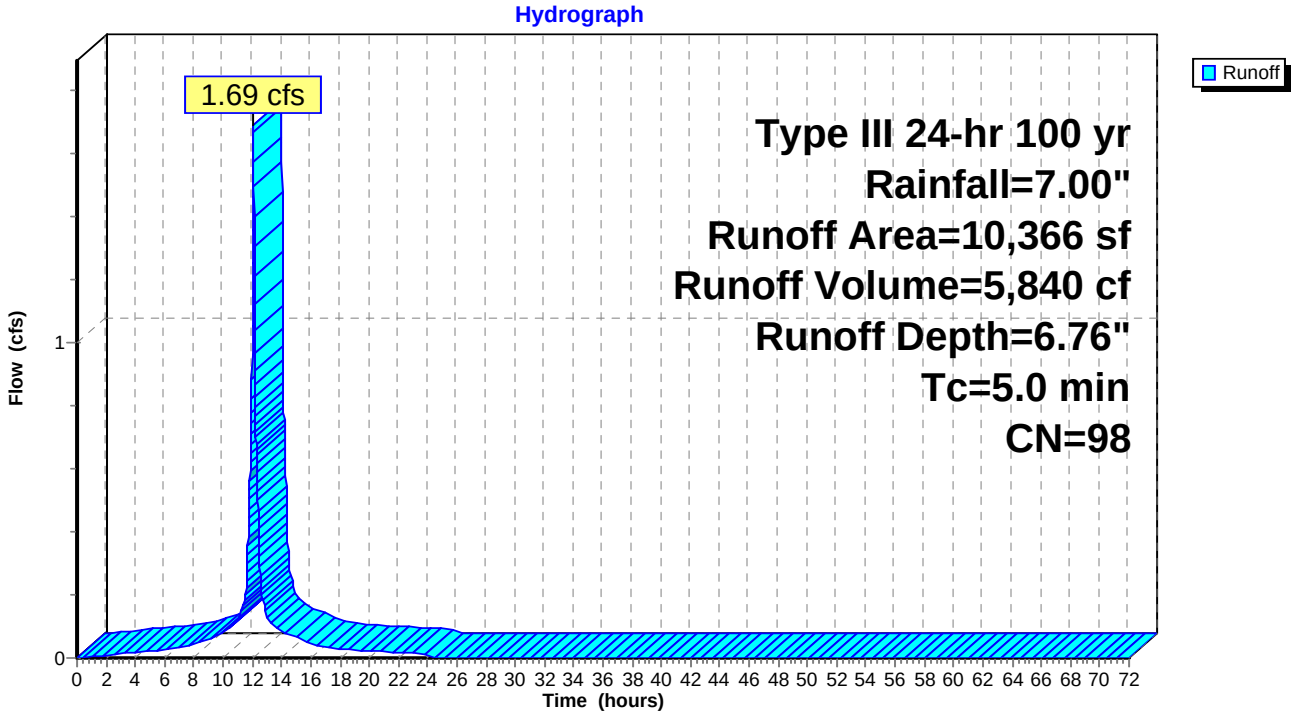
Runoff = 1.69 cfs @ 12.07 hrs, Volume= 5,840 cf, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
10,366	98	Paved parking & roofs
10,366		Impervious Area

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

Subcatchment PWS-3: P-Watershed-3 (ROOF)



Subcatchment PWS-4: P-Watershed-4 (SIDEWALK)

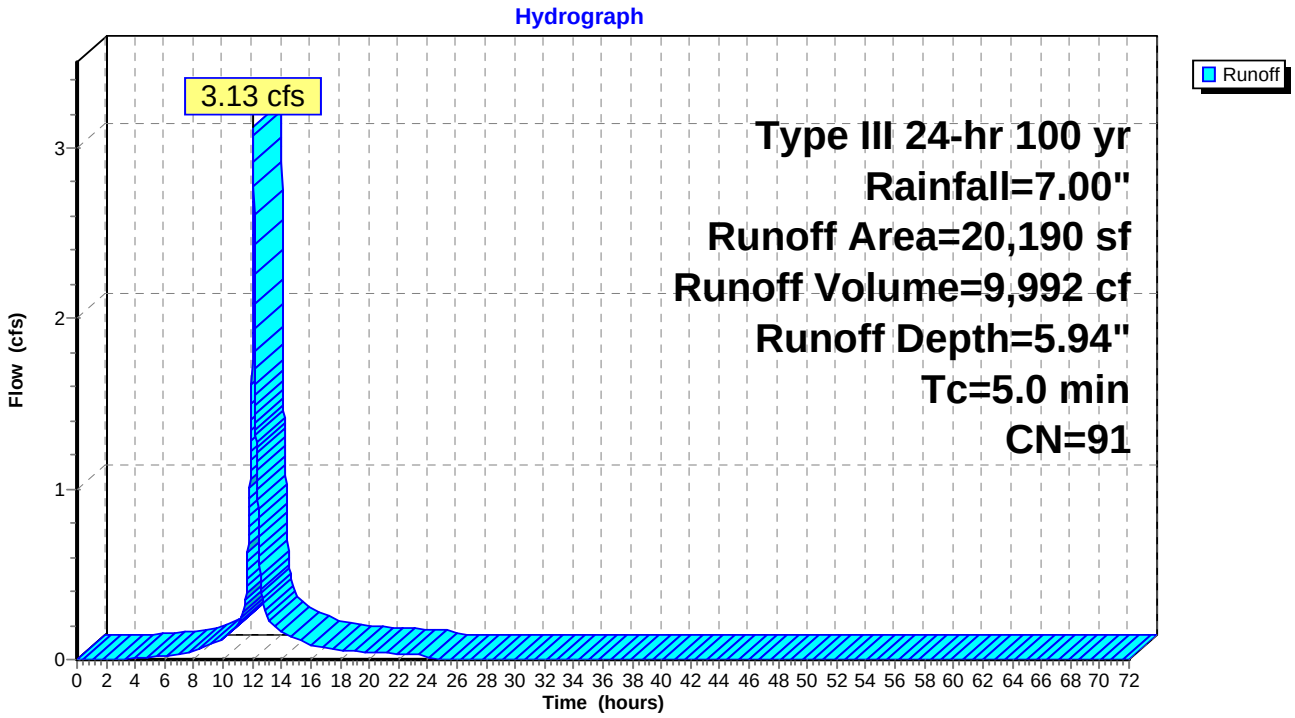
Runoff = 3.13 cfs @ 12.07 hrs, Volume= 9,992 cf, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
12,247	98	Paved parking & roofs
7,943	80	>75% Grass cover, Good, HSG D
20,190	91	Weighted Average
7,943		Pervious Area
12,247		Impervious Area

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

Subcatchment PWS-4: P-Watershed-4 (SIDEWALK)



Pond Basin: Bio Retention Basin

Inflow Area = 40,486 sf, Inflow Depth = 6.06" for 100 yr event
Inflow = 5.50 cfs @ 12.10 hrs, Volume= 20,456 cf
Outflow = 4.85 cfs @ 12.16 hrs, Volume= 16,593 cf, Atten= 12%, Lag= 3.2 min
Discarded = 0.01 cfs @ 12.16 hrs, Volume= 1,760 cf
Primary = 4.84 cfs @ 12.16 hrs, Volume= 14,832 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 13.73' @ 12.16 hrs Surf.Area= 4,221 sf Storage= 6,586 cf

Plug-Flow detention time= 292.3 min calculated for 16,593 cf (81% of inflow)
Center-of-Mass det. time= 218.5 min (989.6 - 771.1)

Volume	Invert	Avail.Storage	Storage Description
#1	11.49'	6,664 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

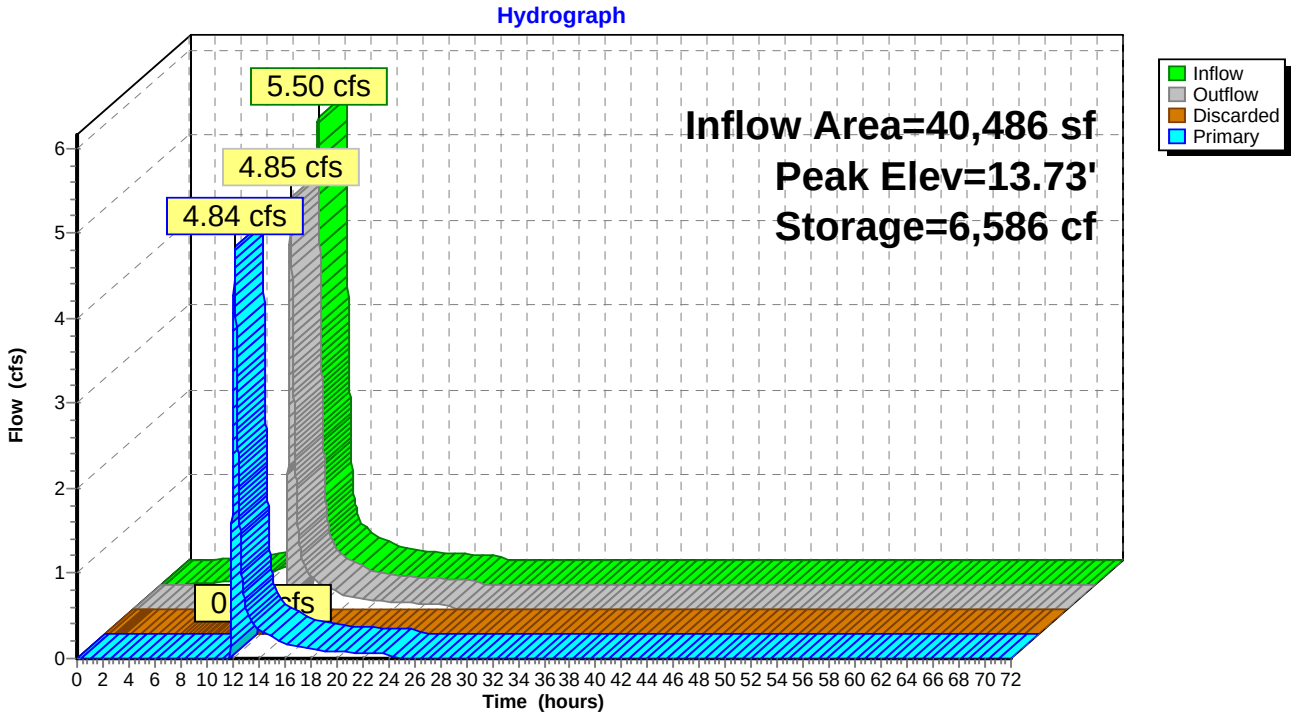
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
11.49	0	0	0
11.50	1,791	9	9
12.00	2,428	1,055	1,064
13.00	3,193	2,811	3,874
13.75	4,247	2,790	6,664

Device	Routing	Invert	Outlet Devices
#1	Primary	13.35'	**24.0" Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#2	Discarded	0.00'	**0.090 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.16 hrs HW=13.73' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=4.84 cfs @ 12.16 hrs HW=13.73' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 4.84 cfs @ 2.02 fps)

Pond Basin: Bio Retention Basin



Pond CB-1: Overflow CB

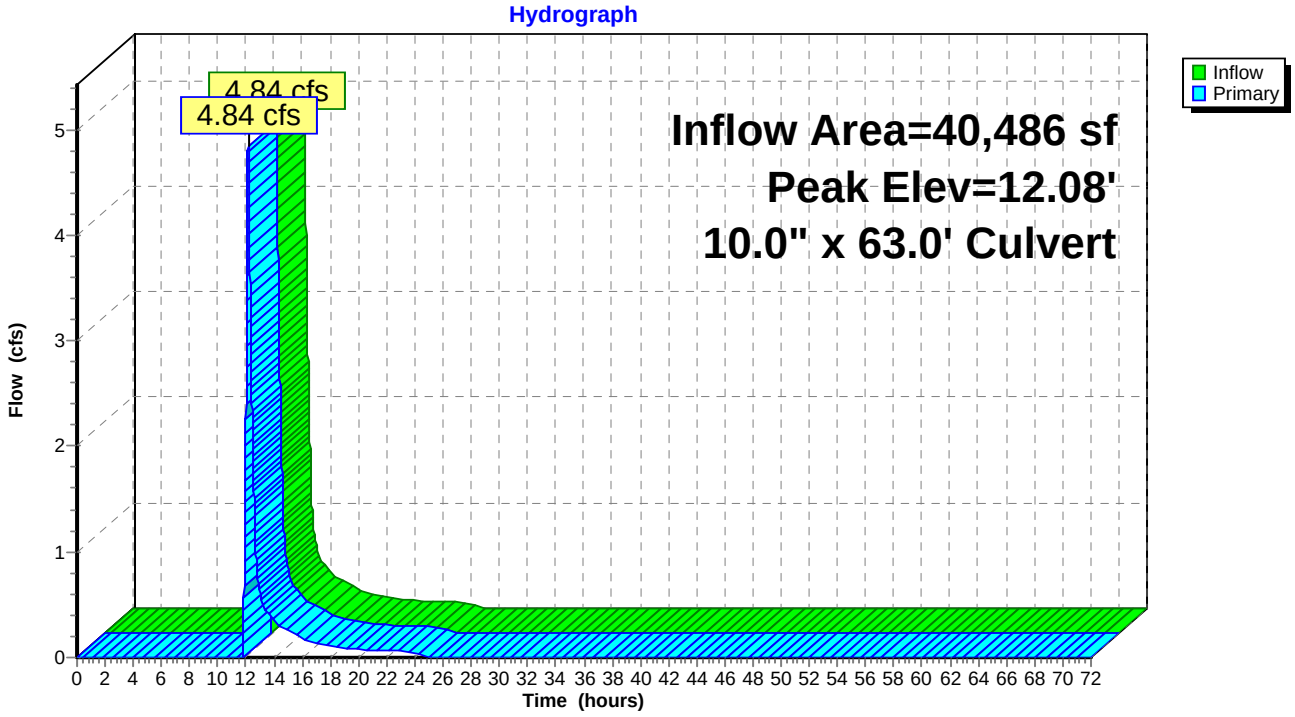
Inflow Area = 40,486 sf, Inflow Depth = 4.40" for 100 yr event
Inflow = 4.84 cfs @ 12.16 hrs, Volume= 14,832 cf
Outflow = 4.84 cfs @ 12.16 hrs, Volume= 14,832 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.84 cfs @ 12.16 hrs, Volume= 14,832 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 12.08' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	9.84'	**10.0" x 63.0' long Culvert** RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 6.64' S= 0.0508 '/' Cc= 0.900 n= 0.010 PVC, smooth interior

Primary OutFlow Max=4.84 cfs @ 12.16 hrs HW=12.08' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.84 cfs @ 8.87 fps)

Pond CB-1: Overflow CB

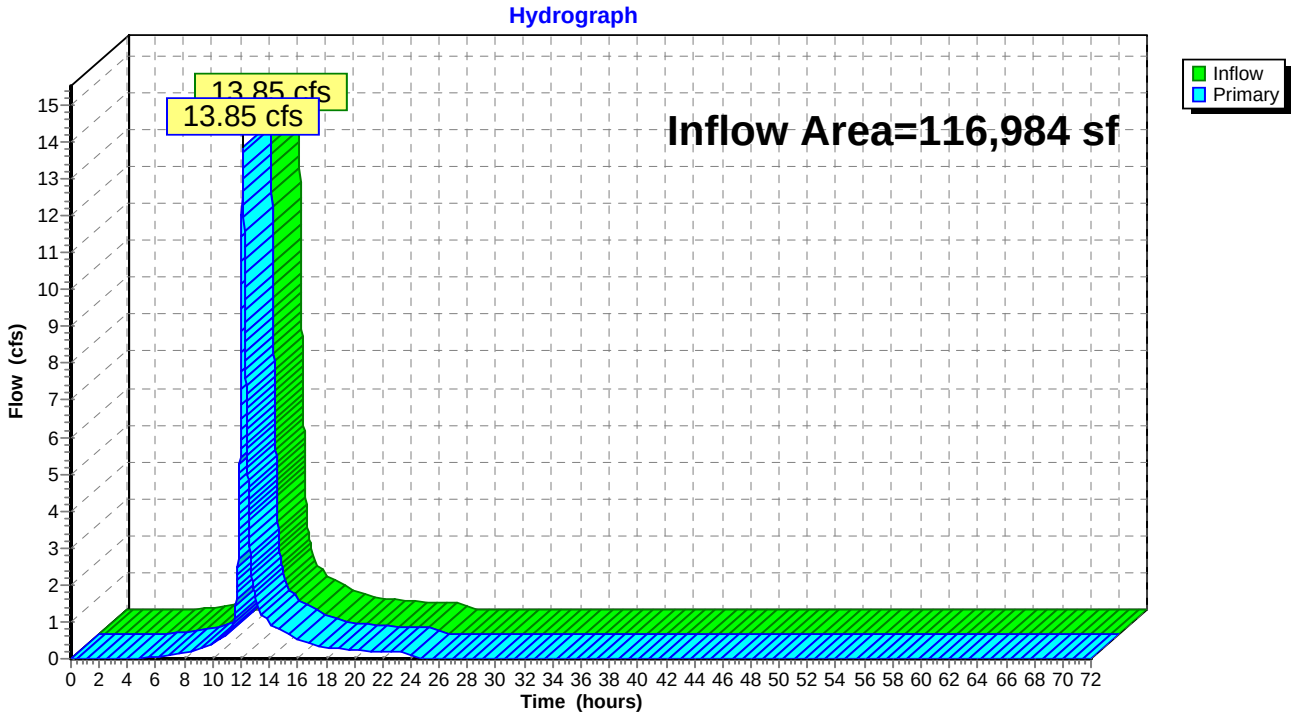


Link POA: TOTAL SITE

Inflow Area = 116,984 sf, Inflow Depth = 5.18" for 100 yr event
Inflow = 13.85 cfs @ 12.13 hrs, Volume= 50,535 cf
Primary = 13.85 cfs @ 12.13 hrs, Volume= 50,535 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POA: TOTAL SITE



APPENDIX B:
SITE SOIL MAP

Soil Map—Middlesex County, Massachusetts, and Norfolk and Suffolk Counties, Massachusetts
(Lower Basin Barracks)

Map Scale: 1:3,360 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 45 90 180 270

Feet
0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 17, Oct 6, 2017

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 13, Oct 6, 2017

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Aug 10, 2014—Aug 11, 2014

MAP LEGEND

MAP INFORMATION

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	1.4	2.7%
603	Urban land, wet substratum	2.5	4.7%
Subtotals for Soil Survey Area		**3.8**	**7.4%**
Totals for Area of Interest		**51.8**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	13.1	25.3%
602	Urban land, 0 to 15 percent slopes	12.7	24.5%
603	Urban land, wet substratum, 0 to 3 percent slopes	20.1	38.9%
655	Udorthents, wet substratum	2.0	3.9%
Subtotals for Soil Survey Area		**47.9**	**92.6%**
Totals for Area of Interest		**51.8**	**100.0%**

APPENDIX C:
HYDROLOGY MAPS

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LEGEND:

EXISTING WATERSHED

TIME OF CONCENTRATION LINE

PROPOSED WATERSHED BOUNDARY

CHARLES RIVER LOCKS

CONCRETE RETAINING WALL

GUARDRAIL

STONE

CONCRETE

CONCRETE RETAINING WALL

IRON FENCE

XWS-1

1 STORY BRICK BUILDING

BITUMINOUS PAVEMENT

N/F COMMONWEALTH OF MASSACHUSETTS

CONCRETE

T.B.M. A – CHISELED SQUARE IN END OF CURB ELEVATION=14.04

CONC

IRON FENCE

BITUMINOUS

CB RIM=13.52 INV.=12.02 DEPTH=11.52 CLOGGED

CONC WALK

BRIDGE GATE

GRANITE CURB

METAL COVERS

84" SEWER

FENCE

CC

EOP

CLF

1 STORY BRICK BUILDING

CB RIM=14.04 WELDED SHUT NO PIPES VISIBLE

3 STORY BUILDING BRICK AND STONE

FFE= 14.77

FFE= 14.34

FFE= 14.80

FFE= 15.23

8"METAL

4"METAL

144x120 SEWER

BRASS TACK IN LEAD PLUG (FND) HELD POSITION

FFE= 14.93

BITUMINOUS PARKING

CB RIM=14.46 INV.A=9.56 INV.B=9.11 INV.C=8.46 INV.D=11.21 INV.E=9.96

10"METAL

3"CLAY

12" UNK.

DMH RIM=14.78 INV.A=12.56 INV.B=9.46 INV.C=9.31 INV.D=9.81 INV.E=10.31

CB RIM=13.84 INV.A=12.34 INV.B=12.44 DEPTH=10.74

CONCRETE

CB RIM=14.04 INV.=13.44 DEPTH=12.44

8"ROP

6"CLAY

8"CLAY

CB RIM=14.45 INV.=10.75 DEPTH=9.95

COMMONWEALTH OF MASSACHUSETTS CHARLES RIVER BASIN COMMISSION 1909 TAKING (PLAN REF. #1 & #3)

8" UNK.

SMH RIM=16.21 INV.A=7.11 INV.B=7.01

TENNIS COURT

TENNIS COURT

LINE OF STREET (1969 MDC TAKING – PLAN REF.#7)

SEWER

DMH RIM=15.09 INV.A&B=10.54 B SEALED DEPTH=10.54

SMH RIM=15.30 INV.A=6.85 INV.B=4.30

BITUMINOUS PARKING

IRON ROD IRF (FND)

CONC WALK

XWS-2

JERSEY BARRIER

TREE

CONCRETE

CONC WALK

T.B.M. B – CHISELED SQUARE IN TRAFFIC BASE ELEVATION=18.29

TRAFFIC SIGN ARM

24"RCP

12" UNK.

TRAFFIC SIGN ARM

DMH RIM=17.12 INV.A&B=9.72 INV.C=12.72

CB RIM=16.88 TOP OF HOOD=13.58 DEPTH=10.68

CHARLES (PUBLIC – VARIABLE WIDTH) LAYOUT NO. L–6360 STREET

13' WIDE EASEMENT BOSTON MARINE CONDUIT (PLAN REF. #2)

144x120 SEWER

40 20 0 20 40

1 inch =20 feet

P:\PROJECTS\2014\14076.00 LOWER BARRACKS BASIN - BOSTON\DWG\14076.00 LBB- HYDROLOGY.DWG

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MA STATE POLICE
LOWER BASIN BARRACKS
250 Leverett Circle, Boston, MA

SEAL

REVISION

EXISTING HYDROLOGY

JOB # 14076.00
DATE: 08.01.2018
SCALE: AS SHOWN
DRAWN BY: MJZ
APPROVED BY: SRG

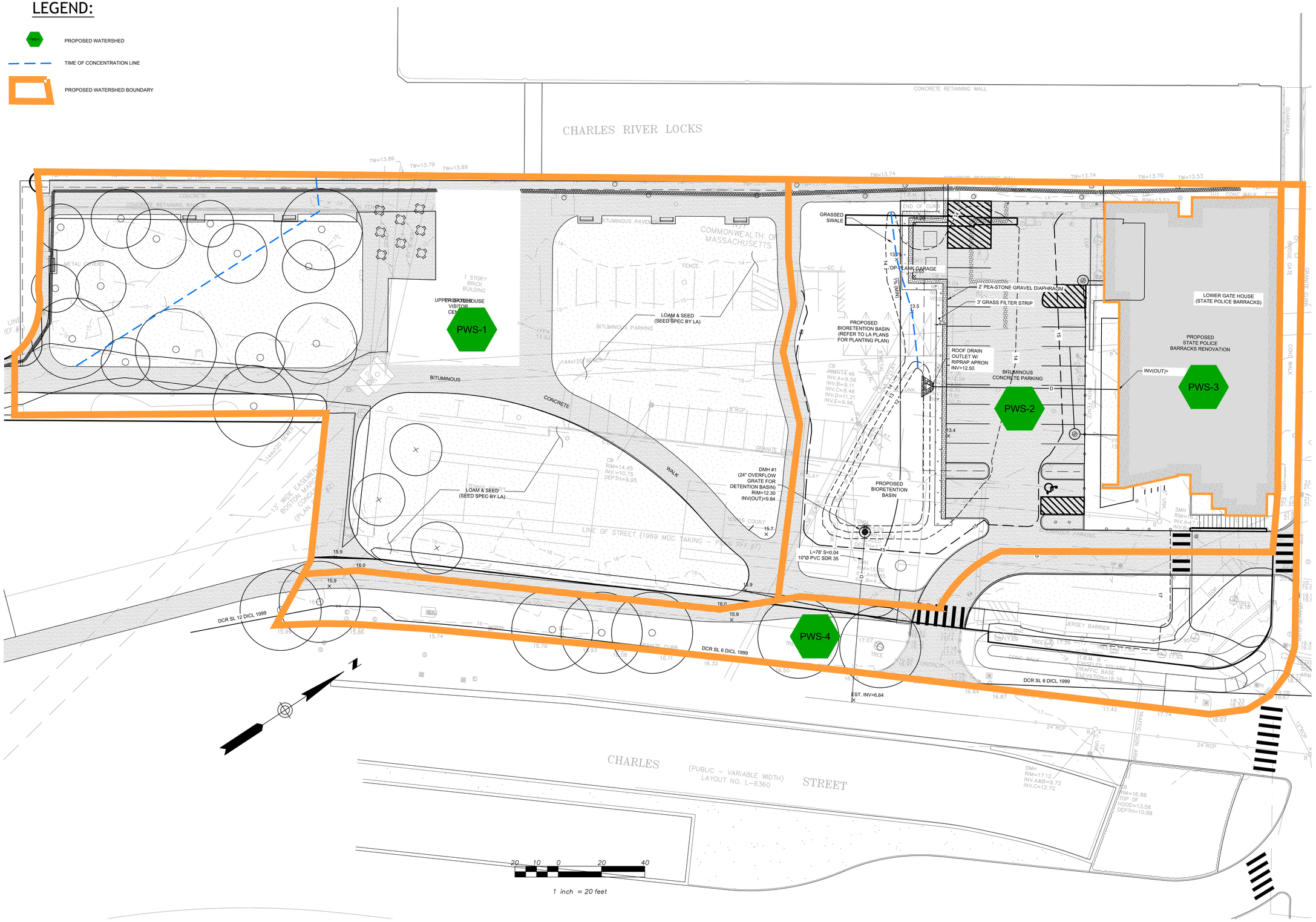
H-1.0

FILE: 14076.00 LBB- HYDROLOGY.DWG

8/1/2018 2:10:42 PM

LEGEND:

- PWS- PROPOSED WATERSHED
- TIME OF CONCENTRATION LINE
- PROPOSED WATERSHED BOUNDARY



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MA STATE POLICE
LOWER BASIN BARRACKS
250 Leverett Circle, Boston, MA

SEAL

REVISION

PROPOSED HYDROLOGY

JOB # 14076.00	H-2.0
DATE: 08.01.2018	
SCALE: AS SHOWN	
DRAWN BY: MJZ	
APPROVED BY: SRG	

FILE:14076.00 LBB- HYDROLOGY.DWG

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APPENDIX D:
OPERATION & MAINTENANCE PLAN

MASSACHUSETTS STATE POLICE – LOWER BASIN BARRACKS
CONSTRUCTION PERIOD POLLUTION PREVENTION PLAN AND EROSION CONTROL OPERATION AND MAINTENANCE PLAN
OCTOBER 2018

During The Construction Period the General Contractor shall be responsible for the following:

1. Erosion Control

Erosion control barriers will be placed along down-gradient portion of the site as indicated on the project plans. Additional erosion control barriers will be placed at the limit of work as needed and in any sensitive areas as work progresses.

A stockpile of additional erosion control barriers shall be kept on site at all times

2. Site Access

Site access, for construction equipment will be from Storrow Drive as shown on the Site Preparation Plan C-101, and a construction entrance will be installed at the onset of the project.

3. Construction Staging

A construction staging area will be established by the Contractor.

4. Site Grading/Site Work

The site activities may only commence when the site is stable from erosion and all required control measures are in place and functional.

5. Slope Stabilization

All surfaces and slopes shall be checked at least once every 7 calendar days and within 24 hours of the occurrence of a storm event 0.25 inches or greater to see that vegetation is in good condition. Any rills or damage from erosion shall be repaired immediately to avoid further damage. If seeps develop on the slopes, the area will be evaluated to determine if the seep will cause an unstable condition and shall be stabilized immediately if necessary. Problems found during the inspections by the General Contractor shall be repaired promptly. Areas requiring re-vegetation shall be replanted immediately or stabilized in a manner acceptable to the Conservation Commission if it is outside of the growing season. Slopes and other exposed surfaces receiving vegetation will be maintained as necessary to support healthy vegetation. If stabilization is required during the non-growing season, straw mulch, or a commercially manufactured blanket must be employed to prevent erosion.

6. Permanent Stabilization

Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed no later than 14 days after the last construction activity. The permanent seed mix, fertilizer, and mulch shall be specified on the project plans. Permanent seeding shall occur in the Spring or Fall.

7. Drainage Structures (Catch Basins, Manholes, Area Drains)

All structures shall be inspected on a bi-weekly basis and/or after every rain storm and repairs made as necessary.

Sediment shall be removed from the sump after the sediment has reached a maximum of one half the depth of the sump. The sediment shall be removed from the site and properly disposed of. Drainage structures/sumps shall be cleaned completely at the end of construction.

8. Dust and Sediment Control

Siltsacks:
Catch basin / area drain filters shall be placed at all inlets to drainage structures as structures are installed and prior to pavement removal. Outlet protection work shall be constructed before runoff is allowed to enter the drainage system. Construction and location of catch basin filters shall be as indicated on the Drawings.

Straw wattles:
Straw wattles shall be installed as indicated on the Drawings.

Wattles shall be placed in a row with ends tightly abutting the adjacent wattles. Each wattle shall be securely anchored in place by 2 stakes or re-bars driven through the wattles. The first stake in each wattle shall be angled toward the previously laid wattle to force the wattles together.

Construction Entrance:
The area of the construction entrance should be cleared of all vegetation, roots, and other objectionable material. The filter fabric should be placed on the subgrade prior to the gravel placement. The gravel shall be placed to the specified dimensions depicted on the plans.

The Construction entrance shall be a minimum of 60-feet in length and 30-feet wide.

Dust Control:
A mechanical street sweeper shall be utilized to clean the existing paved areas on an as-needed basis.

For emergency control of dust apply water to affected areas. The source of supply and the method of application for water are the responsibility of the contractor.

Pollution Prevention Measures

1. Before, during, and after construction, functional erosion and sedimentation controls shall be implemented to prevent the silting of the wetland areas down-gradient of the site. Straw wattles, crushed stone, temporary stabilization and other controls shall be properly maintained and are not to be removed until the site is permanently stabilized. Other controls shall be added as warranted during construction to protect environmentally-sensitive areas. Sufficient extra materials (e.g. straw wattles and other control materials) shall be stored on site for emergencies.

2. Silt sacks and straw wattle check dams shall be installed at all existing and proposed infiltration areas to protect from soils and sediment.

3. Casting of excavated materials shall be stored away from wetland areas and sensitive land areas.

4. Any stockpiling of loose materials shall be properly stabilized to prevent erosion and siltation. Preventative controls such as straw wattles, temporary seeding/mulching and jute covering shall be implemented to prevent such an occurrence.

5. There shall be no flooding, ponding, or flood related damage caused by the project or surface run-off emanating from the project on lands of an abutter, nearby or down-gradient of the site.

6. There shall be no contaminant migration caused by the project to nearby and down-gradient properties, nearby aquifers, and nearby resource areas.

7. The contractor shall make sufficient provisions to control any unexpected drainage and erosion conditions that may arise during construction that may create damage on abutting properties. Said control measures are to be implemented at once.

8. During construction flood prevention, erosion, and sedimentation controls shall be in place before the natural ground cover is disturbed. Said controls shall be in place prior to other construction work and shall be monitored and approved by the Contractor. They shall be properly maintained and are not to be removed until the site is stabilized.

9. The Contractor shall designate a person or persons to inspect and supervise the erosion controls for the project. The Conservation Commission shall be notified as to the means to contact said individual or individuals on a 24-hour basis on all working and non-working days of the project. Said means of contact shall include at least 2 separate telephone number of said designated person or persons.

10. There shall be periodic inspection of straw wattles, and other erosion controls by the Contractor's Designee to assure their continued effectiveness.

11. The Contractor shall make adequate provisions for controlling erosion and sediment from activities that might yield water at high volumes with high suspended solid contents, such as dewatering excavations.

12. Street sweeping shall be used to keep public ways free and clear of sediment and dirt from the site activities.

Other Control Measures

Waste Materials. All trash and construction debris from the site will be hauled to an approved landfill or recycling facility. No construction waste material will be buried on the site. All personnel will receive instructions regarding the correct procedure for waste disposal. Notices describing these practices will be posted in the construction office. The site superintendent will be responsible for seeing that these procedures are followed. Employee waste and other loose materials will be collected so as to prevent the release of floatables during rainfall events.

Hazardous Waste. No Hazardous materials are expected to be encountered. The mandated State and Local permits for removal of such materials, if located, will be implemented when such materials are encountered.

After Construction, the Owner shall be responsible for the following:

General Land Grading and Slopes Stabilization

All surfaces and slopes shall be checked bi-annually to see that vegetation is in good condition. Any rills or damage from erosion shall be repaired immediately to avoid further damage. If seeps develop on the slopes, the area will be evaluated to determine if the seep will cause an unstable condition and shall be stabilized immediately if necessary. Problems found during the inspections by the Owner shall be repaired promptly. Areas requiring re-vegetation shall be replanted immediately. Slopes and other exposed surfaces receiving vegetation will be maintained as necessary to support healthy vegetation.

Areas of steep slopes (2.5:1 or greater) shall be stabilized using jute mesh or a similar approved erosion blanket.

Erosion Controls

Erosion controls shall not be removed or dismantled without approval from the Engineer or Conservation Commission. Sediment deposits that are removed or left in place after the barriers have been dismantled shall be graded manually to conform to the existing topography and vegetated using seeding or other long term cover as approved in the Landscape Plan. Bare ground that cannot be permanently stabilized within 30 days shall be stabilized by temporary measures.

Street Sweeping

It is proposed that the parking and drive areas be swept with a wet brush street sweeper on a semi-annual basis, with at least two sweepings per year. One sweep shall be done at the end of the winter season (prior to the heavy rains), and the other sweep at the end of autumn (prior to snowfall).

Stormwater Management System

Catch Basins, Area Drains, Drain Manholes:
The catch basins, drain manholes, and area drains shall be inspected annually, and cleaned out when sumps are approximately one foot full. The use of "clam shells" for sediment removal shall not be allowed; a vacuum truck shall be the approved method of cleaning. Integrity and functionality of oil hoods shall also be checked at the time of the inspection.

Bioretention Area:
Bioretention areas require careful attention while plants are being established and seasonal landscaping maintenance thereafter. For the first year after planting, adequate water is crucial to plant survival, and temporary irrigation is necessary.

Inspect pretreatment devices and bioretention cells regularly for sediment build-up, structural damage, and standing water. The grass filter strip should be mowed regularly as needed.

Inspect soil and repair eroded areas monthly. Re-mulch void areas as needed. Remove litter and debris monthly. Treat diseased vegetation as needed. Remove and replace dead vegetation twice per year (spring and fall). Prune and weed as needed to maintain appearance.

Proper selection of plant species and support during establishment of vegetation should minimize—if not eliminate—the need for fertilizers and pesticides.

Remove invasive species as needed to prevent these species from spreading into the bioretention area. Replace mulch every two years, in the early spring. Upon failure, excavate bioretention area, scarify bottom and sides, replace filter fabric and soil, replant, and mulch. Never store snow in Bioretention areas.

Because the soil medium filters contaminants from runoff, the cation exchange capacity of the soil media will eventually be exhausted. When the cation exchange capacity of the soil media decreases, change the soil media to prevent contaminants from migrating to the groundwater, or from being discharged via an underdrain outlet. The cation exchange capacity governs the ability of the soil to hold nutrients that are crucial to plant health. It is recommended the soil media should be replaced every 10 years or when the plants are showing signs of stress and nutrient deficiency. Using small shrubs and plants instead of larger trees will make it easier to replace the media with clean material when needed.

Plant maintenance is critical. Concentrated salts in roadway runoff may kill plants, necessitating removal of dead vegetation each spring and replanting. The operation and maintenance plan must include measures to make sure the plants are maintained.

Bioretention Maintenance Schedule:

Activity	Time of Year	Frequency
Inspect and remove trash	Year round	Monthly
Mulch	Spring	Annually
Remove dead vegetation	Fall or Spring	Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or fall	Annually

Pea Gravel Diaphragms:
Pea gravel diaphragms should be inspected for clogging and/or migration of stone. Check on a yearly basis and clean as needed. Use hand methods (i.e., a person with a shovel) when cleaning or replacing to minimize disturbance. Sediment build-up reduces capacity to treat the water quality event**.**

Drainage Channel:
The drainage channel shall be inspected the first few months after construction to make sure that there is no rilling or gullying, and that vegetation in the channel is adequate. Thereafter, inspect the channel twice a year for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding, and sediment accumulation.

Regular maintenance tasks include mowing, fertilizing, liming, watering, pruning, weeding, and pest control. Mow channels at least twice per year. Do not cut the grass shorter than three to four inches. Keep grass height under 6 inches to maintain the design depth necessary to serve as a conveyance. Do not mow excessively, because it may increase the design flow velocity. Remove sediment and debris manually at least once per year. Re-seed periodically to maintain the dense growth of grass vegetation. Take care to protect drainage channels from snow removal procedures and off-street parking.

INSPECTION REPORT FORM FOR STORM WATER SYSTEM

Project: Massachusetts State Police – Lower Basin Barracks - Boston, MA
250 Leverett Circle, Boston MA

INSPECTOR:_____ **DATE:**_____

Regular Inspection: ☐
Inspection after Rainfall: ☐ **Amount of Rainfall:**_____**inches**

BMP	Functioning Correctly	Notes/Action Taken
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	

Additional Observations: _____

_____

_____

Action Required: _____

_____

_____

To be performed by:_____ **On or Before:**_____

Attachment G

Project Plans

Existing Conditions Plan
C-1.1 Demolition & Erosion Control Plan
C-2.1 Utilities and Grading Plan
C-3.1 Civil Details
L-100 Site Plan (Landscape)
H-1.0 Existing Hydrology (from Attachment F, Stormwater Report, Appedix C)
H-2.0 Proposed Hydrology (from Attachment F, Stormwater Report, Appendix C)

LEGEND

- DISK
- IRON ROD FOUND
- AREA DRAIN
- CATCH BASIN
- DRAIN MANHOLE
- NO LABEL MANHOLE
- SEWER MANHOLE
- ELECTRIC HANDHOLE
- ELECTRIC MANHOLE
- GAS VALVE
- TELEPHONE MANHOLE
- WATER GATE
- FIRE HYDRANT
- UTILITY POLE
- DECIDUOUS TREE
- SIGN (SINGLE POSTED)
- TRAFFIC SIGNAL
- MONITORING WELL
- LIGHT POLE
- BOLLARD
- WATER HANDHOLE
- SIGN (DOUBLE POST)
- NO DUMPING PLAQUE
- UNKNOWN VALVE
- UNKNOWN HANDHOLE

FFE FINISHED FLOOR ELEVATION
TW TOP OF WALL

- PROPERTY LINE
- TAKING LINE
- EASEMENT
- CHAIN LINK FENCE
- WOOD FENCE
- METAL/WIRE FENCE
- SEWER LINE
- DRAIN LINE
- WATER LINE
- GAS LINE
- UNDERGROUND ELECTRIC
- TELEPHONE LINE
- OVERHEAD WIRES
- INTERMEDIATE CONTOURS
- INDEX CONTOURS

PLAN REFERENCES

MASSACHUSETTS DEPARTMENT OF CONSERVATION AND RECREATION RECORDS:

1. "COMMONWEALTH OF MASSACHUSETTS, CHARLES RIVER BASIN COMMISSION, PLAN OF LAND IN BOSTON BELONGING TO THE CITY OF BOSTON", DATED JULY 12, 1909, PLAN NO.14 OF LAND TAKINGS.

2. "COMMONWEALTH OF MASSACHUSETTS, CHARLES RIVER BASIN COMMISSION, PLAN OF LAND IN BOSTON BELONGING TO THE CITY OF BOSTON", DATED FEB. 24, 1909, PLAN NO.12 OF LAND TAKINGS.

3. "COMMONWEALTH OF MASSACHUSETTS, METROPOLITAN DISTRICT COMMISSION, PARKS DIVISION, PLAN OF LAND TO BE TRANSFERRED BETWEEN THE CITY OF BOSTON AND THE COMM. OF MASS.", DATED APRIL 21, 1942, PLAN 26550 V.T., SHEET 1 OF 5.

4. "COMMONWEALTH OF MASSACHUSETTS, METROPOLITAN DISTRICT COMMISSION, PARKS DIVISION, CHARLES RIVER RESERVATION, PLAN OF TAKING OF CHARLESBANK AND A PORTION OF CHARLES STREET, BOSTON, LONGFELLOW BRIDGE TO CHARLES RIVER DAM", DATED NOV. 2, 1949, PLAN 28746 V.T.

5. "COMMONWEALTH OF MASSACHUSETTS, METROPOLITAN DISTRICT COMMISSION, PARKS DIVISION, CHARLES RIVER RESERVATION, PLAN OF TAKING OF A PORTION OF CHARLES STREET, BOSTON, LONGFELLOW BRIDGE TO CHARLES RIVER DAM", DATED APRIL 27, 1951, PLAN 29825X V.T.

6. "COMMONWEALTH OF MASSACHUSETTS, METROPOLITAN DISTRICT COMMISSION, PARKS DIVISION, PLAN OF TAKING LAND OF CITY OF BOSTON & ROBERT G. SHAW AND PORTIONS OF NASHUA ST., LEVERETT ST. AND BRIGHTON ST.", DATED JUNE 7, 1951, PLAN 29969X.

7. "COMMONWEALTH OF MASSACHUSETTS, METROPOLITAN DISTRICT COMMISSION, PARKS DIVISION, CHARLES RIVER RESERVATION, HIGH LEVEL BRIDGE AND APPROACHES, LEVERETT CIRCLE TO CITY SQUARE", LAND TAKING PLANS NO. L.C.-1 THROUGH L.C.-4, DATED OCTOBER 24, 1969, PLANS 46193-X-V.T. THROUGH 46196-X-V.T.

CITY OF BOSTON PUBLIC WORKS, ENGINEERING DIVISION:

8. PLAN TITLED "CITY OF BOSTON, CHARLES ST., BOSTON PROPER", DATED FEBRUARY 26, 1930, LAYOUT NO. L-6359.

NOTES

1. THIS PLAN WAS PREPARED FROM AN ACTUAL ON THE GROUND FIELD SURVEY CONDUCTED BY WSP BETWEEN DECEMBER 6 – 30, 2011 AND RECENTLY UPDATED ON APRIL 2–4, 2018.

2. THE HORIZONTAL DATUM SHOWN HEREON IS BASED UPON NORTH AMERICAN DATUM OF 1983 (NAD 83).

3. THE VERTICAL DATUM SHOWN HEREON REFERENCES BOSTON CITY BASE DATUM.

4. FOR INFORMATION PERTAINING TO THE OWNERSHIP OF THE LOCUS PARCEL BY THE COMMONWEALTH OF MASSACHUSETTS, SEE "THE ACTS AND RESOLVES PASSED BY THE GENERAL COURT OF MASSACHUSETTS" FILED IN THE STATE LIBRARY OF MASSACHUSETTS:
CHAPTER 465, SECTION 12 ACTS OF 1903
CHAPTER 371, SECTION 2 & SECTION 12 ACTS OF 1929
CHAPTER 262 ACTS OF 1949

LOCUS MAP
(N.T.S.)

SEE NOTE #2

CHARLES RIVER LOCKS

CONCRETE RETAINING WALL

(1969 MDC TAKING – PLAN REF.#7)

CHARLES RIVER DAM ROAD
(PUBLIC – VARIABLE WIDTH)
(FORMERLY LEVERETT AVE.)

N/F COMMONWEALTH OF MASSACHUSETTS

1 STORY BRICK BUILDING

3 STORY BUILDING BRICK AND STONE

BITUMINOUS PAVEMENT

BITUMINOUS PARKING

CONCRETE

IRON FENCE

FENCE

GRANITE CURB

CONC WALK

GRANITE CURB

BRIDGE

BRIDGE GATE

T.B.M. A – CHISELED SQUARE IN END OF CURB ELEVATION=14.04

T.B.M. B – CHISELED SQUARE IN TRAFFIC BASE ELEVATION=18.29

CB RIM=15.52 INV.=12.02 DEPTH=11.52 CLOGGED

CB RIM=14.04 WELDED SHUT NO PIPES VISIBLE

CB RIM=13.84 INV.A=12.34 INV.B=12.44 DEPTH=10.74

CB RIM=14.04 INV.=13.44 DEPTH=12.44

CB RIM=14.46 INV.A=9.56 INV.B=9.11 INV.C=8.46 INV.D=11.21 INV.E=9.96

DMH RIM=14.76 INV.A=12.56 INV.B=9.46 INV.C=9.31 INV.D=9.81 INV.E=10.31

CB RIM=14.45 INV.=10.75 DEPTH=9.95

DMH RIM=15.09 INV.A&B=10.54 B SEALED DEPTH=10.54

SMH RIM=15.30 INV.A=6.85 INV.B=4.30

SMH RIM=16.21 INV.A=7.11 INV.B=7.01

SMH RIM=23.77 INV.=-1.63 NO VISIBLE PIPES

CB RIM=21.39 NO VISIBLE PIPES FULL OF DEBRIS

DMH RIM=18.45 INV.A&B=12.45 INV.C=13.75

DMH RIM=17.12 INV.A&B=9.72 INV.C=12.72

CB RIM=16.88 TOP OF HOOD=13.58 DEPTH=10.88

FFE= 14.77

FFE= 14.34

FFE= 14.80

FFE= 14.93

FFE= 15.23

144x120 SEWER

24" RCP

12" UNK.

8" UNK.

8" CLAY

8" RCP

12" RCP

24" RCP

BRASS TACK IN LEAD PLUG IN STONE WALL (FND) HELD DIRECTION

BRASS TACK IN LEAD PLUG (FND) HELD POSITION

METAL COVERS

HARBOR LINE (PLAN REF.#1)

BRONZE DISK HARBOR LINE (FND)

CLUSTERS OF TREES

TENNIS COURT

TENNIS COURT

144x120 SEWER

13' WIDE EASEMENT BOSTON HARBOR COMMISSION (PLAN REF. #2)

LINE OF STREET (1969 MDC TAKING – PLAN REF.#7)

COMMONWEALTH OF MASSACHUSETTS
CHARLES RIVER BASIN COMMISSION
1909 TAKING (PLAN REF. #1 & #3)

JERSEY BARRIER

TRAFFIC SIGN ARM

RAMP

IRON ROD (FND)

CHARLES (PUBLIC – VARIABLE WIDTH) STREET
LAYOUT NO. L-6360

LINE OF STREET (1969 MDC TAKING – PLAN REF.#7)

UTILITY STATEMENTS

THE LOCATION OF THE UTILITIES AS SHOWN HEREON HAVE BEEN COMPILED FROM VISIBLE STRUCTURES AND INFORMATION OBTAINED FROM VARIOUS SOURCES. THE ACTUAL LOCATION OF ALL UTILITIES AND UNDERGROUND STRUCTURES SHALL BE CONSIDERED APPROXIMATE AND SHALL BE VERIFIED BY THE OWNER PRIOR TO ANY CONSTRUCTION. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICES OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED.

COMMONWEALTH OF MASSACHUSETTS
DAVID P. PRINCE
No. 42028
REGISTERED PROFESSIONAL LAND SURVEYOR

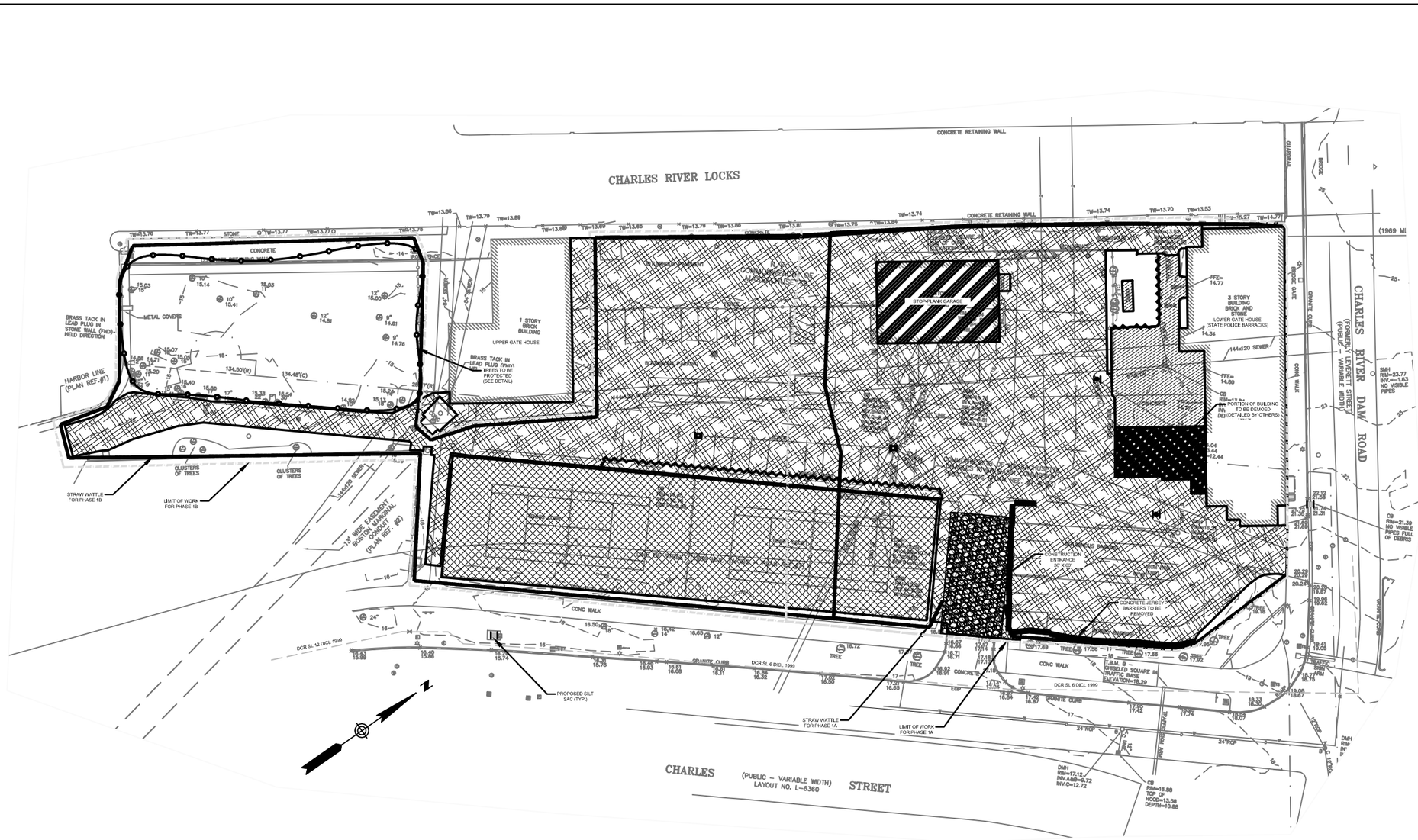
GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

190151-1-BCB DATUM.dwg

EXISTING CONDITIONS PLAN
CHARLES RIVER DAM ROAD
BOSTON, MASSACHUSETTS
PREPARED FOR
SAMIOTES CONSULTANTS, INC.

WSP USA Inc.
155 Main Dunstable Rd, Suites 120 & 125
Nashua, NH 03060
603.595.7900

Drawn By	SMD	Date	Job No.
Surveyed By	MS/MC	APRIL 13, 2018	190151A
Checked By	DPP	Scale	Sheet No.
Book No.	SCANNER C	1" = 20'	1 OF 1



20 10 0 20 40

1 inch = 20feet

DEMOLITION LEGEND:

- BUILDING TO BE REMOVED
- BUILDING TO BE PARTIALLY DEMOED & RENOVATED
- BITUMINOUS CONCRETE TO BE DEMOED
- CEMENT CONCRETE TO BE REMOVED
- AREA OF LIMITED/NO LOAM REMOVAL. COORDINATE WITH ARCHITECT IN THE FIELD
- TENNIS COURT TO BE REMOVED (EQUIPMENT MOVED BY OWNER)
- CONCRETE BARRIER REMOVAL
- CURB REMOVAL
- FENCE REMOVAL
- PROPOSED TREE PROTECTION FENCE
- UTILITIES LINE TO BE REMOVED/ABANDONED
- EROSION CONTROL
- LIMIT OF WORK
- UTILITIES STRUCTURE TO BE REMOVED
- UTILITIES STRUCTURE TO BE ABANDONED IN PLACE
- LIGHT FIXTURES TO BE SALAVAGED
- TREE TO BE REMOVED (INCLUDING STUMP)
- PROPOSED CATCHBASIN FILTER

NOTE:
THE CONTRACTOR SHALL PHASE ALL DEMOLITION AND REMOVAL WORK TO ALLOW FOR THE CONTINUING OPERATION OF ALL STRUCTURES OUTSIDE OF LIMIT OF WORK.

NOTE:
DRAWING DOES NOT SHOW ENTIRE SCOPE OF DEMO. IT IS INTENDED TO AID CONTRACTOR WITH IDENTIFYING WORK AND IS NOT ALL INCLUSIVE.

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DCAMM

DIVISION OF CAPITAL ASSET MANAGEMENT & MAINTENANCE

OFFICE OF PLANNING DESIGN & CONSTRUCTION

McCormack Building
One Ashburton Place - Room 1500
Boston, MA 02108

617-727-4050
www.mass.gov/dcamm

COMMONWEALTH OF MASSACHUSETTS — STEPHEN R. GARON — No. 41472 — REGISTERED ARCHITECT

Project Name:
LOWER BASIN BARRACKS MODERNIZATION

DCAMM Project Number 40115

Project Location
DCAMM PROJ. NO. POL1303 DC1

Project Architect
Finegold Alexander Architects
www.faainc.com

Project Consultants

Structural
RSE Associates Inc

Mech / Plumb / FP / FA / Security
ARUP

Electrical
ART Engineering Corp.

Interiors
Stefura Associates Inc

Civil
Samiotes Consultants

Landscape
Copley Wolff Design Group

Acoustics / AV / PA
Cavanaugh Tocci Associates

Electrical / IT Engineers
ART Engineering Corp

LEED
The Green Engineer, Inc

Geotech
McPhail Associates, LLC

Elevator
Syska Hennessy Group

FOR REFERENCE ONLY

Site Number:
CAMIS Number:
Building Number:
Secretariat: Administration & Finance

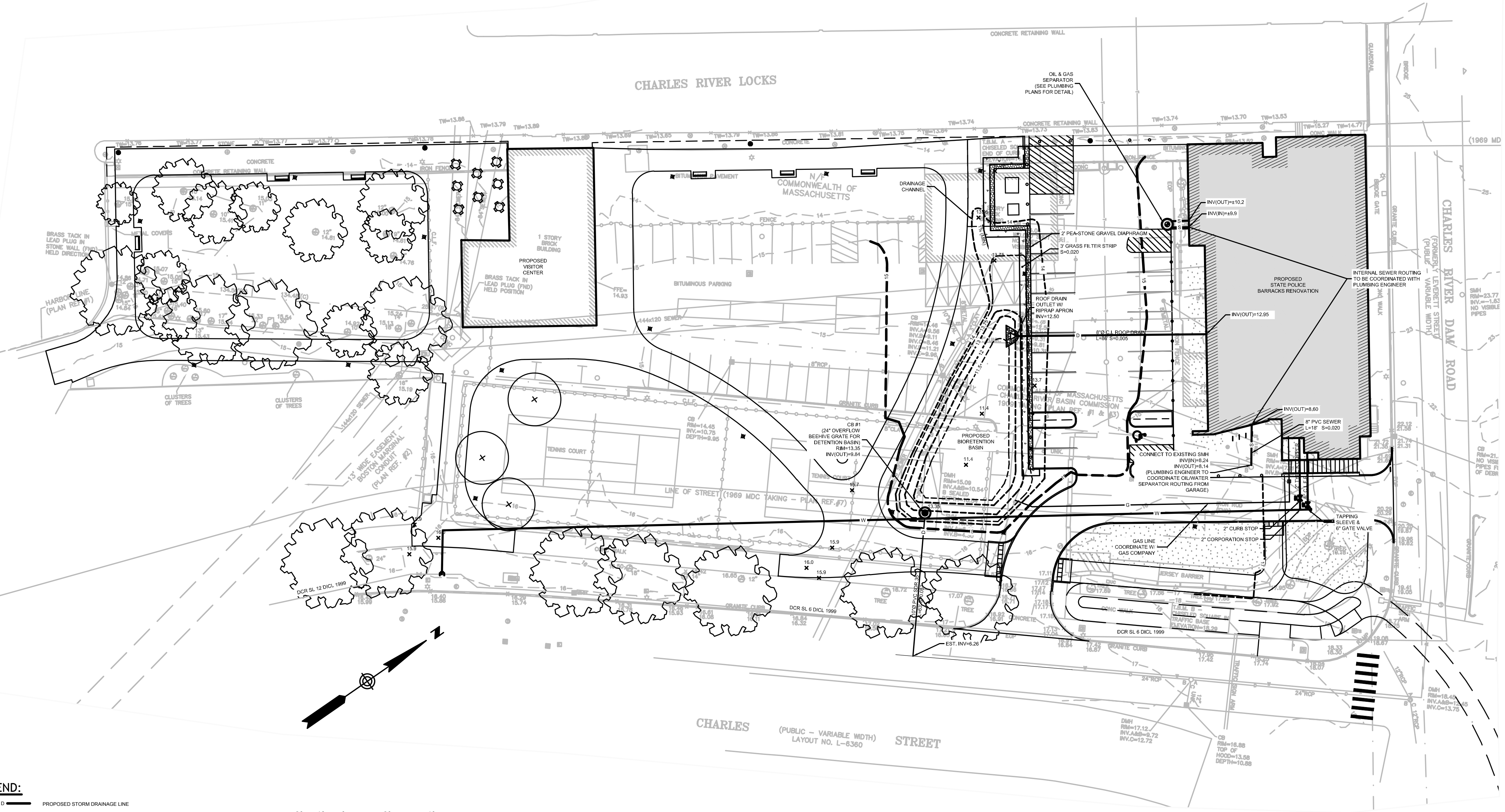
Original Issue Date:
04/13/18

Revisions

No.	Description	Date
1	Con Com	11/16/18

DEMOLITION & EROSION CONTROL PLAN

Drawing Number:
C-1.1
SCHEMATIC DESIGN



LEGEND:

D	PROPOSED STORM DRAINAGE LINE
RD	PROPOSED ROOF DRAIN LINE
UD	PROPOSED UNDERDRAIN LINE
W	PROPOSED WATER LINE
FP	PROPOSED FIRE PROTECTION LINE
SS	PROPOSED SANITARY SEWER LINE
FM	PROPOSED FORCE MAIN
KW	PROPOSED KITCHEN WASTE LINE
SW	PROPOSED SCIENCE WASTE LINE
G	PROPOSED GAS LINE (BY OTHERS)
E	PROPOSED UNDERGROUND ELECTRIC LINE
OH	PROPOSED OVERHEAD ELECTRIC LINE
T	PROPOSED TELEPHONE LINE
SMH	PROPOSED SANITARY SEWER MANHOLE
DMH	PROPOSED STORM DRAINAGE MANHOLE
	PROPOSED WATER QUALITY UNIT
	PROPOSED TRENCH DRAIN
CB	PROPOSED CATCH BASIN (ROUND)
CB	PROPOSED CATCH BASIN (SQUARE)
DCB	PROPOSED DOUBLE CATCH BASIN
129	PROPOSED INTERMEDIATE CONTOUR
130	PROPOSED INDEX CONTOUR
130.0 ×	PROPOSED SPOT GRADE
(130.0) ×	EXISTING GRADE TO REMAIN (V.I.F.)
TW=131.87 BW=130.50 ×	PROPOSED TOP/BOTTOM OF WALL (NOT FOUNDATION)
TC=131.87 BC=130.50 ×	PROPOSED TOP/BOTTOM OF CURB
TS=131.87 BS=130.50 ×	PROPOSED TOP/BOTTOM OF STEP
RIM=130.20 ×	PROPOSED RIM ELEVATION (TO FINAL GRADE)
V.I.F.	VERIFY GRADE IN FIELD \ TO BE SET

20 10 0 20 40

1 inch = 20feet

3/20/2018 10:28:10 AM

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McCormack Building
One Ashburton Place - Room 1500
Boston, MA 02108

617-727-4050
www.mass.gov/dcamm

COMMONWEALTH OF MASSACHUSETTS STEPHEN R. GARVIN No. 42772 CIVIL REGISTERED PROFESSIONAL ENGINEER

Project Name:
LOWER BASIN BARRACKS MODERNIZATION

DCAMM Project Number 40115

Project Location
DCAMM PROJ. NO. POL1303 DC1

Project Architect
Finegold Alexander Architects
www.faainc.com

Project Consultants

Structural
RSE Associates Inc

Mech / Plumb / FP / FA / Security
ARUP

Electrical
ART Engineering Corp.

Interiors
Stefura Associates Inc

Civil
Samiotes Consultants

Landscape
Copley Wolff Design Group

Acoustics / AV / PA
Cavanough Tocci Associates

Electrical / IT Engineers
ART Engineering Corp

LEED
The Green Engineer, Inc

Geotech
McPhail Associates, LLC

Elevator
Syska Hennessy Group

FOR REFERENCE ONLY

Site Number:
CAMIS Number:
Building Number:
Secretariat: Administration & Finance

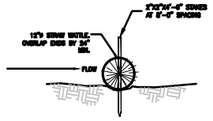
Original Issue Date:
04/13/18

Revisions

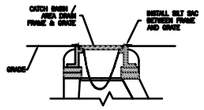
No.	Description	Date
1	Con Com	11/16/18

UTILITIES & GRADING PLAN

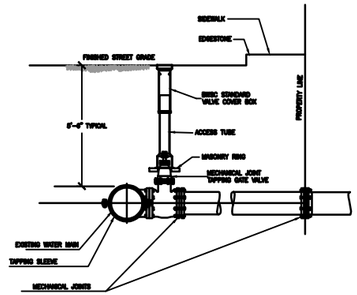
Drawing Number:
C-2.1
SCHEMATIC DESIGN



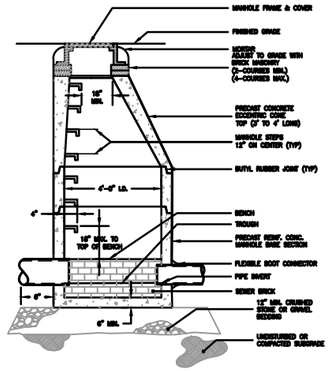
1 STRAW WATTLE
NTS



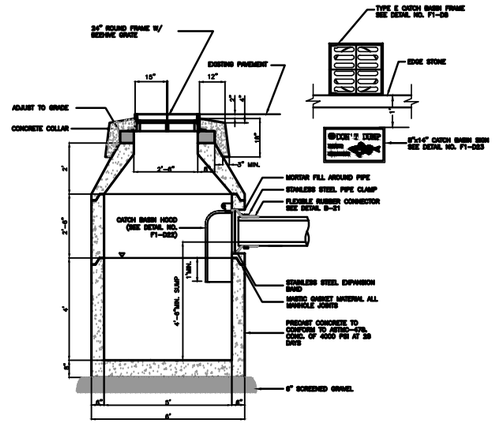
2 CATCH BASIN W/ SILT SAC
NTS



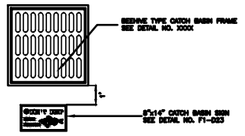
3 WATER PIPE CONNECTION WITH TAPPING SLEEVE AND GATE VALVE



4 PRECAST SANITARY MANHOLE
NTS

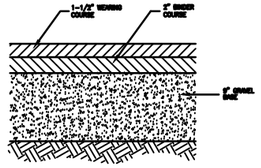


5 CATCH BASIN
NTS

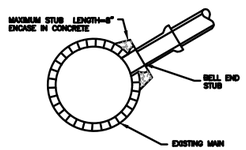


STANDARD CATCH BASIN

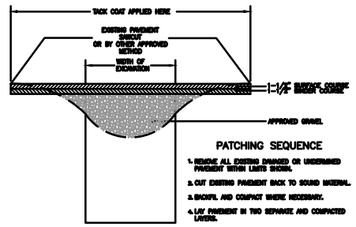
6 CATCH BASIN SIGN INSTALLATION



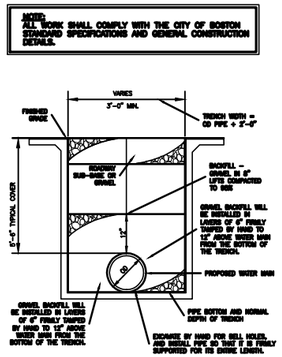
7 BITUMINOUS PAVEMENT
NTS



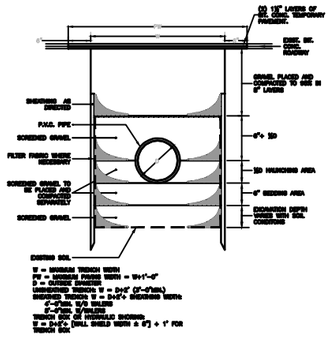
8 CONNECTION TO LARGE SEWER OR STORM DRAINAGE MAIN
NTS



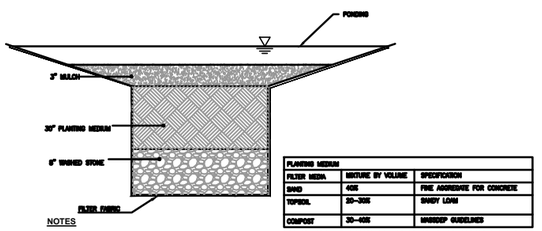
9 TRENCH PATCHING DETAIL



10 WATER MAIN TRENCH IN FIRM GROUND
NTS



11 TRENCH DETAILS FOR PVC PIPE
NTS

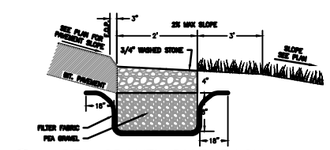


PLANTING MEDIUM		
FILTER MEDIA	MIXTURE BY VOLUME	SPECIFICATION
SAND	40%	FINE AGGREGATE FOR CONCRETE
TOPSOIL	30–35%	SANDY LOAM
COMPOST	30–40%	MASSDEP GUIDELINES

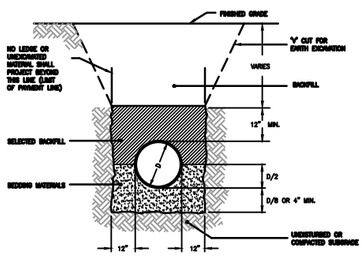
NOTES

1. PLANTING MEDIUM SHALL NOT BE EXPOSED TO SEDIMENT LADEN WATER DURING CONSTRUCTION. ALL BIORETENTION AREAS MUST INCLUDE A PRE-TREATMENT PEA GRAVEL DIAPHRAGM. UPSTREAM RUNOFF SHOULD BE STABILIZED (E.G. STRAW WATTLES OR OTHER APPROVED BARRIERS) PRIOR TO REACHING BIORETENTION AREA. IF POSSIBLE INSTALLATION OF THE FILTER MEDIA SHOULD NOT OCCUR UNTIL THE MAJORITY OF UPSTREAM AREAS ARE STABILIZED.
2. THE PLANTING MEDIUM SHALL BE INSPECTED AFTER EVERY MAJOR STORM IN THE FIRST FEW MONTHS TO ENSURE PROPER FUNCTION.
3. THE TOP SEVERAL INCHES OF THE FILTER SHALL BE REPLACED WITH FRESH MATERIAL WHEN WATER PONDS ON THE SURFACE FOR MORE THAN 72 HOURS. THE REMOVED SEDIMENTS SHOULD BE DISPOSED OF IN AN ACCEPTABLE MANNER.
4. COMPACTION OF THE SOIL BED MATERIAL AND UNDISTURBED EARTH BASE SHALL BE AVOIDED. IF COMPACTION OCCURS, ROTOTILL PRIOR TO SEEDING OR SODDING.
5. IF RELEVANT, PLACE COMMON BORROW MATERIAL IN 12" LIFTS COMPACTED TO 95% OF MAXIMUM DRY DENSITY.
6. MULCH IS AN IMPORTANT COMPONENT OF THE FILTER SYSTEM. PLACE OVER THE PLANTING MEDIUM WELL AGED, SHREDDED, DARK BROWN, HARDWOOD, MODERATELY FINE, BARK OR WOOD FIBER MULCH WILL LESS THAN 5% PASSING THE #200 SIEVE.
7. ADD 20% BY VOLUME TO THE PLANTING MEDIUM/SOIL FILTER OF WELL AGED, ORGANIC, AERATED, GRADED LEAF COMPOST.

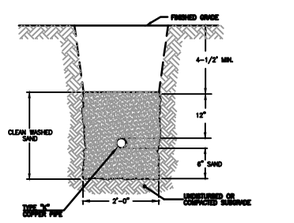
13 BIORETENTION AREA
NTS



12 PEA GRAVEL DIAPHRAGM
NTS



13 TRENCH SECTION – C.I GRAVITY PIPE
NTS



14 COPPER PIPE TRENCH
NTS

3/20/2018 10:28:10 AM

DCAMM
DIVISION OF CAPITAL ASSET MANAGEMENT & MAINTENANCE
OFFICE OF PLANNING DESIGN & CONSTRUCTION
McCormack Building
One Ashburton Place - Room 1500
Boston, MA 02108
617-727-4050
www.mass.gov/dcamm

Project Name:
LOWER BASIN BARRACKS MODERNIZATION

DCAMM Project Number 40115

Project Location
DCAMM PROJ. NO. POL1303 DC1

Project Architect
Finegold Alexander Architects
www.faainc.com

Project Consultants
Structural
RSE Associates Inc
Mech / Plumb / FP / FA / Security
ARUP
Electrical
ART Engineering Corp.
Interiors
Stefura Associates Inc
Civil
Samiotes Consultants
Landscape
Copley Wolff Design Group
Acoustics / AV / PA
Cavanough Tocci Associates
Electrical / IT Engineers
ART Engineering Corp
LEED
The Green Engineer, Inc
Geotech
McPhail Associates, LLC
Elevator
Syska Hennessy Group

FOR REFERENCE ONLY

Site Number:
CAMIS Number:
Building Number:
Secretariat: Administration & Finance

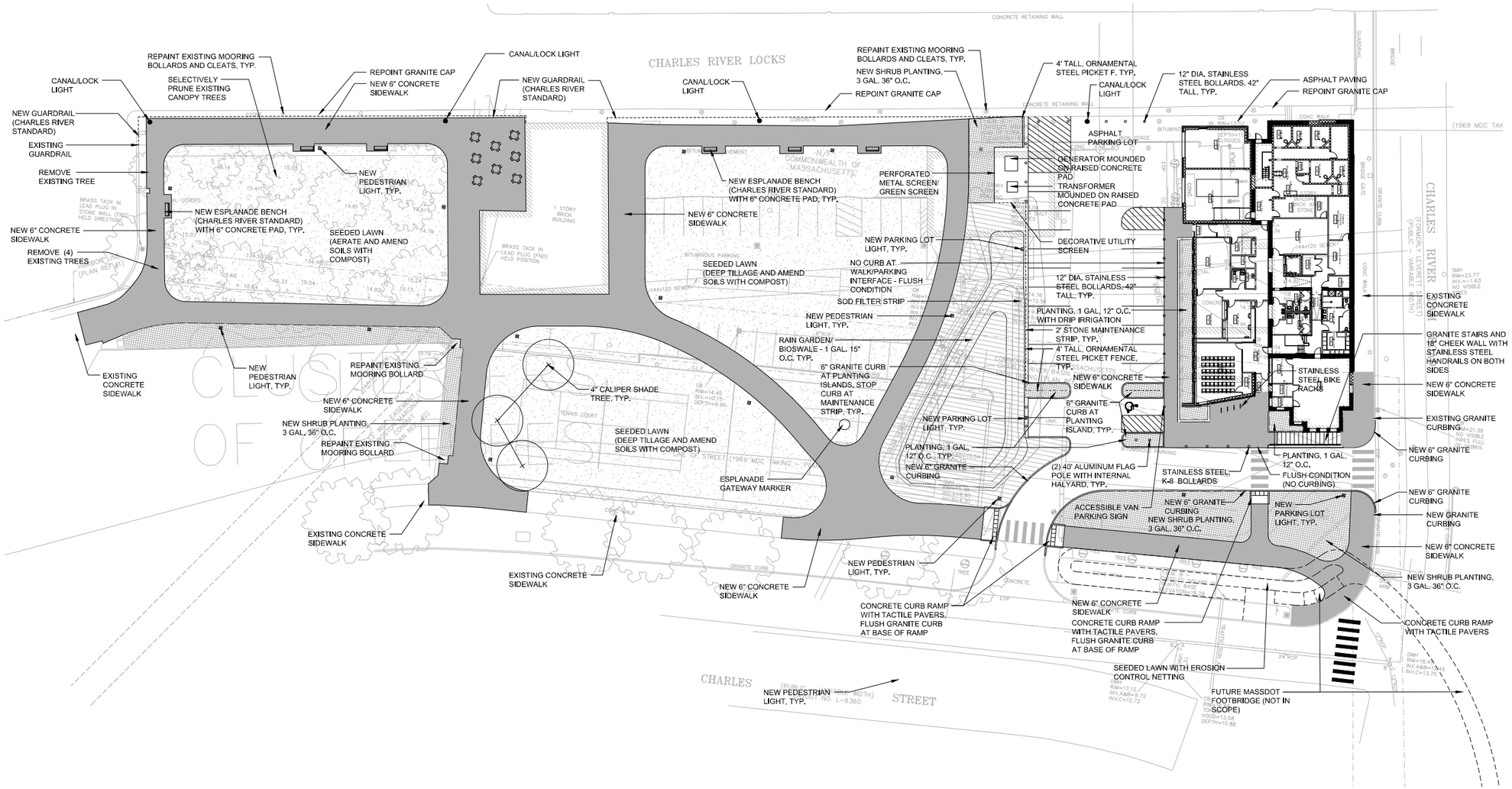
Original Issue Date:
04/13/18

Revisions

No.	Description	Date
1	Con Com	11/16/18

CIVIL DETAILS

Drawing Number:
C-3.1
SCHEMATIC DESIGN

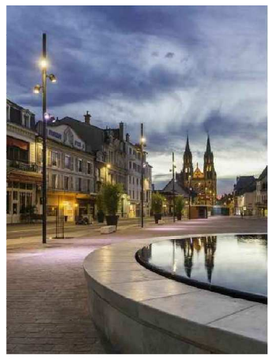


SITE PLAN
SCALE: 1"=20'


ESPLANADE BENCH
(CHARLES RIVER STANDARD)


ESPLANADE GUARDRAIL
(CHARLES RIVER STANDARD)


MOORING BOLLARDS AND CLEATS


CANAL/LOCK LIGHTS


PEDESTRIAN AND PARKING LOT LIGHTS
(MATCH EXISTING ESPLANADE STANDARD)


PERFORATED METAL SCREEN WITH STEEL STRUCTURE (GREEN SCREEN)

File Path: XXXXXXXXXXX

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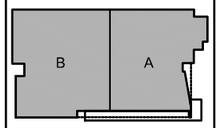

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Original Issue Date
04 - 27 - 2018

Revisions

No.	Description	Date
	ConCom	11/16/18

Plan Name:
Site Plan

Drawing Number:
L-100
Drawing of

LEGEND:

EXISTING WATERSHED

TIME OF CONCENTRATION LINE

PROPOSED WATERSHED BOUNDARY

CHARLES RIVER LOCKS

XWS-1

XWS-2

CONCRETE RETAINING WALL

CONCRETE

CONCRETE RETAINING WALL

IRON FENCE

METAL COVERS

BITUMINOUS PAVEMENT

N/F COMMONWEALTH OF MASSACHUSETTS

1 STORY BRICK BUILDING

FENCE

BRASS TACK IN LEAD PLUG (FND) HELD POSITION

BITUMINOUS PARKING

T.B.M. A – CHISELED SQUARE IN END OF CURB ELEVATION=14.04

CB RIM=14.04 WELDED SHUT NO PIPES VISIBLE

1 STORY BRICK BUILDING

BITUMINOUS

CONC WALK

CB RIM=13.52 INV.=12.02 DEPTH=11.52 CLOGGED

3 STORY BUILDING BRICK AND STONE

GUARDRAIL

BRIDGE GATE

GRANITE CURB

144x120 SEWER

8"METAL

CB RIM=13.84 INV.A=12.34 INV.B=12.44 DEPTH=10.74

CB RIM=14.04 INV.=13.44 DEPTH=12.44

CB RIM=14.46 INV.A=9.56 INV.B=9.11 INV.C=8.46 INV.D=11.21 INV.E=9.96

10"METAL

12" UNK.

DMH RIM=14.78 INV.A=12.56 INV.B=9.48 INV.C=9.31 INV.D=9.81 INV.E=10.31

12"PVC

6"CLAY

8"CLAY

8"RCP

CB RIM=14.45 INV.=10.75 DEPTH=9.95

COMMONWEALTH OF MASSACHUSETTS CHARLES RIVER BASIN COMMISSION 1909 TAKING (PLAN REF. #1 & #3)

TENNIS COURT

LINE OF STREET (1969 MDC TAKING – PLAN REF.#7)

8" UNK.

DMH RIM=15.09 INV.A&B=10.54 B SEALED DEPTH=10.54

SMH RIM=15.30 INV.A=6.85 INV.B=4.30

SMH RIM=16.21 INV.A=7.11 INV.B=7.01

IRON ROD (FND)

JERSEY BARRIER

TRAFFIC SIGN ARM

T.B.M. B – CHISELED SQUARE IN TRAFFIC BASE ELEVATION=16.29

24"RCP

12"RCP

DMH RIM=17.12 INV.A&B=9.72 INV.C=12.72

CB RIM=16.88 TOP OF HOOD=13.58 DEPTH=10.88

13' WIDE EASEMENT BOSTON MARGINAL CONDUIT (PLAN REF. #2)

CHARLES (PUBLIC – VARIABLE WIDTH) LAYOUT NO. L-6360 STREET

40 20 0 20 40

1 inch =20 feet

Samiotes Consultants Inc.
Civil Engineers + Land Surveyors

20 A Street
Framingham, MA 01701

T 508.877.6688
F 508.877.8349

www.samiotes.com

MA STATE POLICE
LOWER BASIN BARRACKS
250 Leverett Circle, Boston, MA

SEAL

REVISION

EXISTING HYDROLOGY

JOB # 14076.00
DATE: 08.01.2018
SCALE: AS SHOWN
DRAWN BY: MJZ
APPROVED BY: SRG

H-1.0

FILE:14076.00 LBB- HYDROLOGY.DWG

P:\PROJECTS\2014\14076.00 LOWER BARRACKS BASIN - BOSTON\DWG\14076.00 LBB- HYDROLOGY.DWG

LEGEND:

- PROPOSED WATERSHED
- TIME OF CONCENTRATION LINE
- PROPOSED WATERSHED BOUNDARY

CHARLES RIVER LOCKS

CONCRETE RETAINING WALL

PWS-1

PWS-2

PWS-3

PWS-4

LOAM & SEED (SEED SPEC BY LA)

PROPOSED BIORETENTION BASIN (REFER TO LA PLANS FOR PLANTING PLAN)

PROPOSED BIORETENTION BASIN

GRASSED SWALE

2' PEA-STONE GRAVEL DIAPHRAGM

3' GRASS FILTER STRIP

ROOF DRAIN OUTLET W/ RIPRAP APRON INV=12.50

BITUMINOUS CONCRETE PARKING

LOWER GATE HOUSE (STATE POLICE BARRACKS)

PROPOSED STATE POLICE BARRACKS RENOVATION

DMH #1 (24" OVERFLOW GRATE FOR DETENTION BASIN) RIM=12.30 INV(OUT)=9.84

L=78' S=0.04 10"Ø PVC SDR 35

DCR SL 12 DICL 1999

DCR SL 6 DICL 1999

CHARLES (PUBLIC – VARIABLE WIDTH) LAYOUT NO. L–6360 STREET

20 10 0 20 40

1 inch = 20 feet

samiotes

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MA STATE POLICE
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SEAL

REVISION

PROPOSED HYDROLOGY

JOB # 14076.00
DATE: 08.01.2018
SCALE: AS SHOWN
DRAWN BY: MJZ
APPROVED BY: SRG

H-2.0

FILE:14076.00 LBB- HYDROLOGY.DWG

December 7, 2018

City of Boston Conservation Commission
City of Boston Environment Department
1 City Hall Square, Room 709
Boston, MA 02201

Subject: **Supplemental Information - Notice of Intent**
Lower Basin Barracks Modernization Project, Boston, MA

Dear Commission Members,

In response to questions raised by Mr. Moreno in his review of the above-referenced Notice of Intent (NOI), please find the following requested information:

- Approximately 63,898 square feet of the site is located in the buffer zone of the resource area "Bank." Of this buffer zone area, 54,031 square feet is currently developed as impervious area. This includes the existing building footprint. Meanwhile, approximately 9,867 square feet of the site's buffer zone is comprised of pervious, vegetated area. This vegetated area is located to the south of the Upper Lock Gatehouse, abutting the Charles River Basin. Approximately 4,927 square feet of the existing impervious area within the buffer zone between the Stop Plank Garage and the Upper Lock Gatehouse will be converted from an area of impervious parking and building footprint, to a pervious, vegetated area, as will a large area of the site located beyond the buffer zone. Per the Wetlands Protection Act regulations at 10.02(2)(b)1.f, the conversion of impervious to vegetated surfaces within the buffer zone is not subject to regulation under the WPA, provided adequate erosion control is provided. As shown in Project Plan Sheet C-1.1 provided in the NOI submitted December 5, 2018, such controls are provided throughout the site.

- Project Plan Sheet C-2.1 has been revised to show a low elevation of 11.4 feet Boston City Base within the proposed bioswale and to include a note as to the ground floor elevation of the proposed building addition (see attached). A copy of the revised C-2.1 Plan Sheet is attached.

- The Climate Resiliency Report Summary has similarly been revised to reflect this lower elevation (see attached Climate Resiliency Report Summary dated 12/07/2018 09:11:56).

- Project Plan Sheet L-100 has been revised to include the first floor elevation of the proposed building addition, as well as to include the proposed site topography. A copy of the revised L-100 Plan Sheet is attached.

PRINCIPALS

Theodore A Barten, PE
Margaret B Briggs
Michael E Guski, CCM
Dale T Raczynski, PE
Cindy Schlessinger
Lester B Smith, Jr
Robert D O'Neal, CCM, INCE
Andrew D Magee
Michael D Howard, PWS
Douglas J Kelleher
AJ Jablonowski, PE
Stephen H Slocomb, PE
David E Hewett, LEED AP
Dwight R Dunk, LPD
David C. Klinch, PWS, PMP

Samuel G. Mygatt, LLB
1943-2010

ASSOCIATES

Richard M. Lampeter, INCE
Maria B. Hartnett
Geoffrey Starsiak

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Maynard, MA 01754
www.epsilonassociates.com

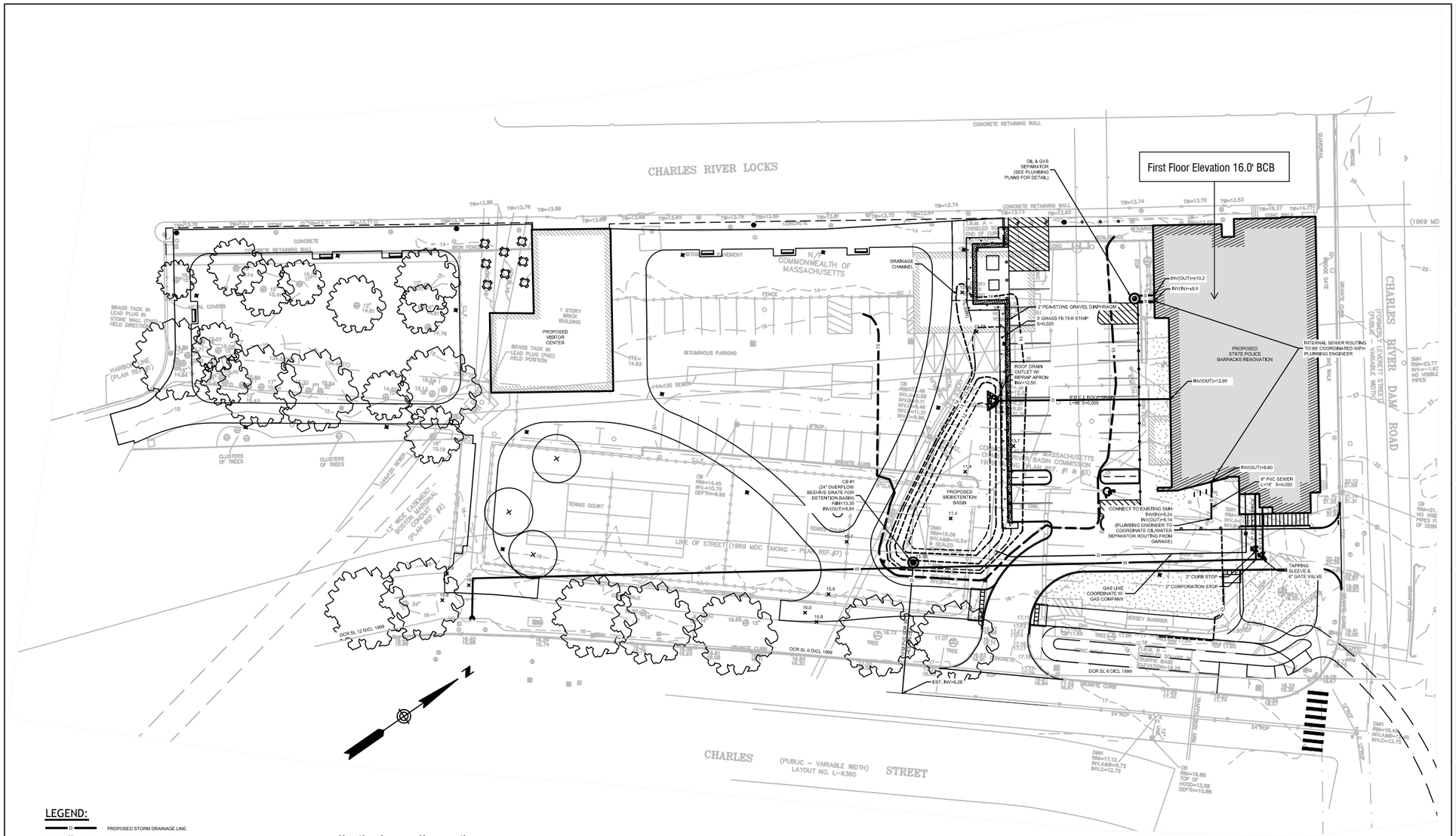
Thank you very much for your review of the enclosed material. Should you have any questions concerning this material please do not hesitate to contact me directly at (978) 461-6248, or via email at amagee@epsilonassociates.com.

Sincerely,
EPSILON ASSOCIATES, INC.

Andrew D. Magee
Principal

encl.

cc: MassDEP – Northeast Regional Office



LEGEND:

D	PROPOSED STORM DRAINAGE LINE
RD	PROPOSED ROOF DRAIN LINE
UD	PROPOSED UNDERDRAIN LINE
W	PROPOSED WATER LINE
FP	PROPOSED FIRE PROTECTION LINE
SS	PROPOSED SANITARY SEWER LINE
SM	PROPOSED FORCE MAIN
KW	PROPOSED KITCHEN WASTE LINE
SW	PROPOSED SCIENCE WASTE LINE
G	PROPOSED GAS LINE (BY OTHERS)
E	PROPOSED UNDERGROUND ELECTRIC LINE
OH	PROPOSED OVERHEAD ELECTRIC LINE
T	PROPOSED TELEPHONE LINE
SMH	PROPOSED SANITARY SEWER MANHOLE
DMH	PROPOSED STORM DRAINAGE MANHOLE
	PROPOSED WATER QUALITY UNIT
	PROPOSED TRENCH DRAIN
CB	PROPOSED CATCH BASIN (ROUND)
CB	PROPOSED CATCH BASIN (SQUARE)
DCB	PROPOSED DOUBLE CATCH BASIN
	PROPOSED INTERMEDIATE CONTOUR
	PROPOSED INDEX CONTOUR
130.0	PROPOSED SPOT GRADE
(130.0)	EXISTING GRADE TO REMAIN (V.I.F.)
TW=131.87 BW=130.50	PROPOSED TOP/BOTTOM OF WALL (NOT FOUNDATION)
TC=131.87 BC=130.50	PROPOSED TOP/BOTTOM OF CURB
TS=131.87 BS=130.50	PROPOSED TOP/BOTTOM OF STEP
RIM=130.20	PROPOSED RIM ELEVATION (TO FINAL GRADE)
V.I.F.	VERIFY GRADE IN FIELD \ TO BE SET

3/20/2018 10:28:10 AM

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COMMONWEALTH OF MASSACHUSETTS — STEPHEN R. GARDEN — No. 41472 — REGISTERED ARCHITECT

Project Name:
LOWER BASIN BARRACKS MODERNIZATION

DCAMM Project Number 40115

Project Location
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UTILITIES & GRADING PLAN

Drawing Number:
C-2.1
SCHEMATIC DESIGN

Boston Planning & Development Agency
Climate Resiliency Report Summary

Submitted: 12/07/2018 09:11:56

A.1 - Project Information

Project Name:	Lower Basin Barracks Modernization project – MA State Police			
Project Address:	Esplanade at Leverette Circle- 250 Leverett Circle, Boston , MA			
Filing Type:	Design / Building Permit (prior to final design approval)			
Filing Contact:	Ellen Anselone	Finegold Alexander Architects	eka@faainc.com	617-227-9272
Is MEPA approval required?	Yes	MEPA date:		

A.2 - Project Team

Owner / Developer:	DCR/ DCAMM – State of MA.
Architect:	Finegold Alexander Architects
Engineer:	STV Construction, Inc
Sustainability / LEED:	The Green Engineer, Inc.
Permitting:	Epsilon
Construction Management:	TBD

A.3 - Project Description and Design Conditions

List the principal Building Uses:	MA State Police Barracks
List the First Floor Uses:	Control desk, report writing, detention, exercise room, sally port, lockers and community room.
List any Critical Site Infrastructure and or Building Uses:	Central police barracks for Esplanade. Major Boston roadway security.

Site and Building:

Site Area (SF):	106650	Building Area (SF):	19560
Building Height (Ft):	38	Building Height (Stories):	2
Existing Site Elevation – Low (Ft BCB):	13.5	Existing Site Elevation – High (Ft BCB):	24.0
Proposed Site Elevation – Low (Ft BCB):	11.4	Proposed Site Elevation – High (Ft BCB):	24
Proposed First Floor Elevation (Ft BCB):	16.0	Below grade spaces/levels (#):	0

Article 37 Green Building:

Boston Planning & Development Agency
Climate Resiliency Report Summary

boston planning & development agency

LEED Version - Rating System:	LEED V4	LEED Certification:	No
Proposed LEED rating:	Silver	Proposed LEED point score (Pts.):	TBD

Building Envelope:

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Roof:	40	Exposed Floor :	23.8
Foundation Wall:	23.8	Slab Edge (at or below grade):	23.8

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall & Spandrel Assembly:	.59	Wall & Spandrel Assembly Value:	.01
Area of Framed & Insulated / Standard Wall:	79.86	Wall Value:	24.07
Area of Vision Window:	10.93	Window Glazing Assembly Value:	.37
		Window Glazing SHGC:	
Area of Doors:	8.62	Door Assembly Value :	.125

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined			
Annual Electric (kWh):		Peak Electric (kW):	
Annual Heating (MMbtu/hr):		Peak Heating (MMbtu):	
Annual Cooling (Tons/hr):		Peak Cooling (Tons):	
Energy Use - Below ASHRAE 90.1 - 2013 (%):		Have the local utilities reviewed the building energy performance?:	
Energy Use - Below Mass. Code (%):		Energy Use Intensity (kBtu/SF):	

Back-up / Emergency Power System

Electrical Generation Output (kW):	80	Number of Power Units:	1
System Type (kW):		Fuel Source:	Diesel

Emergency and Critical System Loads (in the event of a service interruption)

Electric (kW):		Heating (MMbtu/hr):	36
		Cooling (Tons/hr):	

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing greenhouse gas emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon-neutrality by 2050 the performance of new buildings will need to progressively improve to carbon net zero and net positive.

B.1 – GHG Emissions - Design Conditions

For this filing - Annual Building GHG Emissions (Tons):

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

Energy modeling performed during study for selection of preferred mechanical equipment. Ongoing LEED planning process.

Describe building specific passive energy efficiency measures including orientation, massing, building envelop, and systems:

Retrofit of circa 1908 building. New systems, insulations, windows and roof. Addition of green roof on new addition.

Describe building specific active energy efficiency measures including high performance equipment, controls, fixtures, and systems:

Energy recovery ventilators, variable refrigerant flow heating and cooling, lighting controls.

Describe building specific load reduction strategies including on-site renewable energy, clean energy, and storage systems:

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

Describe any energy efficiency assistance or support provided or to be provided to the project:

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

C - Extreme Heat Events

Annual average temperature in Boston increased by about 2˚F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low (Deg.):		Temperature Range - High (Deg.):	
Annual Heating Degree Days:		Annual Cooling Degree Days	

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90° (#):		Days - Above 100° (#):	
Number of Heatwaves / Year (#):		Average Duration of Heatwave (Days):	

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

Concrete sidewalks with a SR of at least 0.28.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

Partial Green roof to offset the heat island effect.

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

Diesel back-up power, high efficiency electric heat-pump based heating and cooling systems.

D - Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25”. There is a significant probability that

this will increase to at least 6" by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

D.1 – Extreme Precipitation - Design Conditions

What is the project design precipitation level? (In. / 24 Hours)	4 In.

Describe all building and site measures for reducing storm water run-off:

Green roof, extensive Bioretention basin, deep sump catch basin(s), overall increase in previous grassed areas throughout the site.

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

Rain water harvesting, bioretention basin, and green roof.

E – Sea Level Rise and Storms

Under any plausible greenhouse gas emissions scenario, the sea level in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Is any portion of the site in a FEMA Special Flood Hazard Area?	No	What Zone:	
What is the current FEMA SFHA Zone Base Flood Elevation for the site (Ft BCB)?		10.46 BCB	Ft
Is any portion of the site in the BPDA Sea Level Rise Flood Hazard Area (see SLR-FHA online map)?	Yes		

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented by the Sea Level Rise Flood Hazard Area (SLR-FHA), which includes 3.2' of sea level rise above 2013 tide levels, an additional 2.5" to account for subsidence, and the 1% Annual Chance Flood. After using the SLR-FHA to identify a

project's Sea Level Rise Base Flood Elevation, proponents should calculate the Sea Level Rise Design Flood Elevation by adding 12" of freeboard for buildings, and 24" of freeboard for critical facilities and infrastructure and any ground floor residential units.

What is the Sea Level Rise - Base Flood Elevation for the site (Ft BCB)?	16.7		
What is the Sea Level Rise - Design Flood Elevation for the site (Ft BCB)?	18.7	First Floor Elevation (Ft BCB):	16.0
What are the Site Elevations at Building (Ft BCB)?	15.0	What is the Accessible Route Elevation (Ft BCB)?	24.0

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Street and sidewalk access above SLR-DFE, window sills above SLR-DFE, utility pads above DFE and electric equipment at 2nd floor. Salt tolerant plant material.

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

Electrical equipment at 2nd floor, emergency generator and transformer above SLR-DFE, and temporary barriers can be used.

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Generator and electric protected, back flow preventers and portable toilets.

Describe any strategies that would support rapid recovery after a weather event:

Protection from water intrusion, equipment location, emergency power.

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

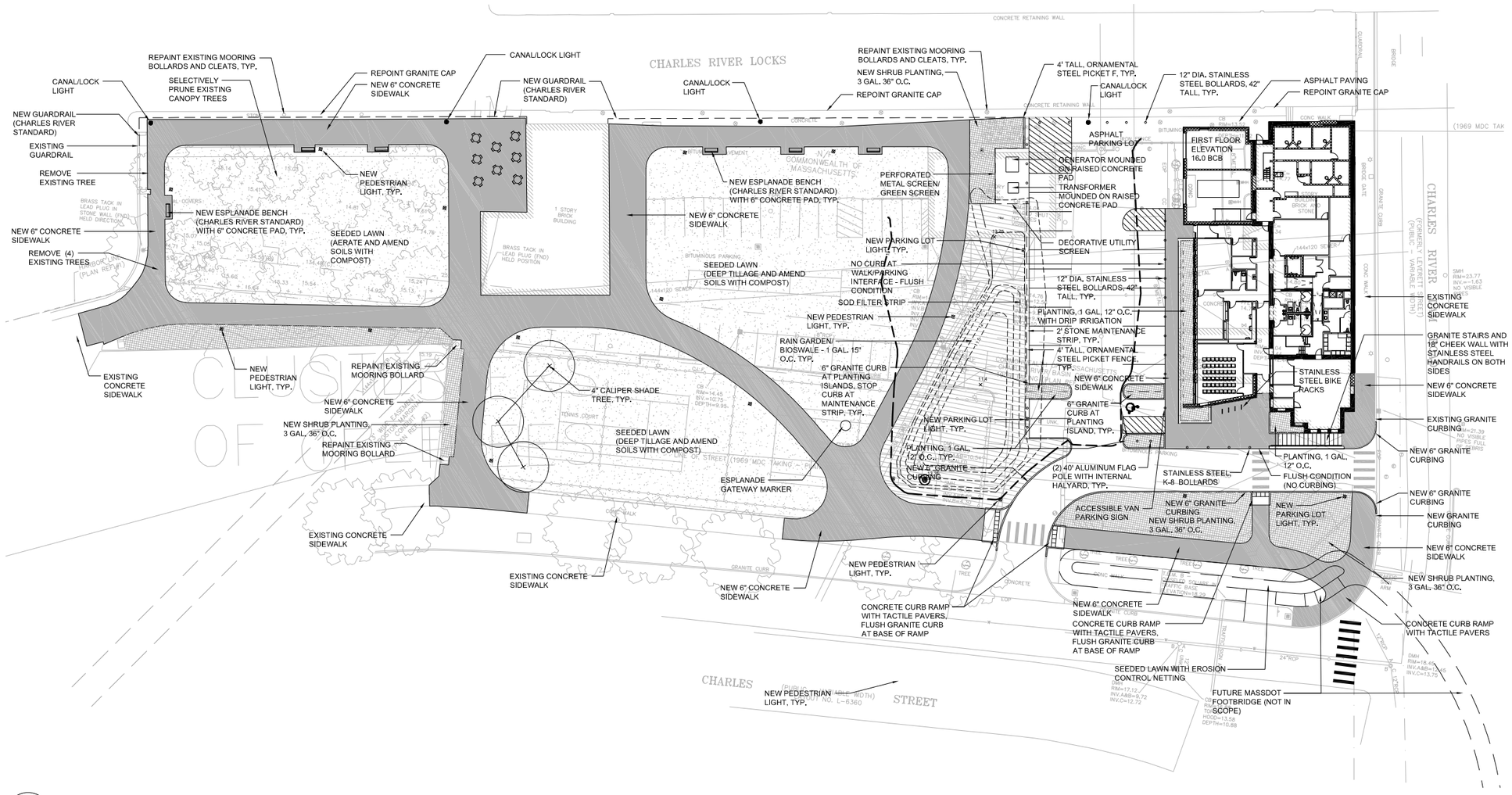
Future adaption could involve raising of sea wall, added bioswales.

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

Raising the first floor and / or blocking all openings at that level.

Thank you for completing the Boston Climate Change Checklist!

For questions or comments about this checklist or Climate Change best practices, please contact:
John.Dalzell@boston.gov



SITE PLAN
SCALE: 1"=20'


ESPLANADE BENCH
(CHARLES RIVER STANDARD)


ESPLANADE GUARDRAIL
(CHARLES RIVER STANDARD)


MOORING BOLLARDS AND CLEATS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(MATCH EXISTING ESPLANADE STANDARD)


PERFORATED METAL SCREEN WITH STEEL STRUCTURE (GREEN SCREEN)

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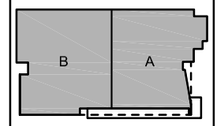

Project Name:
LOWER BASIN BARRACKS MODERNIZATION

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Original Issue Date
04 - 27 - 2018

Revisions

No.	Description	Date
	ConCom	11/16/18

Plan Name:
Site Plan

Drawing Number:
L-100
Drawing of

File Path: XXXXXXXXXXX