



CITY OF WATERTOWN

Conservation Commission

CONSERVATION COMMISSION MEETING WEDNESDAY, DECEMBER 1, 2021 AT 7:00 PM AGENDA

ACCESS INFORMATION:

- A. The meeting will be televised through WCATV (Watertown Cable Access Television):
<http://vodwcatv.org/CablecastPublicSite/?channel=1>
 - B. The Public may join the virtual meeting online: <https://watertown-ma.zoom.us/j/99597080710>
 - C. Public may join the virtual meeting audio only by phone: (877) 853-5257 or (888) 475-4499 (Toll Free) and enter Webinar ID: 995 9708 0710
 - D. Public may comment through email: lschwab@watertown-ma.gov
-

- 1. Commission Discussion-Public Hearing
 - A. **Continued to January meeting- Request for Determination of Applicability-** Gore Place- to make improvements to the existing farmstead in the southwest portion of the site, including a new pole barn and threshing barn with associated fenced barnyards, access walking paths, gravel driveway, utility service upgrades and new stormwater management system. Gore Place Society, Applicant; Highpoint Engineering, Representative
- 2. Commission Discussion-Public Hearing
 - A. **Continued to January meeting- Notice of Intent-** 0 Arlington St. (Williams Pond Parcel) to construct a 2-story commercial building and parking lot on property known as the Williams Pond parcel. Max Hatziliades, Applicant and Owner
- 3. Commission Discussion-Public Hearing
 - A. **Notice of Intent-** 551 Rear Arsenal St- submitted for the project providing improved park facilities at the existing Arsenal Park, a 13.7-acre park situated on the former Arsenal Grounds. Steve Magoon, Community Development and Planning, Applicant; CDM Smith, Representative.
- 4. Agent Report
 - A.
 - 1. CPA
 - 2. Climate and Energy Plan

- 3. Pollinators
- 4. Ongoing Orders of Conditions
- 5. Acceptance of Minutes
 - A. Review of Minutes from the November 3, 2021 Conservation Commission meeting
- 6. Review-Discussion
 - A. Meeting and Filing Dates for 2022

Notice of Intent

Arsenal Park Improvements Project, Phase B

Town of Watertown

November 2021



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Notice of Intent Form

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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 #:
eDEP Transaction #:1256625
City/Town:WATERTOWN

A.General Information

1. Project Location:

a. Street Address	551 ARSENAL STREET	c. Zip Code	02472
b. City/Town	WATERTOWN	e. Longitude	71.15972W
d. Latitude	42.36074N	g. Parcel/Lot #	0
f. Map/Plat #	1301-2A-0		

2. Applicant:

☐ Individual ☒ Organization

a. First Name	STEVE	b. Last Name	MAGOON
c. Organization	WATERTOWN COMMUNITY DEVELOPMENT AND PLANNING		
d. Mailing Address	149 MAIN STREET		
e. City/Town	WATERTOWN	f. State	MA
g. Zip Code	02472	j. Email	smagoon@watertown-ma.gov
h. Phone Number	617-972-6417	i. Fax	617-972-6484

3. Property Owner:

☐ more than one owner

a. First Name	STEVE	b. Last Name	MAGOO
c. Organization	WATERTOWN COMMUNITY DEVELOPMENT AND PLANNING		
d. Mailing Address	149 MAIN STREET		
e. City/Town	WATERTOWN	f. State	MA
g. Zip Code	02472	j. Email	smagoon@watertown-ma.gov
h. Phone Number	617-972-6417	i. Fax	617-972-6484

4. Representative:

a. First Name	MAGDALENA	b. Last Name	LOFSTEDT
c. Organization	CDM SMITH INC.		
d. Mailing Address	75 STATE STREET, SUITE 701		
e. City/Town	BOSTON	f. State	MA
g. Zip Code	02109	j. Email	lofstedtmh@cdmsmith.com
h. Phone Number	617-452-6597	i. Fax	617-345-3901

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

a. Total Fee Paid	b. State Fee Paid	c. City/Town Fee Paid
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6. General Project Description:

THE PROPOSED PHASE B IMPROVEMENTS PROJECT GENERALLY MAINTAIN THE EXISTING LAYOUT AND USES OF THE PARK. THE ENTRANCE DRIVEWAY AND PARKING LOT WILL BE RECONFIGURED TO PROVIDE IMPROVED CIRCULATION. THE CHILDREN'S PLAYGROUND WILL BE UPDATED, ENLARGED, AND DESIGNED FOR ALL AGES AND ABILITIES. THE TENNIS COURT AREA WILL BE UPDATED TO INCLUDE BASKETBALL COURTS, TENNIS COURTS, A CUSTOM SKATE PARK, AND COMMUNITY GARDEN. THE EXISTING RESTROOM BUILDING WILL BE UPDATED. THE EXISTING WALKING PATHS WILL BE WIDENED AND RESURFACED.

7a. Project Type:

- | | |
|---|---|
| 1. ☐ Single Family Home | 2. ☐ Residential Subdivision |
| 3. ☐ Limited Project Driveway Crossing | 4. ☐ Commercial/Industrial |

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5. ☐ Dock/Pier

7. ☐ Coastal Engineering Structure

9. ☐ Transportation

6. ☐ Utilities

8. ☐ Agriculture (eg., cranberries, forestry)

10. ☒ Other

7b. Is any portion of the proposed activity eligible to be treated as a 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:

2. Limited Project

8. Property recorded at the Registry of Deeds for:

a. County:

b. Certificate:

c. Book:

d. Page:

SOUTHERN MIDDLESEX

N/A

13354

200

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

1. Buffer Zone & Resource Area Impacts (temporary & permanent):

☐ This is a Buffer Zone only project - Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.

2. Inland Resource Areas: (See 310 CMR 10.54 - 10.58, if not applicable, go to Section B.3. Coastal Resource Areas)

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

2. square feet

3. cubic yards dredged

d. ☐ Bordering Land Subject to Flooding

1. square feet

2. square feet

3. cubic feet of flood storage lost

4. cubic feet replaced

e. ☐ Isolated Land Subject to Flooding

1. square feet

2. cubic feet of flood storage lost

3. cubic feet replaced

f. ☒ Riverfront Area

Charles River

1. Name of Waterway (if any)

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

137889

square feet

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4. Proposed Alteration of the Riverfront Area:

17,078 0 17,078
a. total square feet b. square feet within 100 ft. c. square feet between 100 ft.
and 200 ft.

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

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

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

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 Beaches 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

f. ☐ Coastal Banks

1. linear feet

g. ☐ Rocky Intertidal Shores

1. square feet

h. ☐ Salt Marshes

1. square feet

2. sq ft restoration, rehab, crea.

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

☐ Restoration/Replacement

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 entered the additional amount here.

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a. square feet of BVW

b. square feet of Salt Marsh

5. Projects Involves Stream Crossings

☐ Project Involves Streams Crossings

If the project involves Stream Crossings, please enter the number of new stream crossings/number of replacement stream crossings.

a. number of new stream crossings

b. number of replacement stream crossings

C. Other Applicable Standards and Requirements

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 of Endangered Species program (NHESP)?

a. ☐ Yes ☒ No

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

Natural Heritage and Endangered Species

Program

Division of Fisheries and Wildlife

1 Rabbit Hill Road

Westborough, MA 01581

b. Date of map: NOV. 9, 2021

If yes, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18)...

c. Submit Supplemental Information for Endangered Species Review * (Check boxes as they apply)

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

3. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetland 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

c. ☐ MESA filing fee (fee information available at: <http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/mass-endangered-species-act-mesa/mesa-fee-schedule.html>)

Make check payable to "Natural Heritage & Endangered Species Fund" 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

d. 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/eea/agencies/dfg/dfw/laws-regulations/cmr/321-cmr-1000-massachusetts-endangered-species-act.html#10.14>; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR

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Provided by MassDEP:
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10.37 and 10.59.)

2. ☐ Separate MESA review ongoing.

a. NHESP Tracking Number

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.

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

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

a. ☒ Not applicable - project is in inland resource area only

b. ☐ Yes ☐ No

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

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

North Shore - Hull to New Hampshire:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 S. Rodney French Blvd
New Bedford, MA 02744

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930

If yes, it 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.

3. 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 DEP Website for ACEC locations). **Note:** electronic filers click on Website.

b. ACEC Name

4. 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

5. 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

6. 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 ☒

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b. ☐ No, Explain why the project is exempt:

1. ☐ Single Family Home
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

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 by regular mail delivery.

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.
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. ☒

a. Plan Title: b. Plan Prepared By: c. Plan Signed/Stamped By: c. Revised Final Date: e. Scale:

COVER, SHEET G-1: GENERAL NOTES AND LEGEND	R. GUILFOIL/G. HOWARD		Nov. 2021	
EX-3 TO EX-5: EXISTING CONDITIONS III-V	R. GUILFOIL/G.HOWARD		Nov. 2021/1"=20'	
L-3 TO L-5: DEMOLITION, REMOVAL, AND EROSION AND SEDIMENTATION CONTROL PLANS III- V	R. GUILFOIL/G. HOWARD		Nov. 2021/1"=20'	
L-8 TO L-10: LAYOUT AND MATERIALS PLAN III-V	R. GUILFOIL/G. HOWARD		Nov. 2021/1"=20'	
L-13 TO L-15 : GRADING, DRAINAGE, UTILITIES PLAN III-V	R. GUILFOIL/G. HOWARD		Nov. 2021/1"=20'	
L-18 TO L-20: LANDSCAPING III-V	R. GUILFOIL/G. HOWARD		Nov. 2021/1"=20'	
D-1 TO D-6: DETAILS I-VI	R. GUILFOIL/G. HOWARD		Nov. 2021	

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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.



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E. Fees

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

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

2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

6. Payer name on check: First Name

7. Payer name on check: Last Name

F. Signatures and Submittal Requirements

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

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

1. Signature of Applicant

2. Date

3. Signature of Property Owner (if different)

4. Date

5. Signature of Representative (if any)

6. Date

For Conservation Commission:

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

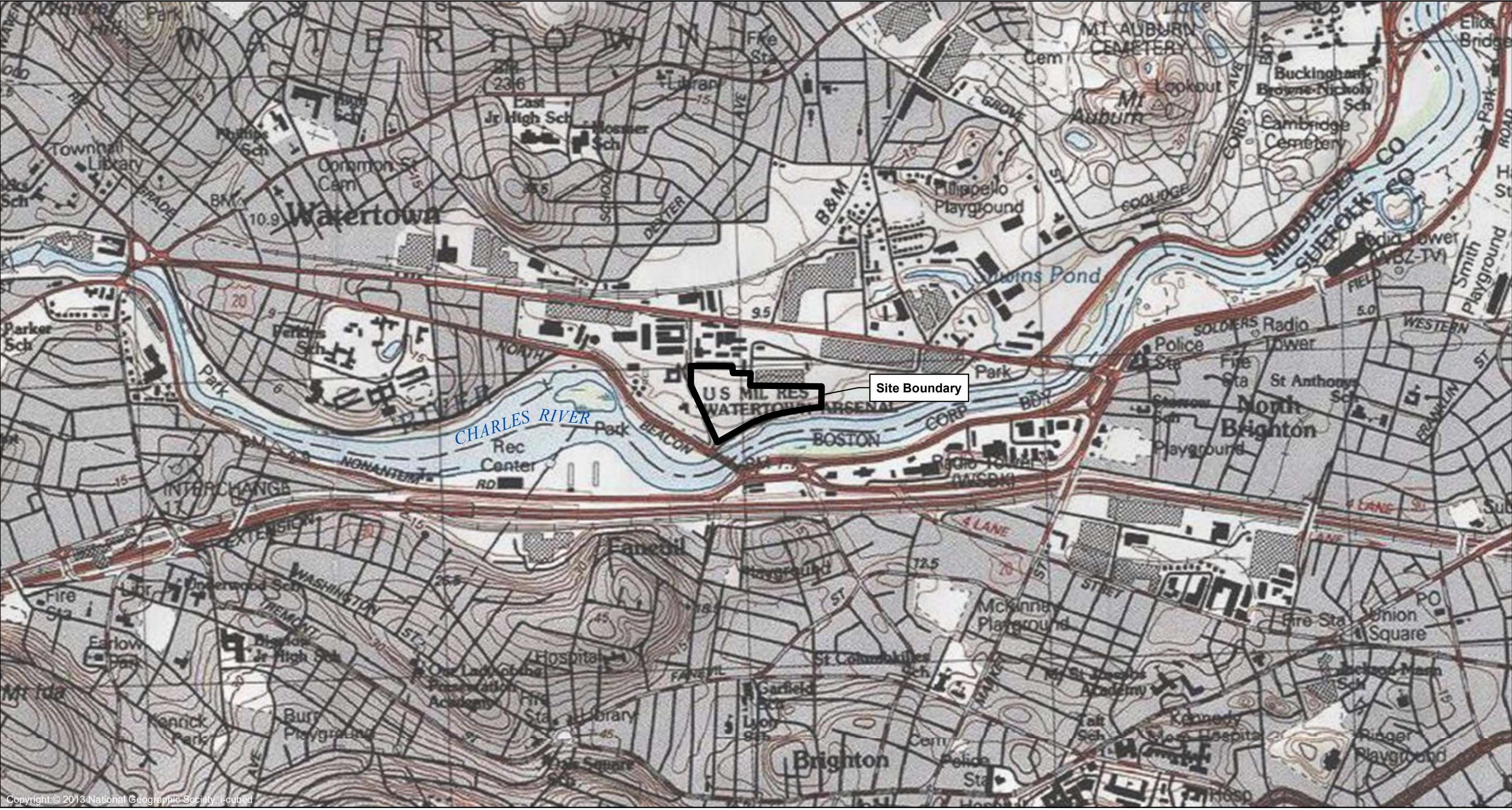
For MassDEP:

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

Other:

If the applicant has checked the "yes" box in Section C, Items 1-3, 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.



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- LEGEND**
- NHESP Estimated Habitats of Rare Wildlife
 - NHESP Priority Habitat of Rare Species
 - Arsenal Park Boundary

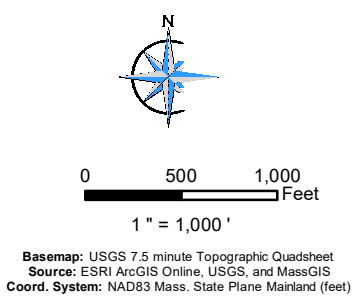


Figure 1: Location Map
Arsenal Park Improvements Project, Phase 1
City of Watertown

National Flood Hazard Layer FIRMette



Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation
MAP PANELS		20.2
		17.5
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/11/2019 at 11:32:44 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

60% SUBMITTAL - NOT FOR CONSTRUCTION

Attachment A

Project Narrative

Attachment A

Project Narrative

1.0 Project Description

The Town of Watertown (the Town) is proposing Phase B of the improvements to the existing Arsenal Park located at 551 Rear Arsenal Street (Map/Lot 1301 2A 0). Arsenal Park is a 13.7-acre park situated on the former Arsenal Grounds. Phase B improvements to the existing park generally maintain the existing layout and uses of the park. The entrance driveway and parking lot will be reconfigured to provide improved circulation and new entrance plaza area. The children's playground will be updated, enlarged, and designed for all ages and abilities. The tennis court area will be updated to include basketball courts, tennis courts, a community garden, and a custom skate park. The existing restroom building will be updated, and the existing walking paths will be widened and resurfaced.

The purpose of this project is to provide improved park facilities. This Notice of Intent (NOI) is being filed because work is proposed within the 200-ft Riverfront Area (RFA). An Order of Conditions (DEP File No. 321-0169) was issued on July 17, 2019, for Phase A of the park improvements which included the following park improvements: terraced lawn area "the knoll", a stone dust Bosque with picnic area and overhead pavilion, terraced multi-use lawn areas, entrance arch from Arsenal Yards, walking paths with bollard lighting and rain gardens. Phase A is currently under construction.

On January 6, 2021, CDM Smith provided an informational presentation to the Commission. Three alternatives for the entrance area were reviewed and one selected by the Commission for advancement. In addition, commission members provided recommendations related to plant material selection including addition of more pollinator species. It was requested assurance that community garden would include accessible beds and that the skatepark would be suitable for all ages. All comments have been addressed or will be included in the final bid documents. CDM Smith will be available for an additional information meeting as requested by the Commission prior bidding the project.

Phase B (the subject of this NOI) bid documents are anticipated to be available in February 2022 with construction to commencing in April of 2022. We anticipate a construction period of 6 months with construction completion in November 2022.

The following sections address the existing on-site wetland conditions, work proposed in and adjacent to resource areas, construction period Best Management Practices, and compliance with performance standards.

2.0 Existing Conditions

The Arsenal Park is located at 551 Rear Arsenal Street in Watertown, Massachusetts, see Figure 1 – Project Location Map.

Arsenal Park is bounded by Talcott Avenue to the west; Greenough Boulevard to the south and east; and Arsenal Yards and an office park to the north. Within the Phase B area, the existing Park includes the entrance driveway and parking lot, playing fields, tennis courts, a children's playground, community gardens, an amphitheater and walking paths. The Park is mostly open space (grass and impervious surfaces) with a densely wooded area along Greenough Boulevard. The topography slopes down towards Greenough Boulevard. Just south of Greenough Boulevard is the Charles River.

2.1 Wetland Resources

Inland Bank (Bank) is defined as:

"a Bank is the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a vegetated bordering wetland and adjacent floodplain, or, in the absence of these, it occurs between a water body and an upland."

The upper boundary of a Bank is the first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of a Bank is the mean annual low flow level." 310 CMR 10.54 (2)

Inland Bank is present along the Charles River. A concrete wall and flagged mean annual flood level (flags B1-80 to B1-100) was used to demarcate the top of inland bank.

Riverfront Area (RFA) is defined as:

"the area of land between a river's mean annual high-water line and a parallel line measured horizontally ... outward from the river and a parallel line located 200 feet away ... In tidal rivers, the mean annual high-water line is coincident with the mean high-water line determined under 310 CMR 10.23." [310 CMR 10.58 (2)]

RFA is associated with the Charles River. RFA is shown in green on the project plans. RFA is presumed significant to all eight interests of the Act.

3.0 Work Proposed within 200-ft Riverfront Area

This project will enhance and update both the active athletic and passive recreational facilities available to the public at the Arsenal Park.

3.1 Work within the 200-foot Riverfront Area

Approximately 137,889 square feet of RFA is present on the Arsenal Park parcel of land identified as Map/Lot 1301 2A 0. Work within RFA for the Phase B Park improvements will be associated with site grading and construction of the southern portions of the park features listed in Section 1.0 (see Figure 3) and project plans in Attachment D.

3.2 Long-Term Maintenance

Construction will occur within the footprint of the existing park. Currently Watertown Parks and Recreation Department maintains the park by mowing and pruning vegetation to prevent tree and shrub branches from hanging over the fence into the facility, a practice which will continue.

The new tennis, basketball courts will be regularly maintained. The paths will be regularly blown off with leaf blowers as necessary to maintain a safe and clean surface.

4.0 Mitigation Measures

Proposed Park B improvements will result in alteration to the RFA. The following sections outline the measures to mitigate construction period and long-term impacts. The construction period measures will be incorporated into construction specifications to prevent impacts to downstream wetland resource areas.

4.1 Construction Period

Sedimentation / Erosion Control

Controlling erosion and transport of sediment to downgradient wetland resources requires development of site-specific uses of best management practices (BMPs), both structural controls as well as proper management of construction activities.

- A stabilized construction site entrance will be installed to limit tracking of sediment onto public paved streets from construction vehicles exiting the site. The stabilized construction entrance will consist of a minimum of 6 inches of crushed stone placed on a geotextile fabric.
- Additional BMPs that will be utilized to control the transport of sediment from the work site include: street sweeping of paved areas and roadways, and deployment of sediment control barriers around soil stockpiles.
- Periodic inspections will be made by the applicant to ensure compliance with the permit conditions.
- Work will proceed as rapidly as possible, limiting the exposure time of disturbed soils to wind and precipitation.

A more detailed description of the sedimentation and erosion control plan will be developed for the NPDES Storm Water Pollution Control Plan, which will be developed by the contractor pursuant to the NPDES General Permit for Construction Activities.

Spill Control Measures

- An equipment storage and refueling area will be established on the site in an area outside of the 100-foot Buffer Zone. All overnight storage of construction equipment and vehicles, refueling and light maintenance activities will occur in this area. A construction fence will be installed along the downgradient limit of this area to identify its limit.
- Spill containment equipment (e.g. oil absorbent pads, oil absorbent materials, containment booms, shovels, etc.) will be stored in the equipment storage and refueling area in an easily accessible manner for use in the clean-up of accidental releases of fuel or other hazardous materials. Should there be an accidental release the proper authorities will be notified in accordance with all applicable federal, state, and local laws.

- To minimize the possibility of leakage of hydraulic fluid, all hydraulic lines on all construction equipment and vehicles will be inspected at the end of each workday. If any excessive wear or leakage is observed, the line will be repaired prior to further use. In addition, a supply of oil absorbent materials (i.e. pads, "speedy dry," and/or booms) will be maintained with the equipment at the work area for immediate deployment in the event of an accidental release of fuel, hydraulic fluid, oil, etc.
- Any oil, hydraulic fluid, or other hazardous materials will be stored in original containers; fuels will be stored in tightly sealed containers which are clearly marked; and all such materials will be stored under a roof or in a covered enclosure.

4.2 Stormwater Design

Please refer to Attachment C for a complete stormwater analysis including a discussion how the project meets the Massachusetts Stormwater Management Standards, complies with the additional Low Impact Design (LID) and phosphorous removal requirements under the MS4 permit, and the Charles River Total Maximum Daily Loads (TMDL) for phosphorus.

5.0 Compliance with the Performance Standards

Work proposed herein and shown on the attached project plans (see Attachment D) was designed to comply with the Massachusetts Wetlands Protection Act (MWPA) and the Massachusetts Wetland Protection Regulations (Regulations) [310 CMR 10.00 et seq.] and the Watertown Wetlands Ordinance (2008) and the Rules and Regulations for the Administration of the Watertown Wetlands Ordinance, Adopted October 2010 (Rules and Regulations). Work is proposed within RFA.

5.1 MWPA and Regulations

The park improvements qualify as a redevelopment project under 310 CMR 10.00 within a previously developed riverfront area. Redevelopment of previously developed RFA can be approved by the Conservation Commission provided it improves existing conditions. The proposed subsurface storage system and rain gardens will provide greater than the total required recharge volume and water quality volume of 7,090 cubic feet of infiltration capacity (refer to Table 4 in Attachment C)

Since this project qualifies as a redevelopment project, the provisions of 310 CMR 10.58 (5) applies and work to redevelop previously developed riverfront areas conforms to the following criteria:

- At a minimum, proposed work shall result in an improvement over existing conditions of the capacity of the riverfront area to protect the interests identified in M.G.L. c. 131 par. 40. When a lot is previously developed but no portion of the riverfront area is degraded, the requirements of 310 CMR 10.58(4) shall be met.*

Overall, the impervious area within the proposed park will remain nearly the same. Under current conditions, 27.26% of the park is impervious. The planned park improvements will slightly increase the amount of impervious area on the parcel by

1,350 square feet resulting in 27.49% of impervious area within the park. RFA on site is likely to provide flood control, prevention of pollution and storm damage.

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

For a discussion how the proposed project complies with the Massachusetts Department of Environmental Protection's Stormwater Management Standards, please refer to Attachment C - Stormwater Report.

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

No work is proposed within 100 feet of Charles River.

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

All park improvements are located in the 100-200 foot RFA.

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

Total impervious area within the RFA under existing conditions is approximately 7,065 square feet. New improved park features will result in a net increase of 2,706 square feet of impervious area (3,739 sf of new impervious area and 1,033 sf of impervious area removed) compared to existing conditions, resulting in approximately 9,770 square feet of total impervious area within the RFA.

Phase B Park improvements will result in a slight increase of total degraded area (i.e., impervious area) within the RFA from 5.01% to 7.08% but remain below 10% of RFA within the 13.7-acre parcel.

- f) When an applicant proposes restoration on-site of degraded riverfront area, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), and (e) at a ratio in square feet of at least 1:1 of restored area to area of alteration not conforming to the criteria.*

The proposed work in the RFA is in compliance with 310 CMR 10.58(5)(c), (d), and (e). Existing and proposed new impervious area within RFA will remain below 10% of the total RFA within the 13.7-acre parcel.

- g) When the applicant proposes mitigation on-site or in the riverfront area within the same general area of the river basin, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), or (e) at a ratio in square feet of at least 2:1 of mitigation area to area of alteration not conforming to the criteria or an equivalent level of environmental protection where square footage is not a relevant measure.*

No mitigation is proposed since Existing and proposed new impervious area within RFA will remain below 10% of the total RFA within the 13.7-acre parcel.

5.2 Watertown Wetlands Ordinance

The following describes how the proposed work complies with the performance standards of the Watertown Wetlands Ordinance and Rules and Regulations.

- a) There is no practicable alternative to the proposed project with less adverse effect, and such activities, including proposed mitigation measures, will have no significant adverse impact on the areas or interests protected by this Ordinance.*

Phase B Park improvements will result in 7.08% of total impervious area within the RFA, and therefore remain below the 10% of allowable alteration within the RFA.

- (b) The Commission shall regard as practicable an alternative which is reasonably available and capable of being done after taking into consideration the proposed property use, overall project purpose (e.g., residential, institutional, commercial, or industrial), logistics, existing technology, costs of the alternatives, and overall project costs.*

See above.

- (c) The Commission will apply the methods and criteria for alternatives analyses specified in the Massachusetts Wetlands Protection Act regulations at 310 CMR 10.58 (4) (c).*

See above.

- (d) The work must have no significant adverse impact on the capacity of the Riverfront Area to protect the interests protected by the Ordinance.*

The proposed park improvements are not anticipated to result in adverse impacts to the interests of the Ordinance.

6.0 Summary

The proposed Arsenal Park Phase B improvements will provide improved recreational facilities including areas for passive recreation, and improved parking and traffic circulation. It will also improve stormwater recharge and water quality by providing pretreatment and installation of a subsurface storage system and rain gardens.

Attachment B

Abutter Notification

NOTIFICATION TO ABUTTERS UNDER THE
MASSACHUSETTS WETLANDS PROTECTION ACT AND WATERTOWN WETLANDS
ORDINANCE (2008) AND THE RULES AND REGULATIONS FOR THE ADMINISTRATION
OF THE WATERTOWN WETLANDS ORDINANCE, ADOPTED OCTOBER 2010

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and Watertown Wetlands Ordinance (2008), you are hereby notified of the following:

- A. The name of the applicant is **Watertown Community Development and Planning**.
- B. The applicant has filed a Notice of Intent with the **Watertown Conservation Commission** seeking permission to remove, fill, dredge or alter an Area Subject to Protection Under the Wetlands Protection Act (MGL Chp. 131, Sec. 40) and the Franklin Wetland By-Law, Chapter 181.
- C. The address of the lot where the activity is proposed is **551 Rear Arsenal Street**.
- D. The Notice of Intent may be examined at the **Watertown Conservation Commission** Office at the Town Hall, Third Floor, 149 Main Street, Watertown, Massachusetts, between the hours of 8.30AM and 5PM, Monday through Friday.
- E. Copies of the Notice of Intent may be obtained from **CDM Smith, Inc. 75 State Street, Suite 701, Boston, MA 02109. Attn: Magdalena Lofstedt** or by calling **(617) 452-6597** between **9 AM** and **5 PM** Monday through Friday.
- F. Please call the **Watertown Conservation Commission at (617) 972-6426**. We understand the public hearing will be virtual via zoom and held on Wednesday, **November 23, 2021, at 7:00 PM**.

NOTE: Notice of Public Hearing, including its date, time and place will also be published at least five (5) days in advance in **Watertown Tab**. You may also contact your local Conservation Commission or the nearest Department of Environmental Protection Regional Office for more information about this application or the Wetlands Protection Act. To contact the Department of Environmental Protection, call the Northeast **Regional Office in Wilmington at (978) 694-3200**.

* This abutter notification is for Phase B of field and recreational improvements to Arsenal Park. Limited work will take place within Riverfront Area.

Parcel ID: 1301 2A 0
WATERTOWN, TOWN OF PARK
149 MAIN ST
WATERTOWN, MA 02472

Parcel ID: 1301 1 1
ARE-MA REGION NO. 75 LLC
C/O ALEXANDRIA REAL
PO BOX 847
CARLSBAD, CA 92018

Parcel ID: 1301 1 1A
TOWN OF WATERTOWN
149 MAIN ST
WATERTOWN, MA 02472

Parcel ID: 1301 1 2
WATERTOWN, TOWN OF
149 MAIN ST
WATERTOWN, MA 02472

Parcel ID: 1301 2 1
WATERTOWN HOME IMPROV
C/O HOME DEPOT USA INC
PROP TAX DEPT #2602
P O BOX 105842
ATLANTA, GA 30348

Parcel ID: 1301 2 1A
ARSENAL YARDS HOLDING
800 BOYLSTON ST SUITE 1390
BOSTON, MA 02199

Parcel ID: 1301 2A 1
BP WATERTOWN RETAIL LLC
800 BOYLSTON ST - SUITE 1390
BOSTON, MA 02199

Parcel ID: 1301 2B 1
ARSENAL ASSOCIATES
C/O RED MORTGAGE CAPITAL
LOAN SERVICING & ASSET MGMT
1717 MAIN ST STE 900
DALLAS, TX 75201

Parcel ID: 1301 2D 2
ARSENAL YARDS HOLDING
800 BOYLSTON ST, STE 1390
BOSTON, MA 02199

Parcel ID: 1301 2D 2A
ARSENAL YARDS HOLDING
800 BOYLSTON ST STE 1390
BOSTON, MA 02199

Parcel ID: 1301 2D 2B
ARSENAL YARDS HOLDING
800 BOYLSTON ST STE 1390
BOSTON, MA 02199

Parcel ID: 1301 2D 2C
ARSENAL YARDS HOLDING
800 BOYLSTON ST STE 1390
BOSTON, MA 02199

Parcel ID: 1301 2D 2D
ARSENAL YARDS HOLDING
800 BOYLSTON ST STE 1390
BOSTON, MA 02199

Parcel ID: 1301 2E 1
NGUYEN BICH N
471A ARSENAL ST U1
WATERTOWN, MA 02472

Parcel ID: 1301 2E 10
FROUNJIAN SAHAG G
471J ARSENAL ST
WATERTOWN, MA 02472

Parcel ID: 1301 2E 11
EFE VOLKAN
EFE AYSE NUR SAHIN
6 GALE RD
BELMON, MA -

Parcel ID: 1301 2E 12
HA MINH T
471L ARSENAL ST U12
WATERTOWN, MA 02472

Parcel ID: 1301 2E 13
ZAHN RONALD D
ZAHN PAMELA E
471M ARSENAL ST U13
WATERTOWN, MA 02472

Parcel ID: 1301 2E 14
ANDROSSOVA MARINA
471 N ARSENAL ST U14
WATERTOWN, MA 02472

Parcel ID: 1301 2E 15
DRONAVADHYALA SRINATH V
VUPPALA SAMANTHA RAO
475N ARSENAL ST U15
WATERTOWN, MA 02472

Parcel ID: 1301 2E 16
KRASNOVSKY ELENA
510 GILBERT AVENUE
MENLO PARK, CA 94025

Parcel ID: 1301 2E 17
DIDDEN WILLIAM
DIDDEN BARBARA G
125 REGATTA ST
MELBOURNE, FL 32951

Parcel ID: 1301 2E 18
CALEGAR MARCUS
OSSA CAMILA
475K ARSENAL ST U18
WATERTOWN, MA 02472

Parcel ID: 1301 2E 19
ISENBERG DANIEL J
34 HILTON AV
WOODS HOLE, MA 02543

Parcel ID: 1301 2E 2
KREY ANDREW
471B ARSENAL ST U2
WATERTOWN, MA 02472

Parcel ID: 1301 2E 20
HASHAM ANDRE TRUSTEE
LO CHRISTINE TRUSTEE
HASHAM & LO REVOCABLE TRUSTS
15 WAVERLY ST #260
BRIGHTON, MA 02135

Parcel ID: 1301 2E 21
SHARRINO CAROLYN L.
31 RUTLEDGE ROAD
BELMONT, MA 02178

Parcel ID: 1301 2E 22
WHOLEY JAMES P
475G ARSENAL ST U22
WATERTOWN, MA 02472

Parcel ID: 1301 2E 23
MARTIN GEOFFREY P.
MARTIN KATHERINE L.
475F ARSENAL ST U23
WATERTOWN, MA 02472

Parcel ID: 1301 2E 24
PARDEE THOMAS
CHUANG YA-WEN
1105 MASSACHUSETTS AVE, UNIT 7E
CAMBRIDGE, MA 02138

Parcel ID: 1301 2E 25
ENG THOMAS
475D ARSENAL ST U25
WATERTOWN, MA 02472

Parcel ID: 1301 2E 26
GAIERO LAURA M
475C ARSENAL ST U26
WATERTOWN, MA 02472

Parcel ID: 1301 2E 27
WHITNEY III PAYSON R
WHITNEY ELIZABETH ANN
475B ARSENAL ST U27
WATERTOWN, MA 02472

Parcel ID: 1301 2E 28
MARULLO WALTER J
475A ARSENAL ST U28
WATERTOWN, MA 02472

Parcel ID: 1301 2E 29
GORDON JUDITH E
473A ARSENAL ST U29
WATERTOWN, MA 02472

Parcel ID: 1301 2E 3
LIHI TECHNOLOGIES LLC
34 HILTON AVE
WOODS HOLE, MA 02543

Parcel ID: 1301 2E 30
McAULIFFE THOMAS J
473B ARSENAL COURT
WATERTOWN, MA 02472

Parcel ID: 1301 2E 31
BASSETT ALLISON M
473 ARSENAL ST UC-31
WATERTOWN, MA 02472

Parcel ID: 1301 2E 32
ADAMS SAMANTHA R.
CORY CHRISTOPHER D.
473 ARSENAL ST APT D-32
WATERTOWN, MA 02472

Parcel ID: 1301 2E 33
LEVIN CARLA & THEODORE
U33-473E ARSENAL ST
C/O JIM LEVIN
473E ARSENAL ST U33
WATERTOWN, MA 02472

Parcel ID: 1301 2E 34
WALTER EUGENE R.
473F ARSENAL ST U34
WATERTOWN, MA 02472

Parcel ID: 1301 2E 35
ARNESON VALERIE G TRUSTEE
VALERIE ARNESON REV
473G ARSENAL ST U35
WATERTOWN, MA 02472

Parcel ID: 1301 2E 36
GORMAN THOMAS
473 H ARSENAL ST U36
WATERTOWN, MA 02472

Parcel ID: 1301 2E 4
TOTH JAMES F
DANIELSON VIRGINIA L.
471 ARSENAL ST D #4
WATERTOWN, MA 02472

Parcel ID: 1301 2E 5
DRONAVADHYALA SPINATH V.
VUPPALA SAMANTHA RAO
471E ARSENAL ST U5
WATERTOWN, MA 02472

Parcel ID: 1301 2E 6
KRIKORIAN SUSAN A.
471F ARSENAL ST U6
WATERTOWN, MA 02472

Parcel ID: 1301 2E 7
MEOLA ANDREA
C/O ANDREA LOGUIDICE
16 SUDBURY ROAD
ASHLAND, MA 01721

Parcel ID: 1301 2E 8
LUKESH SHEILA JEAN
LUKESH WILLIAM N
471H ARSENAL ST U8
WATERTOWN, MA 02472

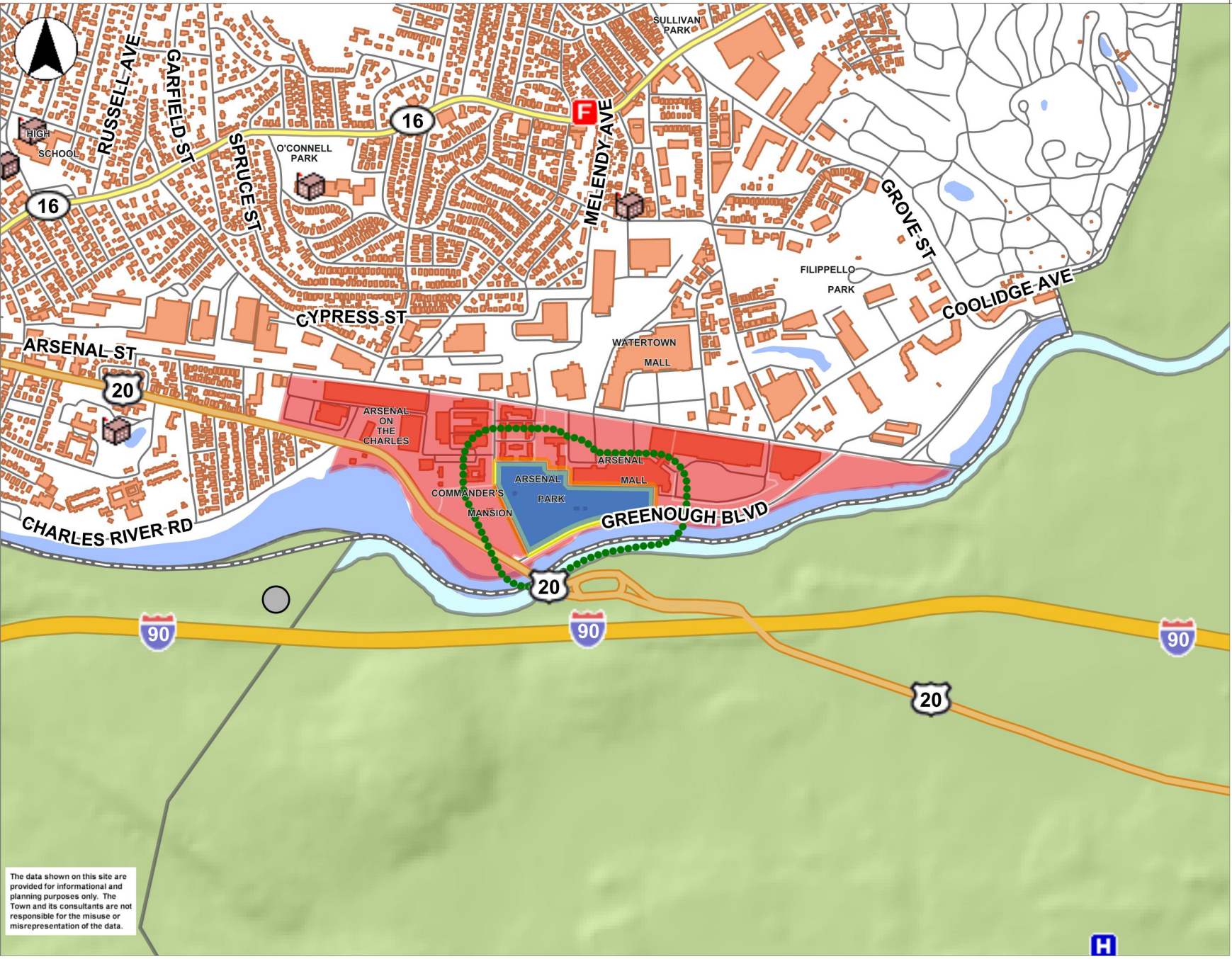
Parcel ID: 1301 2E 9
STEINBERG LINDA J
471I ARSENAL ST U9
WATERTOWN, MA 02472

Parcel ID: 1401 11 0
COMMONWEALTH OF MASS
DEPT OF CONSER. &
251 CAUSEWAY ST. STE 600
BOSTON, MA 02114

Parcel ID: 1401 17 0
COMMONWEALTH OF
DEPT OF CONSER. &
251 CAUSEWAY ST. STE 600
BOSTON, MA 02114



- Fire Stations
- Police Stations
- Schools
- Public Libraries
- Hospitals
- Community Health Centers
- Ice Rinks
- Buildings
- Hooks
- Parcels
- Town Boundary
- MA Highways
 - Interstate
 - US Highway
 - Numbered Routes
- Abutting Town Labels
- Abutting Towns
- Bathymetry
 - 0-5 ft
 - 5-10 ft
 - 10-15 ft
 - 15-20 ft
 - 20-30 ft
 - 30-40 ft
 - 40-50 ft
 - 50-60 ft
 - 60-70 ft
 - 70+ ft
- Streets



The data shown on this site are provided for informational and planning purposes only. The Town and its consultants are not responsible for the misuse or misrepresentation of the data.

0 1600 3200 ft

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Attachment C

Stormwater Report

Arsenal Park Phase B Stormwater Management Report

1.0 Introduction

This report addresses stormwater management associated with the Town of Watertown's Phase B improvements to Arsenal Park (Park). Stormwater management for Arsenal Park improvements has been designed to be consistent *Massachusetts Stormwater Handbook* and with Watertown's *Rules and Regulations for Stormwater Management and Erosion Control*.

2.0 Existing Conditions

Arsenal Park is bounded by Talcott Avenue to the west; Greenough Boulevard to the south and east; and Arsenal Yards and an office park to the north. Within the Phase B area, the Park includes the entrance driveway and parking lot, playing fields, tennis courts, a children's playground, community gardens, an amphitheater and walking paths. The Park is mostly open space (grass and impervious surfaces) with a densely wooded area along Greenough Boulevard. The topography slopes down towards Greenough Boulevard. Just south of Greenough Boulevard is the Charles River. Existing drainage systems within the Phase B area ultimately discharge to the Charles River. Figure 1 shows the existing drainage area map. The total modelled drainage area is approximately 13.0 ac, with approximately 3.6 ac of impervious area.

3.0 Proposed Conditions

Proposed improvements to the Park under Phase B generally maintain the existing layout and uses of the Park. The entrance driveway and parking lot will be reconfigured to provide improved circulation. The children's playground will be updated and enlarged. The tennis court area will be updated to include basketball courts, tennis courts, a custom skate park, and a new community garden. The existing restroom building will be updated. The existing walking paths will be widened and resurfaced. The overall drainage pattern at the Park will remain unchanged. The total proposed impervious area is 3.6 ac, an increase of 0.1 ac (1,400 sf). Figure 2 shows the proposed drainage area map.

This project is considered a new development project per the *Massachusetts Stormwater Handbook* because there will be an increase in impervious area. Stormwater runoff from the entrance driveway, parking lot and children's playground will be directed to a subsurface detention system that will provide peak attenuation, water quality treatment and groundwater recharge. In the tennis and basketball court area, some of the stormwater runoff will be directed to rain gardens for water quality treatment and groundwater recharge, while other stormwater runoff will be directed to a proprietary separator device for water quality treatment. The *Massachusetts Stormwater Handbook* states that the Stormwater Management Standards for walking paths need to be met only the maximum extent practicable, including water quality treatment.

In addition, Minimum Control Measure #5, "Stormwater Management in New Development and Redevelopment", in the NPDES Phase II MS4 General Permit (MS4 Permit) requires compliance with the MA Stormwater Management Standards for projects that result in total earth disturbance equal to or greater than 1 acre, which applies to this project. Based on the MS4 permit, this project is

considered a redevelopment project because it will be constructed on land that previously has been developed to include impervious cover. As a project subject to the requirements of the MS4 permit, the project must implement LID site planning and design strategies and meet the requirements of the *Massachusetts Stormwater Handbook*. The project must also be designed to meet an average annual pollutant removal of 50 percent of the average annual load of total phosphorus related to the total post-construction impervious surface area, in addition to the 80% total suspended solids required in the *Massachusetts Stormwater Handbook*, according to the MS4 permit. Since the Charles River is subject to a TMDL for phosphorus, Watertown is required to provide a 52 percent reduction in post-construction phosphorus in order to meet the TMDL. Thus, meeting this TMDL requirement will also meet the MS4 requirement.

4.0 Drainage Analysis

CDM Smith performed drainage analyses for the Arsenal Park under existing and proposed conditions. The drainage analyses determined peak rates of runoff during 2-, 10-, 25-, and 100-year, 24-hour storm events using HydroCAD, version 10.0. This computer model simulates stormwater runoff flows through drainage areas and stormwater management facilities, and is based on the Natural Resources Soil Conservation Service (NRCS) Method.

Following is a summary of the methodology used to perform the drainage analyses.

- Precipitation data for standard storms used in the models were taken from NOAA Atlas 14, Volume 10. The estimated precipitation depths during the 2-, 10-, 25-, and 100-year 24-hour storms are 3.25, 5.13, 6.31, and 8.12 inches, respectively (see Appendix A).
- The NRCS Web Soil Survey was consulted to determine the hydrologic soil groups (HSG) at the project site. The NRCS has classified most of the soils as “Urban Land,” with areas along Greenough Boulevard classified as “Udorthents.” CDM Smith conservatively assigns Urban Land and Udorthents to HSG “C”. On December 18, 2020, CDM Smith advanced three borings at the site, one of which at the location of the proposed subsurface detention system. The soils were found to be sandy with silt and gravel. Boring CDM-IT-1 is located at the location of the proposed subsurface infiltration system and samples were analyzed for the USDA soil texture classification. Samples S-3 and S-7 were classified as “loamy sand” and “sand,” respectively. Using Table 2.3.3 in Volume 3, Chapter 1 of *Massachusetts Stormwater Handbook*, “loamy sand” and “sand” have infiltration rates of 8.27 and 2.41 inches/hour, respectively. The more conservative rate of 2.41 inches/hour was used for the groundwater recharge calculations. For determining peak rates of runoff at the site, HSG “C” soils were assumed throughout the site. Geotechnical data are provided in Appendix B.
- Under existing conditions, four design points were identified. Stormwater runoff from the northern edge of the Park sheet flows towards an existing office park. Stormwater runoff from the northeastern section of the tennis courts discharges to an existing drainage system that ties into the Arsenal Park Phase A drainage system. Near the children’s playground stormwater runoff sheet flows to an on-site low point, while the rest of the Park ultimately drains to the Charles River. Under proposed conditions there will be three design points. Stormwater runoff from the northern edge of the Park will continue to sheet flow towards the existing office park since most of this area will not undergo improvements. Similarly, stormwater runoff from the

northern half of the skate park and community gardens (currently tennis courts) will ultimately drain to Arsenal Park Phase A. The on-site low point will be eliminated and stormwater runoff from that area will drain to the Charles River, like the rest of the site.

- Curve Numbers (CNs) for the different land uses on the site were selected based on HSG “C” soils for existing and proposed conditions. Land uses included grass cover, woods, buildings, rubber playing surface, and paved areas. Weighted CNs were calculated in HydroCAD.
- Times of concentration (Tc) were calculated in HydroCAD and were based on the Velocity Method in the NRCS National Engineering Handbook (May 2010). A minimum Tc of 6 minutes was used for all drainage areas.

HydroCAD was used to generate peak rates of runoff and runoff volumes for existing and proposed conditions. For conservatism, infiltration was not included in the modeling for peak attenuation to demonstrate that the subsurface storage system will continue to provide peak attenuation even if the underlying soils become clogged. Table 1 provides a summary of modeling results for existing and proposed conditions at the three design points. Table 2 combines the modeling results from the On-Site Low Point and Charles River design points. As Table 2 shows, peak rates of runoff and runoff volumes for proposed conditions are equal to or less than those for existing conditions during all modeled storm events at the Charles River design point. At the Office Park design point, peak rates of runoff for proposed conditions are equal to existing conditions for all storm events. Similarly, proposed runoff volumes are equal to existing conditions, except for the 10- and 100-year storm events where there is a very minor increase in runoff volume. This is due to a small increase in the tributary area that occurs as part of the regrading of the site. However, as Table 3 shows, for the site overall, peak rates of runoff and runoff volumes for proposed conditions are equal to or less than those for existing conditions during all modeled storm events. The HydroCAD modeling input and output can be found in Appendix C.

Table 1
Arsenal Park Improvements – Phase B, Watertown, Massachusetts
HydroCAD Modeling Results

Storm Event	Existing Conditions		Proposed Conditions	
	Peak Rate of Runoff (cfs)	Runoff Volume (ac-ft)	Peak Rate of Runoff (cfs)	Runoff Volume (ac-ft)
DP: Office Park				
2-Year, 24-Hour	0.4	0.03	0.4	0.03
10-Year, 24-Hour	0.9	0.06	0.9	0.07
25-Year, 24-Hour	1.3	0.09	1.3	0.09
100-Year, 24-Hour	1.9	0.13	1.9	0.14
DP: On-Site Low Point				
2-Year, 24-Hour	0.2	0.01	0.0	0.00
10-Year, 24-Hour	0.5	0.03	0.0	0.00
25-Year, 24-Hour	0.6	0.04	0.0	0.00
100-Year, 24-Hour	0.9	0.06	0.0	0.00
DP: Arsenal Park Phase A				
2-Year, 24-Hour	0.8	0.06	0.8	0.05
10-Year, 24-Hour	1.4	0.11	1.3	0.10
25-Year, 24-Hour	1.7	0.14	1.5	0.14
100-Year, 24-Hour	2.3	0.18	1.8	0.18
DP: Charles River				
2-Year, 24-Hour	17.9	1.46	14.8	1.30
10-Year, 24-Hour	37.6	3.02	35.2	2.87
25-Year, 24-Hour	50.7	4.08	47.1	3.94
100-Year, 24-Hour	71.1	5.76	64.9	5.64

Table 2
Arsenal Park Improvements – Phase B, Watertown, Massachusetts
Summary HydroCAD Modeling Results

Storm Event	Existing Conditions		Proposed Conditions	
	Peak Rate of Runoff (cfs)	Runoff Volume (ac-ft)	Peak Rate of Runoff (cfs)	Runoff Volume (ac-ft)
DP: Office Park				
2-Year, 24-Hour	0.4	0.03	0.4	0.03
10-Year, 24-Hour	0.9	0.06	0.9	0.07
25-Year, 24-Hour	1.3	0.09	1.3	0.09
100-Year, 24-Hour	1.86	0.13	1.9	0.14
DP: Arsenal Park Phase A				
2-Year, 24-Hour	0.8	0.06	0.8	0.05
10-Year, 24-Hour	1.4	0.11	1.3	0.10
25-Year, 24-Hour	1.7	0.14	1.5	0.14
100-Year, 24-Hour	2.3	0.18	1.8	0.18
DP: Charles River				
2-Year, 24-Hour	18.1	1.47	14.8	1.30
10-Year, 24-Hour	38.1	3.05	35.2	2.87
25-Year, 24-Hour	51.3	4.12	47.1	3.94
100-Year, 24-Hour	72.0	5.82	64.9	5.64

Table 3
Arsenal Park Improvements – Phase B, Watertown, Massachusetts
Summary HydroCAD Modeling Results – Entire Site

Storm Event	Existing Conditions		Proposed Conditions	
	Peak Rate of Runoff (cfs)	Runoff Volume (ac-ft)	Peak Rate of Runoff (cfs)	Runoff Volume (ac-ft)
2-Year, 24-Hour	19.3	1.56	16.0	1.38
10-Year, 24-Hour	40.4	3.22	37.4	3.04
25-Year, 24-Hour	54.3	4.35	49.9	4.17
100-Year, 24-Hour	76.2	6.13	68.6	5.96

The site was also analyzed for compliance with the recharge (Rv) and water quality volume (WQv) requirements in the *Massachusetts Stormwater Handbook*. Since all the soils in the impervious areas are located on HSG “C” soils, the target depth factor for recharge is 0.25 inches, with a total corresponding Rv of 3,250 cf. All required groundwater recharge for the Park is provided at the subsurface storage system and in the rain gardens.

The required water quality volume is 0.5 inch times the total impervious area at the site, with a total corresponding WQv of 6,510 cf. Table 4 summarizes the impervious area, the calculated required recharge and water quality volumes, along with the total storage volume provided in each stormwater management facility. The total impervious area in this table does not include the walking paths and

the southern half of the basketball courts because these areas are not tributary to the stormwater management facilities. As shown in this table, the subsurface storage system and rain gardens provide the total required recharge volume and water quality volume for the entire site.

Table 4
Summary of Overall Impervious Area, Rv and WQv
Arsenal Park Improvements – Phase B

<i>Stormwater Management Facility</i>	<i>Impervious Area (sf)</i>	<i>Recharge Volume (cf)</i>	<i>Water Quality Volume (cf)</i>	<i>Volume Provided (cf)</i>
Subsurface Storage System	39,470	820	1,650	3,530
Rain Garden #1	10,630	220	440	490
Rain Garden #2	13,030	270	540	840
Rain Garden #3	12,350	260	520	850
Rain Garden #4	23,100	480	960	1,380
Total	98,600	2,050	4,110	7,090

The drawdown times of the water in the subsurface storage system and rain gardens were calculated using the total storage volume provided below the outlet and the total bottom surface area of the stormwater management facility. The drawdown calculations indicate that stormwater will infiltrate within the required 72 hours, based on an infiltration rate of 2.41 inches/hr at the subsurface storage system (based on the soil testing) and an assumed rate of 0.27 inches/hr at the rain gardens (HSG “C” soils). Appendix D provides the recharge volume and water quality volume calculations.

Stormwater management systems must be designed to remove 80 percent of the average annual load (post-construction conditions) of Total Suspended Solids (TSS). Stormwater runoff from the entrance driveway, parking area and children’s playground will receive pretreatment in deep-sump hooded catch basins and in a proprietary separator device prior to discharge to the subsurface detention system. The tennis courts, basketball courts, skate park and walking paths throughout the Park are considered clean and do need pretreatment. Stormwater runoff from the northern half of the tennis and basketball courts and skate park will discharge to rain gardens. Similarly, stormwater runoff from the southern half of the tennis courts and skate park will also discharge to rain gardens. Stormwater runoff from the southern half of the basketball courts will be collected in deep-sump hooded catch basins that will flow through a proprietary separator device prior to discharge to the main drain line on the Park. For the walking paths, it is not practicable to provide measures that remove TSS; however, stormwater runoff from the walking paths will sheet flow through the playing fields and woods and will receive some treatment via overland flow. For the southern half of the basketball courts, the overall TSS removal is 62.5 percent, assuming that the propriety separator device is a Contech CDS unit, which only has a 50 percent TSS removal rate (based on the approval rating by NJDEP). The TSS worksheets are provided in Appendix E.

5.0 Compliance with Phosphorus Removal Requirements

The Charles River is subject to a TMDL for phosphorus; thus, Watertown is required to provide a 52 percent reduction in post-construction phosphorus in order to meet the TMDL. The phosphorus removal calculations are provided in Appendix F. As shown in this appendix, the phosphorus removal

requirement for the entire site is not met. Using the four rain gardens and the subsurface storage system the reduction for the entire site is 47 percent, not the required 52 percent. The Park is 13.0 acres, and only 4.3 acres will be treated for phosphorus removal. Most of the site is comprised of playing fields and wooded area that will have no treatment, and whose land use will remain unchanged from existing to proposed conditions and will continue to release phosphorus as it currently does today. A second phosphorus removal calculation was performed looking only at the areas that will receive treatment. Within those areas, the phosphorus reduction is 92 percent, compared to existing conditions, which is in excess of the required 52 percent reduction. Thus, in areas that have the highest estimated annual total phosphorus loading (primarily impervious areas), the phosphorus mitigation requirement is met. Therefore, this project is meeting the phosphorus removal requirement for the Charles River TMDL within the area of the Park that is undergoing redevelopment and is also meeting the phosphorus removal requirement in the MS4 permit for Minimum Control Measure #5 in that same area.

6.0 Compliance with Stormwater Standards

This project is a new development project and it must fully meet the Massachusetts Stormwater Management Standards. However, the walking paths throughout the Park are only required to meet the standards to the maximum extent practicable. The following summary below describes compliance with each of the stormwater standards. The Stormwater Checklist is provided at the end of this section.

6.1 Stormwater Standard No. 1 – No New Untreated Discharges

The proposed project fully meets the requirement of Stormwater Standard No. 1, as there are no new untreated discharges. Stormwater runoff from the entrance driveway, parking lot, and children's playground receives treatment through deep-sump hooded catch basins, a proprietary separator device and a subsurface detention system. The sport courts/skate park area receives treatment through rain gardens, deep-sump hooded catch basins and a proprietary separator device. Stormwater runoff from the walking paths will sheet flow over the fields prior to discharge to the Charles River and will receive some treatment via overland flow.

6.2 Stormwater Standard No. 2 – Peak Rate Attenuation

As shown in Table 1, peak rates of runoff and runoff volumes for proposed conditions are equal to or less than those for existing conditions during all storm events. Therefore, this standard is met.

6.3 Stormwater Standard No. 3- Recharge

Recharge to groundwater for the new impervious is fully met through the subsurface storage system and rain gardens. Since all the soils in the impervious areas are located on HSG "C" soils, the target depth factor for recharge is 0.25 inches. Calculations demonstrate that the subsurface storage system and rain gardens will drain within 72 hours.

6.4 Stormwater Standard No. 4 – Water Quality

The required water quality volume is based 0.5 inches times the total impervious area. This standard is fully met for areas tributary to the subsurface detention system and the rain gardens. This standard is partially met for the walking paths and the southern half of the basketball courts. Stormwater runoff from the walking paths will sheet flow over the fields prior to discharge to the Charles River and

will receive some treatment via overland flow. Stormwater runoff from the southern half of the basketball courts is estimated to received 62.5 percent TSS removal versus the required 80 percent.

6.5 Stormwater Standard No. 5 – Land Uses With Higher Potential Pollutant Loads

This standard is not applicable to this project. There are no Land Uses with Higher Potential Pollutant Loads (LUHPPLs) in the project area.

6.6 Stormwater Standard No. 6 – Critical Areas

Arsenal Park is not located in a critical area. Therefore, this standard is met.

6.7 Stormwater Standard No. 7 – Redevelopment

This is not a redevelopment project as defined by the Massachusetts Stormwater Handbook and, therefore this standard does not apply.

6.8 Stormwater Standard No. 8 – Construction Period Pollution Prevention and Erosion and Sedimentation Control

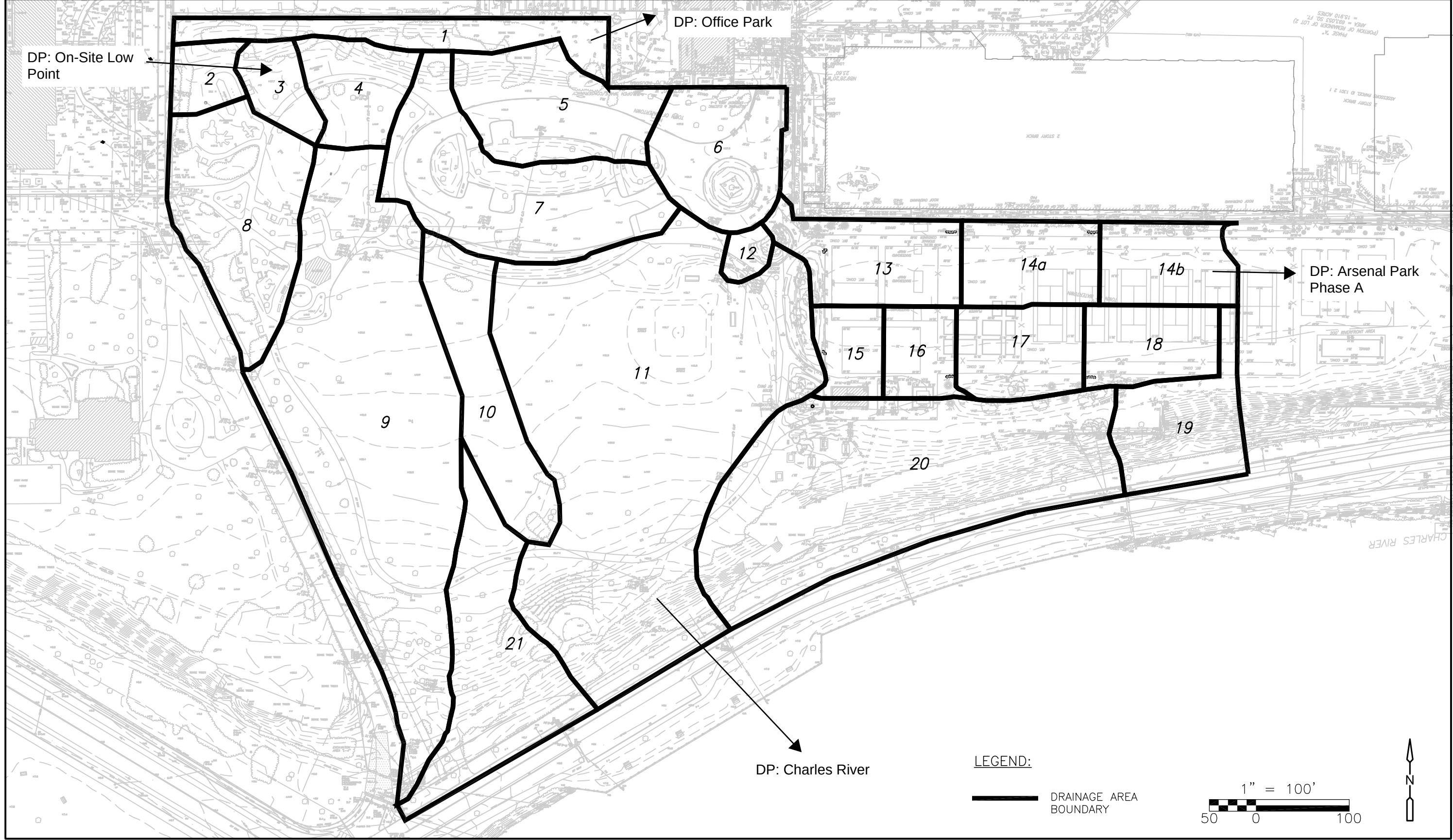
The project is subject to a NPDES General Construction Permit, which will be obtained by the Contractor. A copy of the Stormwater Pollution Prevention Plan (SWPPP) will be developed by the Contractor prior to construction.

6.9 Stormwater Standard No. 9 – Operation and Maintenance Plans

An Operation and Maintenance Plan and Long-Term Pollution Prevention Plan are included with this submittal in Appendix G.

6.10 Stormwater Standard No. 10 – Prohibition of Illicit Discharges

The proposed project fully meets the requirement of Stormwater Standard No. 10 as there are no illicit discharges.



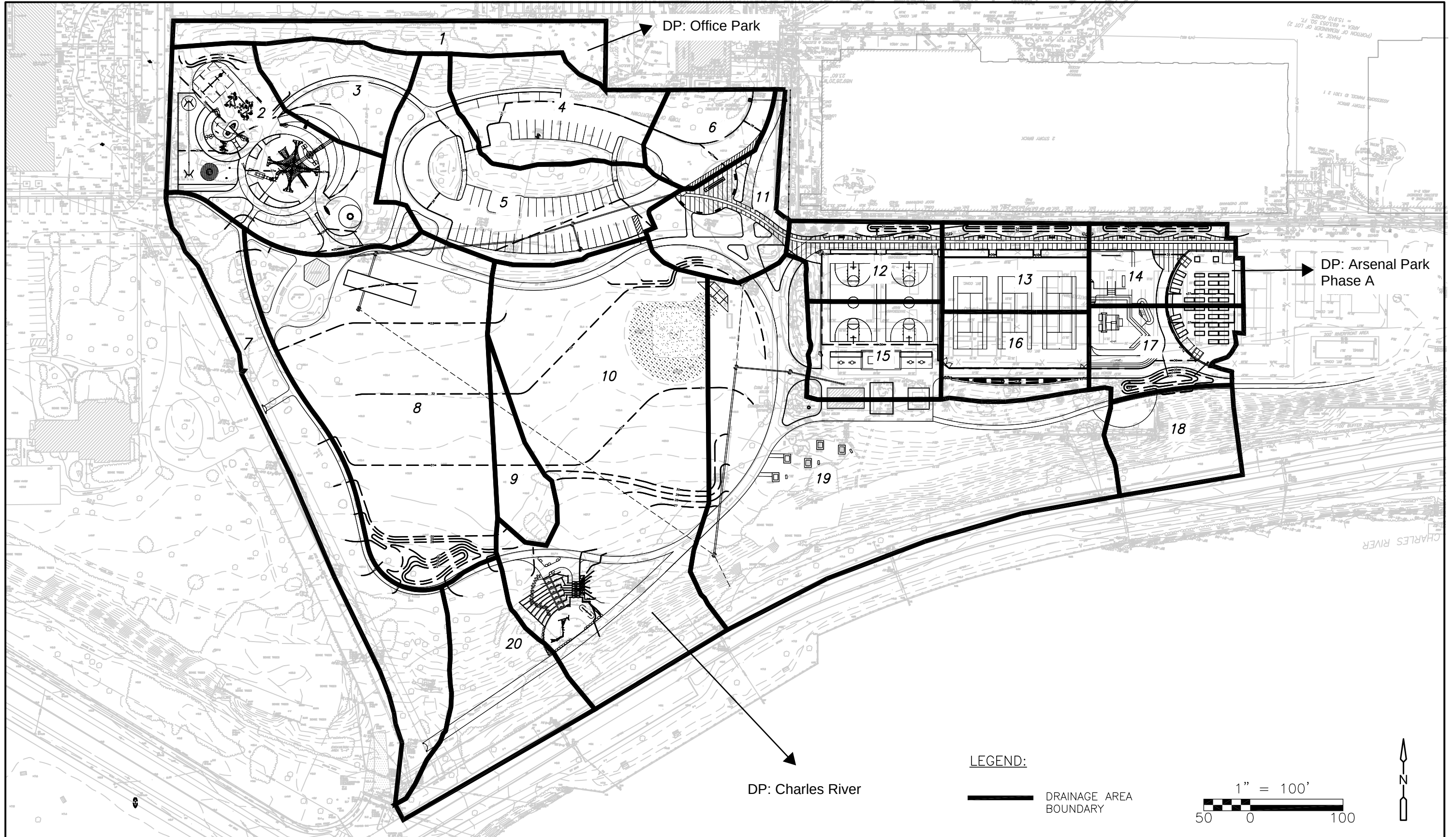


FIGURE 2 - PROPOSED CONDITIONS DRAINAGE AREA MAP
ARSENAL PARK IMPROVEMENTS PROJECT - PHASE B
WATERTOWN, MA
MARCH 2021

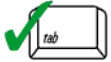
Stormwater Checklist



Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

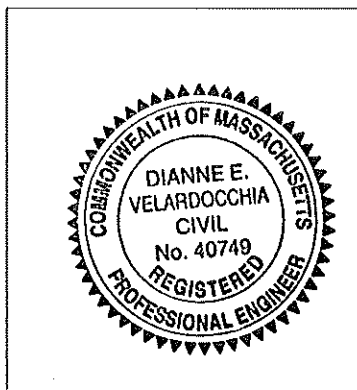
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Dianne E. Velardocchia
Signature and Date

11-9-21

Checklist

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

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



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

Standard 3: Recharge

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

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



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

Standard 4: Water Quality

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

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

This standard partially met as described in the stormwater report.



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) **Not applicable**

- ☐ 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 **Not applicable**

- ☐ 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:
- Not applicable**
- ☐ 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.

Appendix A

Rainfall Data



NOAA Atlas 14, Volume 10, Version 3
Location name: Watertown, Massachusetts,
USA*

Latitude: 42.3676°, Longitude: -71.1879°

Elevation: 24.81 ft**

* source: ESRI Maps

** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.301 (0.236-0.383)	0.371 (0.291-0.474)	0.486 (0.381-0.622)	0.583 (0.453-0.750)	0.715 (0.538-0.970)	0.814 (0.601-1.13)	0.919 (0.659-1.33)	1.04 (0.703-1.54)	1.23 (0.794-1.88)	1.38 (0.872-2.16)
10-min	0.426 (0.334-0.542)	0.526 (0.413-0.671)	0.690 (0.539-0.883)	0.827 (0.642-1.07)	1.01 (0.763-1.37)	1.15 (0.851-1.60)	1.30 (0.934-1.89)	1.48 (0.995-2.18)	1.74 (1.13-2.66)	1.95 (1.24-3.06)
15-min	0.501 (0.393-0.638)	0.619 (0.485-0.789)	0.812 (0.635-1.04)	0.972 (0.755-1.25)	1.19 (0.897-1.62)	1.36 (1.00-1.88)	1.53 (1.10-2.22)	1.74 (1.17-2.57)	2.04 (1.32-3.13)	2.30 (1.45-3.60)
30-min	0.683 (0.536-0.870)	0.845 (0.663-1.08)	1.11 (0.867-1.42)	1.33 (1.03-1.71)	1.63 (1.23-2.22)	1.86 (1.37-2.59)	2.10 (1.51-3.05)	2.39 (1.61-3.53)	2.83 (1.83-4.34)	3.20 (2.03-5.01)
60-min	0.865 (0.679-1.10)	1.07 (0.840-1.37)	1.41 (1.10-1.80)	1.69 (1.31-2.17)	2.07 (1.56-2.82)	2.36 (1.74-3.29)	2.67 (1.92-3.89)	3.04 (2.05-4.49)	3.61 (2.34-5.54)	4.11 (2.60-6.43)
2-hr	1.13 (0.894-1.43)	1.40 (1.10-1.77)	1.83 (1.44-2.33)	2.19 (1.71-2.81)	2.69 (2.04-3.64)	3.06 (2.28-4.24)	3.46 (2.52-5.03)	3.96 (2.68-5.80)	4.75 (3.09-7.22)	5.44 (3.45-8.43)
3-hr	1.32 (1.05-1.66)	1.63 (1.29-2.05)	2.13 (1.68-2.70)	2.55 (2.00-3.25)	3.12 (2.38-4.20)	3.54 (2.65-4.90)	4.01 (2.93-5.80)	4.59 (3.11-6.70)	5.52 (3.59-8.34)	6.33 (4.03-9.76)
6-hr	1.71 (1.37-2.14)	2.10 (1.68-2.63)	2.74 (2.18-3.44)	3.27 (2.58-4.14)	4.00 (3.06-5.34)	4.53 (3.41-6.21)	5.12 (3.75-7.34)	5.86 (3.99-8.46)	7.02 (4.59-10.5)	8.03 (5.12-12.3)
12-hr	2.18 (1.75-2.71)	2.67 (2.15-3.33)	3.48 (2.78-4.34)	4.14 (3.29-5.20)	5.06 (3.90-6.70)	5.74 (4.33-7.78)	6.48 (4.76-9.18)	7.39 (5.05-10.6)	8.80 (5.77-13.0)	10.0 (6.42-15.1)
24-hr	2.62 (2.12-3.24)	3.25 (2.63-4.02)	4.28 (3.45-5.31)	5.13 (4.11-6.40)	6.31 (4.89-8.29)	7.17 (5.45-9.66)	8.12 (6.01-11.4)	9.30 (6.38-13.2)	11.1 (7.33-16.4)	12.8 (8.19-19.1)
2-day	3.00 (2.44-3.68)	3.79 (3.08-4.65)	5.08 (4.12-6.26)	6.15 (4.96-7.62)	7.63 (5.96-9.99)	8.71 (6.67-11.7)	9.90 (7.41-13.9)	11.5 (7.88-16.1)	14.0 (9.20-20.3)	16.2 (10.4-23.9)
3-day	3.30 (2.70-4.03)	4.15 (3.39-5.08)	5.55 (4.51-6.81)	6.71 (5.42-8.28)	8.31 (6.51-10.8)	9.47 (7.28-12.7)	10.8 (8.09-15.1)	12.5 (8.60-17.4)	15.2 (10.1-22.0)	17.7 (11.4-26.0)
4-day	3.57 (2.93-4.35)	4.46 (3.65-5.44)	5.90 (4.82-7.22)	7.10 (5.76-8.74)	8.76 (6.88-11.4)	9.96 (7.68-13.3)	11.3 (8.51-15.8)	13.1 (9.03-18.2)	15.9 (10.5-22.9)	18.5 (11.9-27.0)
7-day	4.33 (3.57-5.25)	5.25 (4.33-6.37)	6.76 (5.54-8.22)	8.01 (6.53-9.79)	9.73 (7.68-12.5)	11.0 (8.49-14.5)	12.4 (9.33-17.1)	14.2 (9.85-19.6)	17.1 (11.4-24.4)	19.7 (12.8-28.7)
10-day	5.03 (4.16-6.07)	5.97 (4.94-7.22)	7.52 (6.19-9.11)	8.80 (7.19-10.7)	10.6 (8.35-13.5)	11.9 (9.18-15.5)	13.3 (9.99-18.2)	15.1 (10.5-20.7)	18.0 (12.0-25.5)	20.5 (13.3-29.6)
20-day	7.05 (5.87-8.45)	8.07 (6.71-9.68)	9.74 (8.07-11.7)	11.1 (9.15-13.5)	13.0 (10.3-16.4)	14.5 (11.2-18.6)	16.0 (11.9-21.2)	17.7 (12.4-24.0)	20.2 (13.5-28.4)	22.3 (14.5-31.9)
30-day	8.71 (7.28-10.4)	9.79 (8.18-11.7)	11.6 (9.61-13.8)	13.0 (10.8-15.7)	15.0 (11.9-18.8)	16.6 (12.8-21.1)	18.1 (13.5-23.8)	19.8 (13.9-26.7)	22.1 (14.8-30.7)	23.9 (15.5-33.9)
45-day	10.8 (9.05-12.8)	11.9 (10.0-14.2)	13.8 (11.5-16.5)	15.3 (12.7-18.4)	17.5 (13.9-21.6)	19.1 (14.8-24.1)	20.8 (15.4-26.9)	22.4 (15.8-29.9)	24.4 (16.4-33.7)	25.9 (16.9-36.5)
60-day	12.5 (10.6-14.8)	13.7 (11.5-16.3)	15.7 (13.1-18.6)	17.3 (14.4-20.7)	19.5 (15.5-24.0)	21.2 (16.5-26.6)	22.9 (17.0-29.4)	24.5 (17.3-32.6)	26.4 (17.8-36.3)	27.7 (18.1-38.9)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

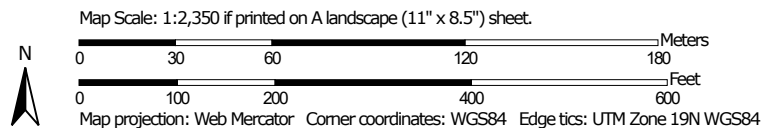
Appendix B

Geotechnical Information

Soil Map—Middlesex County, Massachusetts (Arsenal Park B)



Soil Map may not be valid at this scale.



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

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 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

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
602	Urban land	14.0	84.5%
655	Udorthents, wet substratum	2.6	15.5%
Totals for Area of Interest		16.6	100.0%



Boring Number:
CDM-IT-1

Project Name: Arsenal Park Phase B
Project Number: 56318-253750

Total Depth (ft.): 21

Depth to Initial Water Level (ft):

Depth	Date	Time
17.7	12/18/2020	12:10 PM

Abandonment Method: Soil cuttings and gravel.

Logged By: H. Al-Qudah

Elev. Depth (ft)	Sample Type	Sample Number	Sample Length (in)	Blows per 6 inches	Sample Recovery (in)	N-Value	Graphic Log	Strata	Material Description	Remarks
33.0 0	SS	S-1	24	3 6 12 16	19	18		SAND & GRAVEL	Top 13": Moist, medium dense, dark brown, fine SAND, some silt (SM) -TOPSOIL-	Snow on surface, top 2" frozen. Sample contains trace amount of roots, coal ash and brick. Drill rig chattering between ~1.5' to 4' bgs.
	SS	S-2	24	30 19 25 24	15	44			Bottom 6": Moist, medium dense, light brown, fine to coarse SAND, some fine gravel, trace silt (SW)	
	SS	S-3	24	17 24 27 32	5	51			Moist, dense, light brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt (GP)	
28.0 5	SS	S-4	24	30 20 38 40	16	58			Moist, very dense, light brown, fine to coarse SAND, some fine gravel, trace silt (SW)	
	SS	S-5	24	16 32 35 26	10	67			Moist, very dense, light brown, fine to coarse SAND, some fine gravel, trace silt (SW)	
23.0 10	SS	S-6	24	31 32 28 24	14	60			Moist, very dense, light brown, fine to coarse SAND, some fine gravel, trace silt (SW)	
	SS	S-7	24	17 16 19 20	8	35			Moist, dense, light brown, fine to coarse SAND, some fine gravel, trace silt (SW)	
18.0 15	SS	S-8	24	12 14 19 17	5	33			Moist, dense, light brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt (GP)	
▼										
13.0 20	SS	S-9	24	16 30 19 18	7	49		Wet, dense, fine to coarse SAND and fine to coarse GRAVEL, trace silt (SW)		
8.0									Test boring CDM-1 terminated at 21' bgs. Backfilled with soil cuttings and ground surface restored with gravel.	

Sample Types		Consistency vs Blowcount/Foot				Burmister Classification	
AS - Auger/Grab Sample	HP - Hydro Punch	<u>Granular (Sand):</u>		<u>Fine Grained (Clay):</u>		and	35-50%
CS - California Sampler	SS - Split Spoon	V. Loose:	0-4	Dense:	30-50	some	20-35%
BQ - 1.5" Rock Core	ST - Shelby Tube	Loose:	4-10	V. Dense:	>50	little	10-20%
NQ - 2" Rock Core	WS - Wash Sample	M. Dense:	10-30			trace	<10%
	GP - Geoprobe					moisture	density, color

Boring Number: CDM-IT-1



Boring Number: CDM-2

Client: Town of Watertown
Project Location: Watertown, MA

Project Name: Arsenal Park Phase B
Project Number: 56318-253750

Drilling Contractor/Driller: Northern Drill Service, Inc. / Zac Nader / Tyler Kennedy

Surface Elevation (ft.): 38.3

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4" / N/A

Total Depth (ft.): 21

Hammer Weight/Drop Height/ Spoon Size: 140 lb. / 30" / 1.375" I.D. / 2" O.D.

Depth to Initial Water Level (ft):

Bore Hole Location: See Boring Location Plan.

Depth	Date	Time
8.7	12/21/2020	10:20 AM

N: E:

Abandonment Method: Soil cuttings and gravel.

Drilling Date: Start: 12/21/2020 **End:** 12/21/2020

Logged By: H. Al-Qudah

Elev. Depth (ft)	Sample Type	Sample Number	Sample Length (in)	Blows per 6 inches	Sample Recovery (in)	N-Value	Graphic Log	Strata	Material Description	Remarks
38.3 0	SS	S-1	24	2 2 4 6	16	6		FILL	Top 2": Moist, loose, dark brown, fine to medium SAND, some silt (SM) -TOPSOIL-	Sample contains trace coal ash. Sample contains trace roots, coal ash, and bricks. Sample contains trace brick. Drill rig chattering between ~5 and 6 ft bgs.
	SS	S-2	24	5 4 8 5	15	15			Middle 7": Moist, loose, light brown, fine to coarse SAND, trace silt (SW)	
	SS	S-3	24	6 8 9 11	7	17			Bottom 7": Moist, loose, dark brown, fine to medium SAND, little silt (SM)	
33.3 5	SS	S-4	24	20 20 25 34	11	45		SAND & GRAVEL	Top 14": Moist, medium dense, dark to light brown, fine to coarse SAND, some fine to coarse gravel, little silt (SM)	
	SS	S-5	24	16 24 29 37	13	53			Bottom 1": Moist, medium dense, brown, fine to medium SAND, little silt, trace fine gravel (SM)	
	SS	S-5	24						Moist, medium dense, brown, fine to medium SAND, little silt, little fine gravel (SM)	
									Moist, medium dense, light brown, fine to coarse SAND and fine GRAVEL, trace silt (SW)	
									Moist, very dense, light brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt (SW)	
28.3 10										
23.3 15	SS	S-6	24	18 16 17 14	8	33			Moist, dense, light brown, fine to medium SAND, some fine GRAVEL, trace silt, (SP)	
18.3 20	SS	S-7	24	8 14 17 31	11	31			Moist, dense, light brown, fine to medium SAND, little fine gravel, trace silt (SP)	
13.3									Test boring CDM-2 terminated at 21' bgs. Backfilled with soil cuttings and ground surface restored with gravel.	

BL ARSENAL PARK PHASE B.GPJ - 1/4/21

Sample Types

AS - Auger/Grab Sample
CS - California Sampler
BQ - 1.5" Rock Core
NQ - 2" Rock Core
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
GP - Geoprobe

Consistency vs Blowcount/Foot

Granular (Sand):	
V. Loose: 0-4	Dense: 30-50
Loose: 4-10	V. Dense: >50
M. Dense: 10-30	

Fine Grained (Clay):	
V. Soft: <2	Stiff: 8-15
Soft: 2-4	V. Stiff: 15-30
M. Stiff: 4-8	Hard: >30

Burmister Classification

and some little trace moisture, density, color	35-50% 20-35% 10-20% <10%
--	------------------------------------

Reviewed by:

Date:

Boring Number: CDM-2



Boring Number: CDM-3

Client: Town of Watertown
Project Location: Watertown, MA

Project Name: Arsenal Park Phase B
Project Number: 56318-253750

Drilling Contractor/Driller: Northern Drill Service, Inc. / Zac Nader / Justin Raymond **Surface Elevation (ft.):** 35.5

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4" / N/A

Total Depth (ft.): 16

Hammer Weight/Drop Height/ Spoon Size: 140 lb. / 30" / 1.375" I.D. / 2" O.D.

Depth to Initial Water Level (ft):

Bore Hole Location: See Boring Location Plan.

Depth Date Time
N.E. 12/21/2020 7:20 AM

N: E:

Abandonment Method: Soil cuttings and cold patch asphalt.

Drilling Date: Start: 12/18/2020 **End:** 12/21/2020

Logged By: H. Al-Qudah

Elev. Depth (ft)	Sample Type	Sample Number	Sample Length (in)	Blows per 6 inches	Sample Recovery (in)	N-Value	Graphic Log	Strata	Material Description	Remarks
35.5 0									2" ASPHALT	
									3" FILL	
	SS	S-1	12	8	6				7" CONCRETE	Sample contains trace coal ash.
				8					Top 3": Moist, gray to light brown, fine to medium SAND, some fine gravel, trace silt (SP)	
	SS	S-2	24	3	10	9		FILL	Bottom 3": Moist, dark brown, fine to medium SAND, little fine gravel, little silt, trace organic soil (SM)	
				6					Moist, loose, dark brown, fine to medium SAND, little coarse GRAVEL, trace silt (SP)	
30.5 5	SS	S-3	24	13	8	26			Moist, medium dense, light brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt (SP)	
				13					Moist, dense, light brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt (GP)	
	SS	S-4	24	17	21	39			Moist, dense, brown, fine to coarse SAND, some fine gravel, trace silt (SW)	
				20						
	SS	S-5	24	10	10	42		SAND & GRAVEL		
				18						
25.5 10				24						
				26						
20.5 15	SS	S-6	24	10	8	36			Test boring CDM-3 terminated at 16' bgs, due to possible health concerns with concrete. Backfilled with soil cuttings. Ground surface restored with cold patch asphalt.	
				16						
				20						
				18						
15.5 20										
10.5										

Sample Types

AS - Auger/Grab Sample
CS - California Sampler
BQ - 1.5" Rock Core
NQ - 2" Rock Core
HP - Hydro Punch
SS - Split Spoon
ST - Shelby Tube
WS - Wash Sample
GP - Geoprobe

Consistency vs Blowcount/Foot

Granular (Sand):
V. Loose: 0-4
Loose: 4-10
M. Dense: 10-30
Dense: 30-50
V. Dense: >50

Fine Grained (Clay):
V. Soft: <2
Soft: 2-4
M. Stiff: 4-8
Stiff: 8-15
V. Stiff: 15-30
Hard: >30

Burmister Classification

and 35-50%
some 20-35%
little 10-20%
trace <10%
moisture, density, color

Reviewed by:

Date:

Boring Number: CDM-3

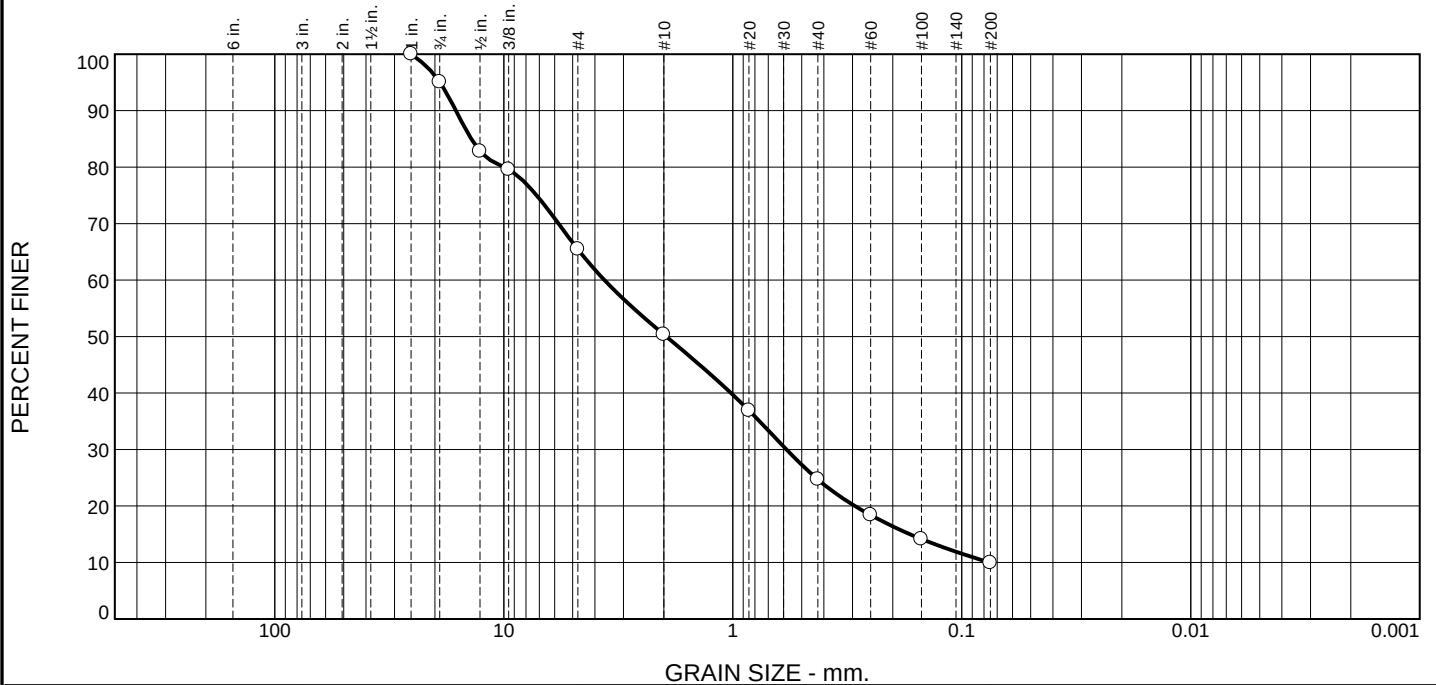


CDM Smith Geotechnical Laboratory Testing Summary Sheet

Client: <u>Town of Watertown</u>	Project Number: <u>56318-253750</u>	Reviewed By: <u>M. Polsky - Lab Manager</u>
Project Name: <u>Arsenal Park Phase B</u>	Task: <u>Task01.01</u>	
Project Location: <u>Watertown, MA</u>	Assigned By: <u>H. Al-Qudah</u>	Date Reviewed: <u>12/31/2020</u>

Sample Date	Boring Number	Sample	Depth (ft)	Identification Tests								Strength Tests				Soil Description
				Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	Dry unit wt. pcf	σ_c psi	Failure Criteria (CIU)	$\sigma_1 - \sigma_3$ or t psi	Strain %	
12/18/20	CDM-IT-1	S-3	4-6	8.5			34.5	55.6	9.9							Brown well-graded sand with silt and gravel
12/18/20	CDM-IT-1	S-7	12-14	9.2			25.7	66.1	8.2							Brown well-graded sand with silt and gravel
12/18/20	CDM-2	S-2A	2-3.2	15.7			23.1	64.4	12.5							Dark & light brown silty sand with gravel (fill with Brick and Masonry)
12/18/20	CDM-2	S-5	8-10	6.6			39.0	55.8	5.2							Brown poorly graded sand with silt and gravel
12/21/20	CDM-3	S-4	6-8	3.7			46.6	47.4	6.0							Brown poorly graded sand with silt and gravel
12/21/20	CDM-3	S-6	14-16	9.4			29.4	61.9	8.7							Brown well-graded sand with silt and gravel

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.9	29.6	15.1	25.7	14.8	9.9	

Test Results (ASTM D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75"	95.1		
.5"	82.8		
.375"	79.6		
#4	65.5		
#10	50.4		
#20	36.9		
#40	24.7		
#60	18.4		
#100	14.2		
#200	9.9		

* (no specification provided)

Material Description

Brown well-graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= SW-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 16.1877 **D₈₅**= 13.8770 **D₆₀**= 3.6334
D₅₀= 1.9516 **D₃₀**= 0.5828 **D₁₅**= 0.1683
D₁₀= 0.0758 **C_u**= 47.96 **C_c**= 1.23

Remarks

As received MC = 8.5%

Date Received: 12/30/2020 Date Tested: 12/31/2020

Tested By: AS/MP

Checked By: MP

Title: Laboratory Manager

Source of Sample: CDM-IT-1
Sample Number: S-3

Depth: 4-6'

Date Sampled: 12/18/2020

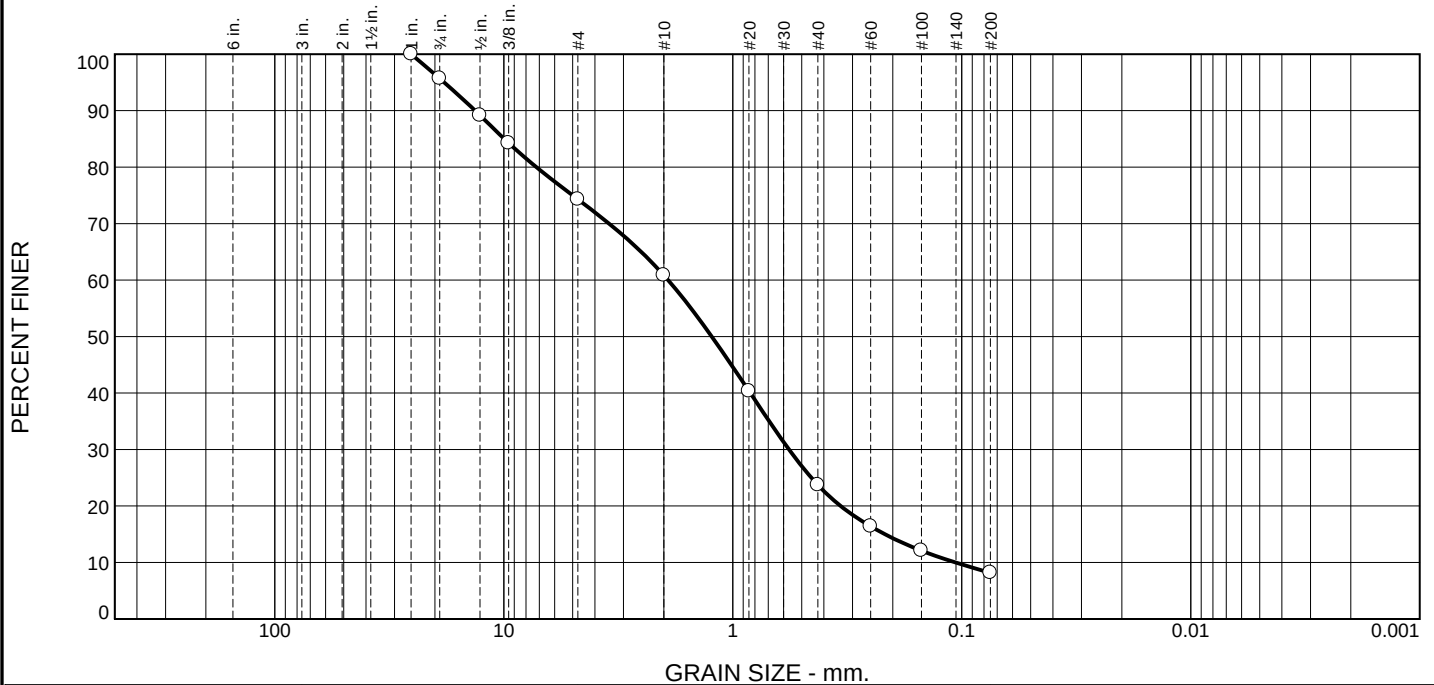
CDM Smith

Boston, Massachusetts

Client: Town of Watertown
Project: Arsenal Park Phase B
Watertown, MA

Project No: 56318.253750

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.3	21.4	13.4	37.2	15.5	8.2	

Test Results (ASTM D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75"	95.7		
.5"	89.2		
.375"	84.3		
#4	74.3		
#10	60.9		
#20	40.4		
#40	23.7		
#60	16.4		
#100	12.1		
#200	8.2		

* (no specification provided)

Material Description

Brown well-graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)

PL=

LL=

PI=

Classification

USCS (D 2487)=

SW-SM

AASHTO (M 145)=

A-1-b

Coefficients

D₉₀= 13.3453

D₈₅= 9.9555

D₆₀= 1.9166

D₅₀= 1.2357

D₃₀= 0.5681

D₁₅= 0.2165

D₁₀= 0.1066

C_u= 17.98

C_c= 1.58

Remarks

As received MC = 9.2%

Date Received: 12/30/2020

Date Tested: 12/31/2020

Tested By: AS/MP

Checked By: MP

Title: Laboratory Manager

Source of Sample: CDM-IT-1
Sample Number: S-7

Depth: 12-14'

Date Sampled: 12/18/2020

CDM Smith

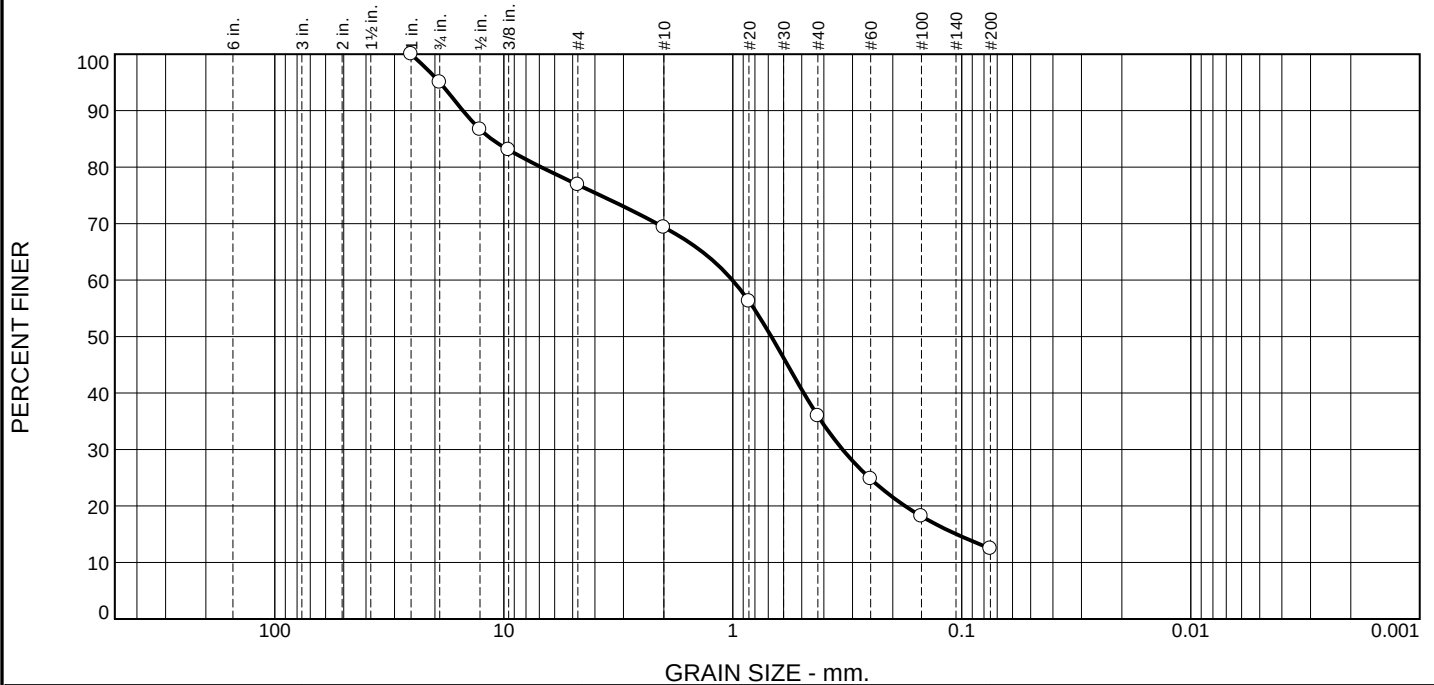
Boston, Massachusetts

Client: Town of Watertown

Project: Arsenal Park Phase B
Watertown, MA

Project No: 56318.253750

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.0	18.1	7.6	33.4	23.4	12.5	

Test Results (ASTM D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75"	95.0		
.5"	86.7		
.375"	83.1		
#4	76.9		
#10	69.3		
#20	56.3		
#40	35.9		
#60	24.8		
#100	18.2		
#200	12.5		

* (no specification provided)

Material Description

Dark & light brown silty sand with gravel
(fill: with Brick and Masonry)

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 15.0805 D₈₅= 11.3436 D₆₀= 1.0039
D₅₀= 0.6788 D₃₀= 0.3314 D₁₅= 0.1054
D₁₀= C_u= C_c=

Remarks

As received MC = 15.7%

Date Received: 12/30/2020 Date Tested: 12/31/2020

Tested By: AS/MP

Checked By: MP

Title: Laboratory Manager

Source of Sample: CDM-2 Depth: 2-4'
Sample Number: S-2A

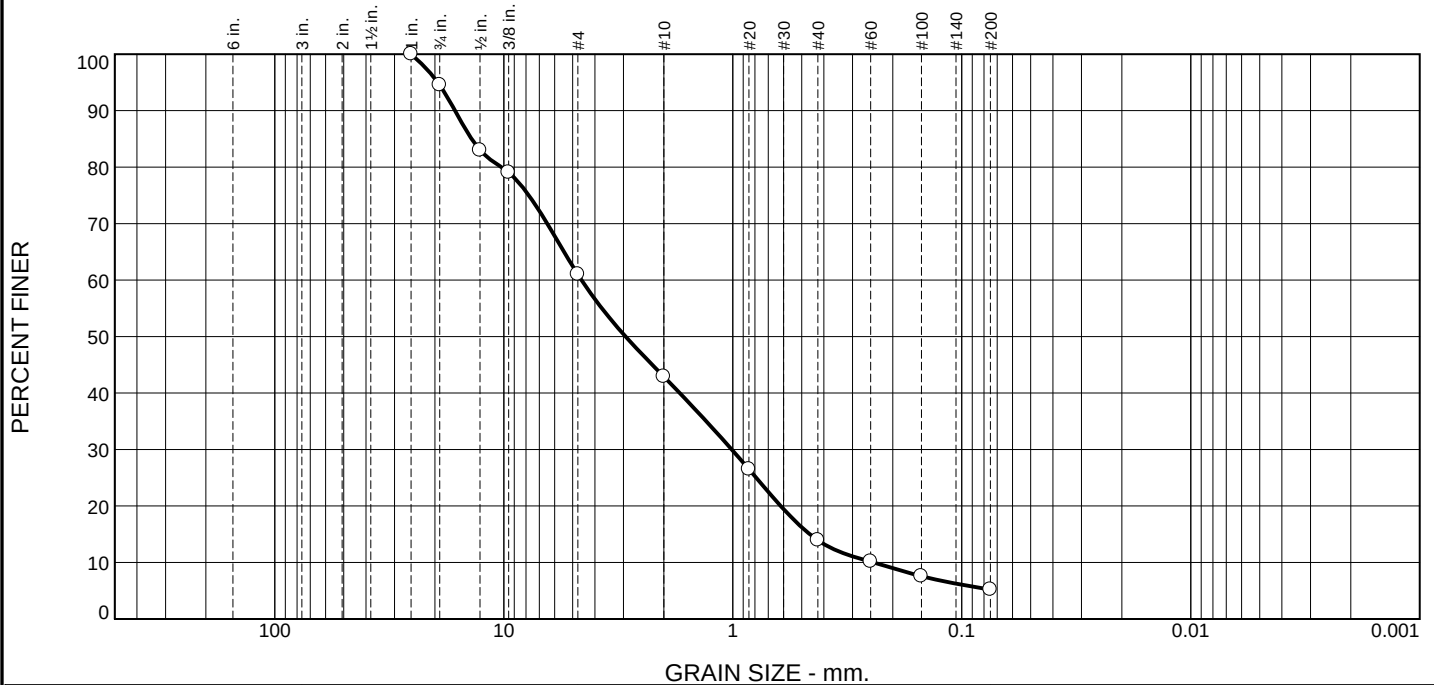
Date Sampled: 12/18/2020

CDM Smith

Boston, Massachusetts

Client: Town of Watertown
Project: Arsenal Park Phase B
Watertown, MA
Project No: 56318.253750

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.5	33.5	18.1	29.0	8.7	5.2	

Test Results (ASTM D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75"	94.5		
.5"	83.0		
.375"	79.1		
#4	61.0		
#10	42.9		
#20	26.5		
#40	13.9		
#60	10.1		
#100	7.6		
#200	5.2		

* (no specification provided)

Material Description

Brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 16.3304 D₈₅= 13.8335 D₆₀= 4.5743
D₅₀= 2.9376 D₃₀= 1.0106 D₁₅= 0.4609
D₁₀= 0.2427 C_u= 18.85 C_c= 0.92

Remarks

As received MC = 6.6%

Date Received: 12/30/2020 Date Tested: 12/31/2020

Tested By: AS/MP

Checked By: MP

Title: Laboratory Manager

Source of Sample: CDM-2 Depth: 8-10'
Sample Number: S-5

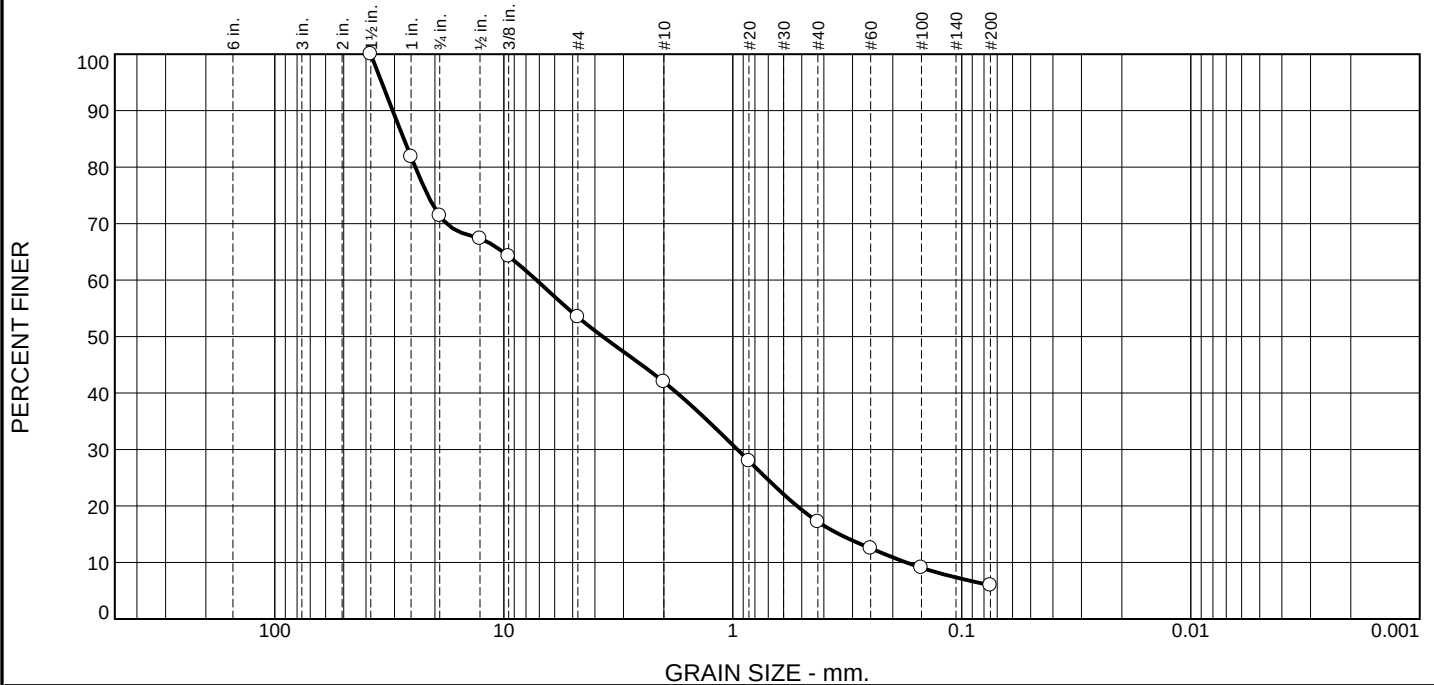
Date Sampled: 12/18/2020

CDM Smith

Boston, Massachusetts

Client: Town of Watertown
Project: Arsenal Park Phase B
Watertown, MA
Project No: 56318.253750

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	28.6	18.0	11.4	24.8	11.2	6.0	

Test Results (ASTM D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5"	100.0		
1"	81.8		
.75"	71.4		
.5"	67.4		
.375"	64.2		
#4	53.4		
#10	42.0		
#20	28.0		
#40	17.2		
#60	12.5		
#100	9.1		
#200	6.0		

* (no specification provided)

Material Description

Brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 30.5654 D₈₅= 27.3177 D₆₀= 7.2027
D₅₀= 3.7012 D₃₀= 0.9555 D₁₅= 0.3427
D₁₀= 0.1748 C_u= 41.20 C_c= 0.73

Remarks

As received MC = 3.7%

Date Received: 12/30/2020 Date Tested: 12/31/2020

Tested By: AS/MP

Checked By: MP

Title: Laboratory Manager

Source of Sample: CDM-3 Depth: 6-8'
Sample Number: S-4

Date Sampled: 12/21/2020

CDM Smith

Boston, Massachusetts

Client: Town of Watertown
Project: Arsenal Park Phase B
Watertown, MA
Project No: 56318.253750

PERCENT FINER



% +3"

	% Gravel
1	0.075
2	0.075
3	0.075
4	0.075
5	0.075
6	0.075
7	0.075
8	0.075
9	0.075
10	0.075
11	0.075
12	0.075
13	0.075
14	0.075
15	0.075
16	0.075
17	0.075
18	0.075
19	0.075
20	0.075
21	0.075
22	0.075
23	0.075
24	0.075
25	0.075
26	0.075
27	0.075
28	0.075
29	0.075
30	0.075
31	0.075
32	0.075
33	0.075
34	0.075
35	0.075
36	0.075
37	0.075
38	0.075
39	0.075
40	0.075
41	0.075
42	0.075
43	0.075
44	0.075
45	0.075
46	0.075
47	0.075
48	0.075
49	0.075
50	0.075
51	0.075
52	0.075
53	0.075
54	0.075
55	0.075
56	0.075
57	0.075
58	0.075
59	0.075
60	0.075
61	0.075
62	0.075
63	0.075
64	0.075
65	0.075
66	0.075
67	0.075
68	0.075
69	0.075
70	0.075
71	0.075
72	0.075
73	0.075
74	0.075
75	0.075
76	0.075
77	0.075
78	0.075
79	0.075
80	0.075
81	0.075
82	0.075
83	0.075
84	0.075
85	0.075
86	0.075
87	0.075
88	0.075
89	0.075
90	0.075
91	0.075
92	0.075
93	0.075
94	0.075
95	0.075
96	0.075
97	0.075
98	0.075
99	0.075
100	0.075

% Sand	
--------	--

% Fines

Test Results (ASTM D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
.75"	96.2		
.5"	88.0		
.375"	82.6		
#4	70.6		
#10	60.2		
#20	45.9		
#40	23.3		
#60	16.4		
#100	12.5		
#200	8.7		

Material Description

Atterberg Limits (ASTM D 4318)

$$LL =$$

PI=

Classification

USCS (D 2487)=

SW-SM

AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 13.9597

$D_{85} = 10.8640$

D₆₀= 1.9614

D₅₀= 0.9950

$$D_{30} = 0.5347$$
$$D_{15} = 0.2088$$
$$D_{10} = 0.0977$$
$$C_u = 20.07$$
$$C_c = 1.49$$

Remarks

As received MC = 9.4%

Date Received: 12/30/2020 **Date Tested:** 12/31/2020

Tested By: AS/MP

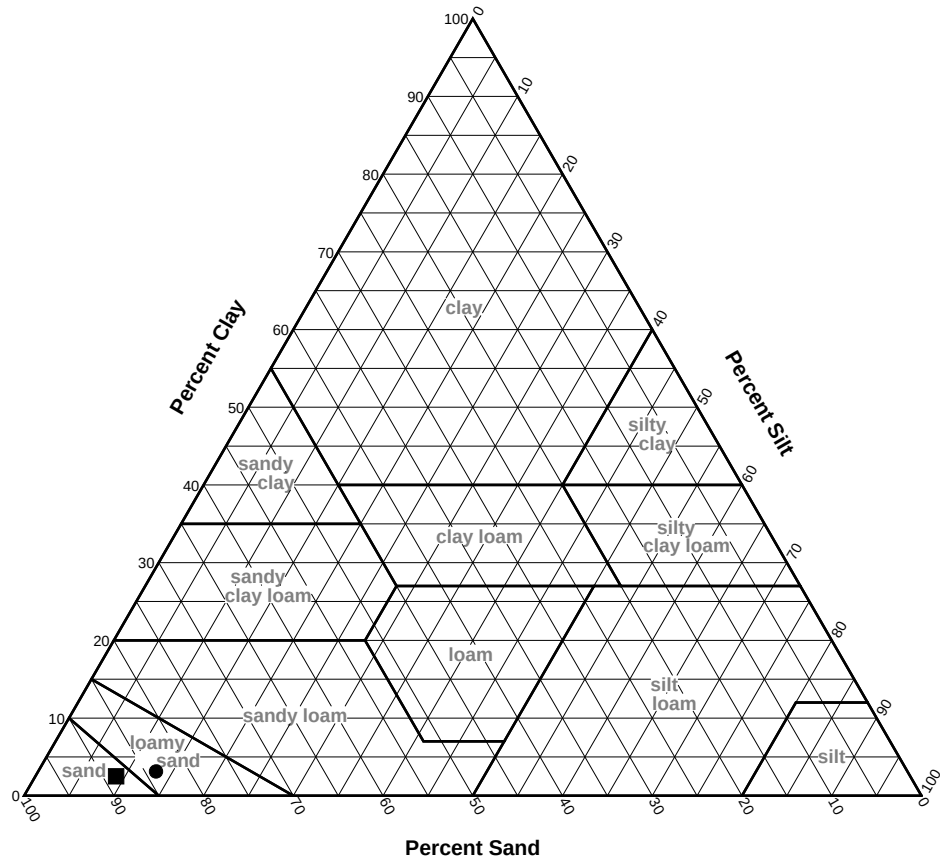
Checked By: MP

Title: Laboratory Manager

Date Sampled: 12/21/2020

Client: Town of Watertown
Project: Arsenal Park Phase B
Watertown, MA
Project No: 56318.253750

USDA Soil Classification



SOIL DATA

	Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
				Sand	Silt	Clay	
●	CDM-IT-1	S-3	4-6'	83.7	13.3	3.0	Loamy sand
■	CDM-IT-1	S-7	12-14'	88.5	9.0	2.5	Sand

CDM Smith

Boston, Massachusetts

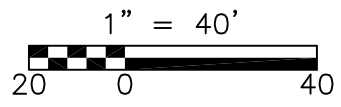
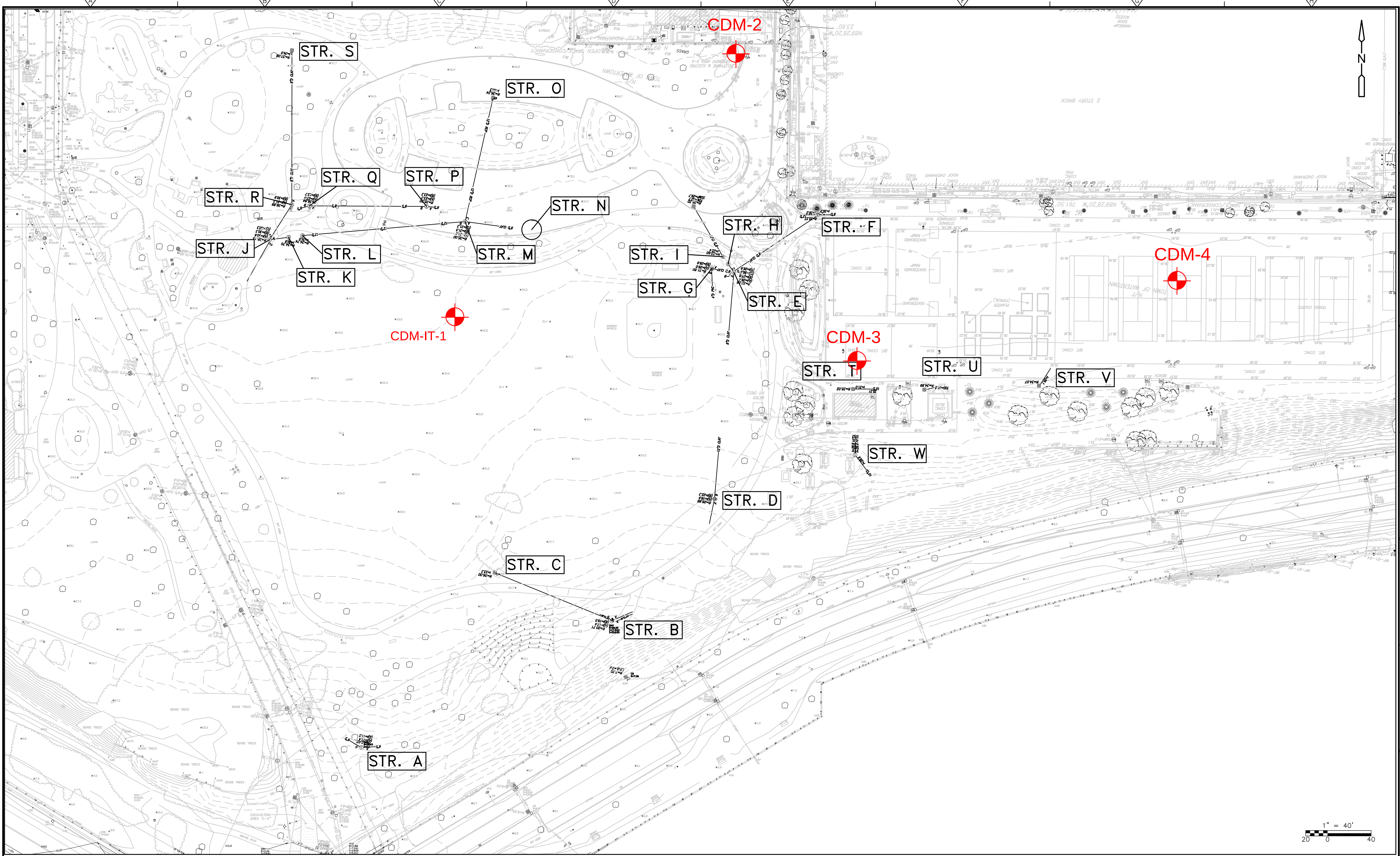
Client: Town of Watertown

Project: Arsenal Park Phase B
Watertown, MA

Project No.: 56318.253750

Checked By: MP

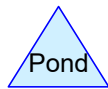
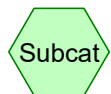
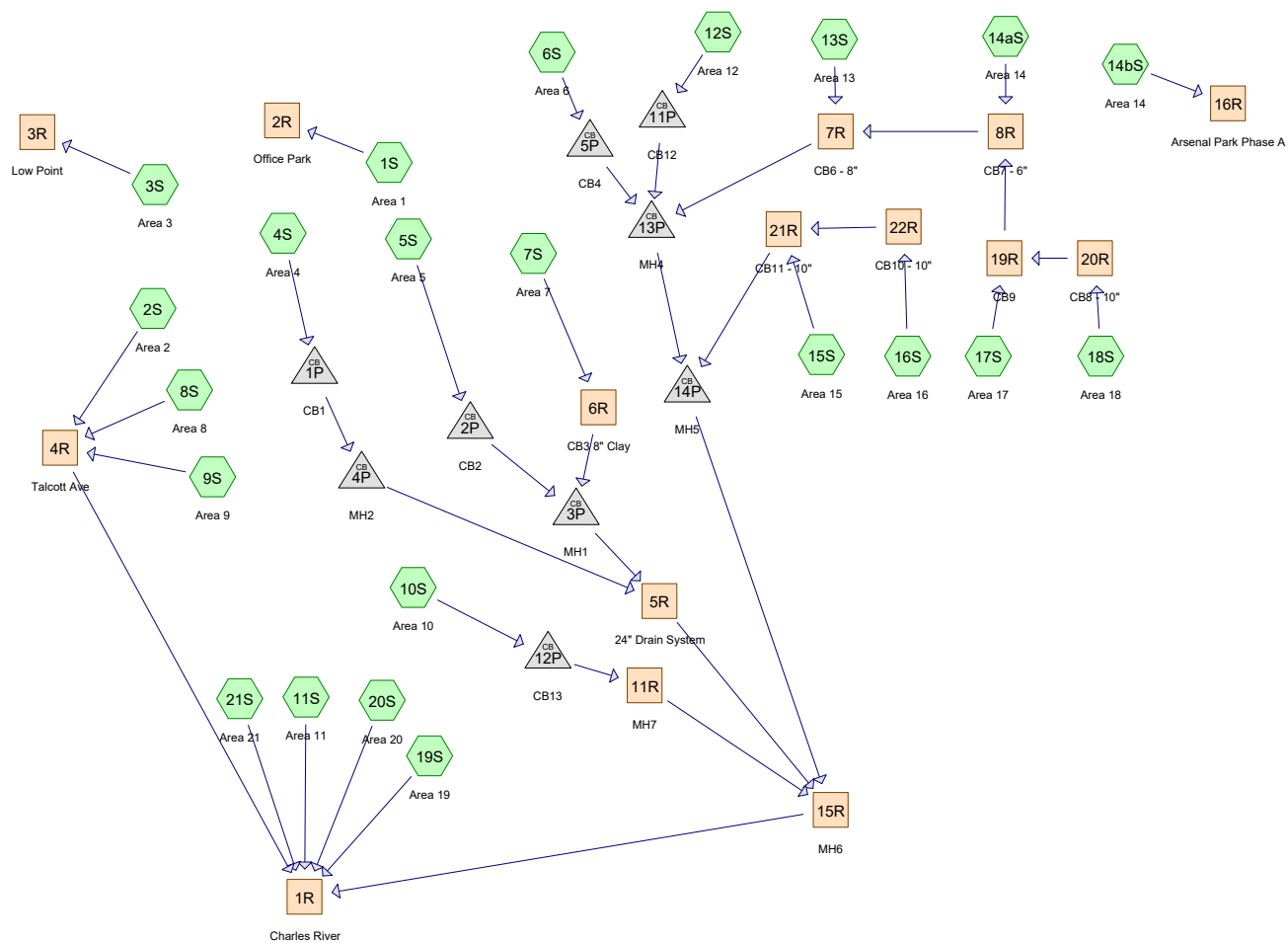
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					DESIGNED BY: _____	CDM Smith 75 State Street Boston, MA 02109 Tel: (617) 452-6000	TOWN OF WATERTOWN, MASSACHUSETTS		PROJECT NO. 56318—238275	
					DRAWN BY: _____		ARSENAL PARK IMPROVEMENTS PROJECT		FILE NAME: _____	
					SHEET CHK'D BY: _____				SHEET NO.	
					CROSS CHK'D BY: _____					
					APPROVED BY: _____					
REV. NO.	DATE	DRWN	CHKD	REMARKS	DATE: _____ MAY 2020					

Appendix C

HydroCAD Model



Routing Diagram for Arsenal Park - Existing Conditions Final 60% - REV

Prepared by CDM, Printed 3/20/2021

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Arsenal Park - Existing Conditions Final 60% - REV Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Prepared by CDM

Printed 3/20/2021

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Area 1	Runoff Area=14,531 sf 0.00% Impervious Runoff Depth=0.96" Flow Length=90' Tc=6.3 min CN=72 Runoff=0.35 cfs 0.027 af
Subcatchment2S: Area 2	Runoff Area=5,370 sf 38.92% Impervious Runoff Depth=1.58" Flow Length=103' Tc=6.0 min CN=82 Runoff=0.23 cfs 0.016 af
Subcatchment3S: Area 3	Runoff Area=6,543 sf 11.33% Impervious Runoff Depth=1.13" Flow Length=85' Tc=6.0 min CN=75 Runoff=0.19 cfs 0.014 af
Subcatchment4S: Area 4	Runoff Area=11,493 sf 13.35% Impervious Runoff Depth=1.19" Flow Length=88' Tc=6.0 min CN=76 Runoff=0.36 cfs 0.026 af
Subcatchment5S: Area 5	Runoff Area=21,710 sf 31.55% Impervious Runoff Depth=1.44" Flow Length=94' Tc=6.0 min CN=80 Runoff=0.83 cfs 0.060 af
Subcatchment6S: Area 6	Runoff Area=18,943 sf 52.08% Impervious Runoff Depth=1.88" Flow Length=156' Tc=6.0 min CN=86 Runoff=0.96 cfs 0.068 af
Subcatchment7S: Area 7	Runoff Area=34,871 sf 50.12% Impervious Runoff Depth=1.80" Flow Length=176' Tc=6.0 min CN=85 Runoff=1.69 cfs 0.120 af
Subcatchment8S: Area 8	Runoff Area=29,602 sf 32.92% Impervious Runoff Depth=1.51" Flow Length=269' Tc=6.9 min CN=81 Runoff=1.16 cfs 0.085 af
Subcatchment9S: Area 9	Runoff Area=88,210 sf 11.22% Impervious Runoff Depth=1.13" Flow Length=476' Tc=13.8 min CN=75 Runoff=1.99 cfs 0.190 af
Subcatchment10S: Area 10	Runoff Area=20,269 sf 3.58% Impervious Runoff Depth=1.13" Flow Length=264' Tc=6.0 min CN=75 Runoff=0.59 cfs 0.044 af
Subcatchment11S: Area 11	Runoff Area=114,065 sf 10.26% Impervious Runoff Depth=1.19" Flow Length=466' Tc=8.6 min CN=76 Runoff=3.22 cfs 0.259 af
Subcatchment12S: Area 12	Runoff Area=2,497 sf 52.38% Impervious Runoff Depth=1.96" Flow Length=59' Tc=6.0 min CN=87 Runoff=0.13 cfs 0.009 af
Subcatchment13S: Area 13	Runoff Area=17,051 sf 72.28% Impervious Runoff Depth=2.31" Flow Length=130' Tc=6.0 min CN=91 Runoff=1.04 cfs 0.075 af
Subcatchment14aS: Area 14	Runoff Area=13,439 sf 83.18% Impervious Runoff Depth=2.59" Flow Length=83' Tc=6.0 min CN=94 Runoff=0.90 cfs 0.067 af
Subcatchment14bS: Area 14	Runoff Area=12,629 sf 83.92% Impervious Runoff Depth=2.59" Flow Length=83' Tc=6.0 min CN=94 Runoff=0.84 cfs 0.063 af
Subcatchment15S: Area 15	Runoff Area=7,058 sf 86.09% Impervious Runoff Depth=2.69" Flow Length=91' Tc=6.0 min CN=95 Runoff=0.48 cfs 0.036 af

Arsenal Park - Existing Conditions Final 60% - REV Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Prepared by CDM

Printed 3/20/2021

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Page 3

Subcatchment16S: Area 16	Runoff Area=7,789 sf 92.26% Impervious Runoff Depth=2.80" Flow Length=81' Tc=6.0 min CN=96 Runoff=0.55 cfs 0.042 af
Subcatchment17S: Area 17	Runoff Area=13,340 sf 74.29% Impervious Runoff Depth=2.31" Flow Length=95' Tc=6.0 min CN=91 Runoff=0.81 cfs 0.059 af
Subcatchment18S: Area 18	Runoff Area=12,020 sf 88.79% Impervious Runoff Depth=2.69" Flow Length=80' Tc=6.0 min CN=95 Runoff=0.82 cfs 0.062 af
Subcatchment19S: Area 19	Runoff Area=16,707 sf 16.39% Impervious Runoff Depth=1.13" Flow Length=289' Tc=6.0 min CN=75 Runoff=0.49 cfs 0.036 af
Subcatchment20S: Area 20	Runoff Area=69,477 sf 12.27% Impervious Runoff Depth=1.07" Flow Length=230' Tc=7.9 min CN=74 Runoff=1.78 cfs 0.142 af
Subcatchment21S: Area 21	Runoff Area=30,013 sf 12.04% Impervious Runoff Depth=1.07" Flow Length=332' Tc=7.4 min CN=74 Runoff=0.78 cfs 0.061 af
Reach 1R: Charles River	Inflow=17.93 cfs 1.459 af Outflow=17.93 cfs 1.459 af
Reach 2R: Office Park	Inflow=0.35 cfs 0.027 af Outflow=0.35 cfs 0.027 af
Reach 3R: Low Point	Inflow=0.19 cfs 0.014 af Outflow=0.19 cfs 0.014 af
Reach 4R: Talcott Ave	Inflow=3.03 cfs 0.292 af Outflow=3.03 cfs 0.292 af
Reach 5R: 24" Drain System	Inflow=2.88 cfs 0.206 af Outflow=2.88 cfs 0.206 af
Reach 6R: CB3 8" Clay	Inflow=1.69 cfs 0.120 af Outflow=1.69 cfs 0.120 af
Reach 7R: CB6 - 8"	Inflow=3.57 cfs 0.263 af Outflow=3.57 cfs 0.263 af
Reach 8R: CB7 - 6"	Inflow=2.53 cfs 0.187 af Outflow=2.53 cfs 0.187 af
Reach 11R: MH7	Inflow=0.59 cfs 0.044 af Outflow=0.59 cfs 0.044 af
Reach 15R: MH6	Inflow=9.16 cfs 0.668 af Outflow=9.16 cfs 0.668 af
Reach 16R: Arsenal Park Phase A	Inflow=0.84 cfs 0.063 af Outflow=0.84 cfs 0.063 af

Arsenal Park - Existing Conditions Final 60% - REV Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Prepared by CDM

Printed 3/20/2021

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Reach 19R: CB9	Inflow=1.64 cfs 0.121 af Outflow=1.64 cfs 0.121 af
Reach 20R: CB8 - 10"	Inflow=0.82 cfs 0.062 af Outflow=0.82 cfs 0.062 af
Reach 21R: CB11 - 10"	Inflow=1.03 cfs 0.078 af Outflow=1.03 cfs 0.078 af
Reach 22R: CB10 - 10"	Inflow=0.55 cfs 0.042 af Outflow=0.55 cfs 0.042 af
Pond 1P: CB1	Peak Elev=34.34' Inflow=0.36 cfs 0.026 af 8.0" Round Culvert n=0.013 L=138.0' S=0.0196 '/ Outflow=0.36 cfs 0.026 af
Pond 2P: CB2	Peak Elev=33.77' Inflow=0.83 cfs 0.060 af 12.0" Round Culvert n=0.013 L=118.0' S=0.0169 '/ Outflow=0.83 cfs 0.060 af
Pond 3P: MH1	Peak Elev=32.61' Inflow=2.52 cfs 0.180 af 12.0" Round Culvert n=0.013 L=176.0' S=0.0051 '/ Outflow=2.52 cfs 0.180 af
Pond 4P: MH2	Peak Elev=31.19' Inflow=0.36 cfs 0.026 af 12.0" Round Culvert n=0.013 L=34.0' S=0.0176 '/ Outflow=0.36 cfs 0.026 af
Pond 5P: CB4	Peak Elev=30.36' Inflow=0.96 cfs 0.068 af 8.0" Round Culvert n=0.013 L=67.0' S=0.0478 '/ Outflow=0.96 cfs 0.068 af
Pond 11P: CB12	Peak Elev=29.80' Inflow=0.13 cfs 0.009 af 8.0" Round Culvert n=0.013 L=17.0' S=0.1529 '/ Outflow=0.13 cfs 0.009 af
Pond 12P: CB13	Peak Elev=23.76' Inflow=0.59 cfs 0.044 af 8.0" Round Culvert n=0.013 L=115.0' S=0.0374 '/ Outflow=0.59 cfs 0.044 af
Pond 13P: MH4	Peak Elev=44.70' Inflow=4.66 cfs 0.340 af 8.0" Round Culvert n=0.013 L=104.0' S=0.0197 '/ Outflow=4.66 cfs 0.340 af
Pond 14P: MH5	Peak Elev=27.09' Inflow=5.69 cfs 0.418 af 12.0" Round Culvert n=0.013 L=100.0' S=0.0203 '/ Outflow=5.69 cfs 0.418 af

Total Runoff Area = 13.031 ac Runoff Volume = 1.562 af Average Runoff Depth = 1.44"
72.74% Pervious = 9.478 ac 27.26% Impervious = 3.553 ac

Summary for Subcatchment 1S: Area 1

Runoff = 0.35 cfs @ 12.10 hrs, Volume= 0.027 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
14,531	72	Woods/grass comb., Good, HSG C
14,531		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	34	0.0680	0.10		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	56	0.0500	1.12		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.3	90	Total			

Summary for Subcatchment 2S: Area 2

Runoff = 0.23 cfs @ 12.09 hrs, Volume= 0.016 af, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
3,280	72	Woods/grass comb., Good, HSG C
2,090	98	Paved parking, HSG C
5,370	82	Weighted Average
3,280		61.08% Pervious Area
2,090		38.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	29	0.1380	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.4	15	0.0130	0.57		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.2	32	0.0220	3.01		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
0.4	27	0.0660	1.28		Shallow Concentrated Flow, Shallow Conc - 3
					Woodland Kv= 5.0 fps
4.7	103	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Area 3

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
4,138	72	Woods/grass comb., Good, HSG C
741	98	Paved parking, HSG C
1,664	74	>75% Grass cover, Good, HSG C
6,543	75	Weighted Average
5,802		88.67% Pervious Area
741		11.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	27	0.0330	0.16		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
1.4	58	0.0100	0.70		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
4.2	85	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Area 4

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
4,237	72	Woods/grass comb., Good, HSG C
1,534	98	Paved parking, HSG C
5,722	74	>75% Grass cover, Good, HSG C
11,493	76	Weighted Average
9,959		86.65% Pervious Area
1,534		13.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	17	0.0120	0.07		Sheet Flow, Sheet Flow - 1
					Grass: Dense n= 0.240 P2= 3.25"
1.8	71	0.0170	0.65		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.0	88	Total			

Summary for Subcatchment 5S: Area 5

Runoff = 0.83 cfs @ 12.09 hrs, Volume= 0.060 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
14,860	72	Woods/grass comb., Good, HSG C
6,850	98	Paved parking, HSG C
21,710	80	Weighted Average
14,860		68.45% Pervious Area
6,850		31.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	30	0.1070	0.12		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.2	25	0.1200	2.42		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
0.2	39	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.6	94	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 6S: Area 6

Runoff = 0.96 cfs @ 12.09 hrs, Volume= 0.068 af, Depth= 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
4,982	72	Woods/grass comb., Good, HSG C
9,865	98	Paved parking, HSG C
4,096	74	>75% Grass cover, Good, HSG C
18,943	86	Weighted Average
9,078		47.92% Pervious Area
9,865		52.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	20	0.0600	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.9	38	0.0210	0.72		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.7	98	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.4	156	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 7S: Area 7

Runoff = 1.69 cfs @ 12.09 hrs, Volume= 0.120 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
11,525	72	Woods/grass comb., Good, HSG C
17,477	98	Paved parking, HSG C
5,869	74	>75% Grass cover, Good, HSG C
34,871	85	Weighted Average
17,394		49.88% Pervious Area
17,477		50.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	30	0.1270	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.4	32	0.0840	1.45		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.9	114	0.0120	2.22		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.2	176	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Area 8

Runoff = 1.16 cfs @ 12.10 hrs, Volume= 0.085 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
12,065	72	Woods/grass comb., Good, HSG C
9,744	98	Paved parking, HSG C
7,793	74	>75% Grass cover, Good, HSG C
29,602	81	Weighted Average
19,858		67.08% Pervious Area
9,744		32.92% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	17	0.0120	0.10		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.8	68	0.0370	1.35		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.4	72	0.0280	3.40		Shallow Concentrated Flow, Shallow Conc - 2 Paved Kv= 20.3 fps
2.8	112	0.0180	0.67		Shallow Concentrated Flow, Shallow Conc - 3 Woodland Kv= 5.0 fps
6.9	269	Total			

Summary for Subcatchment 9S: Area 9

Runoff = 1.99 cfs @ 12.20 hrs, Volume= 0.190 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
51,744	72	Woods/grass comb., Good, HSG C
9,900	98	Paved parking, HSG C
26,000	74	>75% Grass cover, Good, HSG C
566	70	Woods, Good, HSG C
88,210	75	Weighted Average
78,310		88.78% Pervious Area
9,900		11.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	37	0.0050	0.08		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
5.2	352	0.0260	1.13		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.0	87	0.0820	1.43		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
13.8	476	Total			

Summary for Subcatchment 10S: Area 10

Runoff = 0.59 cfs @ 12.09 hrs, Volume= 0.044 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Arsenal Park - Existing Conditions Final 60% - REV Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

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Area (sf)	CN	Description
19,544	74	>75% Grass cover, Good, HSG C
725	98	Paved parking, HSG C
20,269	75	Weighted Average
19,544		96.42% Pervious Area
725		3.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	22	0.1410	0.28		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
3.0	242	0.0370	1.35		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
4.3	264	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 11S: Area 11

Runoff = 3.22 cfs @ 12.13 hrs, Volume= 0.259 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
19,015	70	Woods, Good, HSG C
11,700	98	Paved parking, HSG C
83,350	74	>75% Grass cover, Good, HSG C
114,065	76	Weighted Average
102,365		89.74% Pervious Area
11,700		10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	22	0.0140	0.11		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
4.8	370	0.0340	1.29		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.5	74	0.2110	2.30		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
8.6	466	Total			

Summary for Subcatchment 12S: Area 12

Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

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Area (sf)	CN	Description
1,189	74	>75% Grass cover, Good, HSG C
1,308	98	Paved parking, HSG C
2,497	87	Weighted Average
1,189		47.62% Pervious Area
1,308		52.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	15	0.1070	0.23		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.3	44	0.1410	2.63		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.4	59	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 13S: Area 13

Runoff = 1.04 cfs @ 12.09 hrs, Volume= 0.075 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
4,727	74	>75% Grass cover, Good, HSG C
12,324	98	Paved parking, HSG C
17,051	91	Weighted Average
4,727		27.72% Pervious Area
12,324		72.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	21	0.0070	0.67		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.5	62	0.0120	2.22		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
1.2	47	0.0090	0.66		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
2.2	130	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14aS: Area 14

Runoff = 0.90 cfs @ 12.08 hrs, Volume= 0.067 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

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Area (sf)	CN	Description
2,261	74	>75% Grass cover, Good, HSG C
11,178	98	Paved parking, HSG C
13,439	94	Weighted Average
2,261		16.82% Pervious Area
11,178		83.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0070	0.66		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0200	2.87		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	83	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14bS: Area 14

Runoff = 0.84 cfs @ 12.08 hrs, Volume= 0.063 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
2,031	74	>75% Grass cover, Good, HSG C
10,598	98	Paved parking, HSG C
12,629	94	Weighted Average
2,031		16.08% Pervious Area
10,598		83.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0070	0.66		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0200	2.87		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	83	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 15S: Area 15

Runoff = 0.48 cfs @ 12.08 hrs, Volume= 0.036 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
982	74	>75% Grass cover, Good, HSG C
6,076	98	Paved parking, HSG C
7,058	95	Weighted Average
982		13.91% Pervious Area
6,076		86.09% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	14	0.1710	0.27		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.6	77	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
1.5	91	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 16S: Area 16

Runoff = 0.55 cfs @ 12.08 hrs, Volume= 0.042 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
603	70	Woods, Good, HSG C
7,186	98	Paved parking, HSG C
7,789	96	Weighted Average
603		7.74% Pervious Area
7,186		92.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	21	0.0050	0.58		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	60	0.0250	3.21		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	81	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 17S: Area 17

Runoff = 0.81 cfs @ 12.09 hrs, Volume= 0.059 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
3,430	70	Woods, Good, HSG C
9,910	98	Paved parking, HSG C
13,340	91	Weighted Average
3,430		25.71% Pervious Area
9,910		74.29% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	22	0.0110	0.81		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	52	0.0170	2.65		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.3	21	0.0620	1.24		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
1.1	95	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 18S: Area 18

Runoff = 0.82 cfs @ 12.08 hrs, Volume= 0.062 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
1,348	70	Woods, Good, HSG C
10,672	98	Paved parking, HSG C
12,020	95	Weighted Average
1,348		11.21% Pervious Area
10,672		88.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0130	0.85		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	60	0.0300	3.52		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.7	80	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 19S: Area 19

Runoff = 0.49 cfs @ 12.09 hrs, Volume= 0.036 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
13,969	70	Woods, Good, HSG C
2,738	98	Paved parking, HSG C
16,707	75	Weighted Average
13,969		83.61% Pervious Area
2,738		16.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0140	0.88		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	52	0.0180	2.72		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.5	82	0.3080	2.77		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
2.4	134	0.0180	0.94		Shallow Concentrated Flow, Shallow Conc - 3 Short Grass Pasture Kv= 7.0 fps
3.6	289	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 20S: Area 20

Runoff = 1.78 cfs @ 12.12 hrs, Volume= 0.142 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
58,183	70	Woods, Good, HSG C
2,769	74	>75% Grass cover, Good, HSG C
8,525	98	Paved parking, HSG C
69,477	74	Weighted Average
60,952		87.73% Pervious Area
8,525		12.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	30	0.0530	0.09		Sheet Flow, Sheet Flow - 1 Woods: Light underbrush n= 0.400 P2= 3.25"
0.6	90	0.2780	2.64		Shallow Concentrated Flow, Shallow Conc - 1 Woodland Kv= 5.0 fps
1.8	110	0.0220	1.04		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
7.9	230	Total			

Summary for Subcatchment 21S: Area 21

Runoff = 0.78 cfs @ 12.11 hrs, Volume= 0.061 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

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Area (sf)	CN	Description
21,600	70	Woods, Good, HSG C
3,613	98	Paved parking, HSG C
4,800	74	>75% Grass cover, Good, HSG C
30,013	74	Weighted Average
26,400		87.96% Pervious Area
3,613		12.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	32	0.0190	0.13		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
2.4	186	0.0340	1.29		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.0	114	0.1400	1.87		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
7.4	332	Total			

Summary for Reach 1R: Charles River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 12.257 ac, 26.86% Impervious, Inflow Depth = 1.43" for 2 Yr 24 Hr event
 Inflow = 17.93 cfs @ 12.10 hrs, Volume= 1.459 af
 Outflow = 17.93 cfs @ 12.10 hrs, Volume= 1.459 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Office Park

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.334 ac, 0.00% Impervious, Inflow Depth = 0.96" for 2 Yr 24 Hr event
 Inflow = 0.35 cfs @ 12.10 hrs, Volume= 0.027 af
 Outflow = 0.35 cfs @ 12.10 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Low Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.150 ac, 11.33% Impervious, Inflow Depth = 1.13" for 2 Yr 24 Hr event
 Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af
 Outflow = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Talcott Ave

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.828 ac, 17.64% Impervious, Inflow Depth = 1.24" for 2 Yr 24 Hr event
 Inflow = 3.03 cfs @ 12.15 hrs, Volume= 0.292 af
 Outflow = 3.03 cfs @ 12.15 hrs, Volume= 0.292 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: 24" Drain System

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.563 ac, 37.99% Impervious, Inflow Depth = 1.58" for 2 Yr 24 Hr event
 Inflow = 2.88 cfs @ 12.09 hrs, Volume= 0.206 af
 Outflow = 2.88 cfs @ 12.09 hrs, Volume= 0.206 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: CB3 8" Clay

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.801 ac, 50.12% Impervious, Inflow Depth = 1.80" for 2 Yr 24 Hr event
 Inflow = 1.69 cfs @ 12.09 hrs, Volume= 0.120 af
 Outflow = 1.69 cfs @ 12.09 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 7R: CB6 - 8"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.282 ac, 78.93% Impervious, Inflow Depth = 2.46" for 2 Yr 24 Hr event
 Inflow = 3.57 cfs @ 12.09 hrs, Volume= 0.263 af
 Outflow = 3.57 cfs @ 12.09 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 8R: CB7 - 6"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.891 ac, 81.86% Impervious, Inflow Depth = 2.53" for 2 Yr 24 Hr event
 Inflow = 2.53 cfs @ 12.09 hrs, Volume= 0.187 af
 Outflow = 2.53 cfs @ 12.09 hrs, Volume= 0.187 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 11R: MH7

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.465 ac, 3.58% Impervious, Inflow Depth = 1.13" for 2 Yr 24 Hr event
 Inflow = 0.59 cfs @ 12.09 hrs, Volume= 0.044 af
 Outflow = 0.59 cfs @ 12.09 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 15R: MH6

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.143 ac, 52.70% Impervious, Inflow Depth = 1.93" for 2 Yr 24 Hr event
 Inflow = 9.16 cfs @ 12.09 hrs, Volume= 0.668 af
 Outflow = 9.16 cfs @ 12.09 hrs, Volume= 0.668 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 16R: Arsenal Park Phase A

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.290 ac, 83.92% Impervious, Inflow Depth = 2.59" for 2 Yr 24 Hr event
 Inflow = 0.84 cfs @ 12.08 hrs, Volume= 0.063 af
 Outflow = 0.84 cfs @ 12.08 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 19R: CB9

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.582 ac, 81.16% Impervious, Inflow Depth = 2.49" for 2 Yr 24 Hr event
 Inflow = 1.64 cfs @ 12.09 hrs, Volume= 0.121 af
 Outflow = 1.64 cfs @ 12.09 hrs, Volume= 0.121 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 20R: CB8 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.276 ac, 88.79% Impervious, Inflow Depth = 2.69" for 2 Yr 24 Hr event
 Inflow = 0.82 cfs @ 12.08 hrs, Volume= 0.062 af
 Outflow = 0.82 cfs @ 12.08 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 21R: CB11 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.341 ac, 89.32% Impervious, Inflow Depth = 2.75" for 2 Yr 24 Hr event
 Inflow = 1.03 cfs @ 12.08 hrs, Volume= 0.078 af
 Outflow = 1.03 cfs @ 12.08 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 22R: CB10 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.179 ac, 92.26% Impervious, Inflow Depth = 2.80" for 2 Yr 24 Hr event
 Inflow = 0.55 cfs @ 12.08 hrs, Volume= 0.042 af
 Outflow = 0.55 cfs @ 12.08 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: CB1

[58] Hint: Peaked 0.34' above defined flood level

Inflow Area = 0.264 ac, 13.35% Impervious, Inflow Depth = 1.19" for 2 Yr 24 Hr event
 Inflow = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af
 Outflow = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 34.34' @ 12.09 hrs
 Flood Elev= 34.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	8.0" Round 8" Clay Pipe L= 138.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.00' / 31.30' S= 0.0196 ' / ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.35 cfs @ 12.09 hrs HW=34.34' (Free Discharge)
 ↑1=8" Clay Pipe (Inlet Controls 0.35 cfs @ 1.98 fps)

Summary for Pond 2P: CB2

Inflow Area = 0.498 ac, 31.55% Impervious, Inflow Depth = 1.44" for 2 Yr 24 Hr event
 Inflow = 0.83 cfs @ 12.09 hrs, Volume= 0.060 af
 Outflow = 0.83 cfs @ 12.09 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.83 cfs @ 12.09 hrs, Volume= 0.060 af

Arsenal Park - Existing Conditions Final 60% - REVType III 24-hr 2 Yr 24 Hr Rainfall=3.25"

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Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 33.77' @ 12.09 hrs

Flood Elev= 36.24'

Device	Routing	Invert	Outlet Devices
#1	Primary	33.30'	12.0" Round 12" RCP L= 118.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 33.30' / 31.30' S= 0.0169 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.09 hrs HW=33.77' (Free Discharge)

↑1=12" RCP (Inlet Controls 0.83 cfs @ 2.32 fps)

Summary for Pond 3P: MH1

[79] Warning: Submerged Pond 2P Primary device # 1 OUTLET by 1.31'

Inflow Area = 1.299 ac, 42.99% Impervious, Inflow Depth = 1.66" for 2 Yr 24 Hr event
Inflow = 2.52 cfs @ 12.09 hrs, Volume= 0.180 af
Outflow = 2.52 cfs @ 12.09 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min
Primary = 2.52 cfs @ 12.09 hrs, Volume= 0.180 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 32.61' @ 12.09 hrs

Flood Elev= 35.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.50'	12.0" Round 12" RCP L= 176.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.50' / 30.60' S= 0.0051 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=2.53 cfs @ 12.09 hrs HW=32.61' (Free Discharge)

↑1=12" RCP (Barrel Controls 2.53 cfs @ 3.63 fps)

Summary for Pond 4P: MH2

Inflow Area = 0.264 ac, 13.35% Impervious, Inflow Depth = 1.19" for 2 Yr 24 Hr event
Inflow = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af
Outflow = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 31.19' @ 12.09 hrs

Flood Elev= 36.86'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.90'	12.0" Round 12" RCP L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.90' / 30.30' S= 0.0176 '/' Cc= 0.900

Arsenal Park - Existing Conditions Final 60% - REVType III 24-hr 2 Yr 24 Hr Rainfall=3.25"

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n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=0.35 cfs @ 12.09 hrs HW=31.19' (Free Discharge)

↑1=12" RCP (Inlet Controls 0.35 cfs @ 1.84 fps)

Summary for Pond 5P: CB4

Inflow Area = 0.435 ac, 52.08% Impervious, Inflow Depth = 1.88" for 2 Yr 24 Hr event

Inflow = 0.96 cfs @ 12.09 hrs, Volume= 0.068 af

Outflow = 0.96 cfs @ 12.09 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min

Primary = 0.96 cfs @ 12.09 hrs, Volume= 0.068 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 30.36' @ 12.09 hrs

Flood Elev= 35.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.70'	8.0" Round Culvert L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.70' / 26.50' S= 0.0478 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.96 cfs @ 12.09 hrs HW=30.36' (Free Discharge)

↑1=Culvert (Inlet Controls 0.96 cfs @ 2.76 fps)

Summary for Pond 11P: CB12

Inflow Area = 0.057 ac, 52.38% Impervious, Inflow Depth = 1.96" for 2 Yr 24 Hr event

Inflow = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af

Outflow = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 29.80' @ 12.09 hrs

Flood Elev= 31.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.60'	8.0" Round Culvert L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.60' / 27.00' S= 0.1529 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.13 cfs @ 12.09 hrs HW=29.80' (Free Discharge)

↑1=Culvert (Inlet Controls 0.13 cfs @ 1.51 fps)

Summary for Pond 12P: CB13

Inflow Area = 0.465 ac, 3.58% Impervious, Inflow Depth = 1.13" for 2 Yr 24 Hr event
 Inflow = 0.59 cfs @ 12.09 hrs, Volume= 0.044 af
 Outflow = 0.59 cfs @ 12.09 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.59 cfs @ 12.09 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 23.76' @ 12.09 hrs
 Flood Elev= 26.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.30'	8.0" Round Culvert L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 23.30' / 19.00' S= 0.0374 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.59 cfs @ 12.09 hrs HW=23.76' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.59 cfs @ 2.30 fps)

Summary for Pond 13P: MH4

[58] Hint: Peaked 11.65' above defined flood level
 [81] Warning: Exceeded Pond 5P by 14.30' @ 12.09 hrs
 [81] Warning: Exceeded Pond 11P by 14.86' @ 12.09 hrs

Inflow Area = 1.774 ac, 71.49% Impervious, Inflow Depth = 2.30" for 2 Yr 24 Hr event
 Inflow = 4.66 cfs @ 12.09 hrs, Volume= 0.340 af
 Outflow = 4.66 cfs @ 12.09 hrs, Volume= 0.340 af, Atten= 0%, Lag= 0.0 min
 Primary = 4.66 cfs @ 12.09 hrs, Volume= 0.340 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 44.70' @ 12.09 hrs
 Flood Elev= 33.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.40'	8.0" Round Culvert L= 104.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.40' / 24.35' S= 0.0197 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=4.65 cfs @ 12.09 hrs HW=44.63' (Free Discharge)
 ↑1=Culvert (Barrel Controls 4.65 cfs @ 13.33 fps)

Summary for Pond 14P: MH5

[79] Warning: Submerged Pond 13P Primary device # 1 INLET by 0.69'

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Inflow Area = 2.115 ac, 74.37% Impervious, Inflow Depth = 2.37" for 2 Yr 24 Hr event
Inflow = 5.69 cfs @ 12.09 hrs, Volume= 0.418 af
Outflow = 5.69 cfs @ 12.09 hrs, Volume= 0.418 af, Atten= 0%, Lag= 0.0 min
Primary = 5.69 cfs @ 12.09 hrs, Volume= 0.418 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 27.09' @ 12.09 hrs

Flood Elev= 28.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.33'	12.0" Round Culvert L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.33' / 22.30' S= 0.0203 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=5.68 cfs @ 12.09 hrs HW=27.09' (Free Discharge)↑**1=Culvert** (Inlet Controls 5.68 cfs @ 7.23 fps)

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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

Subcatchment1S: Area 1	Runoff Area=14,531 sf 0.00% Impervious Runoff Depth=2.30" Flow Length=90' Tc=6.3 min CN=72 Runoff=0.88 cfs 0.064 af
Subcatchment2S: Area 2	Runoff Area=5,370 sf 38.92% Impervious Runoff Depth=3.20" Flow Length=103' Tc=6.0 min CN=82 Runoff=0.46 cfs 0.033 af
Subcatchment3S: Area 3	Runoff Area=6,543 sf 11.33% Impervious Runoff Depth=2.56" Flow Length=85' Tc=6.0 min CN=75 Runoff=0.45 cfs 0.032 af
Subcatchment4S: Area 4	Runoff Area=11,493 sf 13.35% Impervious Runoff Depth=2.64" Flow Length=88' Tc=6.0 min CN=76 Runoff=0.82 cfs 0.058 af
Subcatchment5S: Area 5	Runoff Area=21,710 sf 31.55% Impervious Runoff Depth=3.01" Flow Length=94' Tc=6.0 min CN=80 Runoff=1.76 cfs 0.125 af
Subcatchment6S: Area 6	Runoff Area=18,943 sf 52.08% Impervious Runoff Depth=3.59" Flow Length=156' Tc=6.0 min CN=86 Runoff=1.80 cfs 0.130 af
Subcatchment7S: Area 7	Runoff Area=34,871 sf 50.12% Impervious Runoff Depth=3.49" Flow Length=176' Tc=6.0 min CN=85 Runoff=3.24 cfs 0.233 af
Subcatchment8S: Area 8	Runoff Area=29,602 sf 32.92% Impervious Runoff Depth=3.10" Flow Length=269' Tc=6.9 min CN=81 Runoff=2.39 cfs 0.176 af
Subcatchment9S: Area 9	Runoff Area=88,210 sf 11.22% Impervious Runoff Depth=2.56" Flow Length=476' Tc=13.8 min CN=75 Runoff=4.73 cfs 0.431 af
Subcatchment10S: Area 10	Runoff Area=20,269 sf 3.58% Impervious Runoff Depth=2.56" Flow Length=264' Tc=6.0 min CN=75 Runoff=1.39 cfs 0.099 af
Subcatchment11S: Area 11	Runoff Area=114,065 sf 10.26% Impervious Runoff Depth=2.64" Flow Length=466' Tc=8.6 min CN=76 Runoff=7.41 cfs 0.577 af
Subcatchment12S: Area 12	Runoff Area=2,497 sf 52.38% Impervious Runoff Depth=3.69" Flow Length=59' Tc=6.0 min CN=87 Runoff=0.24 cfs 0.018 af
Subcatchment13S: Area 13	Runoff Area=17,051 sf 72.28% Impervious Runoff Depth=4.11" Flow Length=130' Tc=6.0 min CN=91 Runoff=1.80 cfs 0.134 af
Subcatchment14aS: Area 14	Runoff Area=13,439 sf 83.18% Impervious Runoff Depth=4.44" Flow Length=83' Tc=6.0 min CN=94 Runoff=1.49 cfs 0.114 af
Subcatchment14bS: Area 14	Runoff Area=12,629 sf 83.92% Impervious Runoff Depth=4.44" Flow Length=83' Tc=6.0 min CN=94 Runoff=1.40 cfs 0.107 af
Subcatchment15S: Area 15	Runoff Area=7,058 sf 86.09% Impervious Runoff Depth=4.55" Flow Length=91' Tc=6.0 min CN=95 Runoff=0.79 cfs 0.061 af

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Subcatchment16S: Area 16	Runoff Area=7,789 sf 92.26% Impervious Runoff Depth=4.66" Flow Length=81' Tc=6.0 min CN=96 Runoff=0.88 cfs 0.069 af
Subcatchment17S: Area 17	Runoff Area=13,340 sf 74.29% Impervious Runoff Depth=4.11" Flow Length=95' Tc=6.0 min CN=91 Runoff=1.41 cfs 0.105 af
Subcatchment18S: Area 18	Runoff Area=12,020 sf 88.79% Impervious Runoff Depth=4.55" Flow Length=80' Tc=6.0 min CN=95 Runoff=1.35 cfs 0.105 af
Subcatchment19S: Area 19	Runoff Area=16,707 sf 16.39% Impervious Runoff Depth=2.56" Flow Length=289' Tc=6.0 min CN=75 Runoff=1.15 cfs 0.082 af
Subcatchment20S: Area 20	Runoff Area=69,477 sf 12.27% Impervious Runoff Depth=2.47" Flow Length=230' Tc=7.9 min CN=74 Runoff=4.30 cfs 0.328 af
Subcatchment21S: Area 21	Runoff Area=30,013 sf 12.04% Impervious Runoff Depth=2.47" Flow Length=332' Tc=7.4 min CN=74 Runoff=1.89 cfs 0.142 af
Reach 1R: Charles River	Inflow=37.61 cfs 3.019 af Outflow=37.61 cfs 3.019 af
Reach 2R: Office Park	Inflow=0.88 cfs 0.064 af Outflow=0.88 cfs 0.064 af
Reach 3R: Low Point	Inflow=0.45 cfs 0.032 af Outflow=0.45 cfs 0.032 af
Reach 4R: Talcott Ave	Inflow=6.88 cfs 0.640 af Outflow=6.88 cfs 0.640 af
Reach 5R: 24" Drain System	Inflow=5.81 cfs 0.416 af Outflow=5.81 cfs 0.416 af
Reach 6R: CB3 8" Clay	Inflow=3.24 cfs 0.233 af Outflow=3.24 cfs 0.233 af
Reach 7R: CB6 - 8"	Inflow=6.05 cfs 0.458 af Outflow=6.05 cfs 0.458 af
Reach 8R: CB7 - 6"	Inflow=4.25 cfs 0.323 af Outflow=4.25 cfs 0.323 af
Reach 11R: MH7	Inflow=1.39 cfs 0.099 af Outflow=1.39 cfs 0.099 af
Reach 15R: MH6	Inflow=16.97 cfs 1.251 af Outflow=16.97 cfs 1.251 af
Reach 16R: Arsenal Park Phase A	Inflow=1.40 cfs 0.107 af Outflow=1.40 cfs 0.107 af

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Reach 19R: CB9	Inflow=2.76 cfs 0.209 af Outflow=2.76 cfs 0.209 af
Reach 20R: CB8 - 10"	Inflow=1.35 cfs 0.105 af Outflow=1.35 cfs 0.105 af
Reach 21R: CB11 - 10"	Inflow=1.68 cfs 0.131 af Outflow=1.68 cfs 0.131 af
Reach 22R: CB10 - 10"	Inflow=0.88 cfs 0.069 af Outflow=0.88 cfs 0.069 af
Pond 1P: CB1	Peak Elev=34.57' Inflow=0.82 cfs 0.058 af 8.0" Round Culvert n=0.013 L=138.0' S=0.0196 '/' Outflow=0.82 cfs 0.058 af
Pond 2P: CB2	Peak Elev=34.02' Inflow=1.76 cfs 0.125 af 12.0" Round Culvert n=0.013 L=118.0' S=0.0169 '/' Outflow=1.76 cfs 0.125 af
Pond 3P: MH1	Peak Elev=36.01' Inflow=4.99 cfs 0.358 af 12.0" Round Culvert n=0.013 L=176.0' S=0.0051 '/' Outflow=4.99 cfs 0.358 af
Pond 4P: MH2	Peak Elev=31.36' Inflow=0.82 cfs 0.058 af 12.0" Round Culvert n=0.013 L=34.0' S=0.0176 '/' Outflow=0.82 cfs 0.058 af
Pond 5P: CB4	Peak Elev=31.18' Inflow=1.80 cfs 0.130 af 8.0" Round Culvert n=0.013 L=67.0' S=0.0478 '/' Outflow=1.80 cfs 0.130 af
Pond 11P: CB12	Peak Elev=29.88' Inflow=0.24 cfs 0.018 af 8.0" Round Culvert n=0.013 L=17.0' S=0.1529 '/' Outflow=0.24 cfs 0.018 af
Pond 12P: CB13	Peak Elev=24.32' Inflow=1.39 cfs 0.099 af 8.0" Round Culvert n=0.013 L=115.0' S=0.0374 '/' Outflow=1.39 cfs 0.099 af
Pond 13P: MH4	Peak Elev=84.36' Inflow=8.09 cfs 0.605 af 8.0" Round Culvert n=0.013 L=104.0' S=0.0197 '/' Outflow=8.09 cfs 0.605 af
Pond 14P: MH5	Peak Elev=34.45' Inflow=9.77 cfs 0.736 af 12.0" Round Culvert n=0.013 L=100.0' S=0.0203 '/' Outflow=9.77 cfs 0.736 af

Total Runoff Area = 13.031 ac Runoff Volume = 3.222 af Average Runoff Depth = 2.97"
72.74% Pervious = 9.478 ac 27.26% Impervious = 3.553 ac

Summary for Subcatchment 1S: Area 1

Runoff = 0.88 cfs @ 12.10 hrs, Volume= 0.064 af, Depth= 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
14,531	72	Woods/grass comb., Good, HSG C
14,531		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	34	0.0680	0.10		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	56	0.0500	1.12		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.3	90	Total			

Summary for Subcatchment 2S: Area 2

Runoff = 0.46 cfs @ 12.09 hrs, Volume= 0.033 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
3,280	72	Woods/grass comb., Good, HSG C
2,090	98	Paved parking, HSG C
5,370	82	Weighted Average
3,280		61.08% Pervious Area
2,090		38.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	29	0.1380	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.4	15	0.0130	0.57		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.2	32	0.0220	3.01		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
0.4	27	0.0660	1.28		Shallow Concentrated Flow, Shallow Conc - 3
					Woodland Kv= 5.0 fps
4.7	103	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Area 3

Runoff = 0.45 cfs @ 12.09 hrs, Volume= 0.032 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
4,138	72	Woods/grass comb., Good, HSG C
741	98	Paved parking, HSG C
1,664	74	>75% Grass cover, Good, HSG C
6,543	75	Weighted Average
5,802		88.67% Pervious Area
741		11.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	27	0.0330	0.16		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
1.4	58	0.0100	0.70		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
4.2	85	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Area 4

Runoff = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
4,237	72	Woods/grass comb., Good, HSG C
1,534	98	Paved parking, HSG C
5,722	74	>75% Grass cover, Good, HSG C
11,493	76	Weighted Average
9,959		86.65% Pervious Area
1,534		13.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	17	0.0120	0.07		Sheet Flow, Sheet Flow - 1
					Grass: Dense n= 0.240 P2= 3.25"
1.8	71	0.0170	0.65		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.0	88	Total			

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Summary for Subcatchment 5S: Area 5

Runoff = 1.76 cfs @ 12.09 hrs, Volume= 0.125 af, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
14,860	72	Woods/grass comb., Good, HSG C
6,850	98	Paved parking, HSG C
21,710	80	Weighted Average
14,860		68.45% Pervious Area
6,850		31.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	30	0.1070	0.12		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.2	25	0.1200	2.42		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
0.2	39	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.6	94	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 6S: Area 6

Runoff = 1.80 cfs @ 12.09 hrs, Volume= 0.130 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
4,982	72	Woods/grass comb., Good, HSG C
9,865	98	Paved parking, HSG C
4,096	74	>75% Grass cover, Good, HSG C
18,943	86	Weighted Average
9,078		47.92% Pervious Area
9,865		52.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	20	0.0600	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.9	38	0.0210	0.72		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.7	98	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.4	156	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 7S: Area 7

Runoff = 3.24 cfs @ 12.09 hrs, Volume= 0.233 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
11,525	72	Woods/grass comb., Good, HSG C
17,477	98	Paved parking, HSG C
5,869	74	>75% Grass cover, Good, HSG C
34,871	85	Weighted Average
17,394		49.88% Pervious Area
17,477		50.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	30	0.1270	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.4	32	0.0840	1.45		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.9	114	0.0120	2.22		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.2	176	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Area 8

Runoff = 2.39 cfs @ 12.10 hrs, Volume= 0.176 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
12,065	72	Woods/grass comb., Good, HSG C
9,744	98	Paved parking, HSG C
7,793	74	>75% Grass cover, Good, HSG C
29,602	81	Weighted Average
19,858		67.08% Pervious Area
9,744		32.92% Impervious Area

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	17	0.0120	0.10		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.8	68	0.0370	1.35		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.4	72	0.0280	3.40		Shallow Concentrated Flow, Shallow Conc - 2 Paved Kv= 20.3 fps
2.8	112	0.0180	0.67		Shallow Concentrated Flow, Shallow Conc - 3 Woodland Kv= 5.0 fps
6.9	269	Total			

Summary for Subcatchment 9S: Area 9

Runoff = 4.73 cfs @ 12.19 hrs, Volume= 0.431 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
51,744	72	Woods/grass comb., Good, HSG C
9,900	98	Paved parking, HSG C
26,000	74	>75% Grass cover, Good, HSG C
566	70	Woods, Good, HSG C
88,210	75	Weighted Average
78,310		88.78% Pervious Area
9,900		11.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	37	0.0050	0.08		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
5.2	352	0.0260	1.13		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.0	87	0.0820	1.43		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
13.8	476	Total			

Summary for Subcatchment 10S: Area 10

Runoff = 1.39 cfs @ 12.09 hrs, Volume= 0.099 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Area (sf)	CN	Description
19,544	74	>75% Grass cover, Good, HSG C
725	98	Paved parking, HSG C
20,269	75	Weighted Average
19,544		96.42% Pervious Area
725		3.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	22	0.1410	0.28		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
3.0	242	0.0370	1.35		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
4.3	264	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 11S: Area 11

Runoff = 7.41 cfs @ 12.12 hrs, Volume= 0.577 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
19,015	70	Woods, Good, HSG C
11,700	98	Paved parking, HSG C
83,350	74	>75% Grass cover, Good, HSG C
114,065	76	Weighted Average
102,365		89.74% Pervious Area
11,700		10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	22	0.0140	0.11		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
4.8	370	0.0340	1.29		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.5	74	0.2110	2.30		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
8.6	466	Total			

Summary for Subcatchment 12S: Area 12

Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af, Depth= 3.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Area (sf)	CN	Description
1,189	74	>75% Grass cover, Good, HSG C
1,308	98	Paved parking, HSG C
2,497	87	Weighted Average
1,189		47.62% Pervious Area
1,308		52.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	15	0.1070	0.23		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.3	44	0.1410	2.63		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.4	59	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 13S: Area 13

Runoff = 1.80 cfs @ 12.08 hrs, Volume= 0.134 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
4,727	74	>75% Grass cover, Good, HSG C
12,324	98	Paved parking, HSG C
17,051	91	Weighted Average
4,727		27.72% Pervious Area
12,324		72.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	21	0.0070	0.67		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.5	62	0.0120	2.22		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
1.2	47	0.0090	0.66		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
2.2	130	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14aS: Area 14

Runoff = 1.49 cfs @ 12.08 hrs, Volume= 0.114 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Area (sf)	CN	Description
2,261	74	>75% Grass cover, Good, HSG C
11,178	98	Paved parking, HSG C
13,439	94	Weighted Average
2,261		16.82% Pervious Area
11,178		83.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0070	0.66		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0200	2.87		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	83	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14bS: Area 14

Runoff = 1.40 cfs @ 12.08 hrs, Volume= 0.107 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
2,031	74	>75% Grass cover, Good, HSG C
10,598	98	Paved parking, HSG C
12,629	94	Weighted Average
2,031		16.08% Pervious Area
10,598		83.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0070	0.66		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0200	2.87		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	83	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 15S: Area 15

Runoff = 0.79 cfs @ 12.08 hrs, Volume= 0.061 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
982	74	>75% Grass cover, Good, HSG C
6,076	98	Paved parking, HSG C
7,058	95	Weighted Average
982		13.91% Pervious Area
6,076		86.09% Impervious Area

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	14	0.1710	0.27		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.6	77	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
1.5	91	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 16S: Area 16

Runoff = 0.88 cfs @ 12.08 hrs, Volume= 0.069 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
603	70	Woods, Good, HSG C
7,186	98	Paved parking, HSG C
7,789	96	Weighted Average
603		7.74% Pervious Area
7,186		92.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	21	0.0050	0.58		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	60	0.0250	3.21		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	81	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 17S: Area 17

Runoff = 1.41 cfs @ 12.08 hrs, Volume= 0.105 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
3,430	70	Woods, Good, HSG C
9,910	98	Paved parking, HSG C
13,340	91	Weighted Average
3,430		25.71% Pervious Area
9,910		74.29% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	22	0.0110	0.81		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	52	0.0170	2.65		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.3	21	0.0620	1.24		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
1.1	95	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 18S: Area 18

Runoff = 1.35 cfs @ 12.08 hrs, Volume= 0.105 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
1,348	70	Woods, Good, HSG C
10,672	98	Paved parking, HSG C
12,020	95	Weighted Average
1,348		11.21% Pervious Area
10,672		88.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0130	0.85		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	60	0.0300	3.52		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.7	80	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 19S: Area 19

Runoff = 1.15 cfs @ 12.09 hrs, Volume= 0.082 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
13,969	70	Woods, Good, HSG C
2,738	98	Paved parking, HSG C
16,707	75	Weighted Average
13,969		83.61% Pervious Area
2,738		16.39% Impervious Area

Arsenal Park - Existing Conditions Final 60% - REV *type III 24-hr 10 Yr 24 Hr Rainfall=5.13"*

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0140	0.88		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	52	0.0180	2.72		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.5	82	0.3080	2.77		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
2.4	134	0.0180	0.94		Shallow Concentrated Flow, Shallow Conc - 3 Short Grass Pasture Kv= 7.0 fps
3.6	289	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 20S: Area 20

Runoff = 4.30 cfs @ 12.12 hrs, Volume= 0.328 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
58,183	70	Woods, Good, HSG C
2,769	74	>75% Grass cover, Good, HSG C
8,525	98	Paved parking, HSG C
69,477	74	Weighted Average
60,952		87.73% Pervious Area
8,525		12.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	30	0.0530	0.09		Sheet Flow, Sheet Flow - 1 Woods: Light underbrush n= 0.400 P2= 3.25"
0.6	90	0.2780	2.64		Shallow Concentrated Flow, Shallow Conc - 1 Woodland Kv= 5.0 fps
1.8	110	0.0220	1.04		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
7.9	230	Total			

Summary for Subcatchment 21S: Area 21

Runoff = 1.89 cfs @ 12.11 hrs, Volume= 0.142 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Area (sf)	CN	Description
21,600	70	Woods, Good, HSG C
3,613	98	Paved parking, HSG C
4,800	74	>75% Grass cover, Good, HSG C
30,013	74	Weighted Average
26,400		87.96% Pervious Area
3,613		12.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	32	0.0190	0.13		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
2.4	186	0.0340	1.29		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.0	114	0.1400	1.87		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
7.4	332	Total			

Summary for Reach 1R: Charles River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 12.257 ac, 26.86% Impervious, Inflow Depth = 2.96" for 10 Yr 24 Hr event
 Inflow = 37.61 cfs @ 12.10 hrs, Volume= 3.019 af
 Outflow = 37.61 cfs @ 12.10 hrs, Volume= 3.019 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Office Park

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.334 ac, 0.00% Impervious, Inflow Depth = 2.30" for 10 Yr 24 Hr event
 Inflow = 0.88 cfs @ 12.10 hrs, Volume= 0.064 af
 Outflow = 0.88 cfs @ 12.10 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Low Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.150 ac, 11.33% Impervious, Inflow Depth = 2.56" for 10 Yr 24 Hr event
 Inflow = 0.45 cfs @ 12.09 hrs, Volume= 0.032 af
 Outflow = 0.45 cfs @ 12.09 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Talcott Ave

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.828 ac, 17.64% Impervious, Inflow Depth = 2.71" for 10 Yr 24 Hr event
 Inflow = 6.88 cfs @ 12.15 hrs, Volume= 0.640 af
 Outflow = 6.88 cfs @ 12.15 hrs, Volume= 0.640 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: 24" Drain System

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.563 ac, 37.99% Impervious, Inflow Depth = 3.19" for 10 Yr 24 Hr event
 Inflow = 5.81 cfs @ 12.09 hrs, Volume= 0.416 af
 Outflow = 5.81 cfs @ 12.09 hrs, Volume= 0.416 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: CB3 8" Clay

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.801 ac, 50.12% Impervious, Inflow Depth = 3.49" for 10 Yr 24 Hr event
 Inflow = 3.24 cfs @ 12.09 hrs, Volume= 0.233 af
 Outflow = 3.24 cfs @ 12.09 hrs, Volume= 0.233 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 7R: CB6 - 8"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.282 ac, 78.93% Impervious, Inflow Depth = 4.28" for 10 Yr 24 Hr event
 Inflow = 6.05 cfs @ 12.08 hrs, Volume= 0.458 af
 Outflow = 6.05 cfs @ 12.08 hrs, Volume= 0.458 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 8R: CB7 - 6"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.891 ac, 81.86% Impervious, Inflow Depth = 4.36" for 10 Yr 24 Hr event
 Inflow = 4.25 cfs @ 12.08 hrs, Volume= 0.323 af
 Outflow = 4.25 cfs @ 12.08 hrs, Volume= 0.323 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 11R: MH7

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.465 ac, 3.58% Impervious, Inflow Depth = 2.56" for 10 Yr 24 Hr event
 Inflow = 1.39 cfs @ 12.09 hrs, Volume= 0.099 af
 Outflow = 1.39 cfs @ 12.09 hrs, Volume= 0.099 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 15R: MH6

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.143 ac, 52.70% Impervious, Inflow Depth = 3.62" for 10 Yr 24 Hr event
 Inflow = 16.97 cfs @ 12.09 hrs, Volume= 1.251 af
 Outflow = 16.97 cfs @ 12.09 hrs, Volume= 1.251 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 16R: Arsenal Park Phase A

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.290 ac, 83.92% Impervious, Inflow Depth = 4.44" for 10 Yr 24 Hr event
 Inflow = 1.40 cfs @ 12.08 hrs, Volume= 0.107 af
 Outflow = 1.40 cfs @ 12.08 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 19R: CB9

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.582 ac, 81.16% Impervious, Inflow Depth = 4.32" for 10 Yr 24 Hr event
 Inflow = 2.76 cfs @ 12.08 hrs, Volume= 0.209 af
 Outflow = 2.76 cfs @ 12.08 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 20R: CB8 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.276 ac, 88.79% Impervious, Inflow Depth = 4.55" for 10 Yr 24 Hr event
 Inflow = 1.35 cfs @ 12.08 hrs, Volume= 0.105 af
 Outflow = 1.35 cfs @ 12.08 hrs, Volume= 0.105 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 21R: CB11 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.341 ac, 89.32% Impervious, Inflow Depth = 4.61" for 10 Yr 24 Hr event
 Inflow = 1.68 cfs @ 12.08 hrs, Volume= 0.131 af
 Outflow = 1.68 cfs @ 12.08 hrs, Volume= 0.131 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 22R: CB10 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.179 ac, 92.26% Impervious, Inflow Depth = 4.66" for 10 Yr 24 Hr event
 Inflow = 0.88 cfs @ 12.08 hrs, Volume= 0.069 af
 Outflow = 0.88 cfs @ 12.08 hrs, Volume= 0.069 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: CB1

[58] Hint: Peaked 0.57' above defined flood level

Inflow Area = 0.264 ac, 13.35% Impervious, Inflow Depth = 2.64" for 10 Yr 24 Hr event
 Inflow = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af
 Outflow = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 34.57' @ 12.09 hrs
 Flood Elev= 34.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	8.0" Round 8" Clay Pipe L= 138.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.00' / 31.30' S= 0.0196 ' / ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.82 cfs @ 12.09 hrs HW=34.57' (Free Discharge)
 ↑1=8" Clay Pipe (Inlet Controls 0.82 cfs @ 2.57 fps)

Summary for Pond 2P: CB2

Inflow Area = 0.498 ac, 31.55% Impervious, Inflow Depth = 3.01" for 10 Yr 24 Hr event
 Inflow = 1.76 cfs @ 12.09 hrs, Volume= 0.125 af
 Outflow = 1.76 cfs @ 12.09 hrs, Volume= 0.125 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.76 cfs @ 12.09 hrs, Volume= 0.125 af

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 34.02' @ 12.09 hrs

Flood Elev= 36.24'

Device	Routing	Invert	Outlet Devices
#1	Primary	33.30'	12.0" Round 12" RCP L= 118.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 33.30' / 31.30' S= 0.0169 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=1.75 cfs @ 12.09 hrs HW=34.02' (Free Discharge)↑**1=12" RCP** (Inlet Controls 1.75 cfs @ 2.89 fps)**Summary for Pond 3P: MH1**

[58] Hint: Peaked 1.01' above defined flood level

[81] Warning: Exceeded Pond 2P by 1.98' @ 12.09 hrs

Inflow Area = 1.299 ac, 42.99% Impervious, Inflow Depth = 3.30" for 10 Yr 24 Hr event
Inflow = 4.99 cfs @ 12.09 hrs, Volume= 0.358 af
Outflow = 4.99 cfs @ 12.09 hrs, Volume= 0.358 af, Atten= 0%, Lag= 0.0 min
Primary = 4.99 cfs @ 12.09 hrs, Volume= 0.358 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 36.01' @ 12.09 hrs

Flood Elev= 35.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.50'	12.0" Round 12" RCP L= 176.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.50' / 30.60' S= 0.0051 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=4.99 cfs @ 12.09 hrs HW=36.00' (Free Discharge)↑**1=12" RCP** (Barrel Controls 4.99 cfs @ 6.35 fps)**Summary for Pond 4P: MH2**

[79] Warning: Submerged Pond 1P Primary device # 1 OUTLET by 0.06'

Inflow Area = 0.264 ac, 13.35% Impervious, Inflow Depth = 2.64" for 10 Yr 24 Hr event
Inflow = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af
Outflow = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min
Primary = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 31.36' @ 12.09 hrs

Flood Elev= 36.86'

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Device	Routing	Invert	Outlet Devices
#1	Primary	30.90'	12.0" Round 12" RCP L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.90' / 30.30' S= 0.0176 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=0.82 cfs @ 12.09 hrs HW=31.36' (Free Discharge)↑**1=12" RCP** (Inlet Controls 0.82 cfs @ 2.31 fps)**Summary for Pond 5P: CB4**

Inflow Area = 0.435 ac, 52.08% Impervious, Inflow Depth = 3.59" for 10 Yr 24 Hr event
Inflow = 1.80 cfs @ 12.09 hrs, Volume= 0.130 af
Outflow = 1.80 cfs @ 12.09 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min
Primary = 1.80 cfs @ 12.09 hrs, Volume= 0.130 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 31.18' @ 12.09 hrs

Flood Elev= 35.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.70'	8.0" Round Culvert L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.70' / 26.50' S= 0.0478 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=1.80 cfs @ 12.09 hrs HW=31.18' (Free Discharge)↑**1=Culvert** (Inlet Controls 1.80 cfs @ 5.15 fps)**Summary for Pond 11P: CB12**

Inflow Area = 0.057 ac, 52.38% Impervious, Inflow Depth = 3.69" for 10 Yr 24 Hr event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af
Outflow = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min
Primary = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 29.88' @ 12.09 hrs

Flood Elev= 31.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.60'	8.0" Round Culvert L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.60' / 27.00' S= 0.1529 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.24 cfs @ 12.09 hrs HW=29.87' (Free Discharge)↑**1=Culvert** (Inlet Controls 0.24 cfs @ 1.79 fps)

Summary for Pond 12P: CB13

Inflow Area = 0.465 ac, 3.58% Impervious, Inflow Depth = 2.56" for 10 Yr 24 Hr event
 Inflow = 1.39 cfs @ 12.09 hrs, Volume= 0.099 af
 Outflow = 1.39 cfs @ 12.09 hrs, Volume= 0.099 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.39 cfs @ 12.09 hrs, Volume= 0.099 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 24.32' @ 12.09 hrs
 Flood Elev= 26.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.30'	8.0" Round Culvert L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 23.30' / 19.00' S= 0.0374 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=1.39 cfs @ 12.09 hrs HW=24.32' (Free Discharge)
 ↑1=Culvert (Inlet Controls 1.39 cfs @ 3.99 fps)

Summary for Pond 13P: MH4

[58] Hint: Peaked 51.31' above defined flood level
 [81] Warning: Exceeded Pond 5P by 52.98' @ 12.08 hrs
 [81] Warning: Exceeded Pond 11P by 54.28' @ 12.08 hrs

Inflow Area = 1.774 ac, 71.49% Impervious, Inflow Depth = 4.09" for 10 Yr 24 Hr event
 Inflow = 8.09 cfs @ 12.08 hrs, Volume= 0.605 af
 Outflow = 8.09 cfs @ 12.08 hrs, Volume= 0.605 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.09 cfs @ 12.08 hrs, Volume= 0.605 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 84.36' @ 12.08 hrs
 Flood Elev= 33.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.40'	8.0" Round Culvert L= 104.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.40' / 24.35' S= 0.0197 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=8.08 cfs @ 12.08 hrs HW=84.14' (Free Discharge)
 ↑1=Culvert (Barrel Controls 8.08 cfs @ 23.15 fps)

Summary for Pond 14P: MH5

[58] Hint: Peaked 5.79' above defined flood level
 [79] Warning: Submerged Pond 13P Primary device # 1 INLET by 8.01'

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Inflow Area = 2.115 ac, 74.37% Impervious, Inflow Depth = 4.18" for 10 Yr 24 Hr event
Inflow = 9.77 cfs @ 12.08 hrs, Volume= 0.736 af
Outflow = 9.77 cfs @ 12.08 hrs, Volume= 0.736 af, Atten= 0%, Lag= 0.0 min
Primary = 9.77 cfs @ 12.08 hrs, Volume= 0.736 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 34.45' @ 12.08 hrs

Flood Elev= 28.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.33'	12.0" Round Culvert L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.33' / 22.30' S= 0.0203 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=9.75 cfs @ 12.08 hrs HW=34.41' (Free Discharge)↑**1=Culvert** (Barrel Controls 9.75 cfs @ 12.42 fps)

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Area 1	Runoff Area=14,531 sf 0.00% Impervious Runoff Depth=3.25" Flow Length=90' Tc=6.3 min CN=72 Runoff=1.26 cfs 0.090 af
Subcatchment2S: Area 2	Runoff Area=5,370 sf 38.92% Impervious Runoff Depth=4.27" Flow Length=103' Tc=6.0 min CN=82 Runoff=0.61 cfs 0.044 af
Subcatchment3S: Area 3	Runoff Area=6,543 sf 11.33% Impervious Runoff Depth=3.55" Flow Length=85' Tc=6.0 min CN=75 Runoff=0.63 cfs 0.044 af
Subcatchment4S: Area 4	Runoff Area=11,493 sf 13.35% Impervious Runoff Depth=3.65" Flow Length=88' Tc=6.0 min CN=76 Runoff=1.13 cfs 0.080 af
Subcatchment5S: Area 5	Runoff Area=21,710 sf 31.55% Impervious Runoff Depth=4.06" Flow Length=94' Tc=6.0 min CN=80 Runoff=2.36 cfs 0.169 af
Subcatchment6S: Area 6	Runoff Area=18,943 sf 52.08% Impervious Runoff Depth=4.70" Flow Length=156' Tc=6.0 min CN=86 Runoff=2.34 cfs 0.170 af
Subcatchment7S: Area 7	Runoff Area=34,871 sf 50.12% Impervious Runoff Depth=4.60" Flow Length=176' Tc=6.0 min CN=85 Runoff=4.22 cfs 0.307 af
Subcatchment8S: Area 8	Runoff Area=29,602 sf 32.92% Impervious Runoff Depth=4.17" Flow Length=269' Tc=6.9 min CN=81 Runoff=3.19 cfs 0.236 af
Subcatchment9S: Area 9	Runoff Area=88,210 sf 11.22% Impervious Runoff Depth=3.55" Flow Length=476' Tc=13.8 min CN=75 Runoff=6.59 cfs 0.599 af
Subcatchment10S: Area 10	Runoff Area=20,269 sf 3.58% Impervious Runoff Depth=3.55" Flow Length=264' Tc=6.0 min CN=75 Runoff=1.94 cfs 0.138 af
Subcatchment11S: Area 11	Runoff Area=114,065 sf 10.26% Impervious Runoff Depth=3.65" Flow Length=466' Tc=8.6 min CN=76 Runoff=10.24 cfs 0.796 af
Subcatchment12S: Area 12	Runoff Area=2,497 sf 52.38% Impervious Runoff Depth=4.81" Flow Length=59' Tc=6.0 min CN=87 Runoff=0.31 cfs 0.023 af
Subcatchment13S: Area 13	Runoff Area=17,051 sf 72.28% Impervious Runoff Depth=5.26" Flow Length=130' Tc=6.0 min CN=91 Runoff=2.28 cfs 0.172 af
Subcatchment14aS: Area 14	Runoff Area=13,439 sf 83.18% Impervious Runoff Depth=5.60" Flow Length=83' Tc=6.0 min CN=94 Runoff=1.86 cfs 0.144 af
Subcatchment14bS: Area 14	Runoff Area=12,629 sf 83.92% Impervious Runoff Depth=5.60" Flow Length=83' Tc=6.0 min CN=94 Runoff=1.74 cfs 0.135 af
Subcatchment15S: Area 15	Runoff Area=7,058 sf 86.09% Impervious Runoff Depth=5.72" Flow Length=91' Tc=6.0 min CN=95 Runoff=0.98 cfs 0.077 af

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Subcatchment16S: Area 16	Runoff Area=7,789 sf 92.26% Impervious Runoff Depth=5.84" Flow Length=81' Tc=6.0 min CN=96 Runoff=1.09 cfs 0.087 af
Subcatchment17S: Area 17	Runoff Area=13,340 sf 74.29% Impervious Runoff Depth=5.26" Flow Length=95' Tc=6.0 min CN=91 Runoff=1.78 cfs 0.134 af
Subcatchment18S: Area 18	Runoff Area=12,020 sf 88.79% Impervious Runoff Depth=5.72" Flow Length=80' Tc=6.0 min CN=95 Runoff=1.68 cfs 0.132 af
Subcatchment19S: Area 19	Runoff Area=16,707 sf 16.39% Impervious Runoff Depth=3.55" Flow Length=289' Tc=6.0 min CN=75 Runoff=1.60 cfs 0.113 af
Subcatchment20S: Area 20	Runoff Area=69,477 sf 12.27% Impervious Runoff Depth=3.45" Flow Length=230' Tc=7.9 min CN=74 Runoff=6.04 cfs 0.458 af
Subcatchment21S: Area 21	Runoff Area=30,013 sf 12.04% Impervious Runoff Depth=3.45" Flow Length=332' Tc=7.4 min CN=74 Runoff=2.65 cfs 0.198 af
Reach 1R: Charles River	Inflow=50.66 cfs 4.077 af Outflow=50.66 cfs 4.077 af
Reach 2R: Office Park	Inflow=1.26 cfs 0.090 af Outflow=1.26 cfs 0.090 af
Reach 3R: Low Point	Inflow=0.63 cfs 0.044 af Outflow=0.63 cfs 0.044 af
Reach 4R: Talcott Ave	Inflow=9.47 cfs 0.879 af Outflow=9.47 cfs 0.879 af
Reach 5R: 24" Drain System	Inflow=7.71 cfs 0.556 af Outflow=7.71 cfs 0.556 af
Reach 6R: CB3 8" Clay	Inflow=4.22 cfs 0.307 af Outflow=4.22 cfs 0.307 af
Reach 7R: CB6 - 8"	Inflow=7.59 cfs 0.581 af Outflow=7.59 cfs 0.581 af
Reach 8R: CB7 - 6"	Inflow=5.31 cfs 0.410 af Outflow=5.31 cfs 0.410 af
Reach 11R: MH7	Inflow=1.94 cfs 0.138 af Outflow=1.94 cfs 0.138 af
Reach 15R: MH6	Inflow=21.96 cfs 1.632 af Outflow=21.96 cfs 1.632 af
Reach 16R: Arsenal Park Phase A	Inflow=1.74 cfs 0.135 af Outflow=1.74 cfs 0.135 af

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Reach 19R: CB9	Inflow=3.46 cfs 0.266 af Outflow=3.46 cfs 0.266 af
Reach 20R: CB8 - 10"	Inflow=1.68 cfs 0.132 af Outflow=1.68 cfs 0.132 af
Reach 21R: CB11 - 10"	Inflow=2.08 cfs 0.164 af Outflow=2.08 cfs 0.164 af
Reach 22R: CB10 - 10"	Inflow=1.09 cfs 0.087 af Outflow=1.09 cfs 0.087 af
Pond 1P: CB1	Peak Elev=34.78' Inflow=1.13 cfs 0.080 af 8.0" Round Culvert n=0.013 L=138.0' S=0.0196 '/' Outflow=1.13 cfs 0.080 af
Pond 2P: CB2	Peak Elev=34.19' Inflow=2.36 cfs 0.169 af 12.0" Round Culvert n=0.013 L=118.0' S=0.0169 '/' Outflow=2.36 cfs 0.169 af
Pond 3P: MH1	Peak Elev=39.26' Inflow=6.58 cfs 0.475 af 12.0" Round Culvert n=0.013 L=176.0' S=0.0051 '/' Outflow=6.58 cfs 0.475 af
Pond 4P: MH2	Peak Elev=31.45' Inflow=1.13 cfs 0.080 af 12.0" Round Culvert n=0.013 L=34.0' S=0.0176 '/' Outflow=1.13 cfs 0.080 af
Pond 5P: CB4	Peak Elev=31.96' Inflow=2.34 cfs 0.170 af 8.0" Round Culvert n=0.013 L=67.0' S=0.0478 '/' Outflow=2.34 cfs 0.170 af
Pond 11P: CB12	Peak Elev=29.92' Inflow=0.31 cfs 0.023 af 8.0" Round Culvert n=0.013 L=17.0' S=0.1529 '/' Outflow=0.31 cfs 0.023 af
Pond 12P: CB13	Peak Elev=24.96' Inflow=1.94 cfs 0.138 af 8.0" Round Culvert n=0.013 L=115.0' S=0.0374 '/' Outflow=1.94 cfs 0.138 af
Pond 13P: MH4	Peak Elev=119.91' Inflow=10.24 cfs 0.775 af 8.0" Round Culvert n=0.013 L=104.0' S=0.0197 '/' Outflow=10.24 cfs 0.775 af
Pond 14P: MH5	Peak Elev=41.01' Inflow=12.32 cfs 0.939 af 12.0" Round Culvert n=0.013 L=100.0' S=0.0203 '/' Outflow=12.32 cfs 0.939 af

Total Runoff Area = 13.031 ac Runoff Volume = 4.347 af Average Runoff Depth = 4.00"
72.74% Pervious = 9.478 ac 27.26% Impervious = 3.553 ac

Summary for Subcatchment 1S: Area 1

Runoff = 1.26 cfs @ 12.09 hrs, Volume= 0.090 af, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
14,531	72	Woods/grass comb., Good, HSG C
14,531		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	34	0.0680	0.10		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	56	0.0500	1.12		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.3	90	Total			

Summary for Subcatchment 2S: Area 2

Runoff = 0.61 cfs @ 12.09 hrs, Volume= 0.044 af, Depth= 4.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
3,280	72	Woods/grass comb., Good, HSG C
2,090	98	Paved parking, HSG C
5,370	82	Weighted Average
3,280		61.08% Pervious Area
2,090		38.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	29	0.1380	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.4	15	0.0130	0.57		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.2	32	0.0220	3.01		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
0.4	27	0.0660	1.28		Shallow Concentrated Flow, Shallow Conc - 3
					Woodland Kv= 5.0 fps
4.7	103	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Area 3

Runoff = 0.63 cfs @ 12.09 hrs, Volume= 0.044 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
4,138	72	Woods/grass comb., Good, HSG C
741	98	Paved parking, HSG C
1,664	74	>75% Grass cover, Good, HSG C
6,543	75	Weighted Average
5,802		88.67% Pervious Area
741		11.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	27	0.0330	0.16		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
1.4	58	0.0100	0.70		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
4.2	85	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Area 4

Runoff = 1.13 cfs @ 12.09 hrs, Volume= 0.080 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
4,237	72	Woods/grass comb., Good, HSG C
1,534	98	Paved parking, HSG C
5,722	74	>75% Grass cover, Good, HSG C
11,493	76	Weighted Average
9,959		86.65% Pervious Area
1,534		13.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	17	0.0120	0.07		Sheet Flow, Sheet Flow - 1
					Grass: Dense n= 0.240 P2= 3.25"
1.8	71	0.0170	0.65		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.0	88	Total			

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Summary for Subcatchment 5S: Area 5

Runoff = 2.36 cfs @ 12.09 hrs, Volume= 0.169 af, Depth= 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
14,860	72	Woods/grass comb., Good, HSG C
6,850	98	Paved parking, HSG C
21,710	80	Weighted Average
14,860		68.45% Pervious Area
6,850		31.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	30	0.1070	0.12		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.2	25	0.1200	2.42		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
0.2	39	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.6	94	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 6S: Area 6

Runoff = 2.34 cfs @ 12.09 hrs, Volume= 0.170 af, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
4,982	72	Woods/grass comb., Good, HSG C
9,865	98	Paved parking, HSG C
4,096	74	>75% Grass cover, Good, HSG C
18,943	86	Weighted Average
9,078		47.92% Pervious Area
9,865		52.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	20	0.0600	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.9	38	0.0210	0.72		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.7	98	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.4	156	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 7S: Area 7

Runoff = 4.22 cfs @ 12.09 hrs, Volume= 0.307 af, Depth= 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
11,525	72	Woods/grass comb., Good, HSG C
17,477	98	Paved parking, HSG C
5,869	74	>75% Grass cover, Good, HSG C
34,871	85	Weighted Average
17,394		49.88% Pervious Area
17,477		50.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	30	0.1270	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.4	32	0.0840	1.45		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.9	114	0.0120	2.22		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.2	176	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Area 8

Runoff = 3.19 cfs @ 12.10 hrs, Volume= 0.236 af, Depth= 4.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
12,065	72	Woods/grass comb., Good, HSG C
9,744	98	Paved parking, HSG C
7,793	74	>75% Grass cover, Good, HSG C
29,602	81	Weighted Average
19,858		67.08% Pervious Area
9,744		32.92% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	17	0.0120	0.10		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.8	68	0.0370	1.35		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.4	72	0.0280	3.40		Shallow Concentrated Flow, Shallow Conc - 2 Paved Kv= 20.3 fps
2.8	112	0.0180	0.67		Shallow Concentrated Flow, Shallow Conc - 3 Woodland Kv= 5.0 fps
6.9	269	Total			

Summary for Subcatchment 9S: Area 9

Runoff = 6.59 cfs @ 12.19 hrs, Volume= 0.599 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
51,744	72	Woods/grass comb., Good, HSG C
9,900	98	Paved parking, HSG C
26,000	74	>75% Grass cover, Good, HSG C
566	70	Woods, Good, HSG C
88,210	75	Weighted Average
78,310		88.78% Pervious Area
9,900		11.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	37	0.0050	0.08		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
5.2	352	0.0260	1.13		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.0	87	0.0820	1.43		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
13.8	476	Total			

Summary for Subcatchment 10S: Area 10

Runoff = 1.94 cfs @ 12.09 hrs, Volume= 0.138 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Area (sf)	CN	Description
19,544	74	>75% Grass cover, Good, HSG C
725	98	Paved parking, HSG C
20,269	75	Weighted Average
19,544		96.42% Pervious Area
725		3.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	22	0.1410	0.28		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
3.0	242	0.0370	1.35		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
4.3	264	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 11S: Area 11

Runoff = 10.24 cfs @ 12.12 hrs, Volume= 0.796 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
19,015	70	Woods, Good, HSG C
11,700	98	Paved parking, HSG C
83,350	74	>75% Grass cover, Good, HSG C
114,065	76	Weighted Average
102,365		89.74% Pervious Area
11,700		10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	22	0.0140	0.11		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
4.8	370	0.0340	1.29		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.5	74	0.2110	2.30		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
8.6	466	Total			

Summary for Subcatchment 12S: Area 12

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Area (sf)	CN	Description
1,189	74	>75% Grass cover, Good, HSG C
1,308	98	Paved parking, HSG C
2,497	87	Weighted Average
1,189		47.62% Pervious Area
1,308		52.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	15	0.1070	0.23		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.3	44	0.1410	2.63		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.4	59	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 13S: Area 13

Runoff = 2.28 cfs @ 12.08 hrs, Volume= 0.172 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
4,727	74	>75% Grass cover, Good, HSG C
12,324	98	Paved parking, HSG C
17,051	91	Weighted Average
4,727		27.72% Pervious Area
12,324		72.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	21	0.0070	0.67		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.5	62	0.0120	2.22		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
1.2	47	0.0090	0.66		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
2.2	130	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14aS: Area 14

Runoff = 1.86 cfs @ 12.08 hrs, Volume= 0.144 af, Depth= 5.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Area (sf)	CN	Description
2,261	74	>75% Grass cover, Good, HSG C
11,178	98	Paved parking, HSG C
13,439	94	Weighted Average
2,261		16.82% Pervious Area
11,178		83.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0070	0.66		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0200	2.87		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	83	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14bS: Area 14

Runoff = 1.74 cfs @ 12.08 hrs, Volume= 0.135 af, Depth= 5.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
2,031	74	>75% Grass cover, Good, HSG C
10,598	98	Paved parking, HSG C
12,629	94	Weighted Average
2,031		16.08% Pervious Area
10,598		83.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0070	0.66		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0200	2.87		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	83	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 15S: Area 15

Runoff = 0.98 cfs @ 12.08 hrs, Volume= 0.077 af, Depth= 5.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
982	74	>75% Grass cover, Good, HSG C
6,076	98	Paved parking, HSG C
7,058	95	Weighted Average
982		13.91% Pervious Area
6,076		86.09% Impervious Area

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	14	0.1710	0.27		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.6	77	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
1.5	91	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 16S: Area 16

Runoff = 1.09 cfs @ 12.08 hrs, Volume= 0.087 af, Depth= 5.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
603	70	Woods, Good, HSG C
7,186	98	Paved parking, HSG C
7,789	96	Weighted Average
603		7.74% Pervious Area
7,186		92.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	21	0.0050	0.58		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	60	0.0250	3.21		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	81	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 17S: Area 17

Runoff = 1.78 cfs @ 12.08 hrs, Volume= 0.134 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
3,430	70	Woods, Good, HSG C
9,910	98	Paved parking, HSG C
13,340	91	Weighted Average
3,430		25.71% Pervious Area
9,910		74.29% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	22	0.0110	0.81		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	52	0.0170	2.65		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.3	21	0.0620	1.24		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
1.1	95	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 18S: Area 18

Runoff = 1.68 cfs @ 12.08 hrs, Volume= 0.132 af, Depth= 5.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
1,348	70	Woods, Good, HSG C
10,672	98	Paved parking, HSG C
12,020	95	Weighted Average
1,348		11.21% Pervious Area
10,672		88.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0130	0.85		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	60	0.0300	3.52		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.7	80	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 19S: Area 19

Runoff = 1.60 cfs @ 12.09 hrs, Volume= 0.113 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
13,969	70	Woods, Good, HSG C
2,738	98	Paved parking, HSG C
16,707	75	Weighted Average
13,969		83.61% Pervious Area
2,738		16.39% Impervious Area

Arsenal Park - Existing Conditions Final 60% - REV *type III 24-hr 25 Yr 24 Hr Rainfall=6.31"*

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0140	0.88		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	52	0.0180	2.72		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.5	82	0.3080	2.77		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
2.4	134	0.0180	0.94		Shallow Concentrated Flow, Shallow Conc - 3 Short Grass Pasture Kv= 7.0 fps
3.6	289	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 20S: Area 20

Runoff = 6.04 cfs @ 12.11 hrs, Volume= 0.458 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
58,183	70	Woods, Good, HSG C
2,769	74	>75% Grass cover, Good, HSG C
8,525	98	Paved parking, HSG C
69,477	74	Weighted Average
60,952		87.73% Pervious Area
8,525		12.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	30	0.0530	0.09		Sheet Flow, Sheet Flow - 1 Woods: Light underbrush n= 0.400 P2= 3.25"
0.6	90	0.2780	2.64		Shallow Concentrated Flow, Shallow Conc - 1 Woodland Kv= 5.0 fps
1.8	110	0.0220	1.04		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
7.9	230	Total			

Summary for Subcatchment 21S: Area 21

Runoff = 2.65 cfs @ 12.11 hrs, Volume= 0.198 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Area (sf)	CN	Description
21,600	70	Woods, Good, HSG C
3,613	98	Paved parking, HSG C
4,800	74	>75% Grass cover, Good, HSG C
30,013	74	Weighted Average
26,400		87.96% Pervious Area
3,613		12.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	32	0.0190	0.13		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
2.4	186	0.0340	1.29		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.0	114	0.1400	1.87		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
7.4	332	Total			

Summary for Reach 1R: Charles River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 12.257 ac, 26.86% Impervious, Inflow Depth = 3.99" for 25 Yr 24 Hr event
 Inflow = 50.66 cfs @ 12.10 hrs, Volume= 4.077 af
 Outflow = 50.66 cfs @ 12.10 hrs, Volume= 4.077 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Office Park

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.334 ac, 0.00% Impervious, Inflow Depth = 3.25" for 25 Yr 24 Hr event
 Inflow = 1.26 cfs @ 12.09 hrs, Volume= 0.090 af
 Outflow = 1.26 cfs @ 12.09 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Low Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.150 ac, 11.33% Impervious, Inflow Depth = 3.55" for 25 Yr 24 Hr event
 Inflow = 0.63 cfs @ 12.09 hrs, Volume= 0.044 af
 Outflow = 0.63 cfs @ 12.09 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Talcott Ave

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.828 ac, 17.64% Impervious, Inflow Depth = 3.73" for 25 Yr 24 Hr event
Inflow = 9.47 cfs @ 12.15 hrs, Volume= 0.879 af
Outflow = 9.47 cfs @ 12.15 hrs, Volume= 0.879 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: 24" Drain System

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.563 ac, 37.99% Impervious, Inflow Depth = 4.27" for 25 Yr 24 Hr event
Inflow = 7.71 cfs @ 12.09 hrs, Volume= 0.556 af
Outflow = 7.71 cfs @ 12.09 hrs, Volume= 0.556 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: CB3 8" Clay

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.801 ac, 50.12% Impervious, Inflow Depth = 4.60" for 25 Yr 24 Hr event
Inflow = 4.22 cfs @ 12.09 hrs, Volume= 0.307 af
Outflow = 4.22 cfs @ 12.09 hrs, Volume= 0.307 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 7R: CB6 - 8"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.282 ac, 78.93% Impervious, Inflow Depth = 5.44" for 25 Yr 24 Hr event
Inflow = 7.59 cfs @ 12.08 hrs, Volume= 0.581 af
Outflow = 7.59 cfs @ 12.08 hrs, Volume= 0.581 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 8R: CB7 - 6"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.891 ac, 81.86% Impervious, Inflow Depth = 5.52" for 25 Yr 24 Hr event
Inflow = 5.31 cfs @ 12.08 hrs, Volume= 0.410 af
Outflow = 5.31 cfs @ 12.08 hrs, Volume= 0.410 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 11R: MH7

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.465 ac, 3.58% Impervious, Inflow Depth = 3.55" for 25 Yr 24 Hr event
 Inflow = 1.94 cfs @ 12.09 hrs, Volume= 0.138 af
 Outflow = 1.94 cfs @ 12.09 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 15R: MH6

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.143 ac, 52.70% Impervious, Inflow Depth = 4.73" for 25 Yr 24 Hr event
 Inflow = 21.96 cfs @ 12.09 hrs, Volume= 1.632 af
 Outflow = 21.96 cfs @ 12.09 hrs, Volume= 1.632 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 16R: Arsenal Park Phase A

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.290 ac, 83.92% Impervious, Inflow Depth = 5.60" for 25 Yr 24 Hr event
 Inflow = 1.74 cfs @ 12.08 hrs, Volume= 0.135 af
 Outflow = 1.74 cfs @ 12.08 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 19R: CB9

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.582 ac, 81.16% Impervious, Inflow Depth = 5.48" for 25 Yr 24 Hr event
 Inflow = 3.46 cfs @ 12.08 hrs, Volume= 0.266 af
 Outflow = 3.46 cfs @ 12.08 hrs, Volume= 0.266 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 20R: CB8 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.276 ac, 88.79% Impervious, Inflow Depth = 5.72" for 25 Yr 24 Hr event
 Inflow = 1.68 cfs @ 12.08 hrs, Volume= 0.132 af
 Outflow = 1.68 cfs @ 12.08 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 21R: CB11 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.341 ac, 89.32% Impervious, Inflow Depth = 5.78" for 25 Yr 24 Hr event
 Inflow = 2.08 cfs @ 12.08 hrs, Volume= 0.164 af
 Outflow = 2.08 cfs @ 12.08 hrs, Volume= 0.164 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 22R: CB10 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.179 ac, 92.26% Impervious, Inflow Depth = 5.84" for 25 Yr 24 Hr event
 Inflow = 1.09 cfs @ 12.08 hrs, Volume= 0.087 af
 Outflow = 1.09 cfs @ 12.08 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: CB1

[58] Hint: Peaked 0.78' above defined flood level

Inflow Area = 0.264 ac, 13.35% Impervious, Inflow Depth = 3.65" for 25 Yr 24 Hr event
 Inflow = 1.13 cfs @ 12.09 hrs, Volume= 0.080 af
 Outflow = 1.13 cfs @ 12.09 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.13 cfs @ 12.09 hrs, Volume= 0.080 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 34.78' @ 12.09 hrs
 Flood Elev= 34.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	8.0" Round 8" Clay Pipe L= 138.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.00' / 31.30' S= 0.0196 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=1.13 cfs @ 12.09 hrs HW=34.78' (Free Discharge)
 ↑1=8" Clay Pipe (Inlet Controls 1.13 cfs @ 3.23 fps)

Summary for Pond 2P: CB2

Inflow Area = 0.498 ac, 31.55% Impervious, Inflow Depth = 4.06" for 25 Yr 24 Hr event
 Inflow = 2.36 cfs @ 12.09 hrs, Volume= 0.169 af
 Outflow = 2.36 cfs @ 12.09 hrs, Volume= 0.169 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.36 cfs @ 12.09 hrs, Volume= 0.169 af

Arsenal Park - Existing Conditions Final 60% - REVtype III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 34.19' @ 12.09 hrs

Flood Elev= 36.24'

Device	Routing	Invert	Outlet Devices
#1	Primary	33.30'	12.0" Round 12" RCP L= 118.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 33.30' / 31.30' S= 0.0169 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=2.36 cfs @ 12.09 hrs HW=34.19' (Free Discharge)

↑1=12" RCP (Inlet Controls 2.36 cfs @ 3.20 fps)

Summary for Pond 3P: MH1

[58] Hint: Peaked 4.26' above defined flood level

[81] Warning: Exceeded Pond 2P by 5.06' @ 12.09 hrs

Inflow Area = 1.299 ac, 42.99% Impervious, Inflow Depth = 4.39" for 25 Yr 24 Hr event
Inflow = 6.58 cfs @ 12.09 hrs, Volume= 0.475 af
Outflow = 6.58 cfs @ 12.09 hrs, Volume= 0.475 af, Atten= 0%, Lag= 0.0 min
Primary = 6.58 cfs @ 12.09 hrs, Volume= 0.475 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 39.26' @ 12.09 hrs

Flood Elev= 35.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.50'	12.0" Round 12" RCP L= 176.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.50' / 30.60' S= 0.0051 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=6.57 cfs @ 12.09 hrs HW=39.23' (Free Discharge)

↑1=12" RCP (Barrel Controls 6.57 cfs @ 8.36 fps)

Summary for Pond 4P: MH2

[79] Warning: Submerged Pond 1P Primary device # 1 OUTLET by 0.15'

Inflow Area = 0.264 ac, 13.35% Impervious, Inflow Depth = 3.65" for 25 Yr 24 Hr event
Inflow = 1.13 cfs @ 12.09 hrs, Volume= 0.080 af
Outflow = 1.13 cfs @ 12.09 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min
Primary = 1.13 cfs @ 12.09 hrs, Volume= 0.080 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 31.45' @ 12.09 hrs

Flood Elev= 36.86'

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Device	Routing	Invert	Outlet Devices
#1	Primary	30.90'	12.0" Round 12" RCP L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.90' / 30.30' S= 0.0176 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=1.13 cfs @ 12.09 hrs HW=31.45' (Free Discharge)↑**1=12" RCP** (Inlet Controls 1.13 cfs @ 2.53 fps)**Summary for Pond 5P: CB4**

Inflow Area = 0.435 ac, 52.08% Impervious, Inflow Depth = 4.70" for 25 Yr 24 Hr event
Inflow = 2.34 cfs @ 12.09 hrs, Volume= 0.170 af
Outflow = 2.34 cfs @ 12.09 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min
Primary = 2.34 cfs @ 12.09 hrs, Volume= 0.170 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 31.96' @ 12.09 hrs

Flood Elev= 35.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.70'	8.0" Round Culvert L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.70' / 26.50' S= 0.0478 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=2.33 cfs @ 12.09 hrs HW=31.96' (Free Discharge)↑**1=Culvert** (Inlet Controls 2.33 cfs @ 6.68 fps)**Summary for Pond 11P: CB12**

Inflow Area = 0.057 ac, 52.38% Impervious, Inflow Depth = 4.81" for 25 Yr 24 Hr event
Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af
Outflow = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 29.92' @ 12.09 hrs

Flood Elev= 31.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.60'	8.0" Round Culvert L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.60' / 27.00' S= 0.1529 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.31 cfs @ 12.09 hrs HW=29.92' (Free Discharge)↑**1=Culvert** (Inlet Controls 0.31 cfs @ 1.92 fps)

Summary for Pond 12P: CB13

Inflow Area = 0.465 ac, 3.58% Impervious, Inflow Depth = 3.55" for 25 Yr 24 Hr event
 Inflow = 1.94 cfs @ 12.09 hrs, Volume= 0.138 af
 Outflow = 1.94 cfs @ 12.09 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.94 cfs @ 12.09 hrs, Volume= 0.138 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 24.96' @ 12.09 hrs
 Flood Elev= 26.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.30'	8.0" Round Culvert L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 23.30' / 19.00' S= 0.0374 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=1.93 cfs @ 12.09 hrs HW=24.96' (Free Discharge)
 ↑1=Culvert (Inlet Controls 1.93 cfs @ 5.54 fps)

Summary for Pond 13P: MH4

[58] Hint: Peaked 86.86' above defined flood level
 [81] Warning: Exceeded Pond 5P by 87.69' @ 12.08 hrs
 [81] Warning: Exceeded Pond 11P by 89.73' @ 12.08 hrs

Inflow Area = 1.774 ac, 71.49% Impervious, Inflow Depth = 5.24" for 25 Yr 24 Hr event
 Inflow = 10.24 cfs @ 12.08 hrs, Volume= 0.775 af
 Outflow = 10.24 cfs @ 12.08 hrs, Volume= 0.775 af, Atten= 0%, Lag= 0.0 min
 Primary = 10.24 cfs @ 12.08 hrs, Volume= 0.775 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 119.91' @ 12.08 hrs
 Flood Elev= 33.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.40'	8.0" Round Culvert L= 104.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.40' / 24.35' S= 0.0197 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=10.22 cfs @ 12.08 hrs HW=119.57' (Free Discharge)
 ↑1=Culvert (Barrel Controls 10.22 cfs @ 29.27 fps)

Summary for Pond 14P: MH5

[58] Hint: Peaked 12.35' above defined flood level
 [79] Warning: Submerged Pond 13P Primary device # 1 INLET by 14.57'

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Inflow Area = 2.115 ac, 74.37% Impervious, Inflow Depth = 5.33" for 25 Yr 24 Hr event
Inflow = 12.32 cfs @ 12.08 hrs, Volume= 0.939 af
Outflow = 12.32 cfs @ 12.08 hrs, Volume= 0.939 af, Atten= 0%, Lag= 0.0 min
Primary = 12.32 cfs @ 12.08 hrs, Volume= 0.939 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 41.01' @ 12.08 hrs

Flood Elev= 28.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.33'	12.0" Round Culvert L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.33' / 22.30' S= 0.0203 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=12.29 cfs @ 12.08 hrs HW=40.95' (Free Discharge)

↑**1=Culvert** (Barrel Controls 12.29 cfs @ 15.65 fps)

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

Subcatchment1S: Area 1	Runoff Area=14,531 sf 0.00% Impervious Runoff Depth=4.80" Flow Length=90' Tc=6.3 min CN=72 Runoff=1.86 cfs 0.133 af
Subcatchment2S: Area 2	Runoff Area=5,370 sf 38.92% Impervious Runoff Depth=5.97" Flow Length=103' Tc=6.0 min CN=82 Runoff=0.84 cfs 0.061 af
Subcatchment3S: Area 3	Runoff Area=6,543 sf 11.33% Impervious Runoff Depth=5.15" Flow Length=85' Tc=6.0 min CN=75 Runoff=0.90 cfs 0.064 af
Subcatchment4S: Area 4	Runoff Area=11,493 sf 13.35% Impervious Runoff Depth=5.27" Flow Length=88' Tc=6.0 min CN=76 Runoff=1.62 cfs 0.116 af
Subcatchment5S: Area 5	Runoff Area=21,710 sf 31.55% Impervious Runoff Depth=5.74" Flow Length=94' Tc=6.0 min CN=80 Runoff=3.30 cfs 0.238 af
Subcatchment6S: Area 6	Runoff Area=18,943 sf 52.08% Impervious Runoff Depth=6.45" Flow Length=156' Tc=6.0 min CN=86 Runoff=3.15 cfs 0.234 af
Subcatchment7S: Area 7	Runoff Area=34,871 sf 50.12% Impervious Runoff Depth=6.33" Flow Length=176' Tc=6.0 min CN=85 Runoff=5.72 cfs 0.422 af
Subcatchment8S: Area 8	Runoff Area=29,602 sf 32.92% Impervious Runoff Depth=5.86" Flow Length=269' Tc=6.9 min CN=81 Runoff=4.43 cfs 0.332 af
Subcatchment9S: Area 9	Runoff Area=88,210 sf 11.22% Impervious Runoff Depth=5.15" Flow Length=476' Tc=13.8 min CN=75 Runoff=9.54 cfs 0.869 af
Subcatchment10S: Area 10	Runoff Area=20,269 sf 3.58% Impervious Runoff Depth=5.15" Flow Length=264' Tc=6.0 min CN=75 Runoff=2.80 cfs 0.200 af
Subcatchment11S: Area 11	Runoff Area=114,065 sf 10.26% Impervious Runoff Depth=5.27" Flow Length=466' Tc=8.6 min CN=76 Runoff=14.70 cfs 1.149 af
Subcatchment12S: Area 12	Runoff Area=2,497 sf 52.38% Impervious Runoff Depth=6.57" Flow Length=59' Tc=6.0 min CN=87 Runoff=0.42 cfs 0.031 af
Subcatchment13S: Area 13	Runoff Area=17,051 sf 72.28% Impervious Runoff Depth=7.04" Flow Length=130' Tc=6.0 min CN=91 Runoff=3.00 cfs 0.230 af
Subcatchment14aS: Area 14	Runoff Area=13,439 sf 83.18% Impervious Runoff Depth=7.40" Flow Length=83' Tc=6.0 min CN=94 Runoff=2.42 cfs 0.190 af
Subcatchment14bS: Area 14	Runoff Area=12,629 sf 83.92% Impervious Runoff Depth=7.40" Flow Length=83' Tc=6.0 min CN=94 Runoff=2.27 cfs 0.179 af
Subcatchment15S: Area 15	Runoff Area=7,058 sf 86.09% Impervious Runoff Depth=7.52" Flow Length=91' Tc=6.0 min CN=95 Runoff=1.28 cfs 0.102 af

Arsenal Park - Existing Conditions Final 60% - REtype III 24-hr 100 Yr 24 Hr Rainfall=8.12"

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Subcatchment16S: Area 16	Runoff Area=7,789 sf 92.26% Impervious Runoff Depth=7.64" Flow Length=81' Tc=6.0 min CN=96 Runoff=1.42 cfs 0.114 af
Subcatchment17S: Area 17	Runoff Area=13,340 sf 74.29% Impervious Runoff Depth=7.04" Flow Length=95' Tc=6.0 min CN=91 Runoff=2.34 cfs 0.180 af
Subcatchment18S: Area 18	Runoff Area=12,020 sf 88.79% Impervious Runoff Depth=7.52" Flow Length=80' Tc=6.0 min CN=95 Runoff=2.17 cfs 0.173 af
Subcatchment19S: Area 19	Runoff Area=16,707 sf 16.39% Impervious Runoff Depth=5.15" Flow Length=289' Tc=6.0 min CN=75 Runoff=2.31 cfs 0.165 af
Subcatchment20S: Area 20	Runoff Area=69,477 sf 12.27% Impervious Runoff Depth=5.03" Flow Length=230' Tc=7.9 min CN=74 Runoff=8.79 cfs 0.669 af
Subcatchment21S: Area 21	Runoff Area=30,013 sf 12.04% Impervious Runoff Depth=5.03" Flow Length=332' Tc=7.4 min CN=74 Runoff=3.86 cfs 0.289 af
Reach 1R: Charles River	Inflow=71.07 cfs 5.763 af Outflow=71.07 cfs 5.763 af
Reach 2R: Office Park	Inflow=1.86 cfs 0.133 af Outflow=1.86 cfs 0.133 af
Reach 3R: Low Point	Inflow=0.90 cfs 0.064 af Outflow=0.90 cfs 0.064 af
Reach 4R: Talcott Ave	Inflow=13.54 cfs 1.262 af Outflow=13.54 cfs 1.262 af
Reach 5R: 24" Drain System	Inflow=10.64 cfs 0.776 af Outflow=10.64 cfs 0.776 af
Reach 6R: CB3 8" Clay	Inflow=5.72 cfs 0.422 af Outflow=5.72 cfs 0.422 af
Reach 7R: CB6 - 8"	Inflow=9.93 cfs 0.773 af Outflow=9.93 cfs 0.773 af
Reach 8R: CB7 - 6"	Inflow=6.93 cfs 0.543 af Outflow=6.93 cfs 0.543 af
Reach 11R: MH7	Inflow=2.80 cfs 0.200 af Outflow=2.80 cfs 0.200 af
Reach 15R: MH6	Inflow=29.63 cfs 2.229 af Outflow=29.63 cfs 2.229 af
Reach 16R: Arsenal Park Phase A	Inflow=2.27 cfs 0.179 af Outflow=2.27 cfs 0.179 af

Arsenal Park - Existing Conditions Final 60% - REtype III 24-hr 100 Yr 24 Hr Rainfall=8.12"

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Reach 19R: CB9 Inflow=4.52 cfs 0.353 af
Outflow=4.52 cfs 0.353 af

Reach 20R: CB8 - 10" Inflow=2.17 cfs 0.173 af
Outflow=2.17 cfs 0.173 af

Reach 21R: CB11 - 10" Inflow=2.69 cfs 0.215 af
Outflow=2.69 cfs 0.215 af

Reach 22R: CB10 - 10" Inflow=1.42 cfs 0.114 af
Outflow=1.42 cfs 0.114 af

Pond 1P: CB1 Peak Elev=35.26' Inflow=1.62 cfs 0.116 af
8.0" Round Culvert n=0.013 L=138.0' S=0.0196 '/' Outflow=1.62 cfs 0.116 af

Pond 2P: CB2 Peak Elev=34.56' Inflow=3.30 cfs 0.238 af
12.0" Round Culvert n=0.013 L=118.0' S=0.0169 '/' Outflow=3.30 cfs 0.238 af

Pond 3P: MH1 Peak Elev=45.99' Inflow=9.02 cfs 0.661 af
12.0" Round Culvert n=0.013 L=176.0' S=0.0051 '/' Outflow=9.02 cfs 0.661 af

Pond 4P: MH2 Peak Elev=31.59' Inflow=1.62 cfs 0.116 af
12.0" Round Culvert n=0.013 L=34.0' S=0.0176 '/' Outflow=1.62 cfs 0.116 af

Pond 5P: CB4 Peak Elev=33.63' Inflow=3.15 cfs 0.234 af
8.0" Round Culvert n=0.013 L=67.0' S=0.0478 '/' Outflow=3.15 cfs 0.234 af

Pond 11P: CB12 Peak Elev=29.97' Inflow=0.42 cfs 0.031 af
8.0" Round Culvert n=0.013 L=17.0' S=0.1529 '/' Outflow=0.42 cfs 0.031 af

Pond 12P: CB13 Peak Elev=27.35' Inflow=2.80 cfs 0.200 af
8.0" Round Culvert n=0.013 L=115.0' S=0.0374 '/' Outflow=2.80 cfs 0.200 af

Pond 13P: MH4 Peak Elev=190.06' Inflow=13.50 cfs 1.038 af
8.0" Round Culvert n=0.013 L=104.0' S=0.0197 '/' Outflow=13.50 cfs 1.038 af

Pond 14P: MH5 Peak Elev=53.92' Inflow=16.19 cfs 1.253 af
12.0" Round Culvert n=0.013 L=100.0' S=0.0203 '/' Outflow=16.19 cfs 1.253 af

Total Runoff Area = 13.031 ac Runoff Volume = 6.140 af Average Runoff Depth = 5.65"
72.74% Pervious = 9.478 ac 27.26% Impervious = 3.553 ac

Arsenal Park - Existing Conditions Final 60% - REtype III 24-hr 100 Yr 24 Hr Rainfall=8.12"

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Summary for Subcatchment 1S: Area 1

Runoff = 1.86 cfs @ 12.09 hrs, Volume= 0.133 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
14,531	72	Woods/grass comb., Good, HSG C
14,531		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	34	0.0680	0.10		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	56	0.0500	1.12		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.3	90	Total			

Summary for Subcatchment 2S: Area 2

Runoff = 0.84 cfs @ 12.09 hrs, Volume= 0.061 af, Depth= 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
3,280	72	Woods/grass comb., Good, HSG C
2,090	98	Paved parking, HSG C
5,370	82	Weighted Average
3,280		61.08% Pervious Area
2,090		38.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	29	0.1380	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.4	15	0.0130	0.57		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.2	32	0.0220	3.01		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
0.4	27	0.0660	1.28		Shallow Concentrated Flow, Shallow Conc - 3
					Woodland Kv= 5.0 fps
4.7	103	Total, Increased to minimum Tc = 6.0 min			

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Summary for Subcatchment 3S: Area 3

Runoff = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
4,138	72	Woods/grass comb., Good, HSG C
741	98	Paved parking, HSG C
1,664	74	>75% Grass cover, Good, HSG C
6,543	75	Weighted Average
5,802		88.67% Pervious Area
741		11.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	27	0.0330	0.16		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
1.4	58	0.0100	0.70		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
4.2	85	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Area 4

Runoff = 1.62 cfs @ 12.09 hrs, Volume= 0.116 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
4,237	72	Woods/grass comb., Good, HSG C
1,534	98	Paved parking, HSG C
5,722	74	>75% Grass cover, Good, HSG C
11,493	76	Weighted Average
9,959		86.65% Pervious Area
1,534		13.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	17	0.0120	0.07		Sheet Flow, Sheet Flow - 1
					Grass: Dense n= 0.240 P2= 3.25"
1.8	71	0.0170	0.65		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.0	88	Total			

Summary for Subcatchment 5S: Area 5

Runoff = 3.30 cfs @ 12.09 hrs, Volume= 0.238 af, Depth= 5.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
14,860	72	Woods/grass comb., Good, HSG C
6,850	98	Paved parking, HSG C
21,710	80	Weighted Average
14,860		68.45% Pervious Area
6,850		31.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	30	0.1070	0.12		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.2	25	0.1200	2.42		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
0.2	39	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.6	94	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 6S: Area 6

Runoff = 3.15 cfs @ 12.08 hrs, Volume= 0.234 af, Depth= 6.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
4,982	72	Woods/grass comb., Good, HSG C
9,865	98	Paved parking, HSG C
4,096	74	>75% Grass cover, Good, HSG C
18,943	86	Weighted Average
9,078		47.92% Pervious Area
9,865		52.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	20	0.0600	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.9	38	0.0210	0.72		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.7	98	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.4	156	Total, Increased to minimum Tc = 6.0 min			

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Summary for Subcatchment 7S: Area 7

Runoff = 5.72 cfs @ 12.09 hrs, Volume= 0.422 af, Depth= 6.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
11,525	72	Woods/grass comb., Good, HSG C
17,477	98	Paved parking, HSG C
5,869	74	>75% Grass cover, Good, HSG C
34,871	85	Weighted Average
17,394		49.88% Pervious Area
17,477		50.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	30	0.1270	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.4	32	0.0840	1.45		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.9	114	0.0120	2.22		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.2	176	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Area 8

Runoff = 4.43 cfs @ 12.10 hrs, Volume= 0.332 af, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
12,065	72	Woods/grass comb., Good, HSG C
9,744	98	Paved parking, HSG C
7,793	74	>75% Grass cover, Good, HSG C
29,602	81	Weighted Average
19,858		67.08% Pervious Area
9,744		32.92% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	17	0.0120	0.10		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.8	68	0.0370	1.35		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.4	72	0.0280	3.40		Shallow Concentrated Flow, Shallow Conc - 2 Paved Kv= 20.3 fps
2.8	112	0.0180	0.67		Shallow Concentrated Flow, Shallow Conc - 3 Woodland Kv= 5.0 fps
6.9	269	Total			

Summary for Subcatchment 9S: Area 9

Runoff = 9.54 cfs @ 12.19 hrs, Volume= 0.869 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
51,744	72	Woods/grass comb., Good, HSG C
9,900	98	Paved parking, HSG C
26,000	74	>75% Grass cover, Good, HSG C
566	70	Woods, Good, HSG C
88,210	75	Weighted Average
78,310		88.78% Pervious Area
9,900		11.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	37	0.0050	0.08		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
5.2	352	0.0260	1.13		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.0	87	0.0820	1.43		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
13.8	476	Total			

Summary for Subcatchment 10S: Area 10

Runoff = 2.80 cfs @ 12.09 hrs, Volume= 0.200 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Arsenal Park - Existing Conditions Final 60% - REtype III 24-hr 100 Yr 24 Hr Rainfall=8.12"

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Area (sf)	CN	Description
19,544	74	>75% Grass cover, Good, HSG C
725	98	Paved parking, HSG C
20,269	75	Weighted Average
19,544		96.42% Pervious Area
725		3.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	22	0.1410	0.28		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
3.0	242	0.0370	1.35		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
4.3	264	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 11S: Area 11

Runoff = 14.70 cfs @ 12.12 hrs, Volume= 1.149 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
19,015	70	Woods, Good, HSG C
11,700	98	Paved parking, HSG C
83,350	74	>75% Grass cover, Good, HSG C
114,065	76	Weighted Average
102,365		89.74% Pervious Area
11,700		10.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	22	0.0140	0.11		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
4.8	370	0.0340	1.29		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.5	74	0.2110	2.30		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
8.6	466	Total			

Summary for Subcatchment 12S: Area 12

Runoff = 0.42 cfs @ 12.08 hrs, Volume= 0.031 af, Depth= 6.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Arsenal Park - Existing Conditions Final 60% - REtype III 24-hr 100 Yr 24 Hr Rainfall=8.12"

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Area (sf)	CN	Description
1,189	74	>75% Grass cover, Good, HSG C
1,308	98	Paved parking, HSG C
2,497	87	Weighted Average
1,189		47.62% Pervious Area
1,308		52.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	15	0.1070	0.23		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.3	44	0.1410	2.63		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.4	59	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 13S: Area 13

Runoff = 3.00 cfs @ 12.08 hrs, Volume= 0.230 af, Depth= 7.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
4,727	74	>75% Grass cover, Good, HSG C
12,324	98	Paved parking, HSG C
17,051	91	Weighted Average
4,727		27.72% Pervious Area
12,324		72.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	21	0.0070	0.67		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.5	62	0.0120	2.22		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
1.2	47	0.0090	0.66		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
2.2	130	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14aS: Area 14

Runoff = 2.42 cfs @ 12.08 hrs, Volume= 0.190 af, Depth= 7.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Arsenal Park - Existing Conditions Final 60% - REtype III 24-hr 100 Yr 24 Hr Rainfall=8.12"

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Area (sf)	CN	Description
2,261	74	>75% Grass cover, Good, HSG C
11,178	98	Paved parking, HSG C
13,439	94	Weighted Average
2,261		16.82% Pervious Area
11,178		83.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0070	0.66		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0200	2.87		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	83	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14bS: Area 14

Runoff = 2.27 cfs @ 12.08 hrs, Volume= 0.179 af, Depth= 7.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
2,031	74	>75% Grass cover, Good, HSG C
10,598	98	Paved parking, HSG C
12,629	94	Weighted Average
2,031		16.08% Pervious Area
10,598		83.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	20	0.0070	0.66		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0200	2.87		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	83	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 15S: Area 15

Runoff = 1.28 cfs @ 12.08 hrs, Volume= 0.102 af, Depth= 7.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
982	74	>75% Grass cover, Good, HSG C
6,076	98	Paved parking, HSG C
7,058	95	Weighted Average
982		13.91% Pervious Area
6,076		86.09% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	14	0.1710	0.27		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.6	77	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
1.5	91	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 16S: Area 16

Runoff = 1.42 cfs @ 12.08 hrs, Volume= 0.114 af, Depth= 7.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
603	70	Woods, Good, HSG C
7,186	98	Paved parking, HSG C
7,789	96	Weighted Average
603		7.74% Pervious Area
7,186		92.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	21	0.0050	0.58		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	60	0.0250	3.21		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.9	81	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 17S: Area 17

Runoff = 2.34 cfs @ 12.08 hrs, Volume= 0.180 af, Depth= 7.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
3,430	70	Woods, Good, HSG C
9,910	98	Paved parking, HSG C
13,340	91	Weighted Average
3,430		25.71% Pervious Area
9,910		74.29% Impervious Area

Arsenal Park - Existing Conditions Final 60% - REtype III 24-hr 100 Yr 24 Hr Rainfall=8.12"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	22	0.0110	0.81		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	52	0.0170	2.65		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.3	21	0.0620	1.24		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
1.1	95	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 18S: Area 18

Runoff = 2.17 cfs @ 12.08 hrs, Volume= 0.173 af, Depth= 7.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
1,348	70	Woods, Good, HSG C
10,672	98	Paved parking, HSG C
12,020	95	Weighted Average
1,348		11.21% Pervious Area
10,672		88.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	20	0.0130	0.85		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	60	0.0300	3.52		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.7	80	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 19S: Area 19

Runoff = 2.31 cfs @ 12.09 hrs, Volume= 0.165 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
13,969	70	Woods, Good, HSG C
2,738	98	Paved parking, HSG C
16,707	75	Weighted Average
13,969		83.61% Pervious Area
2,738		16.39% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0140	0.88		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.3	52	0.0180	2.72		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.5	82	0.3080	2.77		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
2.4	134	0.0180	0.94		Shallow Concentrated Flow, Shallow Conc - 3 Short Grass Pasture Kv= 7.0 fps
3.6	289	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 20S: Area 20

Runoff = 8.79 cfs @ 12.11 hrs, Volume= 0.669 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
58,183	70	Woods, Good, HSG C
2,769	74	>75% Grass cover, Good, HSG C
8,525	98	Paved parking, HSG C
69,477	74	Weighted Average
60,952		87.73% Pervious Area
8,525		12.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	30	0.0530	0.09		Sheet Flow, Sheet Flow - 1 Woods: Light underbrush n= 0.400 P2= 3.25"
0.6	90	0.2780	2.64		Shallow Concentrated Flow, Shallow Conc - 1 Woodland Kv= 5.0 fps
1.8	110	0.0220	1.04		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
7.9	230	Total			

Summary for Subcatchment 21S: Area 21

Runoff = 3.86 cfs @ 12.11 hrs, Volume= 0.289 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Arsenal Park - Existing Conditions Final 60% - REtype III 24-hr 100 Yr 24 Hr Rainfall=8.12"

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Area (sf)	CN	Description
21,600	70	Woods, Good, HSG C
3,613	98	Paved parking, HSG C
4,800	74	>75% Grass cover, Good, HSG C
30,013	74	Weighted Average
26,400		87.96% Pervious Area
3,613		12.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	32	0.0190	0.13		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
2.4	186	0.0340	1.29		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.0	114	0.1400	1.87		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
7.4	332	Total			

Summary for Reach 1R: Charles River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 12.257 ac, 26.86% Impervious, Inflow Depth = 5.64" for 100 Yr 24 Hr event
Inflow = 71.07 cfs @ 12.10 hrs, Volume= 5.763 af
Outflow = 71.07 cfs @ 12.10 hrs, Volume= 5.763 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Office Park

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.334 ac, 0.00% Impervious, Inflow Depth = 4.80" for 100 Yr 24 Hr event
Inflow = 1.86 cfs @ 12.09 hrs, Volume= 0.133 af
Outflow = 1.86 cfs @ 12.09 hrs, Volume= 0.133 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Low Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.150 ac, 11.33% Impervious, Inflow Depth = 5.15" for 100 Yr 24 Hr event
Inflow = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af
Outflow = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Talcott Ave

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.828 ac, 17.64% Impervious, Inflow Depth = 5.36" for 100 Yr 24 Hr event
 Inflow = 13.54 cfs @ 12.15 hrs, Volume= 1.262 af
 Outflow = 13.54 cfs @ 12.15 hrs, Volume= 1.262 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: 24" Drain System

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.563 ac, 37.99% Impervious, Inflow Depth = 5.96" for 100 Yr 24 Hr event
 Inflow = 10.64 cfs @ 12.09 hrs, Volume= 0.776 af
 Outflow = 10.64 cfs @ 12.09 hrs, Volume= 0.776 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: CB3 8" Clay

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.801 ac, 50.12% Impervious, Inflow Depth = 6.33" for 100 Yr 24 Hr event
 Inflow = 5.72 cfs @ 12.09 hrs, Volume= 0.422 af
 Outflow = 5.72 cfs @ 12.09 hrs, Volume= 0.422 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 7R: CB6 - 8"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.282 ac, 78.93% Impervious, Inflow Depth = 7.23" for 100 Yr 24 Hr event
 Inflow = 9.93 cfs @ 12.08 hrs, Volume= 0.773 af
 Outflow = 9.93 cfs @ 12.08 hrs, Volume= 0.773 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 8R: CB7 - 6"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.891 ac, 81.86% Impervious, Inflow Depth = 7.32" for 100 Yr 24 Hr event
 Inflow = 6.93 cfs @ 12.08 hrs, Volume= 0.543 af
 Outflow = 6.93 cfs @ 12.08 hrs, Volume= 0.543 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 11R: MH7

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.465 ac, 3.58% Impervious, Inflow Depth = 5.15" for 100 Yr 24 Hr event
Inflow = 2.80 cfs @ 12.09 hrs, Volume= 0.200 af
Outflow = 2.80 cfs @ 12.09 hrs, Volume= 0.200 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 15R: MH6

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.143 ac, 52.70% Impervious, Inflow Depth = 6.46" for 100 Yr 24 Hr event
Inflow = 29.63 cfs @ 12.08 hrs, Volume= 2.229 af
Outflow = 29.63 cfs @ 12.08 hrs, Volume= 2.229 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 16R: Arsenal Park Phase A

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.290 ac, 83.92% Impervious, Inflow Depth = 7.40" for 100 Yr 24 Hr event
Inflow = 2.27 cfs @ 12.08 hrs, Volume= 0.179 af
Outflow = 2.27 cfs @ 12.08 hrs, Volume= 0.179 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 19R: CB9

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.582 ac, 81.16% Impervious, Inflow Depth = 7.27" for 100 Yr 24 Hr event
Inflow = 4.52 cfs @ 12.08 hrs, Volume= 0.353 af
Outflow = 4.52 cfs @ 12.08 hrs, Volume= 0.353 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 20R: CB8 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.276 ac, 88.79% Impervious, Inflow Depth = 7.52" for 100 Yr 24 Hr event
Inflow = 2.17 cfs @ 12.08 hrs, Volume= 0.173 af
Outflow = 2.17 cfs @ 12.08 hrs, Volume= 0.173 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 21R: CB11 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.341 ac, 89.32% Impervious, Inflow Depth = 7.58" for 100 Yr 24 Hr event
 Inflow = 2.69 cfs @ 12.08 hrs, Volume= 0.215 af
 Outflow = 2.69 cfs @ 12.08 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach 22R: CB10 - 10"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.179 ac, 92.26% Impervious, Inflow Depth = 7.64" for 100 Yr 24 Hr event
 Inflow = 1.42 cfs @ 12.08 hrs, Volume= 0.114 af
 Outflow = 1.42 cfs @ 12.08 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: CB1

[58] Hint: Peaked 1.26' above defined flood level

Inflow Area = 0.264 ac, 13.35% Impervious, Inflow Depth = 5.27" for 100 Yr 24 Hr event
 Inflow = 1.62 cfs @ 12.09 hrs, Volume= 0.116 af
 Outflow = 1.62 cfs @ 12.09 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.62 cfs @ 12.09 hrs, Volume= 0.116 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 35.26' @ 12.09 hrs
 Flood Elev= 34.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	8.0" Round 8" Clay Pipe L= 138.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.00' / 31.30' S= 0.0196 ' / ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=1.62 cfs @ 12.09 hrs HW=35.26' (Free Discharge)
 ↑1=8" Clay Pipe (Inlet Controls 1.62 cfs @ 4.63 fps)

Summary for Pond 2P: CB2

Inflow Area = 0.498 ac, 31.55% Impervious, Inflow Depth = 5.74" for 100 Yr 24 Hr event
 Inflow = 3.30 cfs @ 12.09 hrs, Volume= 0.238 af
 Outflow = 3.30 cfs @ 12.09 hrs, Volume= 0.238 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.30 cfs @ 12.09 hrs, Volume= 0.238 af

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Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 34.56' @ 12.09 hrs

Flood Elev= 36.24'

Device	Routing	Invert	Outlet Devices
#1	Primary	33.30'	12.0" Round 12" RCP L= 118.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 33.30' / 31.30' S= 0.0169 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=3.29 cfs @ 12.09 hrs HW=34.56' (Free Discharge)

↑1=12" RCP (Inlet Controls 3.29 cfs @ 4.19 fps)

Summary for Pond 3P: MH1

[58] Hint: Peaked 10.99' above defined flood level

[81] Warning: Exceeded Pond 2P by 11.38' @ 12.09 hrs

Inflow Area = 1.299 ac, 42.99% Impervious, Inflow Depth = 6.10" for 100 Yr 24 Hr event

Inflow = 9.02 cfs @ 12.09 hrs, Volume= 0.661 af

Outflow = 9.02 cfs @ 12.09 hrs, Volume= 0.661 af, Atten= 0%, Lag= 0.0 min

Primary = 9.02 cfs @ 12.09 hrs, Volume= 0.661 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 45.99' @ 12.09 hrs

Flood Elev= 35.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.50'	12.0" Round 12" RCP L= 176.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.50' / 30.60' S= 0.0051 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=9.00 cfs @ 12.09 hrs HW=45.93' (Free Discharge)

↑1=12" RCP (Barrel Controls 9.00 cfs @ 11.46 fps)

Summary for Pond 4P: MH2

[79] Warning: Submerged Pond 1P Primary device # 1 OUTLET by 0.29'

Inflow Area = 0.264 ac, 13.35% Impervious, Inflow Depth = 5.27" for 100 Yr 24 Hr event

Inflow = 1.62 cfs @ 12.09 hrs, Volume= 0.116 af

Outflow = 1.62 cfs @ 12.09 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min

Primary = 1.62 cfs @ 12.09 hrs, Volume= 0.116 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 31.59' @ 12.09 hrs

Flood Elev= 36.86'

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Device	Routing	Invert	Outlet Devices
#1	Primary	30.90'	12.0" Round 12" RCP L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.90' / 30.30' S= 0.0176 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=1.62 cfs @ 12.09 hrs HW=31.59' (Free Discharge)↑**1=12" RCP** (Inlet Controls 1.62 cfs @ 2.82 fps)**Summary for Pond 5P: CB4**

Inflow Area = 0.435 ac, 52.08% Impervious, Inflow Depth = 6.45" for 100 Yr 24 Hr event
Inflow = 3.15 cfs @ 12.08 hrs, Volume= 0.234 af
Outflow = 3.15 cfs @ 12.08 hrs, Volume= 0.234 af, Atten= 0%, Lag= 0.0 min
Primary = 3.15 cfs @ 12.08 hrs, Volume= 0.234 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 33.63' @ 12.08 hrs

Flood Elev= 35.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.70'	8.0" Round Culvert L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.70' / 26.50' S= 0.0478 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=3.14 cfs @ 12.08 hrs HW=33.61' (Free Discharge)↑**1=Culvert** (Barrel Controls 3.14 cfs @ 9.01 fps)**Summary for Pond 11P: CB12**

Inflow Area = 0.057 ac, 52.38% Impervious, Inflow Depth = 6.57" for 100 Yr 24 Hr event
Inflow = 0.42 cfs @ 12.08 hrs, Volume= 0.031 af
Outflow = 0.42 cfs @ 12.08 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min
Primary = 0.42 cfs @ 12.08 hrs, Volume= 0.031 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 29.97' @ 12.08 hrs

Flood Elev= 31.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.60'	8.0" Round Culvert L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.60' / 27.00' S= 0.1529 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.42 cfs @ 12.08 hrs HW=29.97' (Free Discharge)↑**1=Culvert** (Inlet Controls 0.42 cfs @ 2.08 fps)

Summary for Pond 12P: CB13

[58] Hint: Peaked 1.35' above defined flood level

Inflow Area = 0.465 ac, 3.58% Impervious, Inflow Depth = 5.15" for 100 Yr 24 Hr event
 Inflow = 2.80 cfs @ 12.09 hrs, Volume= 0.200 af
 Outflow = 2.80 cfs @ 12.09 hrs, Volume= 0.200 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.80 cfs @ 12.09 hrs, Volume= 0.200 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 27.35' @ 12.09 hrs
 Flood Elev= 26.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.30'	8.0" Round Culvert L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 23.30' / 19.00' S= 0.0374 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=2.79 cfs @ 12.09 hrs HW=27.32' (Free Discharge)
 ↑1=Culvert (Barrel Controls 2.79 cfs @ 8.00 fps)

Summary for Pond 13P: MH4

[58] Hint: Peaked 157.01' above defined flood level
 [81] Warning: Exceeded Pond 5P by 156.06' @ 12.08 hrs
 [81] Warning: Exceeded Pond 11P by 159.69' @ 12.08 hrs

Inflow Area = 1.774 ac, 71.49% Impervious, Inflow Depth = 7.02" for 100 Yr 24 Hr event
 Inflow = 13.50 cfs @ 12.08 hrs, Volume= 1.038 af
 Outflow = 13.50 cfs @ 12.08 hrs, Volume= 1.038 af, Atten= 0%, Lag= 0.0 min
 Primary = 13.50 cfs @ 12.08 hrs, Volume= 1.038 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 190.06' @ 12.08 hrs
 Flood Elev= 33.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.40'	8.0" Round Culvert L= 104.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.40' / 24.35' S= 0.0197 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=13.48 cfs @ 12.08 hrs HW=189.47' (Free Discharge)
 ↑1=Culvert (Barrel Controls 13.48 cfs @ 38.61 fps)

Summary for Pond 14P: MH5

[58] Hint: Peaked 25.26' above defined flood level

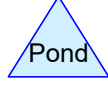
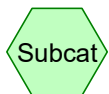
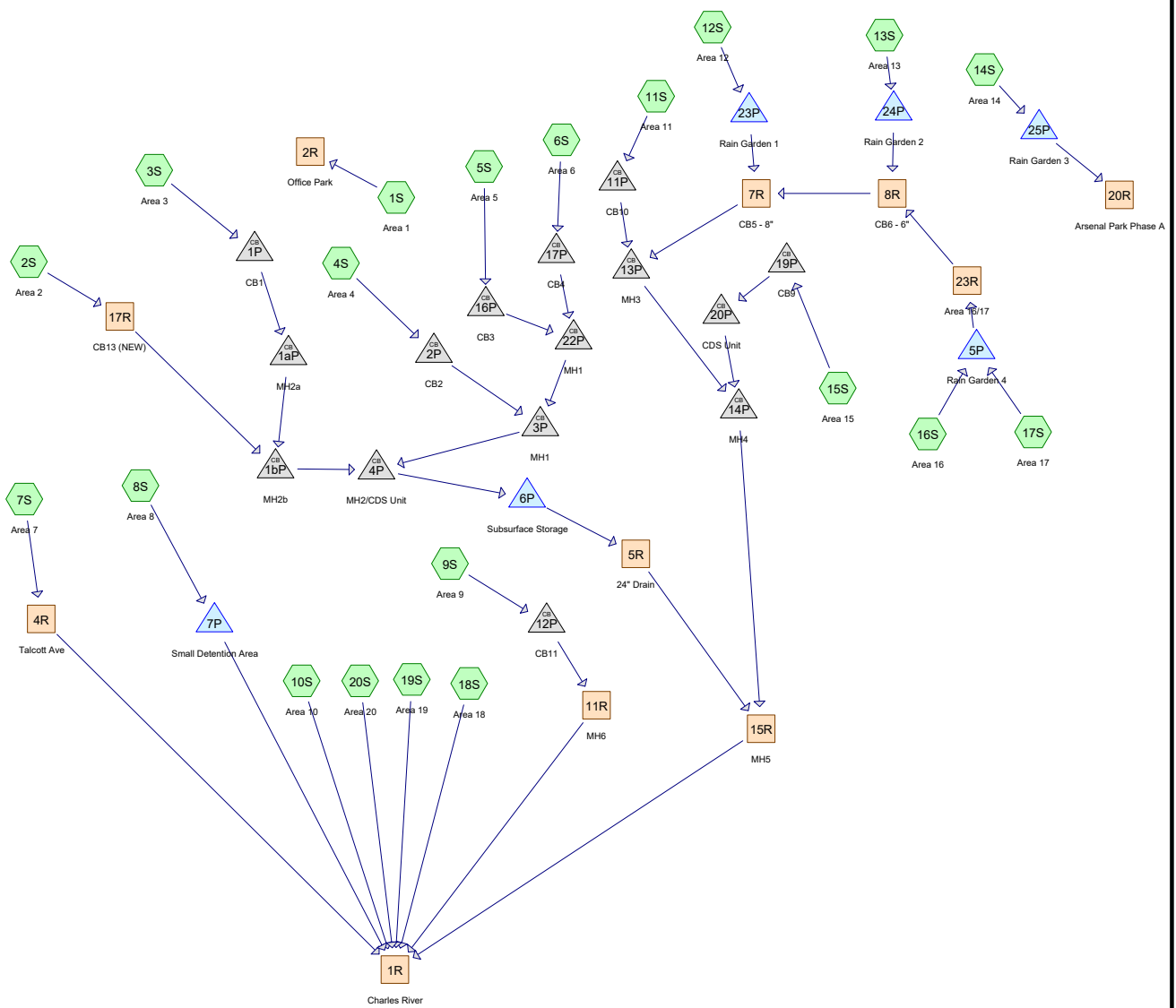
[79] Warning: Submerged Pond 13P Primary device # 1 INLET by 27.45'

Inflow Area = 2.115 ac, 74.37% Impervious, Inflow Depth = 7.11" for 100 Yr 24 Hr event
 Inflow = 16.19 cfs @ 12.08 hrs, Volume= 1.253 af
 Outflow = 16.19 cfs @ 12.08 hrs, Volume= 1.253 af, Atten= 0%, Lag= 0.0 min
 Primary = 16.19 cfs @ 12.08 hrs, Volume= 1.253 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 53.92' @ 12.08 hrs
 Flood Elev= 28.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.33'	12.0" Round Culvert L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.33' / 22.30' S= 0.0203 ' / ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=16.16 cfs @ 12.08 hrs HW=53.82' (Free Discharge)
 ↑ **1=Culvert** (Barrel Controls 16.16 cfs @ 20.58 fps)



Routing Diagram for Arsenal Park - Proposed Conditions Final_11_05_21

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Arsenal Park - Proposed Conditions Final _11_05_2Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1	Runoff Area=14,985 sf 0.00% Impervious Runoff Depth=0.96" Flow Length=90' Tc=6.3 min CN=72 Runoff=0.36 cfs 0.028 af
Subcatchment2S: Area 2	Runoff Area=36,193 sf 14.38% Impervious Runoff Depth=1.25" Flow Length=270' Tc=6.0 min CN=77 Runoff=1.19 cfs 0.086 af
Subcatchment3S: Area 3	Runoff Area=14,426 sf 8.95% Impervious Runoff Depth=1.13" Flow Length=50' Tc=6.0 min CN=75 Runoff=0.42 cfs 0.031 af
Subcatchment4S: Area 4	Runoff Area=21,234 sf 40.36% Impervious Runoff Depth=1.58" Flow Length=111' Tc=6.0 min CN=82 Runoff=0.90 cfs 0.064 af
Subcatchment5S: Area 5	Runoff Area=34,544 sf 54.55% Impervious Runoff Depth=1.88" Flow Length=162' Tc=6.0 min CN=86 Runoff=1.75 cfs 0.124 af
Subcatchment6S: Area 6	Runoff Area=10,969 sf 50.66% Impervious Runoff Depth=1.80" Flow Length=118' Tc=6.0 min CN=85 Runoff=0.53 cfs 0.038 af
Subcatchment7S: Area 7	Runoff Area=37,960 sf 6.93% Impervious Runoff Depth=1.07" Flow Length=593' Tc=17.3 min CN=74 Runoff=0.74 cfs 0.078 af
Subcatchment8S: Area 8	Runoff Area=68,544 sf 11.93% Impervious Runoff Depth=1.25" Flow Length=352' Tc=8.2 min CN=77 Runoff=2.08 cfs 0.164 af
Subcatchment9S: Area 9	Runoff Area=7,600 sf 0.00% Impervious Runoff Depth=1.07" Flow Length=254' Tc=8.7 min CN=74 Runoff=0.19 cfs 0.016 af
Subcatchment10S: Area 10	Runoff Area=91,779 sf 7.58% Impervious Runoff Depth=1.13" Flow Length=423' Tc=7.3 min CN=75 Runoff=2.55 cfs 0.198 af
Subcatchment11S: Area 11	Runoff Area=16,449 sf 45.52% Impervious Runoff Depth=1.72" Flow Length=123' Tc=6.0 min CN=84 Runoff=0.76 cfs 0.054 af
Subcatchment12S: Area 12	Runoff Area=13,363 sf 79.59% Impervious Runoff Depth=2.49" Flow Length=123' Tc=6.0 min CN=93 Runoff=0.87 cfs 0.064 af
Subcatchment13S: Area 13	Runoff Area=15,117 sf 86.21% Impervious Runoff Depth=2.69" Flow Length=89' Tc=6.0 min CN=95 Runoff=1.04 cfs 0.078 af
Subcatchment14S: Area 14	Runoff Area=14,193 sf 87.04% Impervious Runoff Depth=2.69" Flow Length=104' Tc=6.0 min CN=95 Runoff=0.97 cfs 0.073 af
Subcatchment15S: Area 15	Runoff Area=15,120 sf 84.03% Impervious Runoff Depth=2.59" Flow Length=86' Tc=6.0 min CN=94 Runoff=1.01 cfs 0.075 af
Subcatchment16S: Area 16	Runoff Area=14,730 sf 76.58% Impervious Runoff Depth=2.31" Flow Length=80' Tc=6.0 min CN=91 Runoff=0.90 cfs 0.065 af

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Subcatchment17S: Area 17	Runoff Area=14,230 sf 82.91% Impervious Runoff Depth=2.59" Flow Length=87' Tc=6.0 min CN=94 Runoff=0.95 cfs 0.071 af
Subcatchment18S: Area 18	Runoff Area=13,544 sf 21.95% Impervious Runoff Depth=1.19" Flow Length=222' Tc=10.3 min CN=76 Runoff=0.36 cfs 0.031 af
Subcatchment19S: Area 19	Runoff Area=88,424 sf 14.38% Impervious Runoff Depth=1.13" Flow Length=239' Tc=8.3 min CN=75 Runoff=2.37 cfs 0.191 af
Subcatchment20S: Area 20	Runoff Area=24,549 sf 15.91% Impervious Runoff Depth=1.07" Flow Length=195' Tc=12.8 min CN=74 Runoff=0.54 cfs 0.050 af
Reach 1R: Charles River	Inflow=14.75 cfs 1.296 af Outflow=14.75 cfs 1.296 af
Reach 2R: Office Park	Inflow=0.36 cfs 0.028 af Outflow=0.36 cfs 0.028 af
Reach 4R: Talcott Ave	Inflow=0.74 cfs 0.078 af Outflow=0.74 cfs 0.078 af
Reach 5R: 24" Drain	Inflow=2.94 cfs 0.262 af Outflow=2.94 cfs 0.262 af
Reach 7R: CB5 - 8"	Inflow=2.94 cfs 0.215 af Outflow=2.94 cfs 0.215 af
Reach 8R: CB6 - 6"	Inflow=2.15 cfs 0.163 af Outflow=2.15 cfs 0.163 af
Reach 11R: MH6	Inflow=0.19 cfs 0.016 af Outflow=0.19 cfs 0.016 af
Reach 15R: MH5	Inflow=6.87 cfs 0.607 af Outflow=6.87 cfs 0.607 af
Reach 17R: CB13 (NEW)	Inflow=1.19 cfs 0.086 af Outflow=1.19 cfs 0.086 af
Reach 20R: Arsenal Park Phase A	Inflow=0.84 cfs 0.054 af Outflow=0.84 cfs 0.054 af
Reach 23R: Area 16/17	Inflow=1.27 cfs 0.104 af Outflow=1.27 cfs 0.104 af
Pond 1aP: MH2a	Peak Elev=31.29' Inflow=0.42 cfs 0.031 af 8.0" Round Culvert n=0.013 L=34.0' S=0.0176 '/' Outflow=0.42 cfs 0.031 af
Pond 1bP: MH2b	Peak Elev=30.87' Inflow=1.61 cfs 0.118 af 15.0" Round Culvert n=0.013 L=15.0' S=0.0133 '/' Outflow=1.61 cfs 0.118 af

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Pond 1P: CB1	Peak Elev=34.37' Inflow=0.42 cfs 0.031 af 8.0" Round Culvert n=0.013 L=138.0' S=0.0196 '/ Outflow=0.42 cfs 0.031 af
Pond 2P: CB2	Peak Elev=33.79' Inflow=0.90 cfs 0.064 af 12.0" Round Culvert n=0.013 L=115.0' S=0.0174 '/ Outflow=0.90 cfs 0.064 af
Pond 3P: MH1	Peak Elev=30.86' Inflow=3.18 cfs 0.226 af 15.0" Round Culvert n=0.013 L=155.0' S=0.0045 '/ Outflow=3.18 cfs 0.226 af
Pond 4P: MH2/CDS Unit	Peak Elev=30.04' Inflow=4.78 cfs 0.344 af 18.0" Round Culvert n=0.013 L=35.0' S=0.0114 '/ Outflow=4.78 cfs 0.344 af
Pond 5P: Rain Garden 4	Peak Elev=34.79' Storage=2,015 cf Inflow=1.85 cfs 0.136 af Outflow=1.27 cfs 0.104 af
Pond 6P: Subsurface Storage	Peak Elev=28.44' Storage=4,638 cf Inflow=4.78 cfs 0.344 af 18.0" Round Culvert n=0.013 L=35.0' S=0.0057 '/ Outflow=2.94 cfs 0.262 af
Pond 7P: Small Detention Area	Peak Elev=25.56' Storage=1,714 cf Inflow=2.08 cfs 0.164 af Outflow=1.84 cfs 0.126 af
Pond 11P: CB10	Peak Elev=30.14' Inflow=0.76 cfs 0.054 af 8.0" Round Culvert n=0.013 L=17.0' S=0.1529 '/ Outflow=0.76 cfs 0.054 af
Pond 12P: CB11	Peak Elev=23.54' Inflow=0.19 cfs 0.016 af 8.0" Round Culvert n=0.013 L=115.0' S=0.0374 '/ Outflow=0.19 cfs 0.016 af
Pond 13P: MH3	Peak Elev=29.27' Inflow=3.64 cfs 0.269 af 10.0" Round Culvert n=0.013 L=104.0' S=0.0197 '/ Outflow=3.64 cfs 0.269 af
Pond 14P: MH4	Peak Elev=25.35' Inflow=4.60 cfs 0.344 af 18.0" Round Culvert n=0.013 L=100.0' S=0.0480 '/ Outflow=4.60 cfs 0.344 af
Pond 16P: CB3	Peak Elev=31.32' Inflow=1.75 cfs 0.124 af 15.0" Round Culvert n=0.013 L=20.0' S=0.0050 '/ Outflow=1.75 cfs 0.124 af
Pond 17P: CB4	Peak Elev=32.27' Inflow=0.53 cfs 0.038 af 12.0" Round Culvert n=0.013 L=115.0' S=0.0148 '/ Outflow=0.53 cfs 0.038 af
Pond 19P: CB9	Peak Elev=28.02' Inflow=1.01 cfs 0.075 af 12.0" Round Culvert n=0.013 L=114.0' S=0.0149 '/ Outflow=1.01 cfs 0.075 af
Pond 20P: CDS Unit	Peak Elev=26.23' Inflow=1.01 cfs 0.075 af 12.0" Round Culvert n=0.013 L=84.0' S=0.0155 '/ Outflow=1.01 cfs 0.075 af
Pond 22P: MH1	Peak Elev=31.17' Inflow=2.28 cfs 0.162 af 15.0" Round Culvert n=0.013 L=63.0' S=0.0048 '/ Outflow=2.28 cfs 0.162 af
Pond 23P: Rain Garden 1	Peak Elev=34.94' Storage=623 cf Inflow=0.87 cfs 0.064 af Outflow=0.81 cfs 0.053 af

Pond 24P: Rain Garden 2 Peak Elev=34.96' Storage=1,089 cf Inflow=1.04 cfs 0.078 af
Outflow=0.90 cfs 0.059 af

Pond 25P: Rain Garden 3 Peak Elev=34.95' Storage=1,079 cf Inflow=0.97 cfs 0.073 af
Outflow=0.84 cfs 0.054 af

Total Runoff Area = 13.038 ac Runoff Volume = 1.577 af Average Runoff Depth = 1.45"
72.51% Pervious = 9.454 ac 27.49% Impervious = 3.584 ac

Summary for Subcatchment 1S: Area 1

Runoff = 0.36 cfs @ 12.10 hrs, Volume= 0.028 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
14,985	72	Woods/grass comb., Good, HSG C
14,985		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	34	0.0680	0.10		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	56	0.0500	1.12		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.3	90	Total			

Summary for Subcatchment 2S: Area 2

Runoff = 1.19 cfs @ 12.09 hrs, Volume= 0.086 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
10,019	72	Woods/grass comb., Good, HSG C
5,206	98	Paved parking, HSG C
* 12,368	74	Rubber Surface, HSG C
8,600	74	>75% Grass cover, Good, HSG C
36,193	77	Weighted Average
30,987		85.62% Pervious Area
5,206		14.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	30	0.1670	0.14		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	80	0.0060	1.57		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.9	160	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.2	270	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Area 3

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.031 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
6,706	72	Woods/grass comb., Good, HSG C
1,291	98	Paved parking, HSG C
5,909	74	>75% Grass cover, Good, HSG C
* 520	74	Rubber Surface, HSG C
14,426	75	Weighted Average
13,135		91.05% Pervious Area
1,291		8.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	23	0.2000	0.32		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
0.2	27	0.0720	1.88		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
1.4	50	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Area 4

Runoff = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
12,664	72	Woods/grass comb., Good, HSG C
8,570	98	Paved parking, HSG C
21,234	82	Weighted Average
12,664		59.64% Pervious Area
8,570		40.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	24	0.1330	0.19		Sheet Flow, Sheet Flow - 1
					Grass: Dense n= 0.240 P2= 3.25"
0.0	12	0.1830	8.68		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.4	75	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc 2
					Paved Kv= 20.3 fps
2.5	111	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Area 5

Runoff = 1.75 cfs @ 12.09 hrs, Volume= 0.124 af, Depth= 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
15,700	72	Woods/grass comb., Good, HSG C
18,844	98	Paved parking, HSG C
34,544	86	Weighted Average
15,700		45.45% Pervious Area
18,844		54.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	30	0.1270	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.1	12	0.0960	1.55		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.9	120	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.9	162	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 6S: Area 6

Runoff = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
5,412	72	Woods/grass comb., Good, HSG C
5,557	98	Paved parking, HSG C
10,969	85	Weighted Average
5,412		49.34% Pervious Area
5,557		50.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	20	0.0700	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	26	0.0120	0.55		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.5	72	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.9	118	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 7S: Area 7

Runoff = 0.74 cfs @ 12.25 hrs, Volume= 0.078 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
35,328	72	Woods/grass comb., Good, HSG C
2,632	98	Paved parking, HSG C
37,960	74	Weighted Average
35,328		93.07% Pervious Area
2,632		6.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	32	0.0220	0.06		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
9.1	561	0.0420	1.02		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
17.3	593	Total			

Summary for Subcatchment 8S: Area 8

Runoff = 2.08 cfs @ 12.12 hrs, Volume= 0.164 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
60,370	74	>75% Grass cover, Good, HSG C
8,174	98	Paved parking, HSG C
68,544	77	Weighted Average
60,370		88.07% Pervious Area
8,174		11.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	32	0.0250	0.15		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
4.2	265	0.0230	1.06		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
0.4	55	0.1120	2.34		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
8.2	352	Total			

Summary for Subcatchment 9S: Area 9

Runoff = 0.19 cfs @ 12.13 hrs, Volume= 0.016 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
7,600	74	Pasture/grassland/range, Good, HSG C
7,600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	44	0.0140	0.13		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
2.9	210	0.0300	1.21		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
8.7	254	Total			

Summary for Subcatchment 10S: Area 10

Runoff = 2.55 cfs @ 12.11 hrs, Volume= 0.198 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
63,128	74	>75% Grass cover, Good, HSG C
6,960	98	Paved parking, HSG C
21,691	72	Woods/grass comb., Good, HSG C
91,779	75	Weighted Average
84,819		92.42% Pervious Area
6,960		7.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	23	0.0350	0.16		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
4.3	318	0.0310	1.23		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.6	82	0.2090	2.29		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
7.3	423	Total			

Summary for Subcatchment 11S: Area 11

Runoff = 0.76 cfs @ 12.09 hrs, Volume= 0.054 af, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
7,487	98	Paved parking, HSG C
8,962	72	Woods/grass comb., Good, HSG C
16,449	84	Weighted Average
8,962		54.48% Pervious Area
7,487		45.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	18	0.0110	0.77		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.2	50	0.0320	3.63		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.5	55	0.0710	1.87		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
1.1	123	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 12S: Area 12

Runoff = 0.87 cfs @ 12.09 hrs, Volume= 0.064 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
2,728	74	>75% Grass cover, Good, HSG C
10,635	98	Paved parking, HSG C
13,363	93	Weighted Average
2,728		20.41% Pervious Area
10,635		79.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	18	0.0110	0.77		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.2	50	0.0320	3.63		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.2	55	0.0710	5.41		Shallow Concentrated Flow, Shallow Conc - 2 Paved Kv= 20.3 fps
0.8	123	Total, Increased to minimum Tc = 6.0 min			

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Summary for Subcatchment 13S: Area 13

Runoff = 1.04 cfs @ 12.08 hrs, Volume= 0.078 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
2,084	74	>75% Grass cover, Good, HSG C
13,033	98	Paved parking, HSG C
15,117	95	Weighted Average
2,084		13.79% Pervious Area
13,033		86.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	26	0.0140	0.92		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0180	2.72		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.9	89	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14S: Area 14

Runoff = 0.97 cfs @ 12.08 hrs, Volume= 0.073 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
1,840	74	>75% Grass cover, Good, HSG C
12,353	98	Paved parking, HSG C
14,193	95	Weighted Average
1,840		12.96% Pervious Area
12,353		87.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	24	0.0060	0.64		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.5	80	0.0160	2.57		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
1.1	104	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 15S: Area 15

Runoff = 1.01 cfs @ 12.08 hrs, Volume= 0.075 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
2,415	74	>75% Grass cover, Good, HSG C
12,705	98	Paved parking, HSG C
15,120	94	Weighted Average
2,415		15.97% Pervious Area
12,705		84.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	21	0.0330	0.15		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
0.4	65	0.0150	2.49		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
2.7	86	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 16S: Area 16

Runoff = 0.90 cfs @ 12.09 hrs, Volume= 0.065 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
3,450	70	Woods, Good, HSG C
11,280	98	Paved parking, HSG C
14,730	91	Weighted Average
3,450		23.42% Pervious Area
11,280		76.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	16	0.0110	0.76		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.3	64	0.0260	3.27		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.7	80	Total, Increased to minimum Tc = 6.0 min			

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Summary for Subcatchment 17S: Area 17

Runoff = 0.95 cfs @ 12.08 hrs, Volume= 0.071 af, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
2,432	72	Woods/grass comb., Good, HSG C
11,798	98	Paved parking, HSG C
14,230	94	Weighted Average
2,432		17.09% Pervious Area
11,798		82.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0140	0.88		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.2	66	0.0480	4.45		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.6	87	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 18S: Area 18

Runoff = 0.36 cfs @ 12.15 hrs, Volume= 0.031 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
10,571	70	Woods, Good, HSG C
2,973	98	Paved parking, HSG C
13,544	76	Weighted Average
10,571		78.05% Pervious Area
2,973		21.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.2750	0.11		Sheet Flow, Sheet Flow - 1
					Woods: Dense underbrush n= 0.800 P2= 3.25"
0.5	51	0.1200	1.73		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
2.3	121	0.0162	0.89		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
10.3	222	Total			

Summary for Subcatchment 19S: Area 19

Runoff = 2.37 cfs @ 12.13 hrs, Volume= 0.191 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
52,359	70	Woods, Good, HSG C
12,718	98	Paved parking, HSG C
19,125	74	>75% Grass cover, Good, HSG C
4,222	72	Woods/grass comb., Good, HSG C
88,424	75	Weighted Average
75,706		85.62% Pervious Area
12,718		14.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	30	0.0500	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.7	109	0.2390	2.44		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
2.0	100	0.0140	0.83		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
8.3	239	Total			

Summary for Subcatchment 20S: Area 20

Runoff = 0.54 cfs @ 12.19 hrs, Volume= 0.050 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Yr 24 Hr Rainfall=3.25"

Area (sf)	CN	Description
3,905	98	Paved parking, HSG C
20,644	70	Woods, Good, HSG C
24,549	74	Weighted Average
20,644		84.09% Pervious Area
3,905		15.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	28	0.0320	0.04		Sheet Flow, Sheet Flow - 1
					Woods: Dense underbrush n= 0.800 P2= 3.25"
1.7	167	0.1100	1.66		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
12.8	195	Total			

Summary for Reach 1R: Charles River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 12.369 ac, 26.68% Impervious, Inflow Depth = 1.26" for 2 Yr 24 Hr event
Inflow = 14.75 cfs @ 12.16 hrs, Volume= 1.296 af
Outflow = 14.75 cfs @ 12.16 hrs, Volume= 1.296 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 2R: Office Park

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.344 ac, 0.00% Impervious, Inflow Depth = 0.96" for 2 Yr 24 Hr event
Inflow = 0.36 cfs @ 12.10 hrs, Volume= 0.028 af
Outflow = 0.36 cfs @ 12.10 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 4R: Talcott Ave

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.871 ac, 6.93% Impervious, Inflow Depth = 1.07" for 2 Yr 24 Hr event
Inflow = 0.74 cfs @ 12.25 hrs, Volume= 0.078 af
Outflow = 0.74 cfs @ 12.25 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 5R: 24" Drain

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 1.17" for 2 Yr 24 Hr event
Inflow = 2.94 cfs @ 12.20 hrs, Volume= 0.262 af
Outflow = 2.94 cfs @ 12.20 hrs, Volume= 0.262 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 7R: CB5 - 8"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.319 ac, 81.38% Impervious, Inflow Depth = 1.96" for 2 Yr 24 Hr event
Inflow = 2.94 cfs @ 12.13 hrs, Volume= 0.215 af
Outflow = 2.94 cfs @ 12.13 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 8R: CB6 - 6"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.012 ac, 81.93% Impervious, Inflow Depth = 1.93" for 2 Yr 24 Hr event
 Inflow = 2.15 cfs @ 12.14 hrs, Volume= 0.163 af
 Outflow = 2.15 cfs @ 12.14 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 11R: MH6

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.174 ac, 0.00% Impervious, Inflow Depth = 1.07" for 2 Yr 24 Hr event
 Inflow = 0.19 cfs @ 12.13 hrs, Volume= 0.016 af
 Outflow = 0.19 cfs @ 12.13 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 15R: MH5

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.738 ac, 51.56% Impervious, Inflow Depth = 1.54" for 2 Yr 24 Hr event
 Inflow = 6.87 cfs @ 12.16 hrs, Volume= 0.607 af
 Outflow = 6.87 cfs @ 12.16 hrs, Volume= 0.607 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 17R: CB13 (NEW)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.831 ac, 14.38% Impervious, Inflow Depth = 1.25" for 2 Yr 24 Hr event
 Inflow = 1.19 cfs @ 12.09 hrs, Volume= 0.086 af
 Outflow = 1.19 cfs @ 12.09 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 20R: Arsenal Park Phase A

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.326 ac, 87.04% Impervious, Inflow Depth = 1.98" for 2 Yr 24 Hr event
 Inflow = 0.84 cfs @ 12.13 hrs, Volume= 0.054 af
 Outflow = 0.84 cfs @ 12.13 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 23R: Area 16/17

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.665 ac, 79.69% Impervious, Inflow Depth = 1.88" for 2 Yr 24 Hr event
 Inflow = 1.27 cfs @ 12.17 hrs, Volume= 0.104 af
 Outflow = 1.27 cfs @ 12.17 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Pond 1aP: MH2a

Inflow Area = 0.331 ac, 8.95% Impervious, Inflow Depth = 1.13" for 2 Yr 24 Hr event
 Inflow = 0.42 cfs @ 12.09 hrs, Volume= 0.031 af
 Outflow = 0.42 cfs @ 12.09 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.42 cfs @ 12.09 hrs, Volume= 0.031 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 31.29' @ 12.09 hrs

Flood Elev= 36.89'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.90'	8.0" Round 8" Pipe L= 34.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 30.90' / 30.30' S= 0.0176 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf

Primary OutFlow Max=0.42 cfs @ 12.09 hrs HW=31.29' TW=30.87' (Dynamic Tailwater)
 ↑ **1=8" Pipe** (Outlet Controls 0.42 cfs @ 2.88 fps)

Summary for Pond 1bP: MH2b

Inflow Area = 1.162 ac, 12.84% Impervious, Inflow Depth = 1.21" for 2 Yr 24 Hr event
 Inflow = 1.61 cfs @ 12.09 hrs, Volume= 0.118 af
 Outflow = 1.61 cfs @ 12.09 hrs, Volume= 0.118 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.61 cfs @ 12.09 hrs, Volume= 0.118 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 30.87' @ 12.09 hrs

Flood Elev= 35.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.20'	15.0" Round 15" Pipe L= 15.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.20' / 30.00' S= 0.0133 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=1.60 cfs @ 12.09 hrs HW=30.87' TW=30.04' (Dynamic Tailwater)
 ↑ **1=15" Pipe** (Barrel Controls 1.60 cfs @ 3.50 fps)

Summary for Pond 1P: CB1

Inflow Area = 0.331 ac, 8.95% Impervious, Inflow Depth = 1.13" for 2 Yr 24 Hr event
 Inflow = 0.42 cfs @ 12.09 hrs, Volume= 0.031 af
 Outflow = 0.42 cfs @ 12.09 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.42 cfs @ 12.09 hrs, Volume= 0.031 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 34.37' @ 12.09 hrs
 Flood Elev= 37.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	8.0" Round 8" Clay Pipe L= 138.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.00' / 31.30' S= 0.0196 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.42 cfs @ 12.09 hrs HW=34.37' TW=31.29' (Dynamic Tailwater)
 ↑1=8" Clay Pipe (Inlet Controls 0.42 cfs @ 2.08 fps)

Summary for Pond 2P: CB2

Inflow Area = 0.487 ac, 40.36% Impervious, Inflow Depth = 1.58" for 2 Yr 24 Hr event
 Inflow = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af
 Outflow = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 33.79' @ 12.09 hrs
 Flood Elev= 36.24'

Device	Routing	Invert	Outlet Devices
#1	Primary	33.30'	12.0" Round 12" RCP L= 115.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 33.30' / 31.30' S= 0.0174 ' / Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=0.90 cfs @ 12.09 hrs HW=33.79' TW=30.86' (Dynamic Tailwater)
 ↑1=12" RCP (Inlet Controls 0.90 cfs @ 2.37 fps)

Summary for Pond 3P: MH1

Inflow Area = 1.532 ac, 49.40% Impervious, Inflow Depth = 1.77" for 2 Yr 24 Hr event
 Inflow = 3.18 cfs @ 12.09 hrs, Volume= 0.226 af
 Outflow = 3.18 cfs @ 12.09 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.18 cfs @ 12.09 hrs, Volume= 0.226 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 30.86' @ 12.09 hrs
 Flood Elev= 35.00'

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Device	Routing	Invert	Outlet Devices
#1	Primary	29.70'	15.0" Round 15" RCP L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.70' / 29.00' S= 0.0045 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=3.18 cfs @ 12.09 hrs HW=30.86' TW=30.04' (Dynamic Tailwater)↑**1=15" RCP** (Outlet Controls 3.18 cfs @ 3.48 fps)**Summary for Pond 4P: MH2/CDS Unit**

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 1.53" for 2 Yr 24 Hr event
Inflow = 4.78 cfs @ 12.09 hrs, Volume= 0.344 af
Outflow = 4.78 cfs @ 12.09 hrs, Volume= 0.344 af, Atten= 0%, Lag= 0.0 min
Primary = 4.78 cfs @ 12.09 hrs, Volume= 0.344 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 30.04' @ 12.09 hrs

Flood Elev= 34.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	28.90'	18.0" Round 18" RCP L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 28.90' / 28.50' S= 0.0114 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=4.78 cfs @ 12.09 hrs HW=30.04' TW=27.85' (Dynamic Tailwater)↑**1=18" RCP** (Barrel Controls 4.78 cfs @ 4.61 fps)**Summary for Pond 5P: Rain Garden 4**

Inflow Area = 0.665 ac, 79.69% Impervious, Inflow Depth = 2.45" for 2 Yr 24 Hr event
Inflow = 1.85 cfs @ 12.09 hrs, Volume= 0.136 af
Outflow = 1.27 cfs @ 12.17 hrs, Volume= 0.104 af, Atten= 31%, Lag= 5.0 min
Primary = 1.27 cfs @ 12.17 hrs, Volume= 0.104 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 34.79' @ 12.17 hrs Surf.Area= 2,733 sf Storage= 2,015 cf

Flood Elev= 35.00' Surf.Area= 3,157 sf Storage= 2,588 cf

Plug-Flow detention time= 143.5 min calculated for 0.104 af (77% of inflow)

Center-of-Mass det. time= 61.5 min (855.5 - 793.9)

Volume	Invert	Avail.Storage	Storage Description
#1	33.00'	5,435 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	31.00'	89 cf	7.40'W x 30.00'L x 2.00'H Bioretention Soil Layer 444 cf Overall x 20.0% Voids
		5,523 cf	Total Available Storage

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.00	222	0	0
34.00	921	572	572
35.00	2,935	1,928	2,500
36.00	2,935	2,935	5,435

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.50'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	30.80'	10.0" Round 10" RCP Pipe L= 133.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.80' / 19.10' S= 0.0880 ' S= 0.0880 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=1.27 cfs @ 12.17 hrs HW=34.79' TW=0.00' (Dynamic Tailwater)

↑ **2=10" RCP Pipe** (Passes 1.27 cfs of 4.96 cfs potential flow)

↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.27 cfs)

Summary for Pond 6P: Subsurface Storage

[93] Warning: Storage range exceeded by 4.44'

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 1.53" for 2 Yr 24 Hr event
 Inflow = 4.78 cfs @ 12.09 hrs, Volume= 0.344 af
 Outflow = 2.94 cfs @ 12.20 hrs, Volume= 0.262 af, Atten= 38%, Lag= 6.5 min
 Primary = 2.94 cfs @ 12.20 hrs, Volume= 0.262 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 28.44' @ 12.20 hrs Surf.Area= 1,305 sf Storage= 4,638 cf

Flood Elev= 31.50' Surf.Area= 1,305 sf Storage= 8,236 cf

Plug-Flow detention time= 148.9 min calculated for 0.262 af (76% of inflow)

Center-of-Mass det. time= 61.8 min (897.3 - 835.5)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	8,824 cf	StormTrap DoubleTrap 7-6 x 10 Inside= 101.7"W x 90.0"H => 57.31 sf x 15.40'L = 882.4 cf Outside= 101.7"W x 102.0"H => 72.07 sf x 15.40'L = 1,109.6 cf

Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	18.0" Round 18" Pipe L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 27.50' / 27.30' S= 0.0057 ' S= 0.0057 ' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=2.94 cfs @ 12.20 hrs HW=28.44' TW=0.00' (Dynamic Tailwater)

↑ **1=18" Pipe** (Barrel Controls 2.94 cfs @ 3.59 fps)

Summary for Pond 7P: Small Detention Area

Inflow Area = 1.574 ac, 11.93% Impervious, Inflow Depth = 1.25" for 2 Yr 24 Hr event
 Inflow = 2.08 cfs @ 12.12 hrs, Volume= 0.164 af
 Outflow = 1.84 cfs @ 12.17 hrs, Volume= 0.126 af, Atten= 11%, Lag= 3.1 min
 Primary = 1.84 cfs @ 12.17 hrs, Volume= 0.126 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 25.56' @ 12.17 hrs Surf.Area= 1,615 sf Storage= 1,714 cf
 Flood Elev= 26.00' Surf.Area= 1,955 sf Storage= 2,498 cf

Plug-Flow detention time= 130.4 min calculated for 0.126 af (77% of inflow)
 Center-of-Mass det. time= 43.3 min (896.9 - 853.5)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	2,498 cf	Rain Garden (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	682	0	0
25.00	1,179	931	931
26.00	1,955	1,567	2,498

Device	Routing	Invert	Outlet Devices
#1	Primary	25.50'	50.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=1.82 cfs @ 12.17 hrs HW=25.56' TW=0.00' (Dynamic Tailwater)
 ↑1=**Broad-Crested Rectangular Weir**(Weir Controls 1.82 cfs @ 0.60 fps)

Summary for Pond 11P: CB10

Inflow Area = 0.378 ac, 45.52% Impervious, Inflow Depth = 1.72" for 2 Yr 24 Hr event
 Inflow = 0.76 cfs @ 12.09 hrs, Volume= 0.054 af
 Outflow = 0.76 cfs @ 12.09 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.76 cfs @ 12.09 hrs, Volume= 0.054 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 30.14' @ 12.09 hrs
 Flood Elev= 31.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.60'	8.0" Round 8" Clay L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.60' / 27.00' S= 0.1529 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.76 cfs @ 12.09 hrs HW=30.14' TW=28.96' (Dynamic Tailwater)
 ↑1=8" Clay (Inlet Controls 0.76 cfs @ 2.51 fps)

Summary for Pond 12P: CB11

Inflow Area = 0.174 ac, 0.00% Impervious, Inflow Depth = 1.07" for 2 Yr 24 Hr event
 Inflow = 0.19 cfs @ 12.13 hrs, Volume= 0.016 af
 Outflow = 0.19 cfs @ 12.13 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.19 cfs @ 12.13 hrs, Volume= 0.016 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 23.54' @ 12.13 hrs
 Flood Elev= 26.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.30'	8.0" Round Culvert L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 23.30' / 19.00' S= 0.0374 ' S= 0.0374 ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.19 cfs @ 12.13 hrs HW=23.54' TW=0.00' (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 0.19 cfs @ 1.67 fps)

Summary for Pond 13P: MH3

Under existing conditions, this area appears to work with an 8" pipe, even through the model indicates that a 15" pipe is needed. The 8" pipe will remain.

Inflow Area = 1.696 ac, 73.40% Impervious, Inflow Depth = 1.91" for 2 Yr 24 Hr event
 Inflow = 3.64 cfs @ 12.12 hrs, Volume= 0.269 af
 Outflow = 3.64 cfs @ 12.12 hrs, Volume= 0.269 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.64 cfs @ 12.12 hrs, Volume= 0.269 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 29.27' @ 12.12 hrs
 Flood Elev= 33.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.40'	10.0" Round 10" Culvert L= 104.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.40' / 24.35' S= 0.0197 ' S= 0.0197 ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.55 sf

Primary OutFlow Max=3.64 cfs @ 12.12 hrs HW=29.27' TW=25.34' (Dynamic Tailwater)
 ↑1=10" Culvert (Outlet Controls 3.64 cfs @ 6.68 fps)

Summary for Pond 14P: MH4

Assume rim of DMH is at elevation 24.

Inflow Area = 2.043 ac, 75.20% Impervious, Inflow Depth = 2.02" for 2 Yr 24 Hr event
 Inflow = 4.60 cfs @ 12.11 hrs, Volume= 0.344 af
 Outflow = 4.60 cfs @ 12.11 hrs, Volume= 0.344 af, Atten= 0%, Lag= 0.0 min
 Primary = 4.60 cfs @ 12.11 hrs, Volume= 0.344 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 25.35' @ 12.11 hrs

Flood Elev= 31.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.30'	18.0" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.30' / 19.50' S= 0.0480 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 1.77 sf

Primary OutFlow Max=4.59 cfs @ 12.11 hrs HW=25.35' TW=0.00' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 4.59 cfs @ 3.49 fps)

Summary for Pond 16P: CB3

Inflow Area = 0.793 ac, 54.55% Impervious, Inflow Depth = 1.88" for 2 Yr 24 Hr event
 Inflow = 1.75 cfs @ 12.09 hrs, Volume= 0.124 af
 Outflow = 1.75 cfs @ 12.09 hrs, Volume= 0.124 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.75 cfs @ 12.09 hrs, Volume= 0.124 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 31.32' @ 12.09 hrs

Flood Elev= 34.33'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.30'	15.0" Round 12" RCP L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.30' / 30.20' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=1.73 cfs @ 12.09 hrs HW=31.32' TW=31.17' (Dynamic Tailwater)

↑1=12" RCP (Outlet Controls 1.73 cfs @ 2.20 fps)

Summary for Pond 17P: CB4

Inflow Area = 0.252 ac, 50.66% Impervious, Inflow Depth = 1.80" for 2 Yr 24 Hr event
 Inflow = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af
 Outflow = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

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Peak Elev= 32.27' @ 12.09 hrs

Flood Elev= 35.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.90'	12.0" Round 12" RCP L= 115.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.90' / 30.20' S= 0.0148 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.09 hrs HW=32.27' TW=31.17' (Dynamic Tailwater)↑**1=12" RCP** (Outlet Controls 0.53 cfs @ 2.97 fps)**Summary for Pond 19P: CB9**

Inflow Area = 0.347 ac, 84.03% Impervious, Inflow Depth = 2.59" for 2 Yr 24 Hr event
Inflow = 1.01 cfs @ 12.08 hrs, Volume= 0.075 af
Outflow = 1.01 cfs @ 12.08 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min
Primary = 1.01 cfs @ 12.08 hrs, Volume= 0.075 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 28.02' @ 12.08 hrs

Flood Elev= 35.02'

Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	12.0" Round Culvert L= 114.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 27.50' / 25.80' S= 0.0149 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=1.01 cfs @ 12.08 hrs HW=28.02' TW=26.23' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 1.01 cfs @ 2.45 fps)**Summary for Pond 20P: CDS Unit**

Inflow Area = 0.347 ac, 84.03% Impervious, Inflow Depth = 2.59" for 2 Yr 24 Hr event
Inflow = 1.01 cfs @ 12.08 hrs, Volume= 0.075 af
Outflow = 1.01 cfs @ 12.08 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min
Primary = 1.01 cfs @ 12.08 hrs, Volume= 0.075 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 26.23' @ 12.09 hrs

Flood Elev= 34.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	25.70'	12.0" Round Culvert L= 84.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 25.70' / 24.40' S= 0.0155 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=1.01 cfs @ 12.08 hrs HW=26.23' TW=25.33' (Dynamic Tailwater)↑**1=Culvert** (Outlet Controls 1.01 cfs @ 3.49 fps)

Summary for Pond 22P: MH1

Inflow Area = 1.045 ac, 53.61% Impervious, Inflow Depth = 1.86" for 2 Yr 24 Hr event
 Inflow = 2.28 cfs @ 12.09 hrs, Volume= 0.162 af
 Outflow = 2.28 cfs @ 12.09 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.28 cfs @ 12.09 hrs, Volume= 0.162 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 31.17' @ 12.09 hrs
 Flood Elev= 34.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.10'	15.0" Round 15" Pipe L= 63.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.10' / 29.80' S= 0.0048 ' S= 0.0048 ' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=2.27 cfs @ 12.09 hrs HW=31.17' TW=30.86' (Dynamic Tailwater)
 1=15" Pipe (Outlet Controls 2.27 cfs @ 2.71 fps)

Summary for Pond 23P: Rain Garden 1

Inflow Area = 0.307 ac, 79.59% Impervious, Inflow Depth = 2.49" for 2 Yr 24 Hr event
 Inflow = 0.87 cfs @ 12.09 hrs, Volume= 0.064 af
 Outflow = 0.81 cfs @ 12.12 hrs, Volume= 0.053 af, Atten= 6%, Lag= 1.8 min
 Primary = 0.81 cfs @ 12.12 hrs, Volume= 0.053 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 34.94' @ 12.12 hrs Surf.Area= 1,050 sf Storage= 623 cf
 Flood Elev= 35.00' Surf.Area= 1,074 sf Storage= 665 cf

Plug-Flow detention time= 115.1 min calculated for 0.053 af (82% of inflow)
 Center-of-Mass det. time= 44.8 min (836.9 - 792.1)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	1,291 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	128 cf	10.00'W x 32.00'L x 2.00'H Bioretention Soil
			640 cf Overall x 20.0% Voids
		1,419 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	320	0	0
35.00	754	537	537
36.00	754	754	1,291

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150

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#2 Primary 31.10' **8.0" Round 8" PVC Pipe**
 L= 4.0' RCP, square edge headwall, Ke= 0.500
 Inlet / Outlet Invert= 31.10' / 30.97' S= 0.0325 '/' Cc= 0.900
 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.81 cfs @ 12.12 hrs HW=34.94' TW=0.00' (Dynamic Tailwater)

↑ **2=8" PVC Pipe** (Passes 0.81 cfs of 3.15 cfs potential flow)

↑ **1=12" Nyloplast Drain Basin** (Custom Controls 0.81 cfs)

Summary for Pond 24P: Rain Garden 2

Inflow Area = 0.347 ac, 86.21% Impervious, Inflow Depth = 2.69" for 2 Yr 24 Hr event
 Inflow = 1.04 cfs @ 12.08 hrs, Volume= 0.078 af
 Outflow = 0.90 cfs @ 12.13 hrs, Volume= 0.059 af, Atten= 13%, Lag= 2.7 min
 Primary = 0.90 cfs @ 12.13 hrs, Volume= 0.059 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 34.96' @ 12.13 hrs Surf.Area= 1,807 sf Storage= 1,089 cf

Flood Elev= 35.00' Surf.Area= 1,837 sf Storage= 1,142 cf

Plug-Flow detention time= 148.7 min calculated for 0.059 af (75% of inflow)

Center-of-Mass det. time= 64.4 min (844.9 - 780.5)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	2,198 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	223 cf	10.00'W x 55.80'L x 2.00'H Bioretention Soil
			1,116 cf Overall x 20.0% Voids
		2,421 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	558	0	0
35.00	1,279	919	919
36.00	1,279	1,279	2,198

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	31.45'	8.0" Round 8" PVC Pipe L= 97.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.45' / 30.97' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.90 cfs @ 12.13 hrs HW=34.96' TW=0.00' (Dynamic Tailwater)

↑ **2=8" PVC Pipe** (Passes 0.90 cfs of 1.97 cfs potential flow)

↑ **1=12" Nyloplast Drain Basin** (Custom Controls 0.90 cfs)

Summary for Pond 25P: Rain Garden 3

Inflow Area = 0.326 ac, 87.04% Impervious, Inflow Depth = 2.69" for 2 Yr 24 Hr event
 Inflow = 0.97 cfs @ 12.08 hrs, Volume= 0.073 af
 Outflow = 0.84 cfs @ 12.13 hrs, Volume= 0.054 af, Atten= 14%, Lag= 2.8 min
 Primary = 0.84 cfs @ 12.13 hrs, Volume= 0.054 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 34.95' @ 12.13 hrs Surf.Area= 1,804 sf Storage= 1,079 cf

Flood Elev= 35.00' Surf.Area= 1,841 sf Storage= 1,144 cf

Plug-Flow detention time= 154.5 min calculated for 0.054 af (73% of inflow)

Center-of-Mass det. time= 67.5 min (848.0 - 780.5)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	2,203 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	224 cf	10.00'W x 55.90'L x 2.00'H Bioretention Soil
			1,118 cf Overall x 20.0% Voids
		2,426 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	559	0	0
35.00	1,282	921	921
36.00	1,282	1,282	2,203

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	31.10'	12.0" Round 12" RCP Pipe L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.10' / 27.00' S= 0.0301 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.84 cfs @ 12.13 hrs HW=34.95' TW=0.00' (Dynamic Tailwater)

↑ **2=12" RCP Pipe** (Passes 0.84 cfs of 6.92 cfs potential flow)

↑ **1=12" Nyloplast Drain Basin** (Custom Controls 0.84 cfs)

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1	Runoff Area=14,985 sf 0.00% Impervious Runoff Depth=2.30" Flow Length=90' Tc=6.3 min CN=72 Runoff=0.91 cfs 0.066 af
Subcatchment2S: Area 2	Runoff Area=36,193 sf 14.38% Impervious Runoff Depth=2.73" Flow Length=270' Tc=6.0 min CN=77 Runoff=2.66 cfs 0.189 af
Subcatchment3S: Area 3	Runoff Area=14,426 sf 8.95% Impervious Runoff Depth=2.56" Flow Length=50' Tc=6.0 min CN=75 Runoff=0.99 cfs 0.071 af
Subcatchment4S: Area 4	Runoff Area=21,234 sf 40.36% Impervious Runoff Depth=3.20" Flow Length=111' Tc=6.0 min CN=82 Runoff=1.82 cfs 0.130 af
Subcatchment5S: Area 5	Runoff Area=34,544 sf 54.55% Impervious Runoff Depth=3.59" Flow Length=162' Tc=6.0 min CN=86 Runoff=3.29 cfs 0.237 af
Subcatchment6S: Area 6	Runoff Area=10,969 sf 50.66% Impervious Runoff Depth=3.49" Flow Length=118' Tc=6.0 min CN=85 Runoff=1.02 cfs 0.073 af
Subcatchment7S: Area 7	Runoff Area=37,960 sf 6.93% Impervious Runoff Depth=2.47" Flow Length=593' Tc=17.3 min CN=74 Runoff=1.79 cfs 0.179 af
Subcatchment8S: Area 8	Runoff Area=68,544 sf 11.93% Impervious Runoff Depth=2.73" Flow Length=352' Tc=8.2 min CN=77 Runoff=4.67 cfs 0.358 af
Subcatchment9S: Area 9	Runoff Area=7,600 sf 0.00% Impervious Runoff Depth=2.47" Flow Length=254' Tc=8.7 min CN=74 Runoff=0.46 cfs 0.036 af
Subcatchment10S: Area 10	Runoff Area=91,779 sf 7.58% Impervious Runoff Depth=2.56" Flow Length=423' Tc=7.3 min CN=75 Runoff=6.02 cfs 0.449 af
Subcatchment11S: Area 11	Runoff Area=16,449 sf 45.52% Impervious Runoff Depth=3.39" Flow Length=123' Tc=6.0 min CN=84 Runoff=1.49 cfs 0.107 af
Subcatchment12S: Area 12	Runoff Area=13,363 sf 79.59% Impervious Runoff Depth=4.33" Flow Length=123' Tc=6.0 min CN=93 Runoff=1.46 cfs 0.111 af
Subcatchment13S: Area 13	Runoff Area=15,117 sf 86.21% Impervious Runoff Depth=4.55" Flow Length=89' Tc=6.0 min CN=95 Runoff=1.70 cfs 0.132 af
Subcatchment14S: Area 14	Runoff Area=14,193 sf 87.04% Impervious Runoff Depth=4.55" Flow Length=104' Tc=6.0 min CN=95 Runoff=1.59 cfs 0.123 af
Subcatchment15S: Area 15	Runoff Area=15,120 sf 84.03% Impervious Runoff Depth=4.44" Flow Length=86' Tc=6.0 min CN=94 Runoff=1.68 cfs 0.128 af
Subcatchment16S: Area 16	Runoff Area=14,730 sf 76.58% Impervious Runoff Depth=4.11" Flow Length=80' Tc=6.0 min CN=91 Runoff=1.56 cfs 0.116 af

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Subcatchment17S: Area 17	Runoff Area=14,230 sf 82.91% Impervious Runoff Depth=4.44" Flow Length=87' Tc=6.0 min CN=94 Runoff=1.58 cfs 0.121 af
Subcatchment18S: Area 18	Runoff Area=13,544 sf 21.95% Impervious Runoff Depth=2.64" Flow Length=222' Tc=10.3 min CN=76 Runoff=0.83 cfs 0.068 af
Subcatchment19S: Area 19	Runoff Area=88,424 sf 14.38% Impervious Runoff Depth=2.56" Flow Length=239' Tc=8.3 min CN=75 Runoff=5.60 cfs 0.432 af
Subcatchment20S: Area 20	Runoff Area=24,549 sf 15.91% Impervious Runoff Depth=2.47" Flow Length=195' Tc=12.8 min CN=74 Runoff=1.30 cfs 0.116 af
Reach 1R: Charles River	Inflow=35.20 cfs 2.872 af Outflow=35.20 cfs 2.872 af
Reach 2R: Office Park	Inflow=0.91 cfs 0.066 af Outflow=0.91 cfs 0.066 af
Reach 4R: Talcott Ave	Inflow=1.79 cfs 0.179 af Outflow=1.79 cfs 0.179 af
Reach 5R: 24" Drain	Inflow=8.17 cfs 0.619 af Outflow=8.17 cfs 0.619 af
Reach 7R: CB5 - 8"	Inflow=4.31 cfs 0.417 af Outflow=4.31 cfs 0.417 af
Reach 8R: CB6 - 6"	Inflow=3.04 cfs 0.317 af Outflow=3.04 cfs 0.317 af
Reach 11R: MH6	Inflow=0.46 cfs 0.036 af Outflow=0.46 cfs 0.036 af
Reach 15R: MH5	Inflow=15.30 cfs 1.270 af Outflow=15.30 cfs 1.270 af
Reach 17R: CB13 (NEW)	Inflow=2.66 cfs 0.189 af Outflow=2.66 cfs 0.189 af
Reach 20R: Arsenal Park Phase A	Inflow=1.31 cfs 0.104 af Outflow=1.31 cfs 0.104 af
Reach 23R: Area 16/17	Inflow=1.71 cfs 0.205 af Outflow=1.71 cfs 0.205 af
Pond 1aP: MH2a	Peak Elev=31.77' Inflow=0.99 cfs 0.071 af 8.0" Round Culvert n=0.013 L=34.0' S=0.0176 '/' Outflow=0.99 cfs 0.071 af
Pond 1bP: MH2b	Peak Elev=31.42' Inflow=3.65 cfs 0.260 af 15.0" Round Culvert n=0.013 L=15.0' S=0.0133 '/' Outflow=3.65 cfs 0.260 af

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Pond 1P: CB1	Peak Elev=34.68' Inflow=0.99 cfs 0.071 af 8.0" Round Culvert n=0.013 L=138.0' S=0.0196 '/' Outflow=0.99 cfs 0.071 af
Pond 2P: CB2	Peak Elev=34.07' Inflow=1.82 cfs 0.130 af 12.0" Round Culvert n=0.013 L=115.0' S=0.0174 '/' Outflow=1.82 cfs 0.130 af
Pond 3P: MH1	Peak Elev=33.00' Inflow=6.13 cfs 0.440 af 15.0" Round Culvert n=0.013 L=155.0' S=0.0045 '/' Outflow=6.13 cfs 0.440 af
Pond 4P: MH2/CDS Unit	Peak Elev=31.02' Inflow=9.78 cfs 0.700 af 18.0" Round Culvert n=0.013 L=35.0' S=0.0114 '/' Outflow=9.78 cfs 0.700 af
Pond 5P: Rain Garden 4	Peak Elev=35.04' Storage=2,717 cf Inflow=3.13 cfs 0.237 af Outflow=1.71 cfs 0.205 af
Pond 6P: Subsurface Storage	Peak Elev=29.47' Storage=5,853 cf Inflow=9.78 cfs 0.700 af 18.0" Round Culvert n=0.013 L=35.0' S=0.0057 '/' Outflow=8.17 cfs 0.619 af
Pond 7P: Small Detention Area	Peak Elev=25.61' Storage=1,800 cf Inflow=4.67 cfs 0.358 af Outflow=4.65 cfs 0.321 af
Pond 11P: CB10	Peak Elev=35.92' Inflow=1.49 cfs 0.107 af 8.0" Round Culvert n=0.013 L=17.0' S=0.1529 '/' Outflow=1.49 cfs 0.107 af
Pond 12P: CB11	Peak Elev=23.69' Inflow=0.46 cfs 0.036 af 8.0" Round Culvert n=0.013 L=115.0' S=0.0374 '/' Outflow=0.46 cfs 0.036 af
Pond 13P: MH3	Peak Elev=35.20' Inflow=5.65 cfs 0.523 af 10.0" Round Culvert n=0.013 L=104.0' S=0.0197 '/' Outflow=5.65 cfs 0.523 af
Pond 14P: MH4	Peak Elev=25.77' Inflow=7.26 cfs 0.651 af 18.0" Round Culvert n=0.013 L=100.0' S=0.0480 '/' Outflow=7.26 cfs 0.651 af
Pond 16P: CB3	Peak Elev=33.86' Inflow=3.29 cfs 0.237 af 15.0" Round Culvert n=0.013 L=20.0' S=0.0050 '/' Outflow=3.29 cfs 0.237 af
Pond 17P: CB4	Peak Elev=33.69' Inflow=1.02 cfs 0.073 af 12.0" Round Culvert n=0.013 L=115.0' S=0.0148 '/' Outflow=1.02 cfs 0.073 af
Pond 19P: CB9	Peak Elev=28.20' Inflow=1.68 cfs 0.128 af 12.0" Round Culvert n=0.013 L=114.0' S=0.0149 '/' Outflow=1.68 cfs 0.128 af
Pond 20P: CDS Unit	Peak Elev=26.48' Inflow=1.68 cfs 0.128 af 12.0" Round Culvert n=0.013 L=84.0' S=0.0155 '/' Outflow=1.68 cfs 0.128 af
Pond 22P: MH1	Peak Elev=33.55' Inflow=4.30 cfs 0.310 af 15.0" Round Culvert n=0.013 L=63.0' S=0.0048 '/' Outflow=4.30 cfs 0.310 af
Pond 23P: Rain Garden 1	Peak Elev=35.05' Storage=704 cf Inflow=1.46 cfs 0.111 af Outflow=1.30 cfs 0.099 af

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Pond 24P: Rain Garden 2

Peak Elev=35.08' Storage=1,241 cf Inflow=1.70 cfs 0.132 af
Outflow=1.35 cfs 0.112 af

Pond 25P: Rain Garden 3

Peak Elev=35.05' Storage=1,213 cf Inflow=1.59 cfs 0.123 af
Outflow=1.31 cfs 0.104 af

Total Runoff Area = 13.038 ac Runoff Volume = 3.242 af Average Runoff Depth = 2.98"
72.51% Pervious = 9.454 ac 27.49% Impervious = 3.584 ac

Summary for Subcatchment 1S: Area 1

Runoff = 0.91 cfs @ 12.10 hrs, Volume= 0.066 af, Depth= 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
14,985	72	Woods/grass comb., Good, HSG C
14,985		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	34	0.0680	0.10		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	56	0.0500	1.12		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.3	90	Total			

Summary for Subcatchment 2S: Area 2

Runoff = 2.66 cfs @ 12.09 hrs, Volume= 0.189 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
10,019	72	Woods/grass comb., Good, HSG C
5,206	98	Paved parking, HSG C
* 12,368	74	Rubber Surface, HSG C
8,600	74	>75% Grass cover, Good, HSG C
36,193	77	Weighted Average
30,987		85.62% Pervious Area
5,206		14.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	30	0.1670	0.14		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	80	0.0060	1.57		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.9	160	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.2	270	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Area 3

Runoff = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
6,706	72	Woods/grass comb., Good, HSG C
1,291	98	Paved parking, HSG C
5,909	74	>75% Grass cover, Good, HSG C
* 520	74	Rubber Surface, HSG C
14,426	75	Weighted Average
13,135		91.05% Pervious Area
1,291		8.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	23	0.2000	0.32		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
0.2	27	0.0720	1.88		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
1.4	50	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Area 4

Runoff = 1.82 cfs @ 12.09 hrs, Volume= 0.130 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
12,664	72	Woods/grass comb., Good, HSG C
8,570	98	Paved parking, HSG C
21,234	82	Weighted Average
12,664		59.64% Pervious Area
8,570		40.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	24	0.1330	0.19		Sheet Flow, Sheet Flow - 1 Grass: Dense n= 0.240 P2= 3.25"
0.0	12	0.1830	8.68		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.4	75	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc 2 Paved Kv= 20.3 fps
2.5	111	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Area 5

Runoff = 3.29 cfs @ 12.09 hrs, Volume= 0.237 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
15,700	72	Woods/grass comb., Good, HSG C
18,844	98	Paved parking, HSG C
34,544	86	Weighted Average
15,700		45.45% Pervious Area
18,844		54.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	30	0.1270	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.1	12	0.0960	1.55		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.9	120	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.9	162	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 6S: Area 6

Runoff = 1.02 cfs @ 12.09 hrs, Volume= 0.073 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
5,412	72	Woods/grass comb., Good, HSG C
5,557	98	Paved parking, HSG C
10,969	85	Weighted Average
5,412		49.34% Pervious Area
5,557		50.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	20	0.0700	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	26	0.0120	0.55		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.5	72	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.9	118	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 7S: Area 7

Runoff = 1.79 cfs @ 12.24 hrs, Volume= 0.179 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
35,328	72	Woods/grass comb., Good, HSG C
2,632	98	Paved parking, HSG C
37,960	74	Weighted Average
35,328		93.07% Pervious Area
2,632		6.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	32	0.0220	0.06		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
9.1	561	0.0420	1.02		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
17.3	593	Total			

Summary for Subcatchment 8S: Area 8

Runoff = 4.67 cfs @ 12.12 hrs, Volume= 0.358 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
60,370	74	>75% Grass cover, Good, HSG C
8,174	98	Paved parking, HSG C
68,544	77	Weighted Average
60,370		88.07% Pervious Area
8,174		11.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	32	0.0250	0.15		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
4.2	265	0.0230	1.06		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
0.4	55	0.1120	2.34		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
8.2	352	Total			

Summary for Subcatchment 9S: Area 9

Runoff = 0.46 cfs @ 12.13 hrs, Volume= 0.036 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
7,600	74	Pasture/grassland/range, Good, HSG C
7,600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	44	0.0140	0.13		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
2.9	210	0.0300	1.21		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
8.7	254	Total			

Summary for Subcatchment 10S: Area 10

Runoff = 6.02 cfs @ 12.11 hrs, Volume= 0.449 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
63,128	74	>75% Grass cover, Good, HSG C
6,960	98	Paved parking, HSG C
21,691	72	Woods/grass comb., Good, HSG C
91,779	75	Weighted Average
84,819		92.42% Pervious Area
6,960		7.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	23	0.0350	0.16		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
4.3	318	0.0310	1.23		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.6	82	0.2090	2.29		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
7.3	423	Total			

Summary for Subcatchment 11S: Area 11

Runoff = 1.49 cfs @ 12.09 hrs, Volume= 0.107 af, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
7,487	98	Paved parking, HSG C
8,962	72	Woods/grass comb., Good, HSG C
16,449	84	Weighted Average
8,962		54.48% Pervious Area
7,487		45.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	18	0.0110	0.77		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.2	50	0.0320	3.63		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.5	55	0.0710	1.87		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
1.1	123	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 12S: Area 12

Runoff = 1.46 cfs @ 12.08 hrs, Volume= 0.111 af, Depth= 4.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
2,728	74	>75% Grass cover, Good, HSG C
10,635	98	Paved parking, HSG C
13,363	93	Weighted Average
2,728		20.41% Pervious Area
10,635		79.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	18	0.0110	0.77		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.2	50	0.0320	3.63		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.2	55	0.0710	5.41		Shallow Concentrated Flow, Shallow Conc - 2 Paved Kv= 20.3 fps
0.8	123	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 13S: Area 13

Runoff = 1.70 cfs @ 12.08 hrs, Volume= 0.132 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
2,084	74	>75% Grass cover, Good, HSG C
13,033	98	Paved parking, HSG C
15,117	95	Weighted Average
2,084		13.79% Pervious Area
13,033		86.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	26	0.0140	0.92		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0180	2.72		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.9	89	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14S: Area 14

Runoff = 1.59 cfs @ 12.08 hrs, Volume= 0.123 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
1,840	74	>75% Grass cover, Good, HSG C
12,353	98	Paved parking, HSG C
14,193	95	Weighted Average
1,840		12.96% Pervious Area
12,353		87.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	24	0.0060	0.64		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.5	80	0.0160	2.57		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
1.1	104	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 15S: Area 15

Runoff = 1.68 cfs @ 12.08 hrs, Volume= 0.128 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
2,415	74	>75% Grass cover, Good, HSG C
12,705	98	Paved parking, HSG C
15,120	94	Weighted Average
2,415		15.97% Pervious Area
12,705		84.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	21	0.0330	0.15		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
0.4	65	0.0150	2.49		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
2.7	86	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 16S: Area 16

Runoff = 1.56 cfs @ 12.08 hrs, Volume= 0.116 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
3,450	70	Woods, Good, HSG C
11,280	98	Paved parking, HSG C
14,730	91	Weighted Average
3,450		23.42% Pervious Area
11,280		76.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	16	0.0110	0.76		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.3	64	0.0260	3.27		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.7	80	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 17S: Area 17

Runoff = 1.58 cfs @ 12.08 hrs, Volume= 0.121 af, Depth= 4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
2,432	72	Woods/grass comb., Good, HSG C
11,798	98	Paved parking, HSG C
14,230	94	Weighted Average
2,432		17.09% Pervious Area
11,798		82.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0140	0.88		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.2	66	0.0480	4.45		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.6	87	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 18S: Area 18

Runoff = 0.83 cfs @ 12.14 hrs, Volume= 0.068 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
10,571	70	Woods, Good, HSG C
2,973	98	Paved parking, HSG C
13,544	76	Weighted Average
10,571		78.05% Pervious Area
2,973		21.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.2750	0.11		Sheet Flow, Sheet Flow - 1
					Woods: Dense underbrush n= 0.800 P2= 3.25"
0.5	51	0.1200	1.73		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
2.3	121	0.0162	0.89		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
10.3	222	Total			

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Summary for Subcatchment 19S: Area 19

Runoff = 5.60 cfs @ 12.12 hrs, Volume= 0.432 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
52,359	70	Woods, Good, HSG C
12,718	98	Paved parking, HSG C
19,125	74	>75% Grass cover, Good, HSG C
4,222	72	Woods/grass comb., Good, HSG C
88,424	75	Weighted Average
75,706		85.62% Pervious Area
12,718		14.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	30	0.0500	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.7	109	0.2390	2.44		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
2.0	100	0.0140	0.83		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
8.3	239	Total			

Summary for Subcatchment 20S: Area 20

Runoff = 1.30 cfs @ 12.18 hrs, Volume= 0.116 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

Area (sf)	CN	Description
3,905	98	Paved parking, HSG C
20,644	70	Woods, Good, HSG C
24,549	74	Weighted Average
20,644		84.09% Pervious Area
3,905		15.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	28	0.0320	0.04		Sheet Flow, Sheet Flow - 1
					Woods: Dense underbrush n= 0.800 P2= 3.25"
1.7	167	0.1100	1.66		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
12.8	195	Total			

Summary for Reach 1R: Charles River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 12.369 ac, 26.68% Impervious, Inflow Depth = 2.79" for 10 Yr 24 Hr event
Inflow = 35.20 cfs @ 12.12 hrs, Volume= 2.872 af
Outflow = 35.20 cfs @ 12.12 hrs, Volume= 2.872 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 2R: Office Park

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.344 ac, 0.00% Impervious, Inflow Depth = 2.30" for 10 Yr 24 Hr event
Inflow = 0.91 cfs @ 12.10 hrs, Volume= 0.066 af
Outflow = 0.91 cfs @ 12.10 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 4R: Talcott Ave

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.871 ac, 6.93% Impervious, Inflow Depth = 2.47" for 10 Yr 24 Hr event
Inflow = 1.79 cfs @ 12.24 hrs, Volume= 0.179 af
Outflow = 1.79 cfs @ 12.24 hrs, Volume= 0.179 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 5R: 24" Drain

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 2.76" for 10 Yr 24 Hr event
Inflow = 8.17 cfs @ 12.14 hrs, Volume= 0.619 af
Outflow = 8.17 cfs @ 12.14 hrs, Volume= 0.619 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 7R: CB5 - 8"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.319 ac, 81.38% Impervious, Inflow Depth = 3.79" for 10 Yr 24 Hr event
Inflow = 4.31 cfs @ 12.14 hrs, Volume= 0.417 af
Outflow = 4.31 cfs @ 12.14 hrs, Volume= 0.417 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 8R: CB6 - 6"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.012 ac, 81.93% Impervious, Inflow Depth = 3.76" for 10 Yr 24 Hr event
Inflow = 3.04 cfs @ 12.16 hrs, Volume= 0.317 af
Outflow = 3.04 cfs @ 12.16 hrs, Volume= 0.317 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 11R: MH6

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.174 ac, 0.00% Impervious, Inflow Depth = 2.47" for 10 Yr 24 Hr event
Inflow = 0.46 cfs @ 12.13 hrs, Volume= 0.036 af
Outflow = 0.46 cfs @ 12.13 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 15R: MH5

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.738 ac, 51.56% Impervious, Inflow Depth = 3.22" for 10 Yr 24 Hr event
Inflow = 15.30 cfs @ 12.12 hrs, Volume= 1.270 af
Outflow = 15.30 cfs @ 12.12 hrs, Volume= 1.270 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 17R: CB13 (NEW)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.831 ac, 14.38% Impervious, Inflow Depth = 2.73" for 10 Yr 24 Hr event
Inflow = 2.66 cfs @ 12.09 hrs, Volume= 0.189 af
Outflow = 2.66 cfs @ 12.09 hrs, Volume= 0.189 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 20R: Arsenal Park Phase A

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.326 ac, 87.04% Impervious, Inflow Depth = 3.83" for 10 Yr 24 Hr event
Inflow = 1.31 cfs @ 12.14 hrs, Volume= 0.104 af
Outflow = 1.31 cfs @ 12.14 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 23R: Area 16/17

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.665 ac, 79.69% Impervious, Inflow Depth = 3.70" for 10 Yr 24 Hr event
 Inflow = 1.71 cfs @ 12.21 hrs, Volume= 0.205 af
 Outflow = 1.71 cfs @ 12.21 hrs, Volume= 0.205 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Pond 1aP: MH2a

Inflow Area = 0.331 ac, 8.95% Impervious, Inflow Depth = 2.56" for 10 Yr 24 Hr event
 Inflow = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af
 Outflow = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 31.77' @ 12.09 hrs

Flood Elev= 36.89'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.90'	8.0" Round 8" Pipe L= 34.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 30.90' / 30.30' S= 0.0176 ' / S= 0.0176 ' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf

Primary OutFlow Max=0.98 cfs @ 12.09 hrs HW=31.77' TW=31.42' (Dynamic Tailwater)
 ↑ **1=8" Pipe** (Outlet Controls 0.98 cfs @ 2.84 fps)

Summary for Pond 1bP: MH2b

Inflow Area = 1.162 ac, 12.84% Impervious, Inflow Depth = 2.68" for 10 Yr 24 Hr event
 Inflow = 3.65 cfs @ 12.09 hrs, Volume= 0.260 af
 Outflow = 3.65 cfs @ 12.09 hrs, Volume= 0.260 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.65 cfs @ 12.09 hrs, Volume= 0.260 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 31.42' @ 12.09 hrs

Flood Elev= 35.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.20'	15.0" Round 15" Pipe L= 15.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.20' / 30.00' S= 0.0133 ' / S= 0.0133 ' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=3.65 cfs @ 12.09 hrs HW=31.42' TW=31.02' (Dynamic Tailwater)
 ↑ **1=15" Pipe** (Outlet Controls 3.65 cfs @ 3.81 fps)

Summary for Pond 1P: CB1

Inflow Area = 0.331 ac, 8.95% Impervious, Inflow Depth = 2.56" for 10 Yr 24 Hr event
 Inflow = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af
 Outflow = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 34.68' @ 12.09 hrs
 Flood Elev= 37.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	8.0" Round 8" Clay Pipe L= 138.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.00' / 31.30' S= 0.0196 ' / S= 0.0196 ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.99 cfs @ 12.09 hrs HW=34.68' TW=31.77' (Dynamic Tailwater)
 ↑1=8" Clay Pipe (Inlet Controls 0.99 cfs @ 2.84 fps)

Summary for Pond 2P: CB2

Inflow Area = 0.487 ac, 40.36% Impervious, Inflow Depth = 3.20" for 10 Yr 24 Hr event
 Inflow = 1.82 cfs @ 12.09 hrs, Volume= 0.130 af
 Outflow = 1.82 cfs @ 12.09 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.82 cfs @ 12.09 hrs, Volume= 0.130 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 34.07' @ 12.09 hrs
 Flood Elev= 36.24'

Device	Routing	Invert	Outlet Devices
#1	Primary	33.30'	12.0" Round 12" RCP L= 115.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 33.30' / 31.30' S= 0.0174 ' / S= 0.0174 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=1.81 cfs @ 12.09 hrs HW=34.07' TW=32.99' (Dynamic Tailwater)
 ↑1=12" RCP (Outlet Controls 1.81 cfs @ 3.84 fps)

Summary for Pond 3P: MH1

Inflow Area = 1.532 ac, 49.40% Impervious, Inflow Depth = 3.45" for 10 Yr 24 Hr event
 Inflow = 6.13 cfs @ 12.09 hrs, Volume= 0.440 af
 Outflow = 6.13 cfs @ 12.09 hrs, Volume= 0.440 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.13 cfs @ 12.09 hrs, Volume= 0.440 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 33.00' @ 12.09 hrs
 Flood Elev= 35.00'

Arsenal Park - Proposed Conditions Final _11_05_Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Device	Routing	Invert	Outlet Devices
#1	Primary	29.70'	15.0" Round 15" RCP L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.70' / 29.00' S= 0.0045 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=6.12 cfs @ 12.09 hrs HW=32.99' TW=31.01' (Dynamic Tailwater)↑**1=15" RCP** (Outlet Controls 6.12 cfs @ 4.98 fps)**Summary for Pond 4P: MH2/CDS Unit**

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 3.12" for 10 Yr 24 Hr event
 Inflow = 9.78 cfs @ 12.09 hrs, Volume= 0.700 af
 Outflow = 9.78 cfs @ 12.09 hrs, Volume= 0.700 af, Atten= 0%, Lag= 0.0 min
 Primary = 9.78 cfs @ 12.09 hrs, Volume= 0.700 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 31.02' @ 12.09 hrs

Flood Elev= 34.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	28.90'	18.0" Round 18" RCP L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 28.90' / 28.50' S= 0.0114 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=9.76 cfs @ 12.09 hrs HW=31.01' TW=29.29' (Dynamic Tailwater)↑**1=18" RCP** (Barrel Controls 9.76 cfs @ 5.53 fps)**Summary for Pond 5P: Rain Garden 4**

[58] Hint: Peaked 0.04' above defined flood level

Inflow Area = 0.665 ac, 79.69% Impervious, Inflow Depth = 4.27" for 10 Yr 24 Hr event
 Inflow = 3.13 cfs @ 12.08 hrs, Volume= 0.237 af
 Outflow = 1.71 cfs @ 12.21 hrs, Volume= 0.205 af, Atten= 45%, Lag= 7.3 min
 Primary = 1.71 cfs @ 12.21 hrs, Volume= 0.205 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 35.04' @ 12.21 hrs Surf.Area= 3,157 sf Storage= 2,717 cf

Flood Elev= 35.00' Surf.Area= 3,157 sf Storage= 2,588 cf

Plug-Flow detention time= 109.1 min calculated for 0.205 af (87% of inflow)

Center-of-Mass det. time= 49.9 min (829.2 - 779.2)

Volume	Invert	Avail.Storage	Storage Description
#1	33.00'	5,435 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	31.00'	89 cf	7.40'W x 30.00'L x 2.00'H Bioretention Soil Layer
			444 cf Overall x 20.0% Voids
		5,523 cf	Total Available Storage

Arsenal Park - Proposed Conditions Final _11_05_Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.00	222	0	0
34.00	921	572	572
35.00	2,935	1,928	2,500
36.00	2,935	2,935	5,435

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.50'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	30.80'	10.0" Round 10" RCP Pipe L= 133.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.80' / 19.10' S= 0.0880 ' S= 0.0880 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=1.71 cfs @ 12.21 hrs HW=35.04' TW=0.00' (Dynamic Tailwater)↑ **2=10" RCP Pipe** (Passes 1.71 cfs of 5.14 cfs potential flow)↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.71 cfs)**Summary for Pond 6P: Subsurface Storage**

[93] Warning: Storage range exceeded by 5.47'

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 3.12" for 10 Yr 24 Hr event
 Inflow = 9.78 cfs @ 12.09 hrs, Volume= 0.700 af
 Outflow = 8.17 cfs @ 12.14 hrs, Volume= 0.619 af, Atten= 16%, Lag= 3.2 min
 Primary = 8.17 cfs @ 12.14 hrs, Volume= 0.619 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 29.47' @ 12.14 hrs Surf.Area= 1,305 sf Storage= 5,853 cf

Flood Elev= 31.50' Surf.Area= 1,305 sf Storage= 8,236 cf

Plug-Flow detention time= 90.1 min calculated for 0.619 af (88% of inflow)

Center-of-Mass det. time= 36.2 min (852.0 - 815.8)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	8,824 cf	StormTrap DoubleTrap 7-6 x 10 Inside= 101.7"W x 90.0"H => 57.31 sf x 15.40'L = 882.4 cf Outside= 101.7"W x 102.0"H => 72.07 sf x 15.40'L = 1,109.6 cf

Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	18.0" Round 18" Pipe L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 27.50' / 27.30' S= 0.0057 ' S= 0.0057 ' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=8.17 cfs @ 12.14 hrs HW=29.47' TW=0.00' (Dynamic Tailwater)↑ **1=18" Pipe** (Barrel Controls 8.17 cfs @ 4.63 fps)

Summary for Pond 7P: Small Detention Area

Inflow Area = 1.574 ac, 11.93% Impervious, Inflow Depth = 2.73" for 10 Yr 24 Hr event
 Inflow = 4.67 cfs @ 12.12 hrs, Volume= 0.358 af
 Outflow = 4.65 cfs @ 12.13 hrs, Volume= 0.321 af, Atten= 0%, Lag= 0.5 min
 Primary = 4.65 cfs @ 12.13 hrs, Volume= 0.321 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 25.61' @ 12.13 hrs Surf.Area= 1,655 sf Storage= 1,800 cf

Flood Elev= 26.00' Surf.Area= 1,955 sf Storage= 2,498 cf

Plug-Flow detention time= 71.1 min calculated for 0.321 af (90% of inflow)

Center-of-Mass det. time= 21.2 min (851.7 - 830.6)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	2,498 cf	Rain Garden (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	682	0	0
25.00	1,179	931	931
26.00	1,955	1,567	2,498

Device	Routing	Invert	Outlet Devices
#1	Primary	25.50'	50.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=4.65 cfs @ 12.13 hrs HW=25.61' TW=0.00' (Dynamic Tailwater)

↑**1=Broad-Crested Rectangular Weir**(Weir Controls 4.65 cfs @ 0.82 fps)

Summary for Pond 11P: CB10

[58] Hint: Peaked 4.12' above defined flood level

Inflow Area = 0.378 ac, 45.52% Impervious, Inflow Depth = 3.39" for 10 Yr 24 Hr event
 Inflow = 1.49 cfs @ 12.09 hrs, Volume= 0.107 af
 Outflow = 1.49 cfs @ 12.09 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.49 cfs @ 12.09 hrs, Volume= 0.107 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 35.92' @ 12.11 hrs

Flood Elev= 31.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.60'	8.0" Round 8" Clay L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.60' / 27.00' S= 0.1529 ' / S= 0.1529 ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=1.46 cfs @ 12.09 hrs HW=35.51' TW=34.75' (Dynamic Tailwater)

↑**1=8" Clay** (Inlet Controls 1.46 cfs @ 4.19 fps)

Summary for Pond 12P: CB11

Inflow Area = 0.174 ac, 0.00% Impervious, Inflow Depth = 2.47" for 10 Yr 24 Hr event
 Inflow = 0.46 cfs @ 12.13 hrs, Volume= 0.036 af
 Outflow = 0.46 cfs @ 12.13 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.46 cfs @ 12.13 hrs, Volume= 0.036 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 23.69' @ 12.13 hrs

Flood Elev= 26.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.30'	8.0" Round Culvert L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 23.30' / 19.00' S= 0.0374 ' S= 0.0374 ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.46 cfs @ 12.13 hrs HW=23.69' TW=0.00' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 0.46 cfs @ 2.14 fps)

Summary for Pond 13P: MH3

Under existing conditions, this area appears to work with an 8" pipe, even though the model indicates that a 15" pipe is needed. The 8" pipe will remain.

[58] Hint: Peaked 2.15' above defined flood level

Inflow Area = 1.696 ac, 73.40% Impervious, Inflow Depth = 3.70" for 10 Yr 24 Hr event
 Inflow = 5.65 cfs @ 12.11 hrs, Volume= 0.523 af
 Outflow = 5.65 cfs @ 12.11 hrs, Volume= 0.523 af, Atten= 0%, Lag= 0.0 min
 Primary = 5.65 cfs @ 12.11 hrs, Volume= 0.523 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 35.20' @ 12.11 hrs

Flood Elev= 33.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.40'	10.0" Round 10" Culvert L= 104.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.40' / 24.35' S= 0.0197 ' S= 0.0197 ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.55 sf

Primary OutFlow Max=5.65 cfs @ 12.11 hrs HW=35.18' TW=25.76' (Dynamic Tailwater)

↑**1=10" Culvert** (Outlet Controls 5.65 cfs @ 10.35 fps)

Summary for Pond 14P: MH4

Assume rim of DMH is at elevation 24.

Inflow Area = 2.043 ac, 75.20% Impervious, Inflow Depth = 3.83" for 10 Yr 24 Hr event
 Inflow = 7.26 cfs @ 12.10 hrs, Volume= 0.651 af
 Outflow = 7.26 cfs @ 12.10 hrs, Volume= 0.651 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.26 cfs @ 12.10 hrs, Volume= 0.651 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 25.77' @ 12.10 hrs
 Flood Elev= 31.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.30'	18.0" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.30' / 19.50' S= 0.0480 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 1.77 sf

Primary OutFlow Max=7.26 cfs @ 12.10 hrs HW=25.77' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 7.26 cfs @ 4.13 fps)

Summary for Pond 16P: CB3

Inflow Area = 0.793 ac, 54.55% Impervious, Inflow Depth = 3.59" for 10 Yr 24 Hr event
 Inflow = 3.29 cfs @ 12.09 hrs, Volume= 0.237 af
 Outflow = 3.29 cfs @ 12.09 hrs, Volume= 0.237 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.29 cfs @ 12.09 hrs, Volume= 0.237 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 33.86' @ 12.09 hrs
 Flood Elev= 34.33'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.30'	15.0" Round 12" RCP L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.30' / 30.20' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=3.10 cfs @ 12.09 hrs HW=33.81' TW=33.53' (Dynamic Tailwater)
 ↑**1=12" RCP** (Inlet Controls 3.10 cfs @ 2.53 fps)

Summary for Pond 17P: CB4

Inflow Area = 0.252 ac, 50.66% Impervious, Inflow Depth = 3.49" for 10 Yr 24 Hr event
 Inflow = 1.02 cfs @ 12.09 hrs, Volume= 0.073 af
 Outflow = 1.02 cfs @ 12.09 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.02 cfs @ 12.09 hrs, Volume= 0.073 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Arsenal Park - Proposed Conditions Final _11_05_Type III 24-hr 10 Yr 24 Hr Rainfall=5.13"

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Peak Elev= 33.69' @ 12.10 hrs

Flood Elev= 35.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.90'	12.0" Round 12" RCP L= 115.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.90' / 30.20' S= 0.0148 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=0.89 cfs @ 12.09 hrs HW=33.63' TW=33.53' (Dynamic Tailwater)↑**1=12" RCP** (Outlet Controls 0.89 cfs @ 1.14 fps)**Summary for Pond 19P: CB9**

Inflow Area = 0.347 ac, 84.03% Impervious, Inflow Depth = 4.44" for 10 Yr 24 Hr event
Inflow = 1.68 cfs @ 12.08 hrs, Volume= 0.128 af
Outflow = 1.68 cfs @ 12.08 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min
Primary = 1.68 cfs @ 12.08 hrs, Volume= 0.128 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 28.20' @ 12.08 hrs

Flood Elev= 35.02'

Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	12.0" Round Culvert L= 114.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 27.50' / 25.80' S= 0.0149 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=1.67 cfs @ 12.08 hrs HW=28.20' TW=26.48' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 1.67 cfs @ 2.85 fps)**Summary for Pond 20P: CDS Unit**

Inflow Area = 0.347 ac, 84.03% Impervious, Inflow Depth = 4.44" for 10 Yr 24 Hr event
Inflow = 1.68 cfs @ 12.08 hrs, Volume= 0.128 af
Outflow = 1.68 cfs @ 12.08 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min
Primary = 1.68 cfs @ 12.08 hrs, Volume= 0.128 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 26.48' @ 12.09 hrs

Flood Elev= 34.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	25.70'	12.0" Round Culvert L= 84.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 25.70' / 24.40' S= 0.0155 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=1.67 cfs @ 12.08 hrs HW=26.48' TW=25.75' (Dynamic Tailwater)↑**1=Culvert** (Outlet Controls 1.67 cfs @ 3.51 fps)

Summary for Pond 22P: MH1

[80] Warning: Exceeded Pond 16P by 0.09' @ 12.03 hrs (1.78 cfs 0.001 af)

[80] Warning: Exceeded Pond 17P by 0.03' @ 12.06 hrs (0.47 cfs 0.000 af)

Inflow Area = 1.045 ac, 53.61% Impervious, Inflow Depth = 3.56" for 10 Yr 24 Hr event
 Inflow = 4.30 cfs @ 12.09 hrs, Volume= 0.310 af
 Outflow = 4.30 cfs @ 12.09 hrs, Volume= 0.310 af, Atten= 0%, Lag= 0.0 min
 Primary = 4.30 cfs @ 12.09 hrs, Volume= 0.310 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 33.55' @ 12.09 hrs
 Flood Elev= 34.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.10'	15.0" Round 15" Pipe L= 63.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.10' / 29.80' S= 0.0048 ' S= 0.0048 ' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=4.22 cfs @ 12.09 hrs HW=33.53' TW=32.98' (Dynamic Tailwater)
 1=15" Pipe (Outlet Controls 4.22 cfs @ 3.44 fps)

Summary for Pond 23P: Rain Garden 1

[58] Hint: Peaked 0.05' above defined flood level

Inflow Area = 0.307 ac, 79.59% Impervious, Inflow Depth = 4.33" for 10 Yr 24 Hr event
 Inflow = 1.46 cfs @ 12.08 hrs, Volume= 0.111 af
 Outflow = 1.30 cfs @ 12.12 hrs, Volume= 0.099 af, Atten= 11%, Lag= 2.4 min
 Primary = 1.30 cfs @ 12.12 hrs, Volume= 0.099 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 35.05' @ 12.12 hrs Surf.Area= 1,074 sf Storage= 704 cf
 Flood Elev= 35.00' Surf.Area= 1,074 sf Storage= 665 cf

Plug-Flow detention time= 85.2 min calculated for 0.099 af (90% of inflow)
 Center-of-Mass det. time= 35.8 min (813.3 - 777.5)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	1,291 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	128 cf	10.00'W x 32.00'L x 2.00'H Bioretention Soil
			640 cf Overall x 20.0% Voids
		1,419 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	320	0	0
35.00	754	537	537
36.00	754	754	1,291

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Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	31.10'	8.0" Round 8" PVC Pipe L= 4.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.10' / 30.97' S= 0.0325 ' S= 0.0325 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.30 cfs @ 12.12 hrs HW=35.05' TW=0.00' (Dynamic Tailwater)

← **2=8" PVC Pipe** (Passes 1.30 cfs of 3.20 cfs potential flow)

← **1=12" Nyloplast Drain Basin** (Custom Controls 1.30 cfs)

Summary for Pond 24P: Rain Garden 2

[58] Hint: Peaked 0.08' above defined flood level

Inflow Area = 0.347 ac, 86.21% Impervious, Inflow Depth = 4.55" for 10 Yr 24 Hr event
 Inflow = 1.70 cfs @ 12.08 hrs, Volume= 0.132 af
 Outflow = 1.35 cfs @ 12.14 hrs, Volume= 0.112 af, Atten= 20%, Lag= 3.6 min
 Primary = 1.35 cfs @ 12.14 hrs, Volume= 0.112 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 35.08' @ 12.14 hrs Surf.Area= 1,837 sf Storage= 1,241 cf

Flood Elev= 35.00' Surf.Area= 1,837 sf Storage= 1,142 cf

Plug-Flow detention time= 115.2 min calculated for 0.112 af (85% of inflow)

Center-of-Mass det. time= 51.9 min (819.4 - 767.6)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	2,198 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	223 cf	10.00'W x 55.80'L x 2.00'H Bioretention Soil
			1,116 cf Overall x 20.0% Voids
		2,421 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	558	0	0
35.00	1,279	919	919
36.00	1,279	1,279	2,198

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	31.45'	8.0" Round 8" PVC Pipe L= 97.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.45' / 30.97' S= 0.0049 ' S= 0.0049 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.35 cfs @ 12.14 hrs HW=35.08' TW=0.00' (Dynamic Tailwater)

↑ **2=8" PVC Pipe** (Passes 1.35 cfs of 2.00 cfs potential flow)

↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.35 cfs)

Summary for Pond 25P: Rain Garden 3

[58] Hint: Peaked 0.05' above defined flood level

Inflow Area = 0.326 ac, 87.04% Impervious, Inflow Depth = 4.55" for 10 Yr 24 Hr event
 Inflow = 1.59 cfs @ 12.08 hrs, Volume= 0.123 af
 Outflow = 1.31 cfs @ 12.14 hrs, Volume= 0.104 af, Atten= 18%, Lag= 3.3 min
 Primary = 1.31 cfs @ 12.14 hrs, Volume= 0.104 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 35.05' @ 12.14 hrs Surf.Area= 1,841 sf Storage= 1,213 cf

Flood Elev= 35.00' Surf.Area= 1,841 sf Storage= 1,144 cf

Plug-Flow detention time= 119.7 min calculated for 0.104 af (84% of inflow)

Center-of-Mass det. time= 53.9 min (821.5 - 767.6)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	2,203 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	224 cf	10.00'W x 55.90'L x 2.00'H Bioretention Soil
			1,118 cf Overall x 20.0% Voids
		2,426 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	559	0	0
35.00	1,282	921	921
36.00	1,282	1,282	2,203

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	31.10'	12.0" Round 12" RCP Pipe L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.10' / 27.00' S= 0.0301 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.31 cfs @ 12.14 hrs HW=35.05' TW=0.00' (Dynamic Tailwater)

↑ **2=12" RCP Pipe** (Passes 1.31 cfs of 6.97 cfs potential flow)

↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.31 cfs)

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1	Runoff Area=14,985 sf 0.00% Impervious Runoff Depth=3.25" Flow Length=90' Tc=6.3 min CN=72 Runoff=1.30 cfs 0.093 af
Subcatchment2S: Area 2	Runoff Area=36,193 sf 14.38% Impervious Runoff Depth=3.75" Flow Length=270' Tc=6.0 min CN=77 Runoff=3.65 cfs 0.260 af
Subcatchment3S: Area 3	Runoff Area=14,426 sf 8.95% Impervious Runoff Depth=3.55" Flow Length=50' Tc=6.0 min CN=75 Runoff=1.38 cfs 0.098 af
Subcatchment4S: Area 4	Runoff Area=21,234 sf 40.36% Impervious Runoff Depth=4.27" Flow Length=111' Tc=6.0 min CN=82 Runoff=2.42 cfs 0.174 af
Subcatchment5S: Area 5	Runoff Area=34,544 sf 54.55% Impervious Runoff Depth=4.70" Flow Length=162' Tc=6.0 min CN=86 Runoff=4.26 cfs 0.311 af
Subcatchment6S: Area 6	Runoff Area=10,969 sf 50.66% Impervious Runoff Depth=4.60" Flow Length=118' Tc=6.0 min CN=85 Runoff=1.33 cfs 0.096 af
Subcatchment7S: Area 7	Runoff Area=37,960 sf 6.93% Impervious Runoff Depth=3.45" Flow Length=593' Tc=17.3 min CN=74 Runoff=2.52 cfs 0.250 af
Subcatchment8S: Area 8	Runoff Area=68,544 sf 11.93% Impervious Runoff Depth=3.75" Flow Length=352' Tc=8.2 min CN=77 Runoff=6.41 cfs 0.492 af
Subcatchment9S: Area 9	Runoff Area=7,600 sf 0.00% Impervious Runoff Depth=3.45" Flow Length=254' Tc=8.7 min CN=74 Runoff=0.64 cfs 0.050 af
Subcatchment10S: Area 10	Runoff Area=91,779 sf 7.58% Impervious Runoff Depth=3.55" Flow Length=423' Tc=7.3 min CN=75 Runoff=8.38 cfs 0.623 af
Subcatchment11S: Area 11	Runoff Area=16,449 sf 45.52% Impervious Runoff Depth=4.49" Flow Length=123' Tc=6.0 min CN=84 Runoff=1.95 cfs 0.141 af
Subcatchment12S: Area 12	Runoff Area=13,363 sf 79.59% Impervious Runoff Depth=5.49" Flow Length=123' Tc=6.0 min CN=93 Runoff=1.83 cfs 0.140 af
Subcatchment13S: Area 13	Runoff Area=15,117 sf 86.21% Impervious Runoff Depth=5.72" Flow Length=89' Tc=6.0 min CN=95 Runoff=2.11 cfs 0.165 af
Subcatchment14S: Area 14	Runoff Area=14,193 sf 87.04% Impervious Runoff Depth=5.72" Flow Length=104' Tc=6.0 min CN=95 Runoff=1.98 cfs 0.155 af
Subcatchment15S: Area 15	Runoff Area=15,120 sf 84.03% Impervious Runoff Depth=5.60" Flow Length=86' Tc=6.0 min CN=94 Runoff=2.09 cfs 0.162 af
Subcatchment16S: Area 16	Runoff Area=14,730 sf 76.58% Impervious Runoff Depth=5.26" Flow Length=80' Tc=6.0 min CN=91 Runoff=1.97 cfs 0.148 af

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Subcatchment17S: Area 17	Runoff Area=14,230 sf 82.91% Impervious Runoff Depth=5.60" Flow Length=87' Tc=6.0 min CN=94 Runoff=1.97 cfs 0.153 af
Subcatchment18S: Area 18	Runoff Area=13,544 sf 21.95% Impervious Runoff Depth=3.65" Flow Length=222' Tc=10.3 min CN=76 Runoff=1.15 cfs 0.095 af
Subcatchment19S: Area 19	Runoff Area=88,424 sf 14.38% Impervious Runoff Depth=3.55" Flow Length=239' Tc=8.3 min CN=75 Runoff=7.80 cfs 0.600 af
Subcatchment20S: Area 20	Runoff Area=24,549 sf 15.91% Impervious Runoff Depth=3.45" Flow Length=195' Tc=12.8 min CN=74 Runoff=1.83 cfs 0.162 af
Reach 1R: Charles River	Inflow=47.05 cfs 3.940 af Outflow=47.05 cfs 3.940 af
Reach 2R: Office Park	Inflow=1.30 cfs 0.093 af Outflow=1.30 cfs 0.093 af
Reach 4R: Talcott Ave	Inflow=2.52 cfs 0.250 af Outflow=2.52 cfs 0.250 af
Reach 5R: 24" Drain	Inflow=10.97 cfs 0.857 af Outflow=10.97 cfs 0.857 af
Reach 7R: CB5 - 8"	Inflow=4.95 cfs 0.544 af Outflow=4.95 cfs 0.544 af
Reach 8R: CB6 - 6"	Inflow=3.47 cfs 0.415 af Outflow=3.47 cfs 0.415 af
Reach 11R: MH6	Inflow=0.64 cfs 0.050 af Outflow=0.64 cfs 0.050 af
Reach 15R: MH5	Inflow=19.36 cfs 1.705 af Outflow=19.36 cfs 1.705 af
Reach 17R: CB13 (NEW)	Inflow=3.65 cfs 0.260 af Outflow=3.65 cfs 0.260 af
Reach 20R: Arsenal Park Phase A	Inflow=1.48 cfs 0.136 af Outflow=1.48 cfs 0.136 af
Reach 23R: Area 16/17	Inflow=1.96 cfs 0.269 af Outflow=1.96 cfs 0.269 af
Pond 1aP: MH2a	Peak Elev=33.62' Inflow=1.38 cfs 0.098 af 8.0" Round Culvert n=0.013 L=34.0' S=0.0176 '/' Outflow=1.38 cfs 0.098 af
Pond 1bP: MH2b	Peak Elev=32.84' Inflow=5.03 cfs 0.358 af 15.0" Round Culvert n=0.013 L=15.0' S=0.0133 '/' Outflow=5.03 cfs 0.358 af

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Pond 1P: CB1	Peak Elev=35.65' Inflow=1.38 cfs 0.098 af 8.0" Round Culvert n=0.013 L=138.0' S=0.0196 '/' Outflow=1.38 cfs 0.098 af
Pond 2P: CB2	Peak Elev=36.22' Inflow=2.42 cfs 0.174 af 12.0" Round Culvert n=0.013 L=115.0' S=0.0174 '/' Outflow=2.42 cfs 0.174 af
Pond 3P: MH1	Peak Elev=35.46' Inflow=8.00 cfs 0.581 af 15.0" Round Culvert n=0.013 L=155.0' S=0.0045 '/' Outflow=8.00 cfs 0.581 af
Pond 4P: MH2/CDS Unit	Peak Elev=32.22' Inflow=13.03 cfs 0.939 af 18.0" Round Culvert n=0.013 L=35.0' S=0.0114 '/' Outflow=13.03 cfs 0.939 af
Pond 5P: Rain Garden 4	Peak Elev=35.22' Storage=3,227 cf Inflow=3.93 cfs 0.301 af Outflow=1.96 cfs 0.269 af
Pond 6P: Subsurface Storage	Peak Elev=30.08' Storage=6,565 cf Inflow=13.03 cfs 0.939 af 18.0" Round Culvert n=0.013 L=35.0' S=0.0057 '/' Outflow=10.97 cfs 0.857 af
Pond 7P: Small Detention Area	Peak Elev=25.64' Storage=1,845 cf Inflow=6.41 cfs 0.492 af Outflow=6.39 cfs 0.455 af
Pond 11P: CB10	Peak Elev=40.29' Inflow=1.95 cfs 0.141 af 8.0" Round Culvert n=0.013 L=17.0' S=0.1529 '/' Outflow=1.95 cfs 0.141 af
Pond 12P: CB11	Peak Elev=23.78' Inflow=0.64 cfs 0.050 af 8.0" Round Culvert n=0.013 L=115.0' S=0.0374 '/' Outflow=0.64 cfs 0.050 af
Pond 13P: MH3	Peak Elev=39.05' Inflow=6.63 cfs 0.686 af 10.0" Round Culvert n=0.013 L=104.0' S=0.0197 '/' Outflow=6.63 cfs 0.686 af
Pond 14P: MH4	Peak Elev=26.08' Inflow=8.64 cfs 0.848 af 18.0" Round Culvert n=0.013 L=100.0' S=0.0480 '/' Outflow=8.64 cfs 0.848 af
Pond 16P: CB3	Peak Elev=36.88' Inflow=4.26 cfs 0.311 af 15.0" Round Culvert n=0.013 L=20.0' S=0.0050 '/' Outflow=4.26 cfs 0.311 af
Pond 17P: CB4	Peak Elev=36.60' Inflow=1.33 cfs 0.096 af 12.0" Round Culvert n=0.013 L=115.0' S=0.0148 '/' Outflow=1.33 cfs 0.096 af
Pond 19P: CB9	Peak Elev=28.31' Inflow=2.09 cfs 0.162 af 12.0" Round Culvert n=0.013 L=114.0' S=0.0149 '/' Outflow=2.09 cfs 0.162 af
Pond 20P: CDS Unit	Peak Elev=26.69' Inflow=2.09 cfs 0.162 af 12.0" Round Culvert n=0.013 L=84.0' S=0.0155 '/' Outflow=2.09 cfs 0.162 af
Pond 22P: MH1	Peak Elev=36.41' Inflow=5.59 cfs 0.407 af 15.0" Round Culvert n=0.013 L=63.0' S=0.0048 '/' Outflow=5.59 cfs 0.407 af
Pond 23P: Rain Garden 1	Peak Elev=35.17' Storage=792 cf Inflow=1.83 cfs 0.140 af Outflow=1.51 cfs 0.129 af

Pond 24P: Rain Garden 2 Peak Elev=35.19' Storage=1,383 cf Inflow=2.11 cfs 0.165 af
Outflow=1.54 cfs 0.146 af

Pond 25P: Rain Garden 3 Peak Elev=35.15' Storage=1,339 cf Inflow=1.98 cfs 0.155 af
Outflow=1.48 cfs 0.136 af

Total Runoff Area = 13.038 ac Runoff Volume = 4.369 af Average Runoff Depth = 4.02"
72.51% Pervious = 9.454 ac 27.49% Impervious = 3.584 ac

Summary for Subcatchment 1S: Area 1

Runoff = 1.30 cfs @ 12.09 hrs, Volume= 0.093 af, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
14,985	72	Woods/grass comb., Good, HSG C
14,985		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	34	0.0680	0.10		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	56	0.0500	1.12		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.3	90	Total			

Summary for Subcatchment 2S: Area 2

Runoff = 3.65 cfs @ 12.09 hrs, Volume= 0.260 af, Depth= 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
10,019	72	Woods/grass comb., Good, HSG C
5,206	98	Paved parking, HSG C
* 12,368	74	Rubber Surface, HSG C
8,600	74	>75% Grass cover, Good, HSG C
36,193	77	Weighted Average
30,987		85.62% Pervious Area
5,206		14.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	30	0.1670	0.14		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	80	0.0060	1.57		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.9	160	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.2	270	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Area 3

Runoff = 1.38 cfs @ 12.09 hrs, Volume= 0.098 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
6,706	72	Woods/grass comb., Good, HSG C
1,291	98	Paved parking, HSG C
5,909	74	>75% Grass cover, Good, HSG C
* 520	74	Rubber Surface, HSG C
14,426	75	Weighted Average
13,135		91.05% Pervious Area
1,291		8.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	23	0.2000	0.32		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
0.2	27	0.0720	1.88		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
1.4	50	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Area 4

Runoff = 2.42 cfs @ 12.09 hrs, Volume= 0.174 af, Depth= 4.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
12,664	72	Woods/grass comb., Good, HSG C
8,570	98	Paved parking, HSG C
21,234	82	Weighted Average
12,664		59.64% Pervious Area
8,570		40.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	24	0.1330	0.19		Sheet Flow, Sheet Flow - 1
					Grass: Dense n= 0.240 P2= 3.25"
0.0	12	0.1830	8.68		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.4	75	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc 2
					Paved Kv= 20.3 fps
2.5	111	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Area 5

Runoff = 4.26 cfs @ 12.09 hrs, Volume= 0.311 af, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
15,700	72	Woods/grass comb., Good, HSG C
18,844	98	Paved parking, HSG C
34,544	86	Weighted Average
15,700		45.45% Pervious Area
18,844		54.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	30	0.1270	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.1	12	0.0960	1.55		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.9	120	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.9	162	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 6S: Area 6

Runoff = 1.33 cfs @ 12.09 hrs, Volume= 0.096 af, Depth= 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
5,412	72	Woods/grass comb., Good, HSG C
5,557	98	Paved parking, HSG C
10,969	85	Weighted Average
5,412		49.34% Pervious Area
5,557		50.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	20	0.0700	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	26	0.0120	0.55		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.5	72	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.9	118	Total, Increased to minimum Tc = 6.0 min			

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Summary for Subcatchment 7S: Area 7

Runoff = 2.52 cfs @ 12.24 hrs, Volume= 0.250 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
35,328	72	Woods/grass comb., Good, HSG C
2,632	98	Paved parking, HSG C
37,960	74	Weighted Average
35,328		93.07% Pervious Area
2,632		6.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	32	0.0220	0.06		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
9.1	561	0.0420	1.02		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
17.3	593	Total			

Summary for Subcatchment 8S: Area 8

Runoff = 6.41 cfs @ 12.12 hrs, Volume= 0.492 af, Depth= 3.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
60,370	74	>75% Grass cover, Good, HSG C
8,174	98	Paved parking, HSG C
68,544	77	Weighted Average
60,370		88.07% Pervious Area
8,174		11.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	32	0.0250	0.15		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
4.2	265	0.0230	1.06		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
0.4	55	0.1120	2.34		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
8.2	352	Total			

Summary for Subcatchment 9S: Area 9

Runoff = 0.64 cfs @ 12.12 hrs, Volume= 0.050 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
7,600	74	Pasture/grassland/range, Good, HSG C
7,600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	44	0.0140	0.13		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
2.9	210	0.0300	1.21		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
8.7	254	Total			

Summary for Subcatchment 10S: Area 10

Runoff = 8.38 cfs @ 12.11 hrs, Volume= 0.623 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
63,128	74	>75% Grass cover, Good, HSG C
6,960	98	Paved parking, HSG C
21,691	72	Woods/grass comb., Good, HSG C
91,779	75	Weighted Average
84,819		92.42% Pervious Area
6,960		7.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	23	0.0350	0.16		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
4.3	318	0.0310	1.23		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.6	82	0.2090	2.29		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
7.3	423	Total			

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Summary for Subcatchment 11S: Area 11

Runoff = 1.95 cfs @ 12.09 hrs, Volume= 0.141 af, Depth= 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
7,487	98	Paved parking, HSG C
8,962	72	Woods/grass comb., Good, HSG C
16,449	84	Weighted Average
8,962		54.48% Pervious Area
7,487		45.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	18	0.0110	0.77		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.2	50	0.0320	3.63		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.5	55	0.0710	1.87		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
1.1	123	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 12S: Area 12

Runoff = 1.83 cfs @ 12.08 hrs, Volume= 0.140 af, Depth= 5.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
2,728	74	>75% Grass cover, Good, HSG C
10,635	98	Paved parking, HSG C
13,363	93	Weighted Average
2,728		20.41% Pervious Area
10,635		79.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	18	0.0110	0.77		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.2	50	0.0320	3.63		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.2	55	0.0710	5.41		Shallow Concentrated Flow, Shallow Conc - 2 Paved Kv= 20.3 fps
0.8	123	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 13S: Area 13

Runoff = 2.11 cfs @ 12.08 hrs, Volume= 0.165 af, Depth= 5.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
2,084	74	>75% Grass cover, Good, HSG C
13,033	98	Paved parking, HSG C
15,117	95	Weighted Average
2,084		13.79% Pervious Area
13,033		86.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	26	0.0140	0.92		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0180	2.72		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.9	89	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14S: Area 14

Runoff = 1.98 cfs @ 12.08 hrs, Volume= 0.155 af, Depth= 5.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
1,840	74	>75% Grass cover, Good, HSG C
12,353	98	Paved parking, HSG C
14,193	95	Weighted Average
1,840		12.96% Pervious Area
12,353		87.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	24	0.0060	0.64		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.5	80	0.0160	2.57		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
1.1	104	Total, Increased to minimum Tc = 6.0 min			

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Summary for Subcatchment 15S: Area 15

Runoff = 2.09 cfs @ 12.08 hrs, Volume= 0.162 af, Depth= 5.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
2,415	74	>75% Grass cover, Good, HSG C
12,705	98	Paved parking, HSG C
15,120	94	Weighted Average
2,415		15.97% Pervious Area
12,705		84.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	21	0.0330	0.15		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
0.4	65	0.0150	2.49		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
2.7	86	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 16S: Area 16

Runoff = 1.97 cfs @ 12.08 hrs, Volume= 0.148 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
3,450	70	Woods, Good, HSG C
11,280	98	Paved parking, HSG C
14,730	91	Weighted Average
3,450		23.42% Pervious Area
11,280		76.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	16	0.0110	0.76		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.3	64	0.0260	3.27		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.7	80	Total, Increased to minimum Tc = 6.0 min			

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Summary for Subcatchment 17S: Area 17

Runoff = 1.97 cfs @ 12.08 hrs, Volume= 0.153 af, Depth= 5.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
2,432	72	Woods/grass comb., Good, HSG C
11,798	98	Paved parking, HSG C
14,230	94	Weighted Average
2,432		17.09% Pervious Area
11,798		82.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0140	0.88		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.2	66	0.0480	4.45		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.6	87	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 18S: Area 18

Runoff = 1.15 cfs @ 12.14 hrs, Volume= 0.095 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
10,571	70	Woods, Good, HSG C
2,973	98	Paved parking, HSG C
13,544	76	Weighted Average
10,571		78.05% Pervious Area
2,973		21.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.2750	0.11		Sheet Flow, Sheet Flow - 1
					Woods: Dense underbrush n= 0.800 P2= 3.25"
0.5	51	0.1200	1.73		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
2.3	121	0.0162	0.89		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
10.3	222	Total			

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Summary for Subcatchment 19S: Area 19

Runoff = 7.80 cfs @ 12.12 hrs, Volume= 0.600 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
52,359	70	Woods, Good, HSG C
12,718	98	Paved parking, HSG C
19,125	74	>75% Grass cover, Good, HSG C
4,222	72	Woods/grass comb., Good, HSG C
88,424	75	Weighted Average
75,706		85.62% Pervious Area
12,718		14.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	30	0.0500	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.7	109	0.2390	2.44		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
2.0	100	0.0140	0.83		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
8.3	239	Total			

Summary for Subcatchment 20S: Area 20

Runoff = 1.83 cfs @ 12.18 hrs, Volume= 0.162 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

Area (sf)	CN	Description
3,905	98	Paved parking, HSG C
20,644	70	Woods, Good, HSG C
24,549	74	Weighted Average
20,644		84.09% Pervious Area
3,905		15.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	28	0.0320	0.04		Sheet Flow, Sheet Flow - 1
					Woods: Dense underbrush n= 0.800 P2= 3.25"
1.7	167	0.1100	1.66		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
12.8	195	Total			

Summary for Reach 1R: Charles River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 12.369 ac, 26.68% Impervious, Inflow Depth = 3.82" for 25 Yr 24 Hr event
Inflow = 47.05 cfs @ 12.12 hrs, Volume= 3.940 af
Outflow = 47.05 cfs @ 12.12 hrs, Volume= 3.940 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 2R: Office Park

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.344 ac, 0.00% Impervious, Inflow Depth = 3.25" for 25 Yr 24 Hr event
Inflow = 1.30 cfs @ 12.09 hrs, Volume= 0.093 af
Outflow = 1.30 cfs @ 12.09 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 4R: Talcott Ave

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.871 ac, 6.93% Impervious, Inflow Depth = 3.45" for 25 Yr 24 Hr event
Inflow = 2.52 cfs @ 12.24 hrs, Volume= 0.250 af
Outflow = 2.52 cfs @ 12.24 hrs, Volume= 0.250 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 5R: 24" Drain

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 3.82" for 25 Yr 24 Hr event
Inflow = 10.97 cfs @ 12.14 hrs, Volume= 0.857 af
Outflow = 10.97 cfs @ 12.14 hrs, Volume= 0.857 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 7R: CB5 - 8"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.319 ac, 81.38% Impervious, Inflow Depth = 4.95" for 25 Yr 24 Hr event
Inflow = 4.95 cfs @ 12.16 hrs, Volume= 0.544 af
Outflow = 4.95 cfs @ 12.16 hrs, Volume= 0.544 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 8R: CB6 - 6"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.012 ac, 81.93% Impervious, Inflow Depth = 4.93" for 25 Yr 24 Hr event
Inflow = 3.47 cfs @ 12.18 hrs, Volume= 0.415 af
Outflow = 3.47 cfs @ 12.18 hrs, Volume= 0.415 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 11R: MH6

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.174 ac, 0.00% Impervious, Inflow Depth = 3.45" for 25 Yr 24 Hr event
Inflow = 0.64 cfs @ 12.12 hrs, Volume= 0.050 af
Outflow = 0.64 cfs @ 12.12 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 15R: MH5

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.738 ac, 51.56% Impervious, Inflow Depth = 4.32" for 25 Yr 24 Hr event
Inflow = 19.36 cfs @ 12.12 hrs, Volume= 1.705 af
Outflow = 19.36 cfs @ 12.12 hrs, Volume= 1.705 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 17R: CB13 (NEW)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.831 ac, 14.38% Impervious, Inflow Depth = 3.75" for 25 Yr 24 Hr event
Inflow = 3.65 cfs @ 12.09 hrs, Volume= 0.260 af
Outflow = 3.65 cfs @ 12.09 hrs, Volume= 0.260 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 20R: Arsenal Park Phase A

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.326 ac, 87.04% Impervious, Inflow Depth = 5.00" for 25 Yr 24 Hr event
Inflow = 1.48 cfs @ 12.15 hrs, Volume= 0.136 af
Outflow = 1.48 cfs @ 12.15 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 23R: Area 16/17

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.665 ac, 79.69% Impervious, Inflow Depth = 4.86" for 25 Yr 24 Hr event
 Inflow = 1.96 cfs @ 12.23 hrs, Volume= 0.269 af
 Outflow = 1.96 cfs @ 12.23 hrs, Volume= 0.269 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Pond 1aP: MH2a

Inflow Area = 0.331 ac, 8.95% Impervious, Inflow Depth = 3.55" for 25 Yr 24 Hr event
 Inflow = 1.38 cfs @ 12.09 hrs, Volume= 0.098 af
 Outflow = 1.38 cfs @ 12.09 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.38 cfs @ 12.09 hrs, Volume= 0.098 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 33.62' @ 12.10 hrs
 Flood Elev= 36.89'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.90'	8.0" Round 8" Pipe L= 34.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 30.90' / 30.30' S= 0.0176 ' / S= 0.0176 ' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf

Primary OutFlow Max=1.36 cfs @ 12.09 hrs HW=33.50' TW=32.79' (Dynamic Tailwater)
 ↑ **1=8" Pipe** (Outlet Controls 1.36 cfs @ 3.89 fps)

Summary for Pond 1bP: MH2b

Inflow Area = 1.162 ac, 12.84% Impervious, Inflow Depth = 3.69" for 25 Yr 24 Hr event
 Inflow = 5.03 cfs @ 12.09 hrs, Volume= 0.358 af
 Outflow = 5.03 cfs @ 12.09 hrs, Volume= 0.358 af, Atten= 0%, Lag= 0.0 min
 Primary = 5.03 cfs @ 12.09 hrs, Volume= 0.358 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 32.84' @ 12.10 hrs
 Flood Elev= 35.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.20'	15.0" Round 15" Pipe L= 15.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.20' / 30.00' S= 0.0133 ' / S= 0.0133 ' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=4.66 cfs @ 12.09 hrs HW=32.79' TW=32.17' (Dynamic Tailwater)
 ↑ **1=15" Pipe** (Inlet Controls 4.66 cfs @ 3.80 fps)

Summary for Pond 1P: CB1

Inflow Area = 0.331 ac, 8.95% Impervious, Inflow Depth = 3.55" for 25 Yr 24 Hr event
 Inflow = 1.38 cfs @ 12.09 hrs, Volume= 0.098 af
 Outflow = 1.38 cfs @ 12.09 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.38 cfs @ 12.09 hrs, Volume= 0.098 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 35.65' @ 12.10 hrs
 Flood Elev= 37.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	8.0" Round 8" Clay Pipe L= 138.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.00' / 31.30' S= 0.0196 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=1.35 cfs @ 12.09 hrs HW=35.57' TW=33.50' (Dynamic Tailwater)
 ↑1=8" Clay Pipe (Outlet Controls 1.35 cfs @ 3.86 fps)

Summary for Pond 2P: CB2

Inflow Area = 0.487 ac, 40.36% Impervious, Inflow Depth = 4.27" for 25 Yr 24 Hr event
 Inflow = 2.42 cfs @ 12.09 hrs, Volume= 0.174 af
 Outflow = 2.42 cfs @ 12.09 hrs, Volume= 0.174 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.42 cfs @ 12.09 hrs, Volume= 0.174 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 36.22' @ 12.10 hrs
 Flood Elev= 36.24'

Device	Routing	Invert	Outlet Devices
#1	Primary	33.30'	12.0" Round 12" RCP L= 115.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 33.30' / 31.30' S= 0.0174 ' / Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=2.35 cfs @ 12.09 hrs HW=36.13' TW=35.41' (Dynamic Tailwater)
 ↑1=12" RCP (Outlet Controls 2.35 cfs @ 3.00 fps)

Summary for Pond 3P: MH1

[58] Hint: Peaked 0.46' above defined flood level

Inflow Area = 1.532 ac, 49.40% Impervious, Inflow Depth = 4.55" for 25 Yr 24 Hr event
 Inflow = 8.00 cfs @ 12.09 hrs, Volume= 0.581 af
 Outflow = 8.00 cfs @ 12.09 hrs, Volume= 0.581 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.00 cfs @ 12.09 hrs, Volume= 0.581 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

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Peak Elev= 35.46' @ 12.09 hrs

Flood Elev= 35.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.70'	15.0" Round 15" RCP L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.70' / 29.00' S= 0.0045 ' / ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=7.87 cfs @ 12.09 hrs HW=35.41' TW=32.14' (Dynamic Tailwater)

↑1=15" RCP (Outlet Controls 7.87 cfs @ 6.41 fps)

Summary for Pond 4P: MH2/CDS Unit

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 4.18" for 25 Yr 24 Hr event
Inflow = 13.03 cfs @ 12.09 hrs, Volume= 0.939 af
Outflow = 13.03 cfs @ 12.09 hrs, Volume= 0.939 af, Atten= 0%, Lag= 0.0 min
Primary = 13.03 cfs @ 12.09 hrs, Volume= 0.939 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 32.22' @ 12.10 hrs

Flood Elev= 34.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	28.90'	18.0" Round 18" RCP L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 28.90' / 28.50' S= 0.0114 ' / ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=13.01 cfs @ 12.09 hrs HW=32.15' TW=29.81' (Dynamic Tailwater)

↑1=18" RCP (Inlet Controls 13.01 cfs @ 7.36 fps)

Summary for Pond 5P: Rain Garden 4

[58] Hint: Peaked 0.22' above defined flood level

Inflow Area = 0.665 ac, 79.69% Impervious, Inflow Depth = 5.43" for 25 Yr 24 Hr event
Inflow = 3.93 cfs @ 12.08 hrs, Volume= 0.301 af
Outflow = 1.96 cfs @ 12.23 hrs, Volume= 0.269 af, Atten= 50%, Lag= 8.6 min
Primary = 1.96 cfs @ 12.23 hrs, Volume= 0.269 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 35.22' @ 12.23 hrs Surf.Area= 3,157 sf Storage= 3,227 cf

Flood Elev= 35.00' Surf.Area= 3,157 sf Storage= 2,588 cf

Plug-Flow detention time= 97.1 min calculated for 0.269 af (90% of inflow)

Center-of-Mass det. time= 46.6 min (819.8 - 773.3)

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Volume	Invert	Avail.Storage	Storage Description
#1	33.00'	5,435 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	31.00'	89 cf	7.40'W x 30.00'L x 2.00'H Bioretention Soil Layer
			444 cf Overall x 20.0% Voids
		5,523 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.00	222	0	0
34.00	921	572	572
35.00	2,935	1,928	2,500
36.00	2,935	2,935	5,435

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.50'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	30.80'	10.0" Round 10" RCP Pipe L= 133.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.80' / 19.10' S= 0.0880 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=1.96 cfs @ 12.23 hrs HW=35.22' TW=0.00' (Dynamic Tailwater)

↑ **2=10" RCP Pipe** (Passes 1.96 cfs of 5.25 cfs potential flow)

↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.96 cfs)

Summary for Pond 6P: Subsurface Storage

[93] Warning: Storage range exceeded by 6.08'

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 4.18" for 25 Yr 24 Hr event
Inflow = 13.03 cfs @ 12.09 hrs, Volume= 0.939 af
Outflow = 10.97 cfs @ 12.14 hrs, Volume= 0.857 af, Atten= 16%, Lag= 3.1 min
Primary = 10.97 cfs @ 12.14 hrs, Volume= 0.857 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 30.08' @ 12.14 hrs Surf.Area= 1,305 sf Storage= 6,565 cf

Flood Elev= 31.50' Surf.Area= 1,305 sf Storage= 8,236 cf

Plug-Flow detention time= 74.7 min calculated for 0.857 af (91% of inflow)

Center-of-Mass det. time= 31.4 min (839.1 - 807.7)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	8,824 cf	StormTrap DoubleTrap 7-6 x 10 Inside= 101.7"W x 90.0"H => 57.31 sf x 15.40'L = 882.4 cf Outside= 101.7"W x 102.0"H => 72.07 sf x 15.40'L = 1,109.6 cf

Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	18.0" Round 18" Pipe L= 35.0' CPP, square edge headwall, Ke= 0.500

Inlet / Outlet Invert= 27.50' / 27.30' S= 0.0057 ' / n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=10.96 cfs @ 12.14 hrs HW=30.08' TW=0.00' (Dynamic Tailwater)
 ↑1=18" Pipe (Barrel Controls 10.96 cfs @ 6.20 fps)

Summary for Pond 7P: Small Detention Area

Inflow Area = 1.574 ac, 11.93% Impervious, Inflow Depth = 3.75" for 25 Yr 24 Hr event
 Inflow = 6.41 cfs @ 12.12 hrs, Volume= 0.492 af
 Outflow = 6.39 cfs @ 12.12 hrs, Volume= 0.455 af, Atten= 0%, Lag= 0.5 min
 Primary = 6.39 cfs @ 12.12 hrs, Volume= 0.455 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 25.64' @ 12.12 hrs Surf.Area= 1,676 sf Storage= 1,845 cf
 Flood Elev= 26.00' Surf.Area= 1,955 sf Storage= 2,498 cf

Plug-Flow detention time= 56.8 min calculated for 0.455 af (92% of inflow)
 Center-of-Mass det. time= 17.8 min (839.3 - 821.5)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	2,498 cf	Rain Garden (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	682	0	0
25.00	1,179	931	931
26.00	1,955	1,567	2,498

Device	Routing	Invert	Outlet Devices
#1	Primary	25.50'	50.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=6.38 cfs @ 12.12 hrs HW=25.64' TW=0.00' (Dynamic Tailwater)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 6.38 cfs @ 0.91 fps)

Summary for Pond 11P: CB10

[58] Hint: Peaked 8.49' above defined flood level

Inflow Area = 0.378 ac, 45.52% Impervious, Inflow Depth = 4.49" for 25 Yr 24 Hr event
 Inflow = 1.95 cfs @ 12.09 hrs, Volume= 0.141 af
 Outflow = 1.95 cfs @ 12.09 hrs, Volume= 0.141 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.95 cfs @ 12.09 hrs, Volume= 0.141 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

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Peak Elev= 40.29' @ 12.11 hrs

Flood Elev= 31.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.60'	8.0" Round 8" Clay L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.60' / 27.00' S= 0.1529 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=1.93 cfs @ 12.09 hrs HW=39.75' TW=38.44' (Dynamic Tailwater)↑**1=8" Clay** (Inlet Controls 1.93 cfs @ 5.52 fps)**Summary for Pond 12P: CB11**

Inflow Area = 0.174 ac, 0.00% Impervious, Inflow Depth = 3.45" for 25 Yr 24 Hr event
Inflow = 0.64 cfs @ 12.12 hrs, Volume= 0.050 af
Outflow = 0.64 cfs @ 12.12 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min
Primary = 0.64 cfs @ 12.12 hrs, Volume= 0.050 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 23.78' @ 12.12 hrs

Flood Elev= 26.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.30'	8.0" Round Culvert L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 23.30' / 19.00' S= 0.0374 '/' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.64 cfs @ 12.12 hrs HW=23.78' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 0.64 cfs @ 2.37 fps)**Summary for Pond 13P: MH3**

Under existing conditions, this area appears to work with an 8" pipe, even though the model indicates that a 15" pipe is needed. The 8" pipe will remain.

[58] Hint: Peaked 6.00' above defined flood level

Inflow Area = 1.696 ac, 73.40% Impervious, Inflow Depth = 4.85" for 25 Yr 24 Hr event
Inflow = 6.63 cfs @ 12.12 hrs, Volume= 0.686 af
Outflow = 6.63 cfs @ 12.12 hrs, Volume= 0.686 af, Atten= 0%, Lag= 0.0 min
Primary = 6.63 cfs @ 12.12 hrs, Volume= 0.686 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 39.05' @ 12.11 hrs

Flood Elev= 33.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.40'	10.0" Round 10" Culvert L= 104.0' RCP, square edge headwall, Ke= 0.500

Inlet / Outlet Invert= 26.40' / 24.35' S= 0.0197 ' / n= 0.013 Clay tile, Flow Area= 0.55 sf

Primary OutFlow Max=6.62 cfs @ 12.12 hrs HW=39.03' TW=26.06' (Dynamic Tailwater)

↑**1=10" Culvert** (Outlet Controls 6.62 cfs @ 12.14 fps)

Summary for Pond 14P: MH4

Assume rim of DMH is at elevation 24.

Inflow Area = 2.043 ac, 75.20% Impervious, Inflow Depth = 4.98" for 25 Yr 24 Hr event
 Inflow = 8.64 cfs @ 12.10 hrs, Volume= 0.848 af
 Outflow = 8.64 cfs @ 12.10 hrs, Volume= 0.848 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.64 cfs @ 12.10 hrs, Volume= 0.848 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 26.08' @ 12.10 hrs

Flood Elev= 31.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.30'	18.0" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.30' / 19.50' S= 0.0480 ' / n= 0.013 Clay tile, Flow Area= 1.77 sf

Primary OutFlow Max=8.63 cfs @ 12.10 hrs HW=26.08' TW=0.00' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 8.63 cfs @ 4.89 fps)

Summary for Pond 16P: CB3

[58] Hint: Peaked 2.55' above defined flood level

Inflow Area = 0.793 ac, 54.55% Impervious, Inflow Depth = 4.70" for 25 Yr 24 Hr event
 Inflow = 4.26 cfs @ 12.09 hrs, Volume= 0.311 af
 Outflow = 4.26 cfs @ 12.09 hrs, Volume= 0.311 af, Atten= 0%, Lag= 0.0 min
 Primary = 4.26 cfs @ 12.09 hrs, Volume= 0.311 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 36.88' @ 12.10 hrs

Flood Elev= 34.33'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.30'	15.0" Round 12" RCP L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.30' / 30.20' S= 0.0050 ' / n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=3.80 cfs @ 12.09 hrs HW=36.72' TW=36.31' (Dynamic Tailwater)

↑**1=12" RCP** (Inlet Controls 3.80 cfs @ 3.09 fps)

Summary for Pond 17P: CB4

[58] Hint: Peaked 0.70' above defined flood level

Inflow Area = 0.252 ac, 50.66% Impervious, Inflow Depth = 4.60" for 25 Yr 24 Hr event
 Inflow = 1.33 cfs @ 12.09 hrs, Volume= 0.096 af
 Outflow = 1.33 cfs @ 12.09 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.33 cfs @ 12.09 hrs, Volume= 0.096 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 36.60' @ 12.10 hrs
 Flood Elev= 35.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.90'	12.0" Round 12" RCP L= 115.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.90' / 30.20' S= 0.0148 ' / ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=0.97 cfs @ 12.09 hrs HW=36.44' TW=36.31' (Dynamic Tailwater)
 ↑1=12" RCP (Outlet Controls 0.97 cfs @ 1.24 fps)

Summary for Pond 19P: CB9

Inflow Area = 0.347 ac, 84.03% Impervious, Inflow Depth = 5.60" for 25 Yr 24 Hr event
 Inflow = 2.09 cfs @ 12.08 hrs, Volume= 0.162 af
 Outflow = 2.09 cfs @ 12.08 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.09 cfs @ 12.08 hrs, Volume= 0.162 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 28.31' @ 12.08 hrs
 Flood Elev= 35.02'

Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	12.0" Round Culvert L= 114.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 27.50' / 25.80' S= 0.0149 ' / ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=2.09 cfs @ 12.08 hrs HW=28.31' TW=26.68' (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 2.09 cfs @ 3.06 fps)

Summary for Pond 20P: CDS Unit

Inflow Area = 0.347 ac, 84.03% Impervious, Inflow Depth = 5.60" for 25 Yr 24 Hr event
 Inflow = 2.09 cfs @ 12.08 hrs, Volume= 0.162 af
 Outflow = 2.09 cfs @ 12.08 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.09 cfs @ 12.08 hrs, Volume= 0.162 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

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Peak Elev= 26.69' @ 12.09 hrs

Flood Elev= 34.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	25.70'	12.0" Round Culvert L= 84.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 25.70' / 24.40' S= 0.0155 ' S= 0.0155 ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=2.09 cfs @ 12.08 hrs HW=26.68' TW=26.05' (Dynamic Tailwater)↑**1=Culvert** (Outlet Controls 2.09 cfs @ 3.36 fps)**Summary for Pond 22P: MH1**

[58] Hint: Peaked 1.91' above defined flood level

[80] Warning: Exceeded Pond 16P by 0.01' @ 12.02 hrs (0.61 cfs 0.001 af)

[80] Warning: Exceeded Pond 17P by 0.18' @ 12.03 hrs (1.18 cfs 0.004 af)

Inflow Area = 1.045 ac, 53.61% Impervious, Inflow Depth = 4.68" for 25 Yr 24 Hr event
Inflow = 5.59 cfs @ 12.09 hrs, Volume= 0.407 af
Outflow = 5.59 cfs @ 12.09 hrs, Volume= 0.407 af, Atten= 0%, Lag= 0.0 min
Primary = 5.59 cfs @ 12.09 hrs, Volume= 0.407 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 36.41' @ 12.09 hrs

Flood Elev= 34.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.10'	15.0" Round 15" Pipe L= 63.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.10' / 29.80' S= 0.0048 ' S= 0.0048 ' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=5.45 cfs @ 12.09 hrs HW=36.31' TW=35.40' (Dynamic Tailwater)↑**1=15" Pipe** (Outlet Controls 5.45 cfs @ 4.44 fps)**Summary for Pond 23P: Rain Garden 1**

[58] Hint: Peaked 0.17' above defined flood level

Inflow Area = 0.307 ac, 79.59% Impervious, Inflow Depth = 5.49" for 25 Yr 24 Hr event
Inflow = 1.83 cfs @ 12.08 hrs, Volume= 0.140 af
Outflow = 1.51 cfs @ 12.14 hrs, Volume= 0.129 af, Atten= 17%, Lag= 3.3 min
Primary = 1.51 cfs @ 12.14 hrs, Volume= 0.129 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 35.17' @ 12.14 hrs Surf.Area= 1,074 sf Storage= 792 cf

Flood Elev= 35.00' Surf.Area= 1,074 sf Storage= 665 cf

Plug-Flow detention time= 74.0 min calculated for 0.129 af (92% of inflow)

Center-of-Mass det. time= 32.4 min (803.9 - 771.6)

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Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	1,291 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	128 cf	10.00'W x 32.00'L x 2.00'H Bioretention Soil
			640 cf Overall x 20.0% Voids
		1,419 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	320	0	0
35.00	754	537	537
36.00	754	754	1,291

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	31.10'	8.0" Round 8" PVC Pipe L= 4.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.10' / 30.97' S= 0.0325 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.51 cfs @ 12.14 hrs HW=35.17' TW=0.00' (Dynamic Tailwater)↑ **2=8" PVC Pipe** (Passes 1.51 cfs of 3.25 cfs potential flow)↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.51 cfs)**Summary for Pond 24P: Rain Garden 2**

[58] Hint: Peaked 0.19' above defined flood level

Inflow Area = 0.347 ac, 86.21% Impervious, Inflow Depth = 5.72" for 25 Yr 24 Hr event
 Inflow = 2.11 cfs @ 12.08 hrs, Volume= 0.165 af
 Outflow = 1.54 cfs @ 12.16 hrs, Volume= 0.146 af, Atten= 27%, Lag= 4.3 min
 Primary = 1.54 cfs @ 12.16 hrs, Volume= 0.146 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 35.19' @ 12.16 hrs Surf.Area= 1,837 sf Storage= 1,383 cf

Flood Elev= 35.00' Surf.Area= 1,837 sf Storage= 1,142 cf

Plug-Flow detention time= 102.2 min calculated for 0.146 af (88% of inflow)

Center-of-Mass det. time= 47.3 min (809.7 - 762.4)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	2,198 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	223 cf	10.00'W x 55.80'L x 2.00'H Bioretention Soil
			1,116 cf Overall x 20.0% Voids
		2,421 cf	Total Available Storage

Arsenal Park - Proposed Conditions Final _11_05_Type III 24-hr 25 Yr 24 Hr Rainfall=6.31"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	558	0	0
35.00	1,279	919	919
36.00	1,279	1,279	2,198

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	31.45'	8.0" Round 8" PVC Pipe L= 97.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.45' / 30.97' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.54 cfs @ 12.16 hrs HW=35.19' TW=0.00' (Dynamic Tailwater)↑ **2=8" PVC Pipe** (Passes 1.54 cfs of 2.04 cfs potential flow)↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.54 cfs)**Summary for Pond 25P: Rain Garden 3**

[58] Hint: Peaked 0.15' above defined flood level

Inflow Area = 0.326 ac, 87.04% Impervious, Inflow Depth = 5.72" for 25 Yr 24 Hr event
 Inflow = 1.98 cfs @ 12.08 hrs, Volume= 0.155 af
 Outflow = 1.48 cfs @ 12.15 hrs, Volume= 0.136 af, Atten= 25%, Lag= 4.2 min
 Primary = 1.48 cfs @ 12.15 hrs, Volume= 0.136 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 35.15' @ 12.15 hrs Surf.Area= 1,841 sf Storage= 1,339 cf

Flood Elev= 35.00' Surf.Area= 1,841 sf Storage= 1,144 cf

Plug-Flow detention time= 106.5 min calculated for 0.136 af (87% of inflow)

Center-of-Mass det. time= 49.2 min (811.6 - 762.4)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	2,203 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	224 cf	10.00'W x 55.90'L x 2.00'H Bioretention Soil 1,118 cf Overall x 20.0% Voids
		2,426 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	559	0	0
35.00	1,282	921	921
36.00	1,282	1,282	2,203

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85

			Disch. (cfs)	0.000	0.100	0.300	0.550	0.850	1.150	1.300	1.650
			2.150								
#2	Primary	31.10'	12.0" Round 12" RCP Pipe								
			L= 136.0' RCP, square edge headwall, Ke= 0.500								
			Inlet / Outlet Invert= 31.10' / 27.00' S= 0.0301 '/' Cc= 0.900								
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf								

Primary OutFlow Max=1.48 cfs @ 12.15 hrs HW=35.15' TW=0.00' (Dynamic Tailwater)

↑ **2=12" RCP Pipe** (Passes 1.48 cfs of 7.02 cfs potential flow)

↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.48 cfs)

Arsenal Park - Proposed Conditions Final _11_05*Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"*

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Area 1	Runoff Area=14,985 sf 0.00% Impervious Runoff Depth=4.80" Flow Length=90' Tc=6.3 min CN=72 Runoff=1.92 cfs 0.138 af
Subcatchment2S: Area 2	Runoff Area=36,193 sf 14.38% Impervious Runoff Depth=5.38" Flow Length=270' Tc=6.0 min CN=77 Runoff=5.20 cfs 0.373 af
Subcatchment3S: Area 3	Runoff Area=14,426 sf 8.95% Impervious Runoff Depth=5.15" Flow Length=50' Tc=6.0 min CN=75 Runoff=1.99 cfs 0.142 af
Subcatchment4S: Area 4	Runoff Area=21,234 sf 40.36% Impervious Runoff Depth=5.97" Flow Length=111' Tc=6.0 min CN=82 Runoff=3.33 cfs 0.243 af
Subcatchment5S: Area 5	Runoff Area=34,544 sf 54.55% Impervious Runoff Depth=6.45" Flow Length=162' Tc=6.0 min CN=86 Runoff=5.74 cfs 0.426 af
Subcatchment6S: Area 6	Runoff Area=10,969 sf 50.66% Impervious Runoff Depth=6.33" Flow Length=118' Tc=6.0 min CN=85 Runoff=1.80 cfs 0.133 af
Subcatchment7S: Area 7	Runoff Area=37,960 sf 6.93% Impervious Runoff Depth=5.03" Flow Length=593' Tc=17.3 min CN=74 Runoff=3.68 cfs 0.366 af
Subcatchment8S: Area 8	Runoff Area=68,544 sf 11.93% Impervious Runoff Depth=5.38" Flow Length=352' Tc=8.2 min CN=77 Runoff=9.14 cfs 0.706 af
Subcatchment9S: Area 9	Runoff Area=7,600 sf 0.00% Impervious Runoff Depth=5.03" Flow Length=254' Tc=8.7 min CN=74 Runoff=0.94 cfs 0.073 af
Subcatchment10S: Area 10	Runoff Area=91,779 sf 7.58% Impervious Runoff Depth=5.15" Flow Length=423' Tc=7.3 min CN=75 Runoff=12.11 cfs 0.904 af
Subcatchment11S: Area 11	Runoff Area=16,449 sf 45.52% Impervious Runoff Depth=6.21" Flow Length=123' Tc=6.0 min CN=84 Runoff=2.66 cfs 0.195 af
Subcatchment12S: Area 12	Runoff Area=13,363 sf 79.59% Impervious Runoff Depth=7.28" Flow Length=123' Tc=6.0 min CN=93 Runoff=2.39 cfs 0.186 af
Subcatchment13S: Area 13	Runoff Area=15,117 sf 86.21% Impervious Runoff Depth=7.52" Flow Length=89' Tc=6.0 min CN=95 Runoff=2.73 cfs 0.218 af
Subcatchment14S: Area 14	Runoff Area=14,193 sf 87.04% Impervious Runoff Depth=7.52" Flow Length=104' Tc=6.0 min CN=95 Runoff=2.57 cfs 0.204 af
Subcatchment15S: Area 15	Runoff Area=15,120 sf 84.03% Impervious Runoff Depth=7.40" Flow Length=86' Tc=6.0 min CN=94 Runoff=2.72 cfs 0.214 af
Subcatchment16S: Area 16	Runoff Area=14,730 sf 76.58% Impervious Runoff Depth=7.04" Flow Length=80' Tc=6.0 min CN=91 Runoff=2.59 cfs 0.198 af

Arsenal Park - Proposed Conditions Final _11_05Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

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Subcatchment17S: Area 17	Runoff Area=14,230 sf 82.91% Impervious Runoff Depth=7.40" Flow Length=87' Tc=6.0 min CN=94 Runoff=2.56 cfs 0.201 af
Subcatchment18S: Area 18	Runoff Area=13,544 sf 21.95% Impervious Runoff Depth=5.27" Flow Length=222' Tc=10.3 min CN=76 Runoff=1.65 cfs 0.136 af
Subcatchment19S: Area 19	Runoff Area=88,424 sf 14.38% Impervious Runoff Depth=5.15" Flow Length=239' Tc=8.3 min CN=75 Runoff=11.27 cfs 0.871 af
Subcatchment20S: Area 20	Runoff Area=24,549 sf 15.91% Impervious Runoff Depth=5.03" Flow Length=195' Tc=12.8 min CN=74 Runoff=2.66 cfs 0.236 af
Reach 1R: Charles River	Inflow=64.85 cfs 5.642 af Outflow=64.85 cfs 5.642 af
Reach 2R: Office Park	Inflow=1.92 cfs 0.138 af Outflow=1.92 cfs 0.138 af
Reach 4R: Talcott Ave	Inflow=3.68 cfs 0.366 af Outflow=3.68 cfs 0.366 af
Reach 5R: 24" Drain	Inflow=14.45 cfs 1.235 af Outflow=14.45 cfs 1.235 af
Reach 7R: CB5 - 8"	Inflow=5.82 cfs 0.741 af Outflow=5.82 cfs 0.741 af
Reach 8R: CB6 - 6"	Inflow=3.99 cfs 0.567 af Outflow=3.99 cfs 0.567 af
Reach 11R: MH6	Inflow=0.94 cfs 0.073 af Outflow=0.94 cfs 0.073 af
Reach 15R: MH5	Inflow=24.87 cfs 2.386 af Outflow=24.87 cfs 2.386 af
Reach 17R: CB13 (NEW)	Inflow=5.20 cfs 0.373 af Outflow=5.20 cfs 0.373 af
Reach 20R: Arsenal Park Phase A	Inflow=1.76 cfs 0.185 af Outflow=1.76 cfs 0.185 af
Reach 23R: Area 16/17	Inflow=2.15 cfs 0.368 af Outflow=2.15 cfs 0.368 af
Pond 1aP: MH2a	Peak Elev=38.14' Inflow=1.99 cfs 0.142 af 8.0" Round Culvert n=0.013 L=34.0' S=0.0176 '/' Outflow=1.99 cfs 0.142 af
Pond 1bP: MH2b	Peak Elev=36.55' Inflow=7.19 cfs 0.515 af 15.0" Round Culvert n=0.013 L=15.0' S=0.0133 '/' Outflow=7.19 cfs 0.515 af

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Pond 1P: CB1	Peak Elev=42.46' Inflow=1.99 cfs 0.142 af 8.0" Round Culvert n=0.013 L=138.0' S=0.0196 '/' Outflow=1.99 cfs 0.142 af
Pond 2P: CB2	Peak Elev=42.71' Inflow=3.33 cfs 0.243 af 12.0" Round Culvert n=0.013 L=115.0' S=0.0174 '/' Outflow=3.33 cfs 0.243 af
Pond 3P: MH1	Peak Elev=41.27' Inflow=10.88 cfs 0.802 af 15.0" Round Culvert n=0.013 L=155.0' S=0.0045 '/' Outflow=10.88 cfs 0.802 af
Pond 4P: MH2/CDS Unit	Peak Elev=35.23' Inflow=18.07 cfs 1.317 af 18.0" Round Culvert n=0.013 L=35.0' S=0.0114 '/' Outflow=18.07 cfs 1.317 af
Pond 5P: Rain Garden 4	Peak Elev=35.54' Storage=4,163 cf Inflow=5.15 cfs 0.400 af Outflow=2.15 cfs 0.368 af
Pond 6P: Subsurface Storage	Peak Elev=31.13' Storage=7,806 cf Inflow=18.07 cfs 1.317 af 18.0" Round Culvert n=0.013 L=35.0' S=0.0057 '/' Outflow=14.45 cfs 1.235 af
Pond 7P: Small Detention Area	Peak Elev=25.68' Storage=1,908 cf Inflow=9.14 cfs 0.706 af Outflow=9.12 cfs 0.669 af
Pond 11P: CB10	Peak Elev=48.67' Inflow=2.66 cfs 0.195 af 8.0" Round Culvert n=0.013 L=17.0' S=0.1529 '/' Outflow=2.66 cfs 0.195 af
Pond 12P: CB11	Peak Elev=23.94' Inflow=0.94 cfs 0.073 af 8.0" Round Culvert n=0.013 L=115.0' S=0.0374 '/' Outflow=0.94 cfs 0.073 af
Pond 13P: MH3	Peak Elev=46.39' Inflow=8.18 cfs 0.937 af 10.0" Round Culvert n=0.013 L=104.0' S=0.0197 '/' Outflow=8.18 cfs 0.937 af
Pond 14P: MH4	Peak Elev=26.66' Inflow=10.78 cfs 1.151 af 18.0" Round Culvert n=0.013 L=100.0' S=0.0480 '/' Outflow=10.78 cfs 1.151 af
Pond 16P: CB3	Peak Elev=43.88' Inflow=5.74 cfs 0.426 af 15.0" Round Culvert n=0.013 L=20.0' S=0.0050 '/' Outflow=5.74 cfs 0.426 af
Pond 17P: CB4	Peak Elev=43.37' Inflow=1.80 cfs 0.133 af 12.0" Round Culvert n=0.013 L=115.0' S=0.0148 '/' Outflow=1.80 cfs 0.133 af
Pond 19P: CB9	Peak Elev=28.52' Inflow=2.72 cfs 0.214 af 12.0" Round Culvert n=0.013 L=114.0' S=0.0149 '/' Outflow=2.72 cfs 0.214 af
Pond 20P: CDS Unit	Peak Elev=27.41' Inflow=2.72 cfs 0.214 af 12.0" Round Culvert n=0.013 L=84.0' S=0.0155 '/' Outflow=2.72 cfs 0.214 af
Pond 22P: MH1	Peak Elev=43.01' Inflow=7.54 cfs 0.559 af 15.0" Round Culvert n=0.013 L=63.0' S=0.0048 '/' Outflow=7.54 cfs 0.559 af
Pond 23P: Rain Garden 1	Peak Elev=35.38' Storage=953 cf Inflow=2.39 cfs 0.186 af Outflow=1.84 cfs 0.175 af

Pond 24P: Rain Garden 2 Peak Elev=35.38' Storage=1,632 cf Inflow=2.73 cfs 0.218 af
Outflow=1.84 cfs 0.198 af

Pond 25P: Rain Garden 3 Peak Elev=35.33' Storage=1,565 cf Inflow=2.57 cfs 0.204 af
Outflow=1.76 cfs 0.185 af

Total Runoff Area = 13.038 ac Runoff Volume = 6.165 af Average Runoff Depth = 5.67"
72.51% Pervious = 9.454 ac 27.49% Impervious = 3.584 ac

Summary for Subcatchment 1S: Area 1

Runoff = 1.92 cfs @ 12.09 hrs, Volume= 0.138 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
14,985	72	Woods/grass comb., Good, HSG C
14,985		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	34	0.0680	0.10		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	56	0.0500	1.12		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
6.3	90	Total			

Summary for Subcatchment 2S: Area 2

Runoff = 5.20 cfs @ 12.09 hrs, Volume= 0.373 af, Depth= 5.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
10,019	72	Woods/grass comb., Good, HSG C
5,206	98	Paved parking, HSG C
* 12,368	74	Rubber Surface, HSG C
8,600	74	>75% Grass cover, Good, HSG C
36,193	77	Weighted Average
30,987		85.62% Pervious Area
5,206		14.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	30	0.1670	0.14		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	80	0.0060	1.57		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.9	160	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
5.2	270	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Area 3

Runoff = 1.99 cfs @ 12.09 hrs, Volume= 0.142 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
6,706	72	Woods/grass comb., Good, HSG C
1,291	98	Paved parking, HSG C
5,909	74	>75% Grass cover, Good, HSG C
* 520	74	Rubber Surface, HSG C
14,426	75	Weighted Average
13,135		91.05% Pervious Area
1,291		8.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	23	0.2000	0.32		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
0.2	27	0.0720	1.88		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
1.4	50	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Area 4

Runoff = 3.33 cfs @ 12.09 hrs, Volume= 0.243 af, Depth= 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
12,664	72	Woods/grass comb., Good, HSG C
8,570	98	Paved parking, HSG C
21,234	82	Weighted Average
12,664		59.64% Pervious Area
8,570		40.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	24	0.1330	0.19		Sheet Flow, Sheet Flow - 1
					Grass: Dense n= 0.240 P2= 3.25"
0.0	12	0.1830	8.68		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.4	75	0.0210	2.94		Shallow Concentrated Flow, Shallow Conc 2
					Paved Kv= 20.3 fps
2.5	111	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Area 5

Runoff = 5.74 cfs @ 12.08 hrs, Volume= 0.426 af, Depth= 6.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
15,700	72	Woods/grass comb., Good, HSG C
18,844	98	Paved parking, HSG C
34,544	86	Weighted Average
15,700		45.45% Pervious Area
18,844		54.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	30	0.1270	0.13		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.1	12	0.0960	1.55		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.9	120	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.9	162	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 6S: Area 6

Runoff = 1.80 cfs @ 12.09 hrs, Volume= 0.133 af, Depth= 6.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
5,412	72	Woods/grass comb., Good, HSG C
5,557	98	Paved parking, HSG C
10,969	85	Weighted Average
5,412		49.34% Pervious Area
5,557		50.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	20	0.0700	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.8	26	0.0120	0.55		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
0.5	72	0.0130	2.31		Shallow Concentrated Flow, Shallow Conc - 2
					Paved Kv= 20.3 fps
4.9	118	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 7S: Area 7

Runoff = 3.68 cfs @ 12.24 hrs, Volume= 0.366 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
35,328	72	Woods/grass comb., Good, HSG C
2,632	98	Paved parking, HSG C
37,960	74	Weighted Average
35,328		93.07% Pervious Area
2,632		6.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	32	0.0220	0.06		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
9.1	561	0.0420	1.02		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
17.3	593	Total			

Summary for Subcatchment 8S: Area 8

Runoff = 9.14 cfs @ 12.11 hrs, Volume= 0.706 af, Depth= 5.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
60,370	74	>75% Grass cover, Good, HSG C
8,174	98	Paved parking, HSG C
68,544	77	Weighted Average
60,370		88.07% Pervious Area
8,174		11.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	32	0.0250	0.15		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
4.2	265	0.0230	1.06		Shallow Concentrated Flow, Shallow Conc - 1
					Short Grass Pasture Kv= 7.0 fps
0.4	55	0.1120	2.34		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
8.2	352	Total			

Summary for Subcatchment 9S: Area 9

Runoff = 0.94 cfs @ 12.12 hrs, Volume= 0.073 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
7,600	74	Pasture/grassland/range, Good, HSG C
7,600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	44	0.0140	0.13		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
2.9	210	0.0300	1.21		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
8.7	254	Total			

Summary for Subcatchment 10S: Area 10

Runoff = 12.11 cfs @ 12.10 hrs, Volume= 0.904 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
63,128	74	>75% Grass cover, Good, HSG C
6,960	98	Paved parking, HSG C
21,691	72	Woods/grass comb., Good, HSG C
91,779	75	Weighted Average
84,819		92.42% Pervious Area
6,960		7.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	23	0.0350	0.16		Sheet Flow, Sheet Flow - 1 Grass: Short n= 0.150 P2= 3.25"
4.3	318	0.0310	1.23		Shallow Concentrated Flow, Shallow Conc - 1 Short Grass Pasture Kv= 7.0 fps
0.6	82	0.2090	2.29		Shallow Concentrated Flow, Shallow Conc - 2 Woodland Kv= 5.0 fps
7.3	423	Total			

Summary for Subcatchment 11S: Area 11

Runoff = 2.66 cfs @ 12.09 hrs, Volume= 0.195 af, Depth= 6.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
7,487	98	Paved parking, HSG C
8,962	72	Woods/grass comb., Good, HSG C
16,449	84	Weighted Average
8,962		54.48% Pervious Area
7,487		45.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	18	0.0110	0.77		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.2	50	0.0320	3.63		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.5	55	0.0710	1.87		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
1.1	123	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 12S: Area 12

Runoff = 2.39 cfs @ 12.08 hrs, Volume= 0.186 af, Depth= 7.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
2,728	74	>75% Grass cover, Good, HSG C
10,635	98	Paved parking, HSG C
13,363	93	Weighted Average
2,728		20.41% Pervious Area
10,635		79.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	18	0.0110	0.77		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.2	50	0.0320	3.63		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.2	55	0.0710	5.41		Shallow Concentrated Flow, Shallow Conc - 2 Paved Kv= 20.3 fps
0.8	123	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 13S: Area 13

Runoff = 2.73 cfs @ 12.08 hrs, Volume= 0.218 af, Depth= 7.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
2,084	74	>75% Grass cover, Good, HSG C
13,033	98	Paved parking, HSG C
15,117	95	Weighted Average
2,084		13.79% Pervious Area
13,033		86.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	26	0.0140	0.92		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.4	63	0.0180	2.72		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.9	89	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 14S: Area 14

Runoff = 2.57 cfs @ 12.08 hrs, Volume= 0.204 af, Depth= 7.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
1,840	74	>75% Grass cover, Good, HSG C
12,353	98	Paved parking, HSG C
14,193	95	Weighted Average
1,840		12.96% Pervious Area
12,353		87.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	24	0.0060	0.64		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.5	80	0.0160	2.57		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
1.1	104	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 15S: Area 15

Runoff = 2.72 cfs @ 12.08 hrs, Volume= 0.214 af, Depth= 7.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
2,415	74	>75% Grass cover, Good, HSG C
12,705	98	Paved parking, HSG C
15,120	94	Weighted Average
2,415		15.97% Pervious Area
12,705		84.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	21	0.0330	0.15		Sheet Flow, Sheet Flow - 1
					Grass: Short n= 0.150 P2= 3.25"
0.4	65	0.0150	2.49		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
2.7	86	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 16S: Area 16

Runoff = 2.59 cfs @ 12.08 hrs, Volume= 0.198 af, Depth= 7.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
3,450	70	Woods, Good, HSG C
11,280	98	Paved parking, HSG C
14,730	91	Weighted Average
3,450		23.42% Pervious Area
11,280		76.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	16	0.0110	0.76		Sheet Flow, Sheet Flow - 1
					Smooth surfaces n= 0.011 P2= 3.25"
0.3	64	0.0260	3.27		Shallow Concentrated Flow, Shallow Conc - 1
					Paved Kv= 20.3 fps
0.7	80	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 17S: Area 17

Runoff = 2.56 cfs @ 12.08 hrs, Volume= 0.201 af, Depth= 7.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
2,432	72	Woods/grass comb., Good, HSG C
11,798	98	Paved parking, HSG C
14,230	94	Weighted Average
2,432		17.09% Pervious Area
11,798		82.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	21	0.0140	0.88		Sheet Flow, Sheet Flow - 1 Smooth surfaces n= 0.011 P2= 3.25"
0.2	66	0.0480	4.45		Shallow Concentrated Flow, Shallow Conc - 1 Paved Kv= 20.3 fps
0.6	87	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 18S: Area 18

Runoff = 1.65 cfs @ 12.14 hrs, Volume= 0.136 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
10,571	70	Woods, Good, HSG C
2,973	98	Paved parking, HSG C
13,544	76	Weighted Average
10,571		78.05% Pervious Area
2,973		21.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.2750	0.11		Sheet Flow, Sheet Flow - 1 Woods: Dense underbrush n= 0.800 P2= 3.25"
0.5	51	0.1200	1.73		Shallow Concentrated Flow, Shallow Conc - 1 Woodland Kv= 5.0 fps
2.3	121	0.0162	0.89		Shallow Concentrated Flow, Shallow Conc - 2 Short Grass Pasture Kv= 7.0 fps
10.3	222	Total			

Summary for Subcatchment 19S: Area 19

Runoff = 11.27 cfs @ 12.12 hrs, Volume= 0.871 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
52,359	70	Woods, Good, HSG C
12,718	98	Paved parking, HSG C
19,125	74	>75% Grass cover, Good, HSG C
4,222	72	Woods/grass comb., Good, HSG C
88,424	75	Weighted Average
75,706		85.62% Pervious Area
12,718		14.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	30	0.0500	0.09		Sheet Flow, Sheet Flow - 1
					Woods: Light underbrush n= 0.400 P2= 3.25"
0.7	109	0.2390	2.44		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
2.0	100	0.0140	0.83		Shallow Concentrated Flow, Shallow Conc - 2
					Short Grass Pasture Kv= 7.0 fps
8.3	239	Total			

Summary for Subcatchment 20S: Area 20

Runoff = 2.66 cfs @ 12.17 hrs, Volume= 0.236 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Area (sf)	CN	Description
3,905	98	Paved parking, HSG C
20,644	70	Woods, Good, HSG C
24,549	74	Weighted Average
20,644		84.09% Pervious Area
3,905		15.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	28	0.0320	0.04		Sheet Flow, Sheet Flow - 1
					Woods: Dense underbrush n= 0.800 P2= 3.25"
1.7	167	0.1100	1.66		Shallow Concentrated Flow, Shallow Conc - 1
					Woodland Kv= 5.0 fps
12.8	195	Total			

Summary for Reach 1R: Charles River

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 12.369 ac, 26.68% Impervious, Inflow Depth = 5.47" for 100 Yr 24 Hr event
Inflow = 64.85 cfs @ 12.12 hrs, Volume= 5.642 af
Outflow = 64.85 cfs @ 12.12 hrs, Volume= 5.642 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 2R: Office Park

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.344 ac, 0.00% Impervious, Inflow Depth = 4.80" for 100 Yr 24 Hr event
Inflow = 1.92 cfs @ 12.09 hrs, Volume= 0.138 af
Outflow = 1.92 cfs @ 12.09 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 4R: Talcott Ave

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.871 ac, 6.93% Impervious, Inflow Depth = 5.03" for 100 Yr 24 Hr event
Inflow = 3.68 cfs @ 12.24 hrs, Volume= 0.366 af
Outflow = 3.68 cfs @ 12.24 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 5R: 24" Drain

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 5.50" for 100 Yr 24 Hr event
Inflow = 14.45 cfs @ 12.15 hrs, Volume= 1.235 af
Outflow = 14.45 cfs @ 12.15 hrs, Volume= 1.235 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 7R: CB5 - 8"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.319 ac, 81.38% Impervious, Inflow Depth = 6.75" for 100 Yr 24 Hr event
Inflow = 5.82 cfs @ 12.16 hrs, Volume= 0.741 af
Outflow = 5.82 cfs @ 12.16 hrs, Volume= 0.741 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 8R: CB6 - 6"

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.012 ac, 81.93% Impervious, Inflow Depth = 6.72" for 100 Yr 24 Hr event
 Inflow = 3.99 cfs @ 12.17 hrs, Volume= 0.567 af
 Outflow = 3.99 cfs @ 12.17 hrs, Volume= 0.567 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 11R: MH6

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.174 ac, 0.00% Impervious, Inflow Depth = 5.03" for 100 Yr 24 Hr event
 Inflow = 0.94 cfs @ 12.12 hrs, Volume= 0.073 af
 Outflow = 0.94 cfs @ 12.12 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 15R: MH5

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 4.738 ac, 51.56% Impervious, Inflow Depth = 6.04" for 100 Yr 24 Hr event
 Inflow = 24.87 cfs @ 12.12 hrs, Volume= 2.386 af
 Outflow = 24.87 cfs @ 12.12 hrs, Volume= 2.386 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 17R: CB13 (NEW)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.831 ac, 14.38% Impervious, Inflow Depth = 5.38" for 100 Yr 24 Hr event
 Inflow = 5.20 cfs @ 12.09 hrs, Volume= 0.373 af
 Outflow = 5.20 cfs @ 12.09 hrs, Volume= 0.373 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 20R: Arsenal Park Phase A

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.326 ac, 87.04% Impervious, Inflow Depth = 6.81" for 100 Yr 24 Hr event
 Inflow = 1.76 cfs @ 12.17 hrs, Volume= 0.185 af
 Outflow = 1.76 cfs @ 12.17 hrs, Volume= 0.185 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 23R: Area 16/17

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.665 ac, 79.69% Impervious, Inflow Depth = 6.65" for 100 Yr 24 Hr event
 Inflow = 2.15 cfs @ 12.12 hrs, Volume= 0.368 af
 Outflow = 2.15 cfs @ 12.12 hrs, Volume= 0.368 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Summary for Pond 1aP: MH2a

[58] Hint: Peaked 1.25' above defined flood level

Inflow Area = 0.331 ac, 8.95% Impervious, Inflow Depth = 5.15" for 100 Yr 24 Hr event
 Inflow = 1.99 cfs @ 12.09 hrs, Volume= 0.142 af
 Outflow = 1.99 cfs @ 12.09 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.99 cfs @ 12.09 hrs, Volume= 0.142 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 38.14' @ 12.10 hrs

Flood Elev= 36.89'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.90'	8.0" Round 8" Pipe L= 34.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 30.90' / 30.30' S= 0.0176 '/ Cc= 0.900 n= 0.013, Flow Area= 0.35 sf

Primary OutFlow Max=1.96 cfs @ 12.09 hrs HW=37.96' TW=36.48' (Dynamic Tailwater)

↑ **1=8" Pipe** (Outlet Controls 1.96 cfs @ 5.61 fps)

Summary for Pond 1bP: MH2b

[58] Hint: Peaked 1.40' above defined flood level

Inflow Area = 1.162 ac, 12.84% Impervious, Inflow Depth = 5.32" for 100 Yr 24 Hr event
 Inflow = 7.19 cfs @ 12.09 hrs, Volume= 0.515 af
 Outflow = 7.19 cfs @ 12.09 hrs, Volume= 0.515 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.19 cfs @ 12.09 hrs, Volume= 0.515 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 36.55' @ 12.09 hrs

Flood Elev= 35.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.20'	15.0" Round 15" Pipe L= 15.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.20' / 30.00' S= 0.0133 '/ Cc= 0.900

n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=6.79 cfs @ 12.09 hrs HW=36.48' TW=35.16' (Dynamic Tailwater)
 ↑1=15" Pipe (Inlet Controls 6.79 cfs @ 5.54 fps)

Summary for Pond 1P: CB1

[58] Hint: Peaked 5.46' above defined flood level

Inflow Area = 0.331 ac, 8.95% Impervious, Inflow Depth = 5.15" for 100 Yr 24 Hr event
 Inflow = 1.99 cfs @ 12.09 hrs, Volume= 0.142 af
 Outflow = 1.99 cfs @ 12.09 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.99 cfs @ 12.09 hrs, Volume= 0.142 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 42.46' @ 12.10 hrs
 Flood Elev= 37.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	8.0" Round 8" Clay Pipe L= 138.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.00' / 31.30' S= 0.0196 ' / S= 0.0196 ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=1.95 cfs @ 12.09 hrs HW=42.28' TW=37.96' (Dynamic Tailwater)
 ↑1=8" Clay Pipe (Outlet Controls 1.95 cfs @ 5.58 fps)

Summary for Pond 2P: CB2

[58] Hint: Peaked 6.47' above defined flood level

Inflow Area = 0.487 ac, 40.36% Impervious, Inflow Depth = 5.97" for 100 Yr 24 Hr event
 Inflow = 3.33 cfs @ 12.09 hrs, Volume= 0.243 af
 Outflow = 3.33 cfs @ 12.09 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.33 cfs @ 12.09 hrs, Volume= 0.243 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 42.71' @ 12.09 hrs
 Flood Elev= 36.24'

Device	Routing	Invert	Outlet Devices
#1	Primary	33.30'	12.0" Round 12" RCP L= 115.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 33.30' / 31.30' S= 0.0174 ' / S= 0.0174 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=3.24 cfs @ 12.09 hrs HW=42.55' TW=41.19' (Dynamic Tailwater)
 ↑1=12" RCP (Outlet Controls 3.24 cfs @ 4.13 fps)

Summary for Pond 3P: MH1

[58] Hint: Peaked 6.27' above defined flood level

Inflow Area = 1.532 ac, 49.40% Impervious, Inflow Depth = 6.28" for 100 Yr 24 Hr event
 Inflow = 10.88 cfs @ 12.09 hrs, Volume= 0.802 af
 Outflow = 10.88 cfs @ 12.09 hrs, Volume= 0.802 af, Atten= 0%, Lag= 0.0 min
 Primary = 10.88 cfs @ 12.09 hrs, Volume= 0.802 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 41.27' @ 12.09 hrs
 Flood Elev= 35.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.70'	15.0" Round 15" RCP L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.70' / 29.00' S= 0.0045 ' / S= 0.0045 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=10.72 cfs @ 12.09 hrs HW=41.19' TW=35.13' (Dynamic Tailwater)
 ↑1=15" RCP (Outlet Controls 10.72 cfs @ 8.73 fps)

Summary for Pond 4P: MH2/CDS Unit

[58] Hint: Peaked 0.53' above defined flood level

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 5.86" for 100 Yr 24 Hr event
 Inflow = 18.07 cfs @ 12.09 hrs, Volume= 1.317 af
 Outflow = 18.07 cfs @ 12.09 hrs, Volume= 1.317 af, Atten= 0%, Lag= 0.0 min
 Primary = 18.07 cfs @ 12.09 hrs, Volume= 1.317 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 35.23' @ 12.10 hrs
 Flood Elev= 34.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	28.90'	18.0" Round 18" RCP L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 28.90' / 28.50' S= 0.0114 ' / S= 0.0114 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=18.04 cfs @ 12.09 hrs HW=35.14' TW=30.64' (Dynamic Tailwater)
 ↑1=18" RCP (Inlet Controls 18.04 cfs @ 10.21 fps)

Summary for Pond 5P: Rain Garden 4

[95] Warning: Outlet Device #1 rise exceeded
 [58] Hint: Peaked 0.54' above defined flood level

Arsenal Park - Proposed Conditions Final _11_05 Type III 24-hr 100 Yr 24 Hr Rainfall=8.12"

Prepared by CDM

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Inflow Area = 0.665 ac, 79.69% Impervious, Inflow Depth = 7.22" for 100 Yr 24 Hr event
 Inflow = 5.15 cfs @ 12.08 hrs, Volume= 0.400 af
 Outflow = 2.15 cfs @ 12.12 hrs, Volume= 0.368 af, Atten= 58%, Lag= 2.2 min
 Primary = 2.15 cfs @ 12.12 hrs, Volume= 0.368 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 35.54' @ 12.28 hrs Surf.Area= 3,157 sf Storage= 4,163 cf
 Flood Elev= 35.00' Surf.Area= 3,157 sf Storage= 2,588 cf

Plug-Flow detention time= 84.7 min calculated for 0.368 af (92% of inflow)
 Center-of-Mass det. time= 43.4 min (809.9 - 766.6)

Volume	Invert	Avail.Storage	Storage Description
#1	33.00'	5,435 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	31.00'	89 cf	7.40'W x 30.00'L x 2.00'H Bioretention Soil Layer
			444 cf Overall x 20.0% Voids
		5,523 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
33.00	222	0	0
34.00	921	572	572
35.00	2,935	1,928	2,500
36.00	2,935	2,935	5,435

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.50'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	30.80'	10.0" Round 10" RCP Pipe L= 133.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.80' / 19.10' S= 0.0880 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=2.15 cfs @ 12.12 hrs HW=35.35' TW=0.00' (Dynamic Tailwater)

↑ **2=10" RCP Pipe** (Passes 2.15 cfs of 5.34 cfs potential flow)

↑ **1=12" Nyloplast Drain Basin** (Custom Controls 2.15 cfs)

Summary for Pond 6P: Subsurface Storage

[93] Warning: Storage range exceeded by 7.13'

Inflow Area = 2.694 ac, 33.63% Impervious, Inflow Depth = 5.86" for 100 Yr 24 Hr event
 Inflow = 18.07 cfs @ 12.09 hrs, Volume= 1.317 af
 Outflow = 14.45 cfs @ 12.15 hrs, Volume= 1.235 af, Atten= 20%, Lag= 3.6 min
 Primary = 14.45 cfs @ 12.15 hrs, Volume= 1.235 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

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Peak Elev= 31.13' @ 12.15 hrs Surf.Area= 1,305 sf Storage= 7,806 cf

Flood Elev= 31.50' Surf.Area= 1,305 sf Storage= 8,236 cf

Plug-Flow detention time= 60.4 min calculated for 1.235 af (94% of inflow)

Center-of-Mass det. time= 27.0 min (825.5 - 798.5)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	8,824 cf	StormTrap DoubleTrap 7-6 x 10 Inside= 101.7"W x 90.0"H => 57.31 sf x 15.40'L = 882.4 cf Outside= 101.7"W x 102.0"H => 72.07 sf x 15.40'L = 1,109.6 cf

Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	18.0" Round 18" Pipe L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 27.50' / 27.30' S= 0.0057 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=14.44 cfs @ 12.15 hrs HW=31.13' TW=0.00' (Dynamic Tailwater)↑ **1=18" Pipe** (Inlet Controls 14.44 cfs @ 8.17 fps)**Summary for Pond 7P: Small Detention Area**

Inflow Area = 1.574 ac, 11.93% Impervious, Inflow Depth = 5.38" for 100 Yr 24 Hr event
 Inflow = 9.14 cfs @ 12.11 hrs, Volume= 0.706 af
 Outflow = 9.12 cfs @ 12.12 hrs, Volume= 0.669 af, Atten= 0%, Lag= 0.4 min
 Primary = 9.12 cfs @ 12.12 hrs, Volume= 0.669 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 25.68' @ 12.12 hrs Surf.Area= 1,705 sf Storage= 1,908 cf

Flood Elev= 26.00' Surf.Area= 1,955 sf Storage= 2,498 cf

Plug-Flow detention time= 43.9 min calculated for 0.669 af (95% of inflow)

Center-of-Mass det. time= 15.0 min (826.2 - 811.2)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	2,498 cf	Rain Garden (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	682	0	0
25.00	1,179	931	931
26.00	1,955	1,567	2,498

Device	Routing	Invert	Outlet Devices
#1	Primary	25.50'	50.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=9.11 cfs @ 12.12 hrs HW=25.68' TW=0.00' (Dynamic Tailwater)
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 9.11 cfs @ 1.02 fps)

Summary for Pond 11P: CB10

[58] Hint: Peaked 16.87' above defined flood level

Inflow Area = 0.378 ac, 45.52% Impervious, Inflow Depth = 6.21" for 100 Yr 24 Hr event
 Inflow = 2.66 cfs @ 12.09 hrs, Volume= 0.195 af
 Outflow = 2.66 cfs @ 12.09 hrs, Volume= 0.195 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.66 cfs @ 12.09 hrs, Volume= 0.195 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 48.67' @ 12.11 hrs
 Flood Elev= 31.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	29.60'	8.0" Round 8" Clay L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 29.60' / 27.00' S= 0.1529 ' / S= 0.0374 ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=2.63 cfs @ 12.09 hrs HW=47.72' TW=45.27' (Dynamic Tailwater)
 ↑1=**8" Clay** (Inlet Controls 2.63 cfs @ 7.52 fps)

Summary for Pond 12P: CB11

Inflow Area = 0.174 ac, 0.00% Impervious, Inflow Depth = 5.03" for 100 Yr 24 Hr event
 Inflow = 0.94 cfs @ 12.12 hrs, Volume= 0.073 af
 Outflow = 0.94 cfs @ 12.12 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.94 cfs @ 12.12 hrs, Volume= 0.073 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 23.94' @ 12.12 hrs
 Flood Elev= 26.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	23.30'	8.0" Round Culvert L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 23.30' / 19.00' S= 0.0374 ' / S= 0.0374 ' Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.35 sf

Primary OutFlow Max=0.93 cfs @ 12.12 hrs HW=23.94' TW=0.00' (Dynamic Tailwater)
 ↑1=**Culvert** (Inlet Controls 0.93 cfs @ 2.72 fps)

Summary for Pond 13P: MH3

Under existing conditions, this area appears to work with an 8" pipe, even though the model indicates that a 15" pipe is needed. The 8" pipe will remain.

[58] Hint: Peaked 13.34' above defined flood level

Inflow Area = 1.696 ac, 73.40% Impervious, Inflow Depth = 6.63" for 100 Yr 24 Hr event
 Inflow = 8.18 cfs @ 12.12 hrs, Volume= 0.937 af
 Outflow = 8.18 cfs @ 12.12 hrs, Volume= 0.937 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.18 cfs @ 12.12 hrs, Volume= 0.937 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 46.39' @ 12.11 hrs
 Flood Elev= 33.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.40'	10.0" Round 10" Culvert L= 104.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.40' / 24.35' S= 0.0197 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.55 sf

Primary OutFlow Max=8.17 cfs @ 12.12 hrs HW=46.36' TW=26.63' (Dynamic Tailwater)
 ↑1=10" Culvert (Outlet Controls 8.17 cfs @ 14.98 fps)

Summary for Pond 14P: MH4

Assume rim of DMH is at elevation 24.

Inflow Area = 2.043 ac, 75.20% Impervious, Inflow Depth = 6.76" for 100 Yr 24 Hr event
 Inflow = 10.78 cfs @ 12.10 hrs, Volume= 1.151 af
 Outflow = 10.78 cfs @ 12.10 hrs, Volume= 1.151 af, Atten= 0%, Lag= 0.0 min
 Primary = 10.78 cfs @ 12.10 hrs, Volume= 1.151 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 26.66' @ 12.10 hrs
 Flood Elev= 31.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.30'	18.0" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.30' / 19.50' S= 0.0480 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 1.77 sf

Primary OutFlow Max=10.78 cfs @ 12.10 hrs HW=26.65' TW=0.00' (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 10.78 cfs @ 6.10 fps)

Summary for Pond 16P: CB3

[58] Hint: Peaked 9.55' above defined flood level

Inflow Area = 0.793 ac, 54.55% Impervious, Inflow Depth = 6.45" for 100 Yr 24 Hr event
 Inflow = 5.74 cfs @ 12.08 hrs, Volume= 0.426 af
 Outflow = 5.74 cfs @ 12.08 hrs, Volume= 0.426 af, Atten= 0%, Lag= 0.0 min
 Primary = 5.74 cfs @ 12.08 hrs, Volume= 0.426 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 43.88' @ 12.10 hrs
 Flood Elev= 34.33'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.30'	15.0" Round 12" RCP L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 30.30' / 30.20' S= 0.0050 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf

Primary OutFlow Max=4.86 cfs @ 12.08 hrs HW=43.51' TW=42.84' (Dynamic Tailwater)
 ↑1=12" RCP (Inlet Controls 4.86 cfs @ 3.96 fps)

Summary for Pond 17P: CB4

[58] Hint: Peaked 7.47' above defined flood level

Inflow Area = 0.252 ac, 50.66% Impervious, Inflow Depth = 6.33" for 100 Yr 24 Hr event
 Inflow = 1.80 cfs @ 12.09 hrs, Volume= 0.133 af
 Outflow = 1.80 cfs @ 12.09 hrs, Volume= 0.133 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.80 cfs @ 12.09 hrs, Volume= 0.133 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 43.37' @ 12.10 hrs
 Flood Elev= 35.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	31.90'	12.0" Round 12" RCP L= 115.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.90' / 30.20' S= 0.0148 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=1.10 cfs @ 12.09 hrs HW=43.00' TW=42.84' (Dynamic Tailwater)
 ↑1=12" RCP (Outlet Controls 1.10 cfs @ 1.40 fps)

Summary for Pond 19P: CB9

Inflow Area = 0.347 ac, 84.03% Impervious, Inflow Depth = 7.40" for 100 Yr 24 Hr event
 Inflow = 2.72 cfs @ 12.08 hrs, Volume= 0.214 af
 Outflow = 2.72 cfs @ 12.08 hrs, Volume= 0.214 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.72 cfs @ 12.08 hrs, Volume= 0.214 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 28.52' @ 12.09 hrs
 Flood Elev= 35.02'

Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	12.0" Round Culvert L= 114.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 27.50' / 25.80' S= 0.0149 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=2.67 cfs @ 12.08 hrs HW=28.52' TW=27.38' (Dynamic Tailwater)
 ↑1=Culvert (Outlet Controls 2.67 cfs @ 4.15 fps)

Summary for Pond 20P: CDS Unit

Inflow Area = 0.347 ac, 84.03% Impervious, Inflow Depth = 7.40" for 100 Yr 24 Hr event
 Inflow = 2.72 cfs @ 12.08 hrs, Volume= 0.214 af
 Outflow = 2.72 cfs @ 12.08 hrs, Volume= 0.214 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.72 cfs @ 12.08 hrs, Volume= 0.214 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 27.41' @ 12.09 hrs
 Flood Elev= 34.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	25.70'	12.0" Round Culvert L= 84.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 25.70' / 24.40' S= 0.0155 ' / Cc= 0.900 n= 0.013 Clay tile, Flow Area= 0.79 sf

Primary OutFlow Max=2.71 cfs @ 12.08 hrs HW=27.38' TW=26.61' (Dynamic Tailwater)
 ↑1=Culvert (Outlet Controls 2.71 cfs @ 3.46 fps)

Summary for Pond 22P: MH1

[58] Hint: Peaked 8.51' above defined flood level
 [80] Warning: Exceeded Pond 16P by 0.02' @ 12.04 hrs (0.91 cfs 0.003 af)
 [80] Warning: Exceeded Pond 17P by 0.42' @ 12.05 hrs (1.80 cfs 0.011 af)

Inflow Area = 1.045 ac, 53.61% Impervious, Inflow Depth = 6.42" for 100 Yr 24 Hr event
 Inflow = 7.54 cfs @ 12.08 hrs, Volume= 0.559 af
 Outflow = 7.54 cfs @ 12.08 hrs, Volume= 0.559 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.54 cfs @ 12.08 hrs, Volume= 0.559 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 43.01' @ 12.09 hrs
 Flood Elev= 34.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	30.10'	15.0" Round 15" Pipe L= 63.0' RCP, square edge headwall, Ke= 0.500

Inlet / Outlet Invert= 30.10' / 29.80' S= 0.0048 ' /' Cc= 0.900
 n= 0.013, Flow Area= 1.23 sf

Primary OutFlow Max=7.35 cfs @ 12.08 hrs HW=42.84' TW=41.18' (Dynamic Tailwater)
 ↑ **1=15" Pipe** (Outlet Controls 7.35 cfs @ 5.99 fps)

Summary for Pond 23P: Rain Garden 1

[58] Hint: Peaked 0.38' above defined flood level

Inflow Area = 0.307 ac, 79.59% Impervious, Inflow Depth = 7.28" for 100 Yr 24 Hr event
 Inflow = 2.39 cfs @ 12.08 hrs, Volume= 0.186 af
 Outflow = 1.84 cfs @ 12.15 hrs, Volume= 0.175 af, Atten= 23%, Lag= 3.9 min
 Primary = 1.84 cfs @ 12.15 hrs, Volume= 0.175 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 35.38' @ 12.15 hrs Surf.Area= 1,074 sf Storage= 953 cf
 Flood Elev= 35.00' Surf.Area= 1,074 sf Storage= 665 cf

Plug-Flow detention time= 62.2 min calculated for 0.175 af (94% of inflow)
 Center-of-Mass det. time= 28.6 min (793.5 - 765.0)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	1,291 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	128 cf	10.00'W x 32.00'L x 2.00'H Bioretention Soil
			640 cf Overall x 20.0% Voids
		1,419 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	320	0	0
35.00	754	537	537
36.00	754	754	1,291

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	31.10'	8.0" Round 8" PVC Pipe L= 4.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.10' / 30.97' S= 0.0325 ' /' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.84 cfs @ 12.15 hrs HW=35.38' TW=0.00' (Dynamic Tailwater)
 ↑ **2=8" PVC Pipe** (Passes 1.84 cfs of 3.34 cfs potential flow)
 ↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.84 cfs)

Summary for Pond 24P: Rain Garden 2

[58] Hint: Peaked 0.38' above defined flood level

Inflow Area = 0.347 ac, 86.21% Impervious, Inflow Depth = 7.52" for 100 Yr 24 Hr event
 Inflow = 2.73 cfs @ 12.08 hrs, Volume= 0.218 af
 Outflow = 1.84 cfs @ 12.17 hrs, Volume= 0.198 af, Atten= 33%, Lag= 5.1 min
 Primary = 1.84 cfs @ 12.17 hrs, Volume= 0.198 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 35.38' @ 12.17 hrs Surf.Area= 1,837 sf Storage= 1,632 cf
 Flood Elev= 35.00' Surf.Area= 1,837 sf Storage= 1,142 cf

Plug-Flow detention time= 87.8 min calculated for 0.198 af (91% of inflow)
 Center-of-Mass det. time= 42.1 min (798.9 - 756.7)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	2,198 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	223 cf	10.00'W x 55.80'L x 2.00'H Bioretention Soil
			1,116 cf Overall x 20.0% Voids
		2,421 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	558	0	0
35.00	1,279	919	919
36.00	1,279	1,279	2,198

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	31.45'	8.0" Round 8" PVC Pipe L= 97.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.45' / 30.97' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.84 cfs @ 12.17 hrs HW=35.38' TW=0.00' (Dynamic Tailwater)
 ↑ **2=8" PVC Pipe** (Passes 1.84 cfs of 2.09 cfs potential flow)
 ↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.84 cfs)

Summary for Pond 25P: Rain Garden 3

[58] Hint: Peaked 0.33' above defined flood level

Inflow Area = 0.326 ac, 87.04% Impervious, Inflow Depth = 7.52" for 100 Yr 24 Hr event
 Inflow = 2.57 cfs @ 12.08 hrs, Volume= 0.204 af
 Outflow = 1.76 cfs @ 12.17 hrs, Volume= 0.185 af, Atten= 31%, Lag= 4.9 min
 Primary = 1.76 cfs @ 12.17 hrs, Volume= 0.185 af

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Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 35.33' @ 12.17 hrs Surf.Area= 1,841 sf Storage= 1,565 cf

Flood Elev= 35.00' Surf.Area= 1,841 sf Storage= 1,144 cf

Plug-Flow detention time= 91.6 min calculated for 0.185 af (90% of inflow)

Center-of-Mass det. time= 43.8 min (800.5 - 756.7)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	2,203 cf	Rain Garden (Prismatic) Listed below (Recalc)
#2	32.00'	224 cf	10.00'W x 55.90'L x 2.00'H Bioretention Soil
			1,118 cf Overall x 20.0% Voids
		2,426 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.00	559	0	0
35.00	1,282	921	921
36.00	1,282	1,282	2,203

Device	Routing	Invert	Outlet Devices
#1	Device 2	34.75'	12" Nyloplast Drain Basin Head (feet) 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.50 0.85 Disch. (cfs) 0.000 0.100 0.300 0.550 0.850 1.150 1.300 1.650 2.150
#2	Primary	31.10'	12.0" Round 12" RCP Pipe L= 136.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 31.10' / 27.00' S= 0.0301 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.76 cfs @ 12.17 hrs HW=35.33' TW=0.00' (Dynamic Tailwater)↑ **2=12" RCP Pipe** (Passes 1.76 cfs of 7.10 cfs potential flow)↑ **1=12" Nyloplast Drain Basin** (Custom Controls 1.76 cfs)

Appendix D

Recharge Volume and Water Quality Volume Compliance

Arsenal Park - Phase B Improvements

WQv and Rv Calculations

Water Quality Volume - Overall Site

Impervious Area: 156,119 sf

WQV Target: 0.5 in

WQv **6,505 cf**

WQv **0.149 af**

Recharge Volume - Overall Site, HSG "C" Soils

Impervious Area: 156,119 sf

Rv Target: 0.25 in

Rv Required: **3,252 cf**

Rv Required: **0.075 af**

Total Volume Provided: **3,530 cf**

Water Quality Volume - Rain Garden #1

Impervious Area: 10,635 sf, DA Area 12

WQV Target: 0.5 in

WQv Required: **443 cf**

WQv Required: **0.010 af**

WQv Provided: **490 cf**

Water Quality Volume - Rain Garden #2

Impervious Area: 13,033 sf, DA Area 13

WQV Target: 0.5 in

WQv Required: **543 cf**

WQv Required: **0.012 af**

WQv Provided: **844 cf**

Water Quality Volume - Rain Garden #3

Impervious Area: 12,353 sf, DA Area 14

WQV Target: 0.5 in

WQv Required: **515 cf**

WQv Required: **0.012 af**

WQv Provided: **846 cf**

Water Quality Volume - Rain Garden #4

Impervious Area: 23,078 sf, DA Areas 16/17

WQV Target: 0.5 in

WQv Required: **962 cf**

WQv Required: **0.022 af**

WQv Provided: **1373 cf**

Water Quality Volume - Subsurface Storage

Impervious Area: 39,470 sf

WQV Target: 0.5 in

WQv Required: **1,645 cf**

WQv Required: **0.038 af**

WQv Provided: **3530 cf**

Arsenal Park - Phase B Improvements

WQv and Rv Calculations

Recharge Volume - Rain Garden #1

Impervious Area: 10,635 sf, DA Area 12

Rv Target: 0.25 in

Rv Required: **222 cf**

Rv Required: **0.005 af**

Total Volume Provided: **490 cf**

Recharge Volume - Rain Garden #2

Impervious Area: 13,033 sf, DA Area 13

Rv Target: 0.25 in

Rv Required: **272 cf**

Rv Required: **0.006 af**

Total Volume Provided: **844 cf**

Recharge Volume - Rain Garden #3

Impervious Area: 12,353 sf, DA Area 14

Rv Target: 0.25 in

Rv Required: **257 cf**

Rv Required: **0.006 af**

Total Volume Provided: **846 cf**

Recharge Volume - Rain Garden #4

Impervious Area: 23,078 sf, DA Areas 16/17

Rv Target: 0.25 in

Rv Required: **481 cf**

Rv Required: **0.011 af**

Total Volume Provided: **1,373 cf**

Recharge Volume - Subsurface Storage

Impervious Area: 39,470 sf

Rv Target: 0.25 in

Rv Required: **822 cf**

Rv Required: **0.019 af**

Total Volume Provided: **3,530 cf**

Arsenal Park - Phase B Improvements

WQv and Rv Calculations

Drawdown Time -Rain Garden 1

0.27 in/hr infiltration rate
320 sf, bottom area
490 cf, total volume provided
68.1 hours <72 hours, ok

Drawdown Time -Rain Garden 2

0.27 in/hr infiltration rate
558 sf, bottom area
844 cf, total volume provided
67.2 hours <72 hours, ok

Drawdown Time -Rain Garden 3

0.27 in/hr infiltration rate
559 sf, bottom area
846 cf, total volume provided
67.3 hours <72 hours, ok

Drawdown Time -Rain Garden 4

0.27 in/hr infiltration rate
926 sf, bottom area
1373 cf, total volume provided
65.9 hours <72 hours, ok

Drawdown Time -Subsurface Storage

2.41 in/hr infiltration rate
1,305 sf, bottom area
3530 cf, total volume provided
13.5 hours <72 hours, ok

Stage-Area-Storage for Pond 6P: Subsurface Storage

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
24.00	0	29.20	5,530
24.10	0	29.30	5,647
24.20	0	29.40	5,765
24.30	0	29.50	5,883
24.40	0	29.60	6,000
24.50	0	29.70	6,118
24.60	118	29.80	6,236
24.70	235	29.90	6,353
24.80	353	30.00	6,471
24.90	471	30.10	6,589
25.00	588	30.20	6,706
25.10	706	30.30	6,824
25.20	824	30.40	6,942
25.30	941	30.50	7,059
25.40	1,059	30.60	7,177
25.50	1,177	30.70	7,295
25.60	1,294	30.80	7,412
25.70	1,412	30.90	7,530
25.80	1,530	31.00	7,648
25.90	1,647	31.10	7,765
26.00	1,765	31.20	7,883
26.10	1,882	31.30	8,000
26.20	2,000	31.40	8,118
26.30	2,118	31.50	8,236
26.40	2,235	31.60	8,353
26.50	2,353	31.70	8,471
26.60	2,471	31.80	8,589
26.70	2,588	31.90	8,706
26.80	2,706	32.00	8,824
26.90	2,824	32.10	8,824
27.00	2,941	32.20	8,824
27.10	3,059	32.30	8,824
27.20	3,177	32.40	8,824
27.30	3,294	32.50	8,824
27.40	3,412		
27.50	3,530		
27.60	3,647		
27.70	3,765		
27.80	3,883		
27.90	4,000		
28.00	4,118		
28.10	4,236		
28.20	4,353		
28.30	4,471		
28.40	4,589		
28.50	4,706		
28.60	4,824		
28.70	4,941		
28.80	5,059		
28.90	5,177		
29.00	5,294		
29.10	5,412		

Stage-Area-Storage for Pond 23P: Rain Garden 1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
32.00	0	34.60	398
32.05	3	34.65	428
32.10	6	34.70	458
32.15	10	34.75	490
32.20	13	34.80	523
32.25	16	34.85	557
32.30	19	34.90	592
32.35	22	34.95	628
32.40	26	35.00	665
32.45	29	35.05	703
32.50	32	35.10	740
32.55	35	35.15	778
32.60	38	35.20	816
32.65	42	35.25	854
32.70	45	35.30	891
32.75	48	35.35	929
32.80	51	35.40	967
32.85	54	35.45	1,004
32.90	58	35.50	1,042
32.95	61	35.55	1,080
33.00	64	35.60	1,117
33.05	67	35.65	1,155
33.10	70	35.70	1,193
33.15	74	35.75	1,231
33.20	77	35.80	1,268
33.25	80	35.85	1,306
33.30	83	35.90	1,344
33.35	86	35.95	1,381
33.40	90	36.00	1,419
33.45	93		
33.50	96		
33.55	99		
33.60	102		
33.65	106		
33.70	109		
33.75	112		
33.80	115		
33.85	118		
33.90	122		
33.95	125		
34.00	128		
34.05	145		
34.10	162		
34.15	181		
34.20	201		
34.25	222		
34.30	244		
34.35	267		
34.40	291		
34.45	316		
34.50	342		
34.55	370		

Stage-Area-Storage for Pond 24P: Rain Garden 2

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
32.00	0	34.60	688
32.05	6	34.65	738
32.10	11	34.70	790
32.15	17	34.75	844
32.20	22	34.80	900
32.25	28	34.85	958
32.30	33	34.90	1,017
32.35	39	34.95	1,079
32.40	45	35.00	1,142
32.45	50	35.05	1,206
32.50	56	35.10	1,270
32.55	61	35.15	1,334
32.60	67	35.20	1,398
32.65	73	35.25	1,461
32.70	78	35.30	1,525
32.75	84	35.35	1,589
32.80	89	35.40	1,653
32.85	95	35.45	1,717
32.90	100	35.50	1,781
32.95	106	35.55	1,845
33.00	112	35.60	1,909
33.05	117	35.65	1,973
33.10	123	35.70	2,037
33.15	128	35.75	2,101
33.20	134	35.80	2,165
33.25	140	35.85	2,229
33.30	145	35.90	2,293
33.35	151	35.95	2,357
33.40	156	36.00	2,421
33.45	162		
33.50	167		
33.55	173		
33.60	179		
33.65	184		
33.70	190		
33.75	195		
33.80	201		
33.85	206		
33.90	212		
33.95	218		
34.00	223		
34.05	252		
34.10	283		
34.15	315		
34.20	349		
34.25	385		
34.30	423		
34.35	463		
34.40	504		
34.45	547		
34.50	592		
34.55	639		

Stage-Area-Storage for Pond 25P: Rain Garden 3

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
32.00	0	34.60	689
32.05	6	34.65	740
32.10	11	34.70	792
32.15	17	34.75	846
32.20	22	34.80	902
32.25	28	34.85	960
32.30	34	34.90	1,020
32.35	39	34.95	1,081
32.40	45	35.00	1,144
32.45	50	35.05	1,208
32.50	56	35.10	1,272
32.55	61	35.15	1,336
32.60	67	35.20	1,401
32.65	73	35.25	1,465
32.70	78	35.30	1,529
32.75	84	35.35	1,593
32.80	89	35.40	1,657
32.85	95	35.45	1,721
32.90	101	35.50	1,785
32.95	106	35.55	1,849
33.00	112	35.60	1,913
33.05	117	35.65	1,977
33.10	123	35.70	2,042
33.15	129	35.75	2,106
33.20	134	35.80	2,170
33.25	140	35.85	2,234
33.30	145	35.90	2,298
33.35	151	35.95	2,362
33.40	157	36.00	2,426
33.45	162		
33.50	168		
33.55	173		
33.60	179		
33.65	184		
33.70	190		
33.75	196		
33.80	201		
33.85	207		
33.90	212		
33.95	218		
34.00	224		
34.05	252		
34.10	283		
34.15	316		
34.20	350		
34.25	386		
34.30	424		
34.35	464		
34.40	505		
34.45	548		
34.50	593		
34.55	640		

Stage-Area-Storage for Pond 5P: Rain Garden 4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
31.00	0	33.60	348
31.05	2	33.65	381
31.10	4	33.70	415
31.15	7	33.75	452
31.20	9	33.80	490
31.25	11	33.85	530
31.30	13	33.90	572
31.35	16	33.95	615
31.40	18	34.00	660
31.45	20	34.05	709
31.50	22	34.10	762
31.55	24	34.15	821
31.60	27	34.20	885
31.65	29	34.25	953
31.70	31	34.30	1,027
31.75	33	34.35	1,106
31.80	36	34.40	1,190
31.85	38	34.45	1,279
31.90	40	34.50	1,373
31.95	42	34.55	1,471
32.00	44	34.60	1,575
32.05	47	34.65	1,684
32.10	49	34.70	1,798
32.15	51	34.75	1,917
32.20	53	34.80	2,042
32.25	56	34.85	2,171
32.30	58	34.90	2,305
32.35	60	34.95	2,444
32.40	62	35.00	2,588
32.45	64	35.05	2,735
32.50	67	35.10	2,882
32.55	69	35.15	3,029
32.60	71	35.20	3,175
32.65	73	35.25	3,322
32.70	75	35.30	3,469
32.75	78	35.35	3,616
32.80	80	35.40	3,762
32.85	82	35.45	3,909
32.90	84	35.50	4,056
32.95	87	35.55	4,203
33.00	89	35.60	4,349
33.05	101	35.65	4,496
33.10	114	35.70	4,643
33.15	130	35.75	4,790
33.20	147	35.80	4,936
33.25	166	35.85	5,083
33.30	187	35.90	5,230
33.35	209	35.95	5,377
33.40	234	36.00	5,523
33.45	259		
33.50	287		
33.55	317		

Appendix E

TSS Removal Spreadsheets

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Arsenal Park Improvements Phase B - Watertown, MA

	A	B	C	D	E
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
TSS Removal Calculation Worksheet	Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
	Proprietary Separator Device	0.50	0.75	0.375	0.375
	Subsurface Infiltration Structure	0.80	0.375	0.30	0.075

Total TSS Removal =

92.5%

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

Project: Arsenal Park Improvements Phase B
 Prepared By: DVelardocchia
 Date: 2/12/2021

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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Arsenal Park Improvements Phase B - Watertown, MA

TSS Removal Calculation Worksheet	A	B	C	D	E
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
	Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
	Proprietary Separator Device	0.50	0.75	0.375	0.375

Total TSS Removal =

62.5%

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

Project: Arsenal Park Improvements Phase B
Prepared By: DVelardocchia
Date: 2/12/2021

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

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Arsenal Park Improvements Phase B - Watertown, MA

TSS Removal Calculation Worksheet	B BMP ¹	C TSS Removal Rate ¹	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
	Rain Garden	0.90	1.00	0.90	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10

Total TSS Removal =

90%

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

Project: Arsenal Park Improvements
Prepared By: DEV
Date: 2/10/2021

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



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Nonpoint Pollution Control

Division of Water Quality

401-02B

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CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

January 9, 2015

Derek M. Berg
CONTECH Engineered Solutions, LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Lab Certification for the
Continuous Deflective Separator (CDS®) Stormwater Treatment Device
By Contech Engineered Solutions LLC

TSS Removal Rate 50%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions, LLC has requested a Laboratory Certification for the CDS® Stormwater Treatment Device.

The projects falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

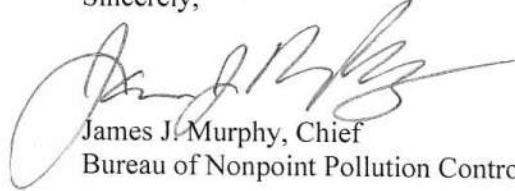
NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix for this device is published online at <http://www.njcat.org/verification-process/technology-verification-database.html>.

The NJDEP certifies the use of the Continuous Deflective Separator (CDS®) Stormwater Treatment Device by Contech Engineered Solutions LLC at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix.

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Practices Manual.

If you have any questions regarding the above information, please contact Mr. Titus Magnanao of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

C: Chron File
Richard Magee, NJCAT
Madhu Guru, DLUR
Ravi Patraju, NJDEP
Elizabeth Dragon, BNPC
Titus Magnanao, BNPC

CDS® Inspection and Maintenance Guide – New Jersey



Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump. Refer to Table 1 for depth

from water surface to top of sediment pile for each model size indicating that maintenance is required.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile ¹		Sediment Storage Capacity	
	ft	m	ft	m	yd ³	m ³
CDS-4	4	1.2	3.0	0.9	0.9	0.7
CDS-5	5	1.5	3.7	1.1	1.5	1.1
CDS-6	6	1.8	4.7	1.4	2.1	1.6
CDS-8	8	2.4	5.8	1.8	3.7	2.8
CDS-10	10	3.0	7.4	2.3	5.8	4.4
CDS-12	12	3.4	8.0	2.4	8.4	6.4

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

¹ Distances from water surface to top of sediment pile are based on 75% of sump capacity being occupied.



Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

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Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treatment products. For information, visit www.ContechES.com or call 800.338.1122

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cdsMaintenance 11/14

CONTECH
ENGINEERED SOLUTIONS
800.925.5240
www.ContechES.com

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

[illegible]

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.



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CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

January 9, 2015

Derek M. Berg
CONTECH Engineered Solutions, LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Lab Certification for the
Continuous Deflective Separator (CDS®) Stormwater Treatment Device
By Contech Engineered Solutions LLC

TSS Removal Rate 50%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions, LLC has requested a Laboratory Certification for the CDS® Stormwater Treatment Device.

The projects falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

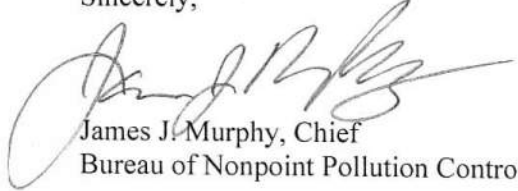
NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix for this device is published online at <http://www.njcat.org/verification-process/technology-verification-database.html>.

The NJDEP certifies the use of the Continuous Deflective Separator (CDS®) Stormwater Treatment Device by Contech Engineered Solutions LLC at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix.

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance of the New Jersey Stormwater Best Management Practices Manual.

If you have any questions regarding the above information, please contact Mr. Titus Magnanao of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

C: Chron File
Richard Magee, NJCAT
Madhu Guru, DLUR
Ravi Patraju, NJDEP
Elizabeth Dragon, BNPC
Titus Magnanao, BNPC

CDS® Inspection and Maintenance Guide – New Jersey



Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump. Refer to Table 1 for depth

from water surface to top of sediment pile for each model size indicating that maintenance is required.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile ¹		Sediment Storage Capacity	
	ft	m	ft	m	yd ³	m ³
CDS-4	4	1.2	3.0	0.9	0.9	0.7
CDS-5	5	1.5	3.7	1.1	1.5	1.1
CDS-6	6	1.8	4.7	1.4	2.1	1.6
CDS-8	8	2.4	5.8	1.8	3.7	2.8
CDS-10	10	3.0	7.4	2.3	5.8	4.4
CDS-12	12	3.4	8.0	2.4	8.4	6.4

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

¹ Distances from water surface to top of sediment pile are based on 75% of sump capacity being occupied.



Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

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Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treatment products. For information, visit www.ContechES.com or call 800.338.1122

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cdsMaintenance 11/14

CONTECH
ENGINEERED SOLUTIONS
800.925.5240
www.ContechES.com

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

[illegible]

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

Appendix F

Phosphorus Removal Calculation

Arsenal Park Improvements Project - Phase B

Total Phosphorus Load Reduction Calculation - Entire Site

Source: Calculation based on Attachment 3 in Appendix F of MA MS4 General Permit

Estimated Annual Pre-Developed TP Load	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)
Open Space	Impervious	3.55	1.52	5.40
Open Space	Pervious	9.48	0.21	1.99
Total		13.0		7.39

Estimated Post-Development Unmitigated TP Load	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)
Open Space	Impervious	3.58	1.52	5.45
Open Space	Pervious	9.45	0.21	1.99
Total		13.0		7.43

Estimated TP Removed Per Year - Rain Garden #1 (Area 12)	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)	Cumulative Phosphorous Load Reduction (%)	Annual TP Removed (lbs)	Annual TP Remaining (lbs)
Open Space	Impervious	0.24	1.52	0.37	82%	0.31	0.070
Open Space	Pervious	0.06	0.21	0.01			
Total		0.31		0.38			

Estimated TP Removed Per Year - Rain Garden #2 (Area 13)	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)	Cumulative Phosphorous Load Reduction (%)	Annual TP Removed (lbs)	Annual TP Remaining (lbs)
Open Space	Impervious	0.30	1.52	0.45	89%	0.41	0.051
Open Space	Pervious	0.05	0.21	0.01			
Total		0.35		0.46			

Arsenal Park Improvements Project - Phase B

Total Phosphorus Load Reduction Calculation - Entire Site

Estimated TP Removed Per Year - Rain Garden #3 (Area 14)	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)	Cumulative Phosphorous Load Reduction (%)	Annual TP Removed (lbs)	Annual TP Remaining (lbs)
Open Space	Impervious	0.28	1.52	0.43	90%	0.40	0.043
Open Space	Pervious	0.04	0.21	0.01			
Total		0.33		0.44			

Estimated TP Removed Per Year - Rain Garden #4 (Areas 16/17)	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)	Cumulative Phosphorous Load Reduction (%)	Annual TP Removed (lbs)	Annual TP Remaining (lbs)
Open Space	Impervious	0.53	1.52	0.81	88%	0.73	0.104
Open Space	Pervious	0.14	0.21	0.03			
Total		0.66		0.83			

Estimated TP Removed Per Year - Subsurface Infiltration System	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)	Cumulative Phosphorous Load Reduction (%)	Annual TP Removed (lbs)	Annual TP Remaining (lbs)
Open Space (area directly tributary to subsurface system)	Impervious	0.91	1.52	1.38	97%	1.69	0.058
Open Space (area directly tributary to subsurface system)	Pervious	1.79	0.21	0.38			
Total		2.69		1.75			

* The annual load into the subsurface infiltration system is the remaining annual TP from the upstream bioretention areas

Estimated Annual Pre-Developed TP Load

7.39 lbs/yr

Estimated Annual Post-Development Unmitigated TP Load

7.43 lbs/yr

Estimated TP Removed Per Year

3.55 lbs/yr

Estimated Annual Post-Development TP Load

3.88 lbs/yr

TP Percent Reduction

47%

Watertown's Requirement

52%

Arsenal Park Improvements Project - Phase B
Total Phosphorus Load Reduction Calculation - Entire Site
Phosphorus Removal Calculations

Rain Garden #1

Volume of rain garden area	490 cf	
Impervious area	0.24 ac	
Equivalent depth (impervious)	0.6 in	
Runoff from pervious area (area)	0.06 ac	
Runoff depth	0.06 in	
Runoff volume	14 ft ³	
Volume to treat impervious area	476	
Equivalent depth (impervious)	0.54 in	
Runoff from pervious area (area)	0.06 ac	
Runoff depth	0.054 in	
Runoff volume	12 ft ³	
Volume to treat impervious area	478	
Equivalent depth (impervious)	0.54 in	Converges

Use HSG "C" for infiltration rate since boring/test pit was not taken in this area.

By interpolation of Figure 3-8 in Appendix F, TP reduction = 82%

Rain Garden #2

Volume of rain garden area	844 cf	
Impervious area	0.30 ac	
Equivalent depth (impervious)	0.78 in	
Runoff from pervious area (area)	0.05 ac	
Runoff depth	0.087 in	
Runoff volume	15 ft ³	
Volume to treat impervious area	829	
Equivalent depth (impervious)	0.76 in	
Runoff from pervious area (area)	0.05 ac	
Runoff depth	0.084 in	
Runoff volume	15 ft ³	
Volume to treat impervious area	829	
Equivalent depth (impervious)	0.76 in	Converges

Use HSG "C" for infiltration rate since boring/test pit was not taken in this area.

By interpolation of Figure 3-8 in Appendix F, TP reduction = 89%

Arsenal Park Improvements Project - Phase B

Total Phosphorus Load Reduction Calculation - Entire Site

Rain Garden #3

Volume of rain garden area	846 cf	
Impervious area	0.28 ac	
Equivalent depth (impervious)	0.82 in	
Runoff from pervious area (area)	0.04 ac	
Runoff depth	0.093 in	
Runoff volume	14 ft ³	
Volume to treat impervious area	832	
Equivalent depth (impervious)	0.81 in	
Runoff from pervious area (area)	0.04 ac	
Runoff depth	0.092 in	
Runoff volume	14 ft ³	
Volume to treat impervious area	832	
Equivalent depth (impervious)	0.81 in	Converges

Use HSG "C" for infiltration rate since boring/test pit was not taken in this area.

By interpolation of Figure 3-8 in Appendix F, TP reduction = 90%

Rain Garden #4

Volume of rain garden area	1373 cf (vol below overflow pipe)	
Impervious area	0.53 ac	
Equivalent depth (impervious)	0.71 in	
Runoff from pervious area (area)	0.14 ac	
Runoff depth	0.077 in	
Runoff volume	37 ft ³	
Volume to treat impervious area	1336	
Equivalent depth (impervious)	0.69 in	
Runoff from pervious area (area)	0.14 ac	
Runoff depth	0.074 in	
Runoff volume	36 ft ³	
Volume to treat impervious area	1337	
Equivalent depth (impervious)	0.70 in	Converges

Use HSG "C" for infiltration rate since boring/test pit was not taken in this area.

By interpolation of Figure 3-8 in Appendix F, TP reduction = 88%

Arsenal Park Improvements Project - Phase B
Total Phosphorus Load Reduction Calculation - Entire Site

Subsurface Infiltration Area

Volume of subsurface infiltration	3530 cf (vol below invert of outlet pipe)
Impervious area	0.91 ac
Equivalent depth (impervious)	1.07 in
Runoff from pervious area (area)	1.79 ac
Runoff depth	0.127 in
Runoff volume	824 ft ³
Volume to treat impervious area	2706
Equivalent depth (impervious)	0.82 in
Runoff from pervious area (area)	1.79 ac
Runoff depth	0.093 in
Runoff volume	604 ft ³
Volume to treat impervious area	2926
Equivalent depth (impervious)	0.89 in
Runoff from pervious area (area)	1.79 ac
Runoff depth	0.1035 in
Runoff volume	672 ft ³
Volume to treat impervious area	2858
Equivalent depth (impervious)	0.87 in
Runoff from pervious area (area)	1.79 ac
Runoff depth	0.1005 in
Runoff volume	652 ft ³
Volume to treat impervious area	2878
Equivalent depth (impervious)	0.87 in
Converges	

By interpolation of Figure 3-5 in Appendix F, TP reduction =

97%

Arsenal Park Improvements Project - Phase B

Total Phosphorus Load Reduction Calculation - Treatment Areas Only

Source: Calculation based on Attachment 3 in Appendix F of MA MS4 General Permit

Estimated Annual Pre-Developed TP Load	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)
Open Space	Impervious	2.34	1.52	3.56
Open Space	Pervious	2.07	0.21	0.43
Total		4.41		3.99

Estimated Post-Development Unmitigated TP Load	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)
Open Space	Impervious	2.26	1.52	3.44
Open Space	Pervious	2.08	0.21	0.44
Total		4.34		3.88

Estimated TP Removed Per Year - Rain Garden #1 (Area 12)	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)	Cumulative Phosphorous Load Reduction (%)	Annual TP Removed (lbs)	Annual TP Remaining (lbs)
Open Space	Impervious	0.24	1.52	0.37	82%	0.31	0.070
Open Space	Pervious	0.06	0.21	0.01			
Total		0.31		0.38			

Estimated TP Removed Per Year - Rain Garden #2 (Area 13)	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)	Cumulative Phosphorous Load Reduction (%)	Annual TP Removed (lbs)	Annual TP Remaining (lbs)
Open Space	Impervious	0.30	1.52	0.45	89%	0.41	0.051
Open Space	Pervious	0.05	0.21	0.01			
Total		0.35		0.46			

Arsenal Park Improvements Project - Phase B

Total Phosphorus Load Reduction Calculation - Treatment Areas Only

Estimated TP Removed Per Year - Rain Garden #3 (Area 14)	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)	Cumulative Phosphorous Load Reduction (%)	Annual TP Removed (lbs)	Annual TP Remaining (lbs)
Open Space	Impervious	0.28	1.52	0.43	90%	0.40	0.043
Open Space	Pervious	0.04	0.21	0.01			
Total		0.33		0.44			

Estimated TP Removed Per Year - Rain Garden #4 (Areas 16/17)	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)	Cumulative Phosphorous Load Reduction (%)	Annual TP Removed (lbs)	Annual TP Remaining (lbs)
Open Space	Impervious	0.53	1.52	0.81	88%	0.73	0.104
Open Space	Pervious	0.14	0.21	0.03			
Total		0.66		0.83			

Estimated TP Removed Per Year - Subsurface Infiltration System	Use	Area (ac)	Estimated Annual TP Loading (lb/yr/ac)	Annual TP Loading (lbs)	Cumulative Phosphorous Load Reduction (%)	Annual TP Removed (lbs)	Annual TP Remaining (lbs)
Open Space (area directly tributary to subsurface system)	Impervious	0.91	1.52	1.38	97%	1.69	0.058
Open Space (area directly tributary to subsurface system)	Pervious	1.79	0.21	0.38			
Total		2.69		1.75			

* The annual load into the subsurface infiltration system is the remaining annual TP from the upstream bioretention areas

Estimated Annual Pre-Developed TP Load

3.99 lbs/yr

Estimated Annual Post-Development Unmitigated TP Load

3.88 lbs/yr

Estimated TP Removed Per Year

3.55 lbs/yr

Estimated Annual Post-Development TP Load

0.33 lbs/yr

TP Percent Reduction

92%

Watertown's Requirement

52%

Arsenal Park Improvements Project - Phase B

Total Phosphorus Load Reduction Calculation - Treatment Areas Only

Phosphorus Removal Calculations

Rain Garden #1

Volume of rain garden area	490 cf	
Impervious area	0.24 ac	
Equivalent depth (impervious)	0.6 in	
Runoff from pervious area (area)	0.06 ac	
Runoff depth	0.06 in	
Runoff volume	14 ft ³	
Volume to treat impervious area	476	
Equivalent depth (impervious)	0.54 in	
Runoff from pervious area (area)	0.06 ac	
Runoff depth	0.054 in	
Runoff volume	12 ft ³	
Volume to treat impervious area	478	
Equivalent depth (impervious)	0.54 in	Converges

Use HSG "C" for infiltration rate since boring/test pit was not taken in this area.

By interpolation of Figure 3-8 in Appendix F, TP reduction = 82%

Rain Garden #2

Volume of rain garden area	844 cf	
Impervious area	0.30 ac	
Equivalent depth (impervious)	0.78 in	
Runoff from pervious area (area)	0.05 ac	
Runoff depth	0.087 in	
Runoff volume	15 ft ³	
Volume to treat impervious area	829	
Equivalent depth (impervious)	0.76 in	
Runoff from pervious area (area)	0.05 ac	
Runoff depth	0.084 in	
Runoff volume	15 ft ³	
Volume to treat impervious area	829	
Equivalent depth (impervious)	0.76 in	Converges

Use HSG "C" for infiltration rate since boring/test pit was not taken in this area.

By interpolation of Figure 3-8 in Appendix F, TP reduction = 89%

Arsenal Park Improvements Project - Phase B

Total Phosphorus Load Reduction Calculation - Treatment Areas Only

Rain Garden #3

Volume of rain garden area	846 cf	
Impervious area	0.28 ac	
Equivalent depth (impervious)	0.82 in	
Runoff from pervious area (area)	0.04 ac	
Runoff depth	0.093 in	
Runoff volume	14 ft ³	
Volume to treat impervious area	832	
Equivalent depth (impervious)	0.81 in	
Runoff from pervious area (area)	0.04 ac	
Runoff depth	0.092 in	
Runoff volume	14 ft ³	
Volume to treat impervious area	832	
Equivalent depth (impervious)	0.81 in	Converges

Use HSG "C" for infiltration rate since boring/test pit was not taken in this area.

By interpolation of Figure 3-8 in Appendix F, TP reduction =

90%

Rain Garden #4

Volume of rain garden area	1373 cf (vol below overflow pipe)	
Impervious area	0.53 ac	
Equivalent depth (impervious)	0.71 in	
Runoff from pervious area (area)	0.14 ac	
Runoff depth	0.077 in	
Runoff volume	37 ft ³	
Volume to treat impervious area	1336	
Equivalent depth (impervious)	0.69 in	
Runoff from pervious area (area)	0.14 ac	
Runoff depth	0.074 in	
Runoff volume	36 ft ³	
Volume to treat impervious area	1337	
Equivalent depth (impervious)	0.70 in	Converges

Use HSG "C" for infiltration rate since boring/test pit was not taken in this area.

By interpolation of Figure 3-8 in Appendix F, TP reduction =

88%

Arsenal Park Improvements Project - Phase B

Total Phosphorus Load Reduction Calculation - Treatment Areas Only

Subsurface Infiltration Area

Volume of subsurface infiltration	3530 cf (vol below invert of outlet pipe)	
Impervious area	0.91 ac	
Equivalent depth (impervious)	1.07 in	
Runoff from pervious area (area)	1.79 ac	
Runoff depth	0.127 in	
Runoff volume	824 ft ³	
Volume to treat impervious area	2706	
Equivalent depth (impervious)	0.82 in	
Runoff from pervious area (area)	1.79 ac	
Runoff depth	0.093 in	
Runoff volume	604 ft ³	
Volume to treat impervious area	2926	
Equivalent depth (impervious)	0.89 in	
Runoff from pervious area (area)	1.79 ac	
Runoff depth	0.1035 in	
Runoff volume	672 ft ³	
Volume to treat impervious area	2858	
Equivalent depth (impervious)	0.87 in	Converges
Runoff from pervious area (area)	1.79 ac	
Runoff depth	0.1005 in	
Runoff volume	652 ft ³	
Volume to treat impervious area	2878	
Equivalent depth (impervious)	0.87 in	Converges

By interpolation of Figure 3-5 in Appendix F, TP reduction =

97%

Appendix G

Operation and Maintenance Plan/ Long-Term Pollution Prevention Plan

Post-Construction Operation and Maintenance Plan

Project: Arsenal Park Improvements – Phase B

Location: Talcott Avenue and Greenough Boulevard, Watertown, MA

Owner/Responsible Party: Town of Watertown

This document describes the operation and maintenance activities for the proposed stormwater management facilities associated with the Arsenal Park Improvements.

Deep-Sump Hooded Catch Basin

Deep-sump hooded catch basins are located in the parking areas and at the tennis courts. Maintenance activities include the following:

- Inspect the catch basins four times per year for depth of sediment and physical condition of the catch basin.
- Clean out the catch basins two times per year, particularly at the end of the foliage and snow removal seasons, or more frequently, if needed.
- Repair or replace damaged catch basin hoods.
- Dispose of catch basin cleanings at a landfill or other facility permitted by MassDEP to accept solid waste, without any prior approval by MassDEP, unless the sediments are contaminated.

Rain Garden

Rain gardens are located along the southern and northern sides of the sports courts and along the walking path. Maintenance activities include the following:

- Annually, check to ensure the filter surface remains well draining after storm events. If filter bed is clogged, is draining poorly, or has standing water that covers more than 50 percent of the surface 48 hours after a precipitation event, then remove top few inches of material, and till, or rake remaining material as needed. Upon failure, excavate rain garden, scarify bottom and sides, replace filter fabric and soil, replant, and mulch. On average, replacement or rehabilitation of the filtration media will occur every 8 years.
- Perform a minimum of one inspection during the growing season to ensure the health, density and diversity of the vegetation. Vegetation should cover more than 75 percent of the system. Remove and replace dead vegetation. In addition, look for erosion, scour and unwanted growth; any unwanted growth should be removed with minimum disruption to the remaining vegetation.
- During the fall, prior to the first snowfall, remove all fallen leaves and debris.
- Inspect the rain garden on a monthly basis to remove trash and debris.
- Prune and weed the plantings periodically to control the growth of unwanted plants. To maintain the permeability of the system, the vegetation within the rain garden must be maintained with lightweight equipment, such as a hand-held line trimmer.

- Use zero-phosphorus fertilizers, if needed, to promote growth of the plantings.
- Replace the underlying mulch on a yearly basis.
- Do not use the rain garden for stockpiling of plowed snow and ice, compost, or any other material.

Contech CDS Unit

- The CDS units are proprietary separator devices located adjacent to the subsurface detention system and west of the basketball courts. Routine maintenance should follow manufacturer's instructions, which are attached.

Subsurface Detention System

The subsurface detention system is located south of the parking lot. Maintenance activities include the following:

- During the first year of operation, inspect the chamber after major rainfall events, but at least twice per year to gain an understanding of the sediment buildup in this chamber. The actual frequency of maintenance can be determined after the first year of operation.
- Remove accumulated sediment using a vacuum.
- Dispose of the sediment at a landfill or other facility permitted by MassDEP to accept solid waste, without any prior approval by MassDEP, unless the sediments are contaminated.

Stormwater Management Facility Inspection Form

Location: Arsenal Park Improvements – Phase B
Talcott Avenue and Greenough Boulevard, Watertown, MA

Inspected By: _____

Inspection Date: _____

BMP Measure	Status/Inspection	Action Taken
Deep Sump Catch Basin		
Rain Garden		
CDS Unit		
Subsurface Detention		

Long-Term Pollution Prevention Plan

The following practices will be employed at Arsenal Park to provide source control and pollution prevention:

1. The entrance driveway and parking lot will be periodically swept to remove trash and debris.
2. The rain gardens will be inspected periodically to remove trash and debris.
3. No hazardous materials shall be stored outside at the park.
4. Salt and de-icing chemicals shall be used sparingly at the park.
5. Any spills that occur at the park shall be contained and cleaned up in a timely manner to prevent the spilled product from entering the catch basin, rain gardens and subsurface detention system.

All personnel who provide regular maintenance at Arsenal Park shall be trained annually on the pollution prevention measures described above.

CDS® Inspection and Maintenance Guide



Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allow both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y ³	m ³
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities



Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

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CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

[illegible]

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

Attachment D
Project Plans (bound separately)

TOWN OF WATERTOWN, MASSACHUSETTS

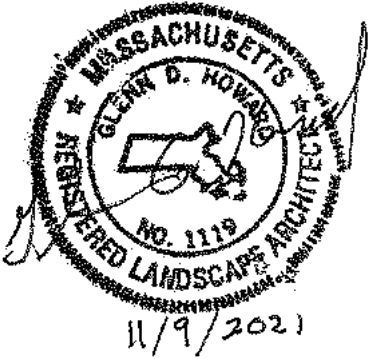
ARSENAL PARK IMPROVEMENTS PROJECT PHASE B



FOR PERMITTING PURPOSES
ONLY
NOT FOR CONSTRUCTION

LOCATION PLAN
NOVEMBER 2021

**CDM
Smith**
BOSTON, MASSACHUSETTS



Water

Environment

Transportation

Energy

Facilities

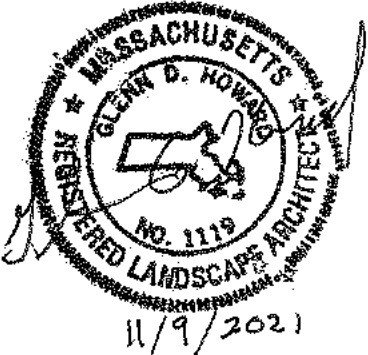
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THE FOLLOWING DRAWINGS ARE INLCUDED IN THE NOI PACKAGE:

SHEET	TITLE
G-1	GENERAL INDEX
G-2	GENERAL NOTES AND LEGEND
EX-1	EXISTING CONDITIONS PLAN I
EX-2	EXISTING CONDITIONS PLAN II
EX-3	EXISTING CONDITIONS PLAN III
EX-4	EXISTING CONDITIONS PLAN IV
EX-5	EXISTING CONDITIONS PLAN V
L-1	REMOVAL, EROSION, AND SEDIMENTATION CONTROL PLAN I
L-2	REMOVAL, EROSION, AND SEDIMENTATION CONTROL PLAN II
L-3	REMOVAL, EROSION, AND SEDIMENTATION CONTROL PLAN III
L-4	REMOVAL, EROSION, AND SEDIMENTATION CONTROL PLAN IV
L-5	REMOVAL, EROSION, AND SEDIMENTATION CONTROL PLAN V
L-6	LAYOUT AND MATERIALS PLAN I
L-7	LAYOUT AND MATERIALS PLAN II
L-8	LAYOUT AND MATERIALS PLAN III
L-9	LAYOUT AND MATERIALS PLAN IV
L-10	LAYOUT AND MATERIALS PLAN V
L-11	GRADING, DRAINAGE, AND UTILITIES PLAN I
L-12	GRADING, DRAINAGE, AND UTILITIES PLAN II
L-13	GRADING, DRAINAGE, AND UTILITIES PLAN III
L-14	GRADING, DRAINAGE, AND UTILITIES PLAN IV
L-15	GRADING, DRAINAGE, AND UTILITIES PLAN V
L-16	LANDSCAPING PLAN I
L-17	LANDSCAPING PLAN II
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L-19	LANDSCAPING PLAN IV
L-20	LANDSCAPING PLAN V
D-1	DETAILS I
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D-4	DETAILS IV
D-5	DETAILS V
D-6	DETAILS VI
D-7	DETAILS VII
A-1	RECTANGULAR AND HEXAGONAL GAZEBOS PLANS, SECTIONS, AND ELEVATIONS
A-2	PUBLIC RESTROOMS PLANS, SECTIONS AND ELEVATIONS
E-1	ELECTRICAL LEGEND
E-2	ELECTRICAL GENERAL NOTES
E-3	ELECTRICAL OVERALL SITE PLAN
E-4	ELECTRICAL ENLARGED SITE DEMOLITION PLAN I
E-5	ELECTRICAL ENLARGED SITE DEMOLITION PLAN II
E-6	ELECTRICAL BATHROOM DEMOLITION PLANS
E-7	ELECTRICAL ENLARGED SITE LIGHTING PLAN I

E-8	ELECTRICAL ENLARGED SITE LIGHTING PLAN II
E-9	LIGHTING FIXTURE SCHEDULE
E-10	ELECTRICAL ONE LINE DIAGRAM MODIFICATIONS
E-11	ELECTRICAL DETAILS
AS-01	SKATEPARK COVER SHEET
AS-02	SKATEPARK MASTER PLAN
AS-03	SKATEPARK 3 DIMENSIONAL GRAPHIC
AS-04	SKATEPARK HORIZONTAL CONTROL PLAN
AS-05	SKATEPARK HORIZONTAL CONTROL POINTS
AS-06	SKATEPARK SURFACE GRADING AND DRAINAGE PLAN
AS-07	SKATEPARK CORING PLAN
AS-08	SKATEPARK CONCRETE PLAN
AS-09	SKATEPARK JOINTING PLAN
AS-10	SKATEPARK CROSS SECTIONS I
AS-11	SKATEPARK CROSS SECTIONS II
AS-12	SKATEPARK CONSTRUCTION DETAILS I
AS-13	SKATEPARK CONSTRUCTION DETAILS II

NOT INCLUDED IN THIS SET



REV.	DATE	DRWN	CHKD		REMARKS

DESIGNED BY: _____	WATKINS/GUILFOIL
DRAWN BY: _____	WATKINS/GUILFOIL
SHEET CHK'D BY: _____	G.HOWARD
CROSS CHK'D BY: _____	---
APPROVED BY: _____	G.HOWARD
DATE: _____	NOVEMBER 2021

**CDM
Smith**

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TOWN OF WATERTOWN, MASSACHUSETTS

ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

GENERAL INDEX

SHEET NO.
G-1

PROJECT NO: 56318-253750
FILE NAME: G001NFIK

SHEET NO.
G-1

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GENERAL NOTES:

- CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SECURITY THROUGHOUT THE DURATION OF THE CONTRACT.
- CONTRACTOR SHALL COMPLY WITH ALL ASPECTS OF 220 CMR 99.00 (DIG SAFE LAW) AND MASSACHUSETTS CHAPTER 82 SECTION 40. CONTRACTOR SHALL NOTIFY ALL UTILITY OWNERS IN WRITING AND CALL DIGSAFE AT "811", 72 HOURS PRIOR TO BEGINNING CONSTRUCTION ACTIVITIES.
- CONTRACTOR SHALL INSTALL ALL REQUIRED EROSION AND SEDIMENTATION CONTROL MEASURES, PRIOR TO UNDERTAKING SITE DEMOLITION AND REMOVALS.
- CONTRACTOR SHALL IDENTIFY AND PROTECT ALL ON-SITE STRUCTURES IDENTIFIED ON THE DRAWINGS TO BE RETAINED AND PROTECTED THROUGHOUT THE DURATION OF THE CONTRACT.
- CONTRACTOR SHALL EXCAVATE TOPSOIL AND SUBGRADE MATERIAL TO MIN. DEPTH OF 6-IN AND TO OTHER DEPTHS REQUIRED TO ACCOMMODATE NEW MATERIALS AND AGGREGATE LAYERS, AND DRAINAGE.
- NO WORK SHALL OCCUR OUTSIDE THE LIMIT OF WORK WITHOUT PRIOR APPROVAL BY THE ENGINEER OR OWNER. DAMAGE TO ANY SITE FEATURES TO BE RETAINED SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER IN A MANNER APPROVED BY THE ENGINEER AND OWNER.
- PRIOR TO START OF CONSTRUCTION, CONTRACTOR SHALL HAND EXCAVATE TEST PIT TO CONFIRM LOCATIONS OF ALL SUBSURFACE UTILITIES TO BE MAINTAINED IN AREA OF WORK. DAMAGE CAUSED BY CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE OWNER.
- ALL AREAS WITHIN LIMIT OF WORK BUT OUTSIDE OF AREAS SPECIFICALLY CALLED OUT FOR REMOVAL AND DISPOSAL, SHALL BE COORDINATED WITH OTHER SHEETS FOR LIMITS OF DISTURBANCE.
- SEE ELECTRICAL SHEETS FOR ADDITIONAL INFORMATION RELATED TO ELECTRICAL REMOVAL AND DISPOSAL.
- SAW CUT EXISTING PAVEMENT AT LIMITS OF REMOVAL.

EROSION AND SEDIMENT CONTROL NOTES:

- REFER TO ALL RELEVANT EROSION AND SEDIMENTATION CONTROL SPECIFICATIONS
- PRIOR TO ANY ACTIVITY ON THE SITE, THE CONTRACTOR SHALL PREPARE AND FILE SWPPP AND APPOINT A QUALIFIED INDIVIDUAL WHO SHALL BE RESPONSIBLE FOR MONITORING ALL ACTIVITIES TO ENSURE ENVIRONMENTAL COMPLIANCE. THIS INDIVIDUAL SHALL INSPECT AND DIRECT THE MAINTENANCE OF ALL EROSION AND SEDIMENTATION CONTROL MEASURES ON SITE AND SHALL SUBMIT PROGRESS/MONITORING REPORTS AS REQUESTED TO THE ENGINEER AND OWNER.
- APPROPRIATE EROSION CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE BEGINNING OF ALL PHASES OF CONSTRUCTION, AND SHALL BE MAINTAINED DURING CONSTRUCTION. THE EROSION CONTROL DETAILS AND SPECIFICATIONS SHALL BE CONSIDERED THE MINIMUM STANDARDS REQUIRED FOR THIS PROJECT. ADDITIONAL OR MODIFIED EROSION CONTROL MEASURES MAY BE REQUIRED AT ANY TIME DURING CONSTRUCTION AT NO ADDITIONAL COST. THESE SHALL BE MAINTAINED UNTIL THEY ARE NO LONGER NEEDED, AT WHICH TIME THEY SHALL BE REMOVED.
- CATCH BASIN FILTERS SHALL BE INSTALLED ON ALL CATCH BASIN STRUCTURES IN AREAS OF WORK AS APPROVED BY THE ENGINEER AND OWNER.
- A STABILIZED CONSTRUCTION ENTRANCE, TRACKING PAD OR OTHER APPROVED STABILIZATION METHOD SHALL BE CONSTRUCTED AT ALL ENTRANCE / EXIT POINTS OF THE SITE TO REDUCE THE AMOUNT OF SOIL CARRIED ONTO IMPERVIOUS AREAS AND OFF SITE. PREVENT OFF-SITE VEHICLE TRACKING OF SEDIMENTS. ALL PAVED ROAD AND PATH SURFACES IN THE WORK AREA OR AFFECTED BY THE WORK SHALL BE SWEEPED ON A REGULAR BASIS AS DIRECTED BY THE ENGINEER OR OWNER.
- SITE DEWATERING DETAILS, INCLUDING PROPER SIZING OF PUMPS, CONTAINMENT AREAS AND TREATMENT METHODS FOR ALL DEWATERING OPERATIONS, SHALL BE SUBMITTED BY THE CONTRACTOR WHERE REQUIRED.
- AN ADEQUATE STOCKPILE OF EROSION CONTROL MATERIALS SHALL BE ON SITE AT ALL TIMES IN AN EASILY ACCESSIBLE LOCATION FOR EMERGENCY OR ROUTINE REPLACEMENT AND SHALL INCLUDE MATERIALS TO REPAIR OR REPLACE STRAW WATTLES OR ANY OTHER DEVICES PLANNED FOR USE DURING CONSTRUCTION.
- THE AREA OF CONSTRUCTION SHALL REMAIN IN A STABLE CONDITION AT THE CLOSE OF EACH CONSTRUCTION DAY. EROSION CONTROLS WILL BE INSPECTED AT THIS TIME, AND REPAIRED, REINFORCED OR REPLACED AS NECESSARY.
- ONCE BEGUN, GRADING AND CONSTRUCTION SHALL CONTINUE IN AN EXPEDITIOUS MANNER TO MINIMIZE THE OPPORTUNITY FOR EROSION.
- SODDED AREAS AND SEEDING UNDERTAKEN AS SPECIFIED IN SECTION 329200 SHALL BE UNDERTAKEN IN THE SPRING, EARLY SUMMER OR EARLY FALL. WHEN SEEDING IS FOUND TO BE IMPRACTICAL, APPROPRIATE TEMPORARY STABILIZATION SHALL BE APPLIED. PERMANENT SEEDING MAY TAKE PLACE DURING THE SUMMER, ONLY IF PLANS PROVIDE FOR ADEQUATE MULCHING AND WATERING.
- THE OWNER RESERVES THE RIGHT TO IMPOSE ADDITIONAL CONDITIONS ON PORTIONS OF THIS PROJECT TO MITIGATE ANY IMPACTS WHICH COULD RESULT FROM SITE EROSION, OR ANY NOTICEABLE DEGRADATION OF SURFACE WATER QUALITY DISCHARGING FROM THE SITE.
- EROSION AND SEDIMENTATION CONTROL DEVICES SHALL BE INSPECTED BEFORE AND AFTER EACH PREDICTED STORM EVENT AND REPAIRED OR REPLACED AS NECESSARY. ANY ACCUMULATED SEDIMENT ADJACENT TO THE BARRIERS SHALL BE REMOVED. INSPECT INLET PROTECTION AND SEDIMENTATION BARRIERS WEEKLY AND AFTER ALL STORM EVENTS OF ½ INCH OR GREATER AND REPAIR AS NEEDED AND AS DIRECTED BY THE ENGINEER.
- ALL AREAS OUTSIDE THE LIMIT OF WORK SHALL BE PROTECTED AT ALL TIMES.
- ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED AFTER FINAL SITE STABILIZATION. DISTURBED SOIL AREAS RESULTING FROM THE REMOVAL OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED WITHIN 30 DAYS OF REMOVAL.
- UPON COMPLETION OF CONSTRUCTION ACTIVITIES INSPECT AND CLEAN OUT DRAINAGE SYSTEMS TO THE SATISFACTION OF THE ENGINEER. ALL EXISTING PAVEMENT AND WALKWAYS TO BE PROTECTED THAT ARE DISTURBED BY THIS CONTRACT SHALL BE PROMPTLY REPAIRED IN A MANNER APPROVED BY ENGINEER IN ACCORDANCE WITH SPECIFICATIONS
- UTILIZE BEST MANAGEMENT PRACTICES AND COMPLY WITH APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS AS RELATED TO SEDIMENT AND EROSION CONTROL. MASSACHUSETTS EROSION CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS SHALL BE FOLLOWED FOR ALL WORK.

SITE ACCESS NOTES:

- CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF ALL CONSTRUCTION ACCESS ROADS AND WORK AREAS DURING CONSTRUCTION OF THE PROJECT IN ORDER TO MAINTAIN SAFE AND OPERABLE WORKING CONDITIONS.
- CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ENSURING PERSONNEL, MATERIALS, AND EQUIPMENT CAN TRAVEL SAFELY OVER ANY OF THE PROJECT RELATED ACCESS ROADS AND TRAVEL WAYS TO MEET ALL CONSTRUCTION REQUIREMENTS. IF THE CONTRACTOR CANNOT PROVIDE SAFE AND ADEQUATE ACCESS VIA THE SITE ACCESS ROUTE SHOWN, THEN AN ALTERNATIVE ROUTE AND/OR METHOD FOR COMPLETING CONSTRUCTION SHALL BE SUBMITTED FOR APPROVAL BY OWNER OR OWNERS REPRESENTATIVE.

GRADING AND EXCAVATION NOTES:

- CONTRACTOR SHALL NOTIFY ENGINEER AND OWNER OF ANY OBSTRUCTIONS ENCOUNTERED DURING EXCAVATION, PRIOR TO CONTINUING WITH CONSTRUCTION ACTIVITIES IN THE AREA WHERE AN OBSTRUCTION IS ENCOUNTERED.
- CONTRACTOR SHALL BE AWARE OF ALL EXISTING DRAIN AND PIPE STRUCTURES TO REMAIN AND WHETHER THEY ARE ABANDONED OR TO REMAIN IN USE. CONTRACTOR SHALL MAINTAIN DRAINAGE SYSTEM DURING CONSTRUCTION ACTIVITIES TO ENSURE FUNCTION OF EXISTING SYSTEM AT ALL TIMES.
- ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES OUTSIDE THE LIMIT OF WORK OR AREAS WITHIN LIMIT OF WORK NOT INTENDED TO BE MODIFIED SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE IN MANNER APPROVED BY ENGINEER.
- NO SOIL SHALL BE REMOVED FROM THE SITE. SOIL EXCAVATED FOR INSTALLATION OF THE STORMWATER DETENTION STRUCTURE, FOUNDATIONS, UTILITIES, PIPING AND MISCELLANEOUS SUBGRADE SOILS SHALL UTILIZED IN THE NEW PROMONTORY BERM AREA LOCATED BELOW THE TOP 2-FT FROM FINISHED GRADE. EXCAVATED SOILS SHALL NOT BE LOCATED WITHIN 5 LATERAL FEET OF ANY WALKWAY, PRECAST STAIRS OR PRECAST WALLS. EXISTING SOILS SHALL BE AMENDED FOR RE-USE AS SPECIFIED.
- TO ESTABLISH PROPER GRADES, CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF GRADE STAKES. THE NUMBER AND LOCATION SHALL BE AS APPROVED BY THE ENGINEER. CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR A FINAL FIELD CHECK OF FINISHED GRADES ACCEPTABLE TO THE OWNER AND THE ENGINEER PRIOR TO FINE GRADING ACTIVITIES FIELD SHALL BE LASER GRADED AS SPECIFIED.
- IF EXISTING TREES, UTILITIES, OR STRUCTURES IMPEDE EXCAVATION ACTIVITIES IN ANY MANNER, CONTRACTOR SHALL INFORM THE ENGINEER AND OWNER PRIOR TO CONTINUING WITH CONSTRUCTION ACTIVITIES.
- SLOPE OF WALKWAYS SHALL BE 5% (MAX.) LONGITUDINAL AND 2% (MAX.) CROSS SLOPE EXCEPT AS SHOWN ON THE DRAWINGS.
- REGRADED SLOPES SHALL NOT EXCEED 3:1 UNLESS APPROVED BY ENGINEER.

SITE PAVING NOTES:

- CONTRACTOR SHALL MAKE EVERY EFFORT TO ENSURE THAT FRESHLY POURED CONCRETE SLABS DO NOT BECOME VANDALIZED DURING THE CURING PROCESS. ANY SLABS THAT ARE VANDALIZED SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.
- CONCRETE COLOR, EXPANSION JOINT, AND SCORING LOCATIONS AND PATTERNS ARE SHOWN TO DEMONSTRATE DESIGN INTENT. CONTRACTOR SHALL SUBMIT A CONCRETE COLOR, JOINTING, AND SCORING SHOP SUBMITAL FOR APPROVAL PRIOR TO CONSTRUCTION. FINAL FORMWORK SHALL BE APPROVED IN THE FIELD BY OWNER OR ENGINEER PRIOR TO POURING.
- EXPANSION JOINTS TO BE LOCATED BETWEEN POURS OF TWO DIFFERENT COLORS.
- EXPANSION JOINTS SHALL BE LOCATED BETWEEN POURS OF TWO DIFFERENT MATERIALS, INCLUDING, BUT NOT LIMITED TO FOOTINGS/FOUNDATIONS, PRECAST CONCRETE CURBS/WALLS, CONCRETE PADS, MANHOLES, AND CATCH BASINS.

SITE LAYOUT NOTES:

- PROJECT LAYOUT IS BASED ON BENCH MARKS AND HORIZONTAL CONTROL POINTS AS SHOWN ON THIS SHEET AND EXISTING CONDITIONS PLANT SHEETS EX-1, EX-2, EX-3, EX-4, AND EX-5.
- CONTRACTOR SHALL MAKE EVERY EFFORT TO ENSURE THAT FRESHLY POURED CONCRETE SLABS DO NOT BECOME VANDALIZED DURING THE CURING PROCESS. ANY SLABS THAT ARE VANDALIZED SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.

LANDSCAPE NOTES:

- ALL PROPOSED PLANTING LOCATIONS SHALL BE STAKED AS SHOWN ON THE PLANS FOR FIELD REVIEW BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
- CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES AND NOTIFY LANDSCAPE ARCHITECT OF CONFLICTS.
- NO PLANT MATERIALS SHALL BE INSTALLED UNTIL ALL GRADING AND SIDEWALK CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.
- A 3-INCH DEEP SHREDDED PINE BARK SAUCER SHALL BE INSTALLED UNDER ALL TREES AND SHRUBS, AND IN ALL PLANTING BEDS, AS SHOWN ON THE PLANS, OR AS DIRECTED BY OWNER'S REPRESENTATIVE.
- ALL TREES SHALL BE BALLED AND BURLAPPED, UNLESS OTHERWISE NOTED, OR APPROVED BY THE LANDSCAPE ARCHITECT.
- FINAL QUANTITY FOR EACH PLANT TYPE SHALL BE AS SHOWN ON THE PLAN. THIS NUMBER SHALL TAKE PRECEDENCE IN CASE OF ANY DISCREPANCY BETWEEN QUANTITIES SHOWN ON THE PLANT LIST AND ON THE PLAN. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES BETWEEN THE NUMBER OF PLANTS SHOWN ON THE PLAN AND PLANT LABELS PRIOR TO BIDDING.
- ANY PROPOSED PLANT SUBSTITUTIONS MUST BE APPROVED IN WRITING BY THE LANDSCAPE ARCHITECT.
- ALL PLANT MATERIALS INSTALLED SHALL MEET OR EXCEED THE SPECIFICATIONS OF THE "AMERICAN STANDARDS FOR NURSERY STOCK" BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
- ALL PLANT MATERIALS SHALL BE MAINTAINED AND GUARANTEED AS SPECIFIED.
- THIS PLAN IS INTENDED FOR LANDSCAPING PURPOSES ONLY. REFER TO SITE / CIVIL DRAWINGS FOR ALL OTHER SITE CONSTRUCTION INFORMATION.

PLANT MAINTENANCE NOTES:

- CONTRACTOR SHALL PROVIDE COMPLETE MAINTENANCE OF THE PLANTINGS AS SPECIFIED.
- WATERING SHALL BE REQUIRED DURING THE GROWING SEASON, WHEN NATURAL RAINFALL IS BELOW ONE INCH PER WEEK.
- CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT FOR THE COMPLETE LANDSCAPE MAINTENANCE WORK.
- WATER SHALL BE APPLIED IN SUFFICIENT QUANTITY TO THOROUGHLY SATURATE THE SOIL IN THE ROOT ZONE OF EACH PLANT.
- CONTRACTOR SHALL REPLACE DEAD OR DYING PLANTS DURING AND A MAXIMUM OF ONE MONTH PRIOR TO THE END OF THE PLANT MAINTENANCE AND GUARANTEE PERIOD.

SURVEY NOTES:

- COORDINATES, IN U.S. SURVEY FEET, ARE REFERENCED TO THE MASSACHUSETTS COORDINATE SYSTEM, MAINLAND ZONE, REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83/CORS)
- ELEVATIONS, IN U.S. SURVEY FEET, ARE REFERENCED TO NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).
- THE EXISTING SITE CONDITIONS SURVEY WAS PREPARED ON JULY 19, 2016, REVISED ON NOVEMBER 14, 2018, BY FELDMAN SURVEYORS, PROFESSIONAL LAND SURVEYORS, 152 HAMPDEN STREET, BOSTON, MA 02119.
- SUBSURFACE UTILITY LINES, AS SHOWN HEREON ARE APPROXIMATE ONLY. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD. FELDMAN ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN.
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- PARCEL LINES AND ASSESSOR INFORMATION WERE COMPILED FROM INFORMATION PROVIDED BY THE TOWN OF WATERTOWN ASSESSOR'S OFFICE.

SURVEY LEGEND:

	OBSERVATION WELL		BIT
	SEWER MANHOLE		CONC
	DRAIN MANHOLE		BRK
	ELECTRIC MANHOLE		CW
	WATER MANHOLE		BRW
	TELEPHONE MANHOLE		NTS
	MANHOLE		M&S
	HYDRANT		SD
	WATER SHUT OFF		BR
	GAS SHUT OFF		HVAC
	CATCH BASIN		POB
	CONTROL BOX		CO
	TRAFFIC SIGNAL		SO
	LIGHT POLE		PLTR
	ELECTRIC HANDHOLE		P&R
	BOLLARD		COL
	SIGN		GR
	AREA DRAIN		WL
	FIRE ALARM		LSA
	ROOF DRAIN		R=
	STAND PIPE/SIAMESE CONNECTION		FFE
	GAS METER		R=
	ELECTRIC METER		I=
	AIR CONDITIONING UNIT		TT=
	HANDICAP PARKING SPACE		TR=
	DECIDUOUS TREE		TOVP=
	CONIFEROUS TREE		BOT=
	HANDICAP RAMP		INACC.
	GATE POST		NVP
	ELECTRIC CONTROL BOX		TOW
	NOW OR FORMERLY		TOD
	FOUND		FOW
	RECORD		EDGE OF WOODS
	CALCULATED		GUARD RAIL
	ENTRANCE		METAL FENCE
	FINISH FLOOR ELEVATION		SEWER
	VERTICAL GRANITE CURB		DRAIN
	SLOPED GRANITE CURB		WATER
	CONCRETE CURB		GAS
	BIT. CONC. BERM		ELECTRIC
	CHAIN LINK FENCE		TELEPHONE
	STOCKADE FENCE		OVERHEAD WIRES
	WROUGHT IRON FENCE		DIGSAFE ELECTRIC
			DIGSAFE TELEPHONE

REV.	DATE	DRWN	CHKD		REMARKS

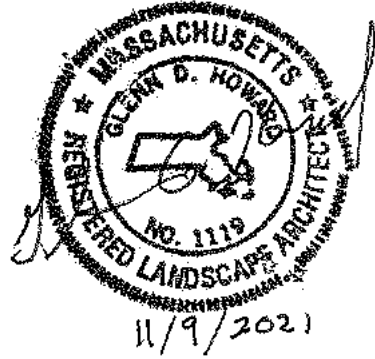
DESIGNED BY: _____	WATKINS/GUILFOIL
DRAWN BY: _____	WATKINS/GUILFOIL
SHEET CHK'D BY: _____	G.HOWARD
GROSS CHK'D BY: _____	---
APPROVED BY: _____	G.HOWARD
DATE: _____	NOVEMBER 2021



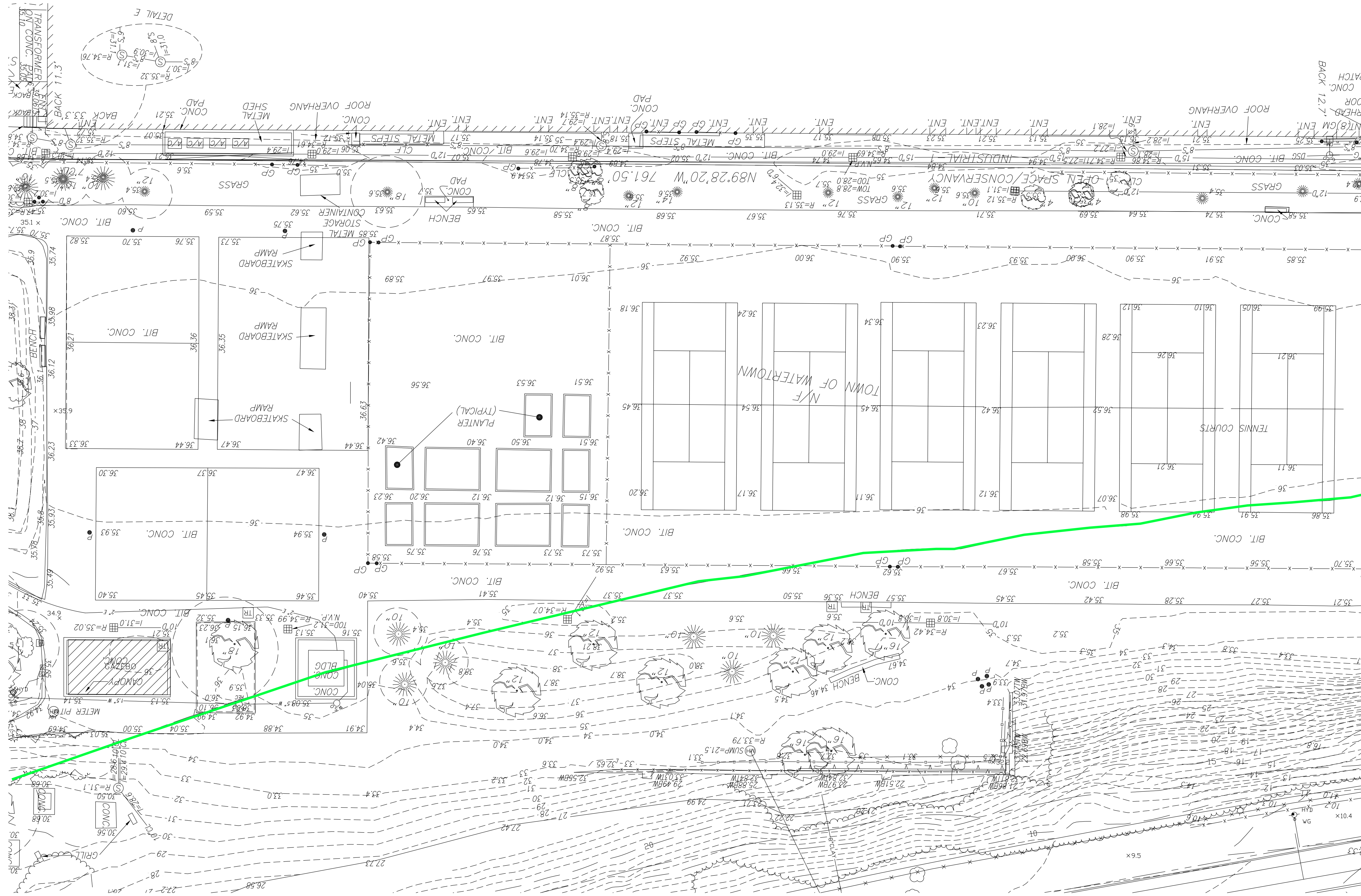
TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

GENERAL NOTES AND LEGEND
SHEET NO.
G-1

PROJECT NO: 56318-253750
FILE NAME: G002GNLG
SHEET NO.
G-1



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SURVEY LEGEND:

- OBSERVATION WELL
- SEWER MANHOLE
- DRAIN MANHOLE
- ELECTRIC MANHOLE
- WATER MANHOLE
- TELEPHONE MANHOLE
- MANHOLE
- HYDRANT
- WATER SHUT OFF
- GAS SHUT OFF
- CATCH BASIN
- CONTROL BOX
- TRAFFIC SIGNAL
- LIGHT POLE
- ELECTRIC HANDHOLE

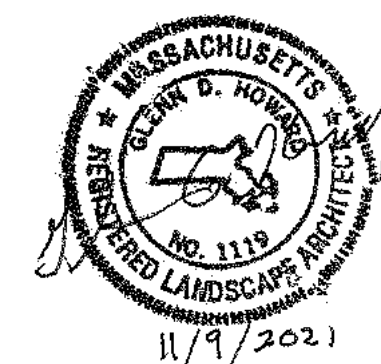
- HANDICAP RAMP
- GATE POST
- ELECTRIC CONTROL BOX
- N/F
- FOUND
- RECORD
- CALC
- ENTRANCE
- FFE
- VERTICAL GRANITE CURB
- SLOPED GRANITE CURB
- CONCRETE CURB
- BIT. CONC. BERM
- CHAIN LINK FENCE
- STOCKADE FENCE

- POST & ROPE FENCE
- COLUMN
- GUARDRAIL
- WALK LIGHT
- LANDSCAPING
- RIM ELEVATION
- FINISHED FLOOR ELEVATION
- RIM ELEVATION
- INVERT ELEVATION
- TOP OF TRAP
- CENTERLINE OF TROUGH
- TOP OF VERTICAL PIPE
- BOTTOM ELEVATION
- INACCESSIBLE
- NO VISIBLE PIPES

- BOLLARD
- SIGN
- AREA DRAIN
- FIRE ALARM
- ROOF DRAIN
- STAND PIPE/SIAMESE CONNECTION
- GAS METER
- ELECTRIC METER
- AIR CONDITIONING UNIT
- HANDICAP PARKING SPACE
- DECIDUOUS TREE
- CONIFEROUS TREE

- WROUGHT IRON FENCE
- BITUMINOUS
- CONCRETE
- BRICK
- CONCRETE WALL
- BRICK WALL
- NOT TO SCALE
- MULCH & SHRUBS
- STRIP DRAIN
- BIKE RACK
- AIR CONDITIONING UNIT
- POINT OF BEGINNING
- CLEAN OUT
- SHUT OFF (UNKNOWN)
- PLANTER

- TOP OF WATER
- TOP OF DEBRIS
- FULL OF WATER
- EDGE OF WOODS
- GUARD RAIL
- METAL FENCE
- SEWER
- DRAIN
- WATER
- GAS
- ELECTRIC
- TELEPHONE
- OVERHEAD WIRES
- DIGSAFE ELECTRIC
- DIGSAFE TELEPHONE



1" = 20'

PROJECT NO. 56318-253750
FILE NAME: C001EXPL

SHEET NO.

EX-3

SURVEY NOTES:

- COORDINATES, IN U.S. SURVEY FEET, ARE REFERENCED TO THE MASSACHUSETTS COORDINATE SYSTEM, MAINLAND ZONE, REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83/CORS)
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TOWN OF WATERTOWN, MASSACHUSETTS

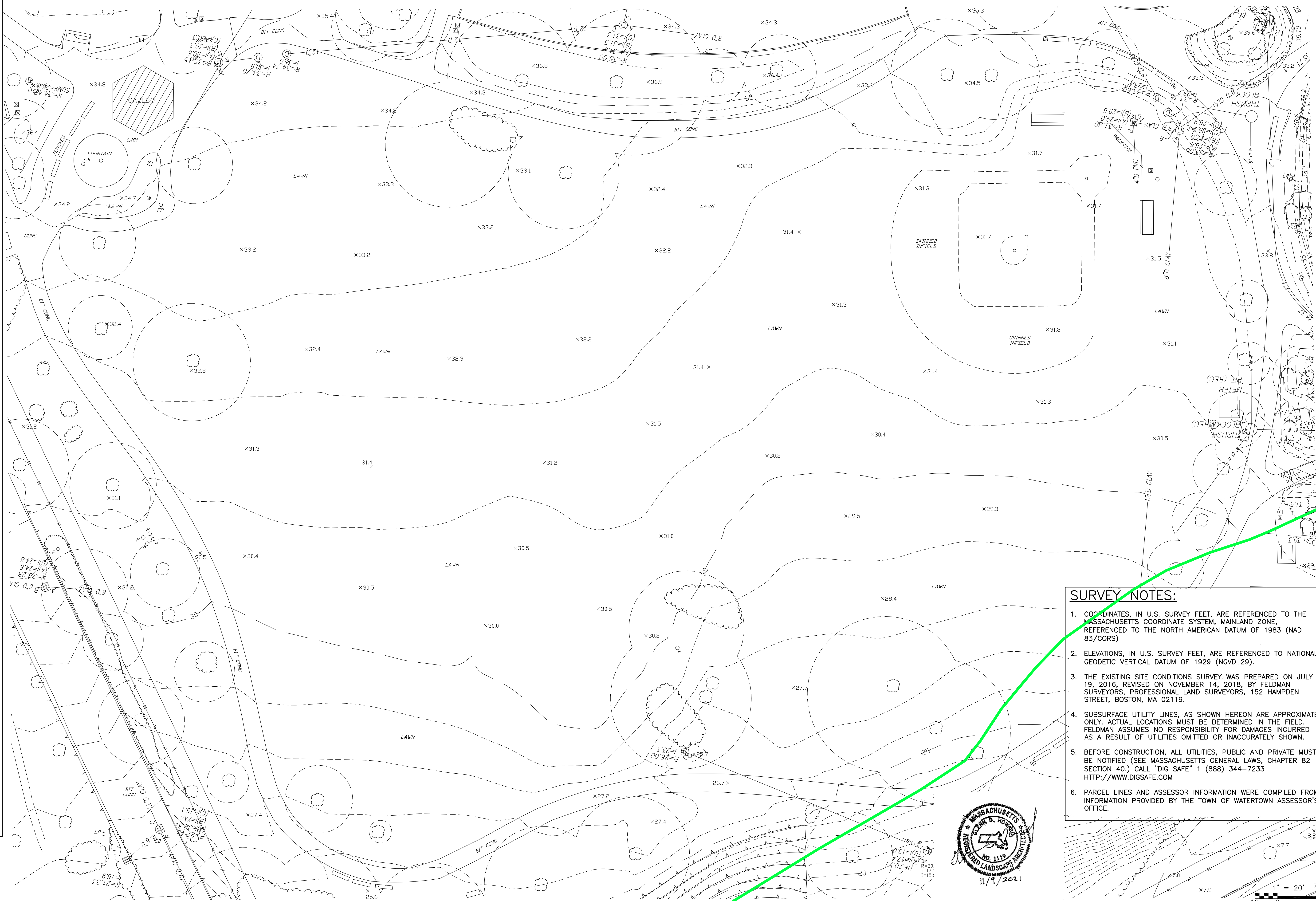
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

EXISTING CONDITIONS PLAN III

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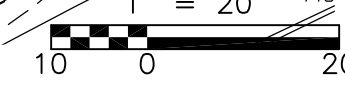
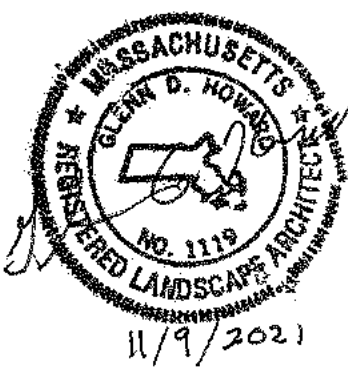
SURVEY LEGEND:

- OBSERVATION WELL
- SEWER MANHOLE
- DRAIN MANHOLE
- ELECTRIC MANHOLE
- WATER MANHOLE
- TELEPHONE MANHOLE
- MANHOLE
- HYDRANT
- WATER SHUT OFF
- GAS SHUT OFF
- CATCH BASIN
- CONTROL BOX
- TRAFFIC SIGNAL
- LIGHT POLE
- ELECTRIC HANDHOLE
- BOLLARD
- SIGN
- AD AREA DRAIN
- FA FIRE ALARM
- RD ROOF DRAIN
- STAND PIPE/SIAMESE CONNECTION
- GAS METER
- ELECTRIC METER
- AIR CONDITIONING UNIT
- HANDICAP PARKING SPACE
- DECIDUOUS TREE
- CONIFEROUS TREE
- HANDICAP RAMP
- GP GATE POST
- EBOX ELECTRIC CONTROL BOX
- N/F NOW OR FORMERLY
- FND FOUND
- REC RECORD
- CALC CALCULATED
- ENT ENTRANCE
- FFE FINISH FLOOR ELEVATION
- VGC VERTICAL GRANITE CURB
- SOC SLOPED GRANITE CURB
- CC CONCRETE CURB
- BB BIT. CONC. BERM
- CLF CHAIN LINK FENCE
- STF STOCKADE FENCE
- WIF WROUGHT IRON FENCE
- BIT BITUMINOUS
- CONC CONCRETE
- BRK BRICK
- CW CONCRETE WALL
- BRW BRICK WALL
- NTS NOT TO SCALE
- M&S MULCH & SHRUBS
- SD STRIP DRAIN
- BR BIKE RACK
- HVAC AIR CONDITIONING UNIT
- POB POINT OF BEGINNING
- CO CLEAN OUT
- SO SHUT OFF (UNKNOWN)
- PLTR PLANTER
- P&R POST & ROPE FENCE
- COL COLUMN
- GR GUARDRAIL
- WL WALK LIGHT
- LSA LANDSCAPING
- R RIM ELEVATION
- FFE FINISHED FLOOR ELEVATION
- R RIM ELEVATION
- I INVERT ELEVATION
- TT TOP OF TRAP
- TR CENTERLINE OF TROUGH
- TOVP TOP OF VERTICAL PIPE
- BOT BOTTOM ELEVATION
- INACC. INACCESSIBLE
- NVP NO VISIBLE PIPES
- TOW TOP OF WATER
- TOD TOP OF DEBRIS
- FOW FULL OF WATER
- EDGE OF WOODS
- GUARD RAIL
- X-X METAL FENCE
- S SEWER
- D DRAIN
- W WATER
- G GAS
- E ELECTRIC
- T TELEPHONE
- OHW OVERHEAD WIRES
- DSE DIGSAFE ELECTRIC
- DST DIGSAFE TELEPHONE



SURVEY NOTES:

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REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: <u>WATKINS/GUILFOIL</u>
DRAWN BY: <u>WATKINS/GUILFOIL</u>
SHEET CHK'D BY: <u>G.HOWARD</u>
GROSS CHK'D BY: <u> </u>
APPROVED BY: <u>G.HOWARD</u>
DATE: <u>NOVEMBER 2021</u>



TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

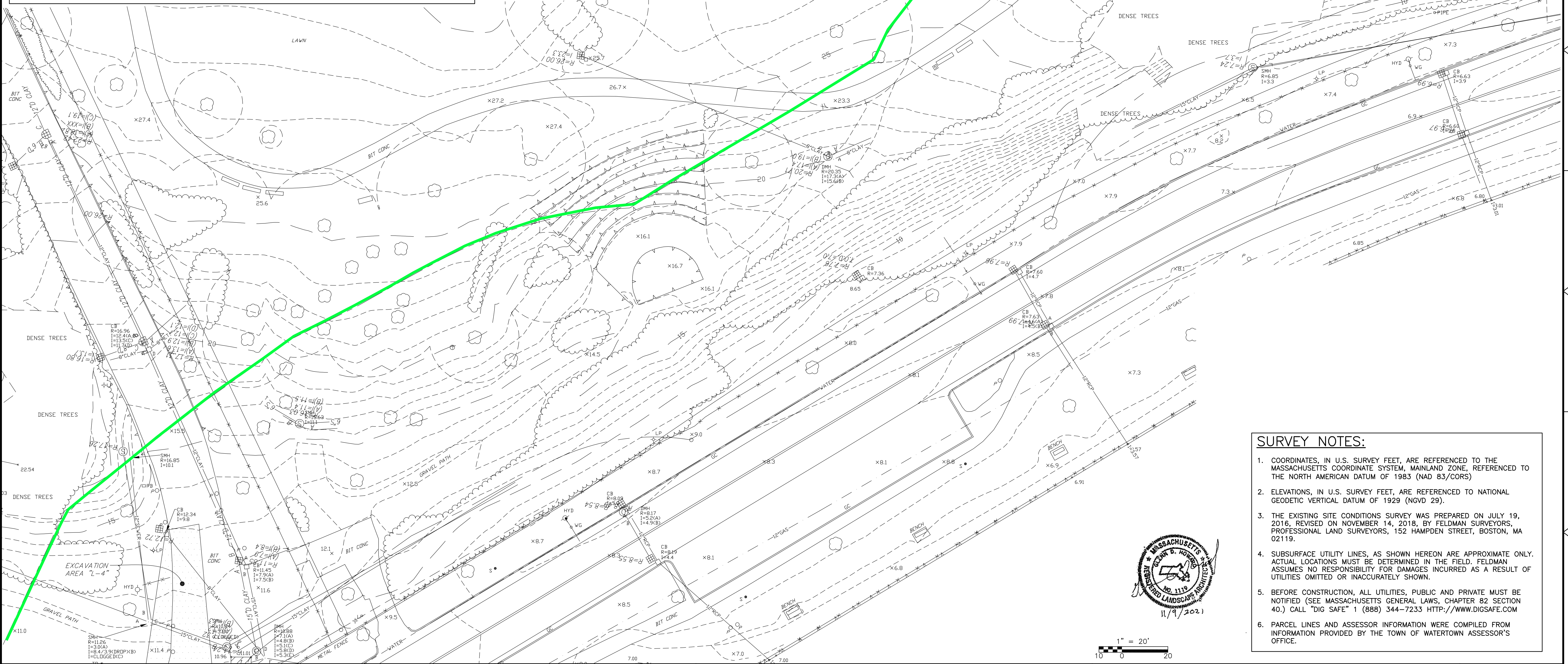
EXISTING CONDITIONS PLAN IV
SHEET NO.
EX-4

PROJECT NO: 56318-253750
FILE NAME: C001EXPL
SHEET NO.
EX-4

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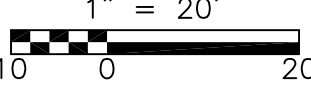
SURVEY LEGEND:

	OBSERVATION WELL		HANDICAP RAMP		POST & ROPE FENCE
	SEWER MANHOLE		GATE POST		COLUMN
	DRAIN MANHOLE		ELECTRIC CONTROL BOX		GUARDRAIL
	ELECTRIC MANHOLE		NOW OR FORMERLY		WALK LIGHT
	WATER MANHOLE		FOUND		LANDSCAPING
	TELEPHONE MANHOLE		RECORD		RIM ELEVATION
	MANHOLE		CALCULATED		RIM ELEVATION
	HYDRANT		ENTRANCE		RIM ELEVATION
	WATER SHUT OFF		FINISH FLOOR ELEVATION		INVERT ELEVATION
	GAS SHUT OFF		VERTICAL GRANITE CURB		TOP OF TRAP
	CATCH BASIN		SLOPED GRANITE CURB		CENTERLINE OF TROUGH
	CONTROL BOX		CONCRETE CURB		TOP OF VERTICAL PIPE
	TRAFFIC SIGNAL		BIT. CONC. BERM		BOTTOM ELEVATION
	LIGHT POLE		CHAIN LINK FENCE		INACCESSIBLE
	ELECTRIC HANDHOLE		STOCKADE FENCE		NO VISIBLE PIPES
	BOLLARD		WROUGHT IRON FENCE		TOP OF WATER
	SIGN		BITUMINOUS		TOP OF DEBRIS
	AREA DRAIN		CONCRETE		FULL OF WATER
	FIRE ALARM		BRICK		EDGE OF WOODS
	ROOF DRAIN		CONCRETE WALL		GUARD RAIL
	STAND PIPE/SIAMESE CONNECTION		BRICK WALL		METAL FENCE
	GAS METER		NOT TO SCALE		SEWER
	ELECTRIC METER		MULCH & SHRUBS		DRAIN
	AIR CONDITIONING UNIT		STRIP DRAIN		WATER
	HANDICAP PARKING SPACE		BIKE RACK		GAS
	DECIDUOUS TREE		AIR CONDITIONING UNIT		ELECTRIC
	CONIFEROUS TREE		POINT OF BEGINNING		TELEPHONE
			CLEAN OUT		OVERHEAD WIRES
			SHUT OFF (UNKNOWN)		DIGSAFE ELECTRIC
			PLANTER		DIGSAFE TELEPHONE



SURVEY NOTES:

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REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: <u>WATKINS/GUILFOIL</u>
DRAWN BY: <u>WATKINS/GUILFOIL</u>
SHEET CHK'D BY: <u>G.HOWARD</u>
CROSS CHK'D BY: <u> </u>
APPROVED BY: <u>G.HOWARD</u>
DATE: <u>NOVEMBER 2021</u>

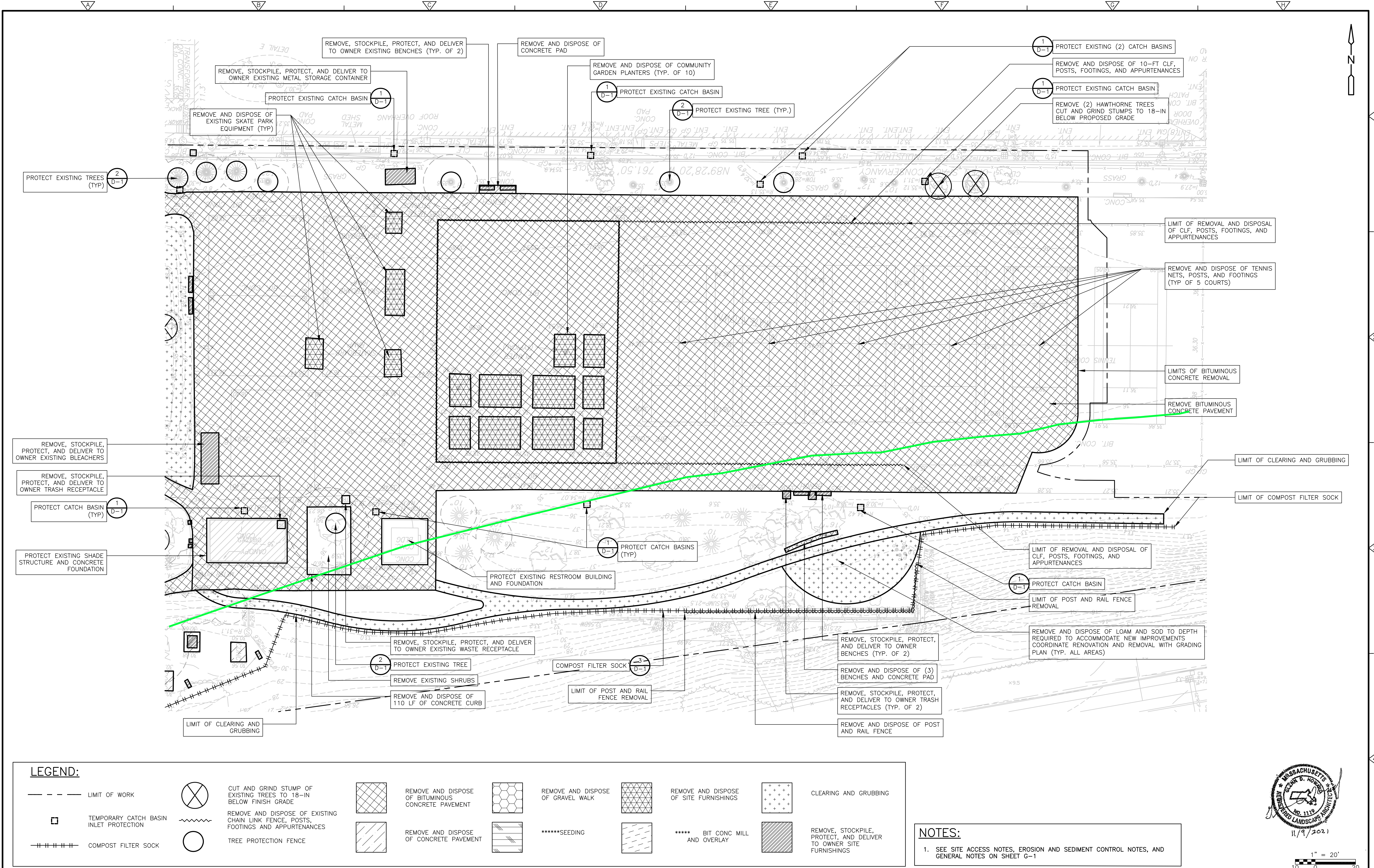


TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

EXISTING CONDITIONS PLAN V
EX-5

PROJECT NO. 56318-253750
FILE NAME: C001EXPL
SHEET NO.
EX-5

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LEGEND:

--- --

LIMIT OF WORK

TEMPORARY CATCH BASIN INLET PROTECTION

COMPOST FILTER SOCK

CUT AND GRIND STUMP OF EXISTING TREES TO 18-IN BELOW FINISH GRADE

REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE, POSTS, FOOTINGS AND APPURTENANCES

TREE PROTECTION FENCE

REMOVE AND DISPOSE OF BITUMINOUS CONCRETE PAVEMENT

REMOVE AND DISPOSE OF CONCRETE PAVEMENT

REMOVE AND DISPOSE OF GRAVEL WALK

*****SEEDING

REMOVE AND DISPOSE OF SITE FURNISHINGS

***** BIT CONC MILL AND OVERLAY

CLEARING AND GRUBBING

REMOVE, STOCKPILE, PROTECT, AND DELIVER TO OWNER SITE FURNISHINGS

NOTES:

1. SEE SITE ACCESS NOTES, EROSION AND SEDIMENT CONTROL NOTES, AND GENERAL NOTES ON SHEET G-1

				DESIGNED BY: <u>WATKINS/GUILFOIL</u>	CDM Smith 75 State Street Boston, MA 02109 Tel: (617) 452-6000	TOWN OF WATERTOWN, MASSACHUSETTS ARSENAL PARK IMPROVEMENTS PROJECT PHASE B		DEMOLITION, REMOVALS, EROSION, AND SEDIMENTATION CONTROL PLAN III		MASSACHUSETTS GEORGE B. HOBBS LANDSCAPE ARCHITECT No. 1119 11/9/2021 1" = 20' 10 0 20 PROJECT NO. 56318-253750 FILE NAME: C002STPL SHEET NO. L-3
REV.	NO.	DATE	DRWN	CHKD	REMARKS					
					DRAWN BY: <u>WATKINS/GUILFOIL</u>					
					SHEET CHK'D BY: <u>G.HOWARD</u>					
					CROSS CHK'D BY: <u> </u>					
					APPROVED BY: <u>G.HOWARD</u>					
					DATE: <u>NOVEMBER 2021</u>					

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CLEAR AND GRUB EXISTING NATURAL TURF FIELD. REMOVE TOPSOIL TO DEPTH REQUIRED TO ACCOMMODATE NEW IMPROVEMENTS

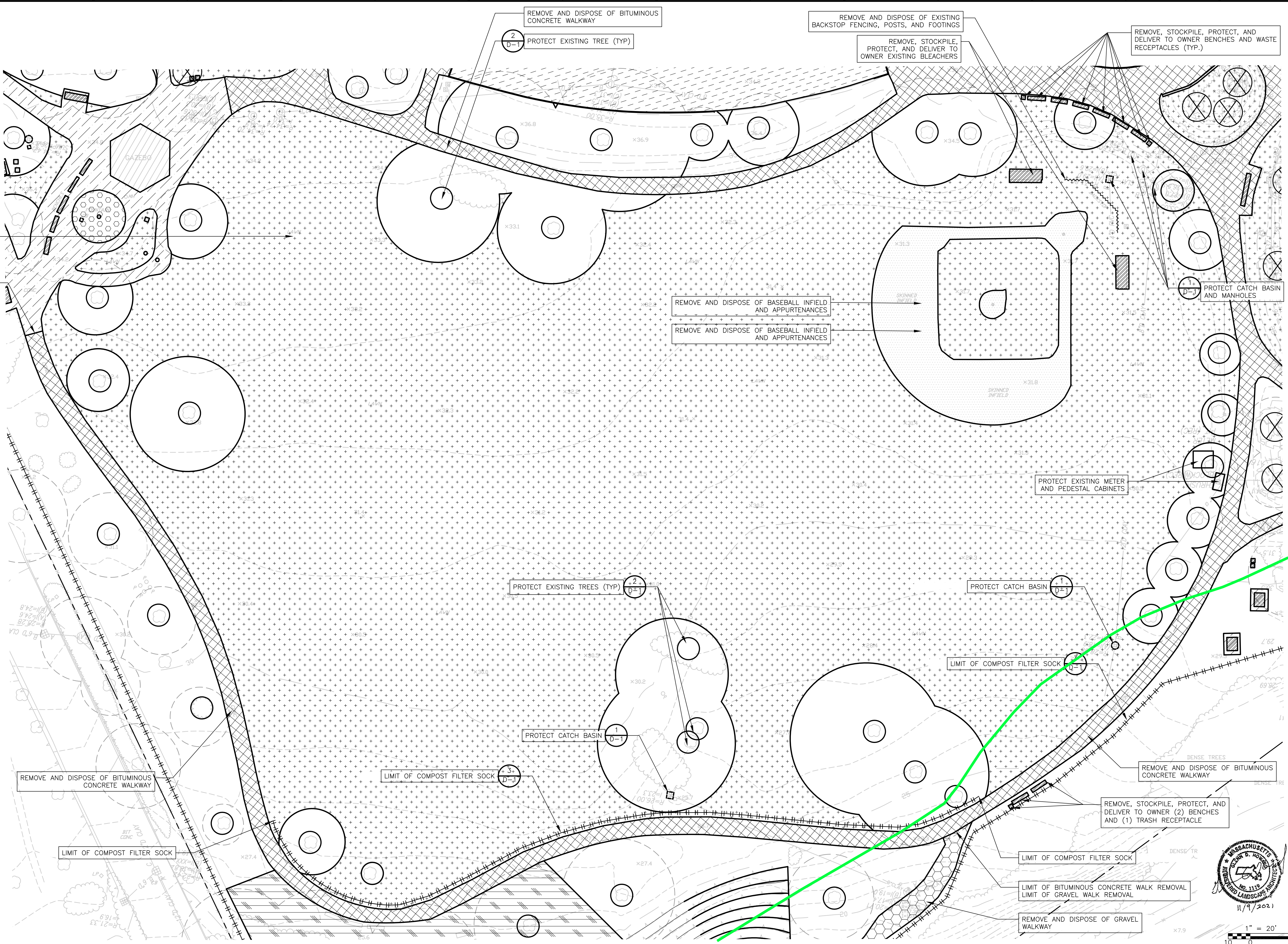
LIMIT OF BITUMINOUS CONCRETE WALK REMOVAL
LIMIT OF CONCRETE WALK REMOVAL

NOTES:

1. SEE SITE ACCESS NOTES, EROSION AND SEDIMENT CONTROL NOTES, AND GENERAL NOTES ON SHEET G-1

LEGEND:

- LIMIT OF WORK
- REMOVE AND DISPOSE OF BITUMINOUS CONCRETE PAVEMENT
- REMOVE AND DISPOSE OF CONCRETE PAVEMENT
- REMOVE AND DISPOSE OF SITE FURNISHINGS
- BITUMINOUS CONCRETE MILL AND OVERLAY
- CLEARING AND GRUBBING
- REMOVE, STOCKPILE, PROTECT, AND DELIVER TO OWNER SITE FURNISHINGS
- REMOVE AND DISPOSE OF GRAVEL WALK
- *****SEEDING
- REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE, POSTS, FOOTINGS AND APPURTENANCES
- COMPOST FILTER SOCK
- TEMPORARY CATCH BASIN INLET PROTECTION
- CUT AND GRIND STUMP OF EXISTING TREES TO 18-IN BELOW FINISH GRADE
- TREE PROTECTION FENCE



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: WATKINS/GUILFOIL
DRAWN BY: WATKINS/GUILFOIL
SHEET CHK'D BY: G.HOWARD
CROSS CHK'D BY: ---
APPROVED BY: G.HOWARD
DATE: NOVEMBER 2021

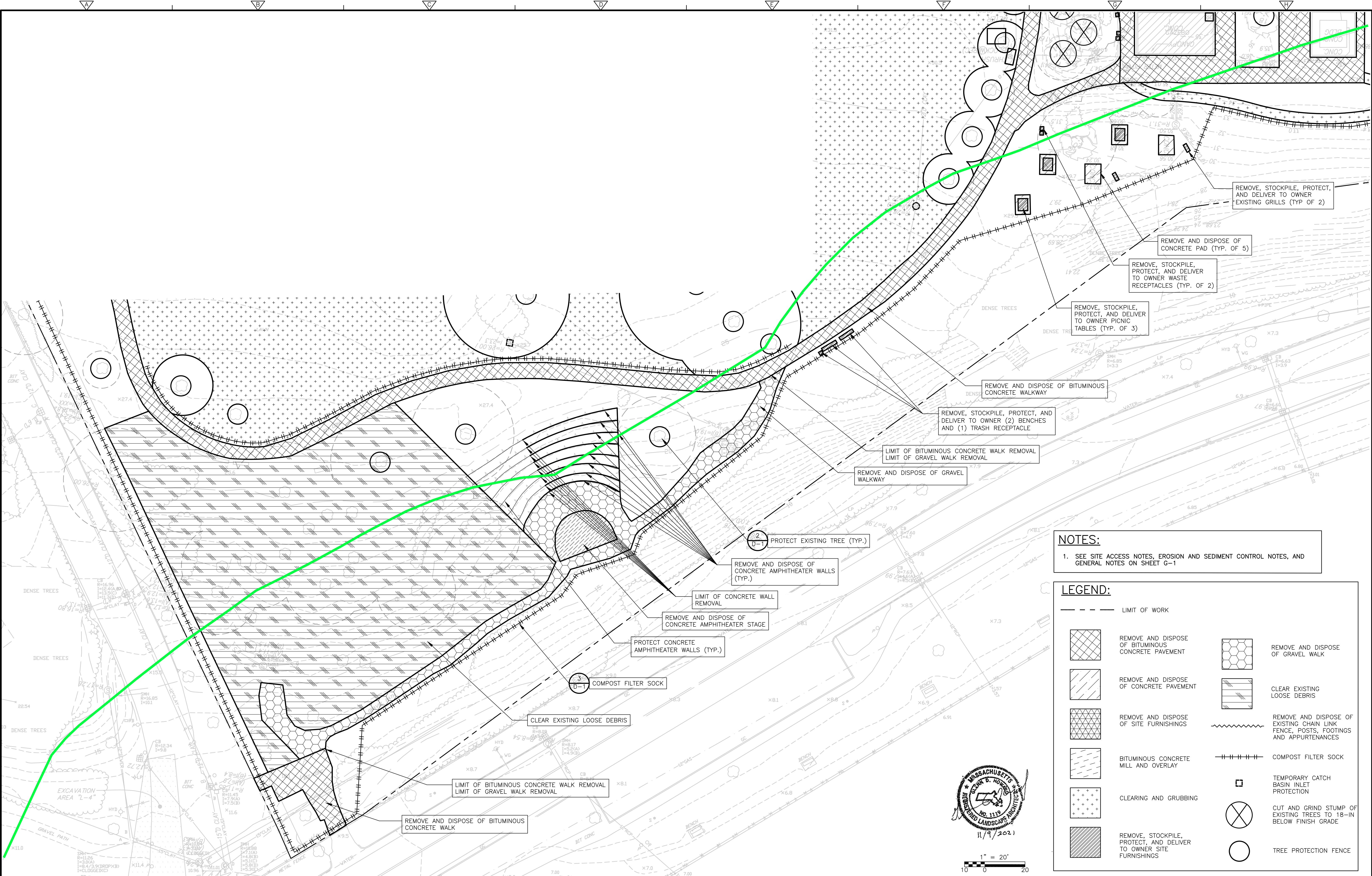
CDM Smith
75 State Street
Boston, MA 02109
Tel: (617) 452-6000

TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

DEMOLITION, REMOVALS, EROSION,
AND SEDIMENTATION CONTROL PLAN IV

PROJECT NO. 56318-253750
FILE NAME:
SHEET NO.
L-4

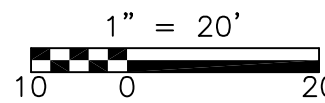
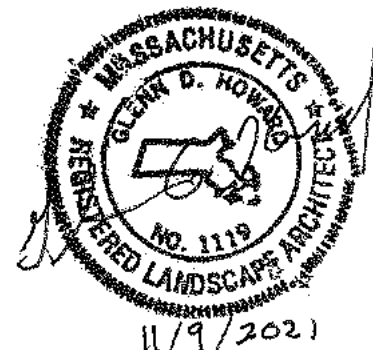
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NOTES:
1. SEE SITE ACCESS NOTES, EROSION AND SEDIMENT CONTROL NOTES, AND GENERAL NOTES ON SHEET G-1

LEGEND:

---	LIMIT OF WORK		
	REMOVE AND DISPOSE OF BITUMINOUS CONCRETE PAVEMENT		REMOVE AND DISPOSE OF GRAVEL WALK
	REMOVE AND DISPOSE OF CONCRETE PAVEMENT		CLEAR EXISTING LOOSE DEBRIS
	REMOVE AND DISPOSE OF SITE FURNISHINGS		REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE, POSTS, FOOTINGS AND APPURTENANCES
	BITUMINOUS CONCRETE MILL AND OVERLAY		COMPOST FILTER SOCK
	CLEARING AND GRUBBING		TEMPORARY CATCH BASIN INLET PROTECTION
	REMOVE, STOCKPILE, PROTECT, AND DELIVER TO OWNER SITE FURNISHINGS		CUT AND GRIND STUMP OF EXISTING TREES TO 18-IN BELOW FINISH GRADE
			TREE PROTECTION FENCE



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: WATKINS/GUILFOIL
DRAWN BY: WATKINS/GUILFOIL
SHEET CHK'D BY: G.HOWARD
CROSS CHK'D BY: ---
APPROVED BY: G.HOWARD
DATE: NOVEMBER 2021

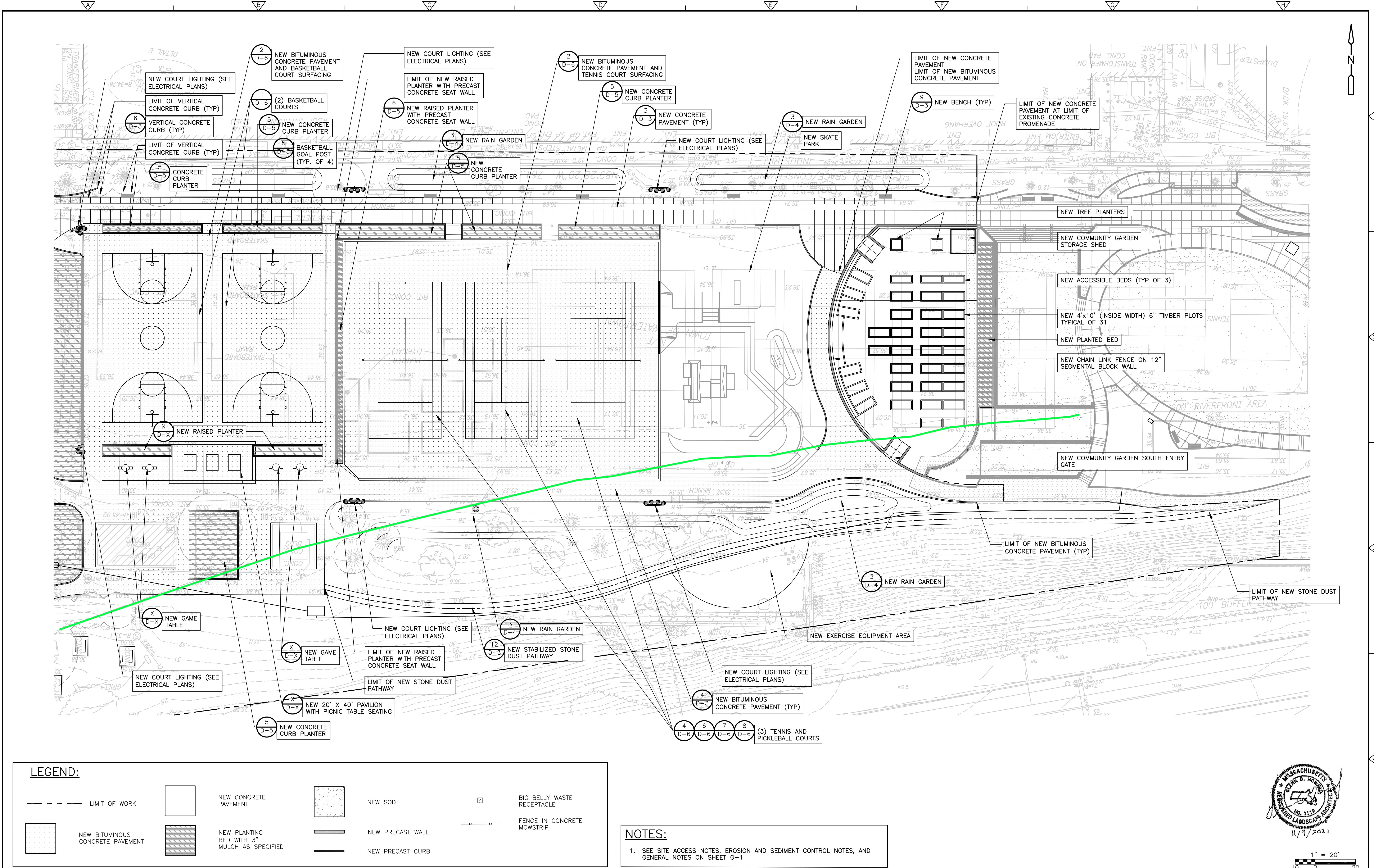
CDM Smith
75 State Street
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TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

DEMOLITION, REMOVALS, EROSION,
AND SEDIMENTATION CONTROL PLAN V

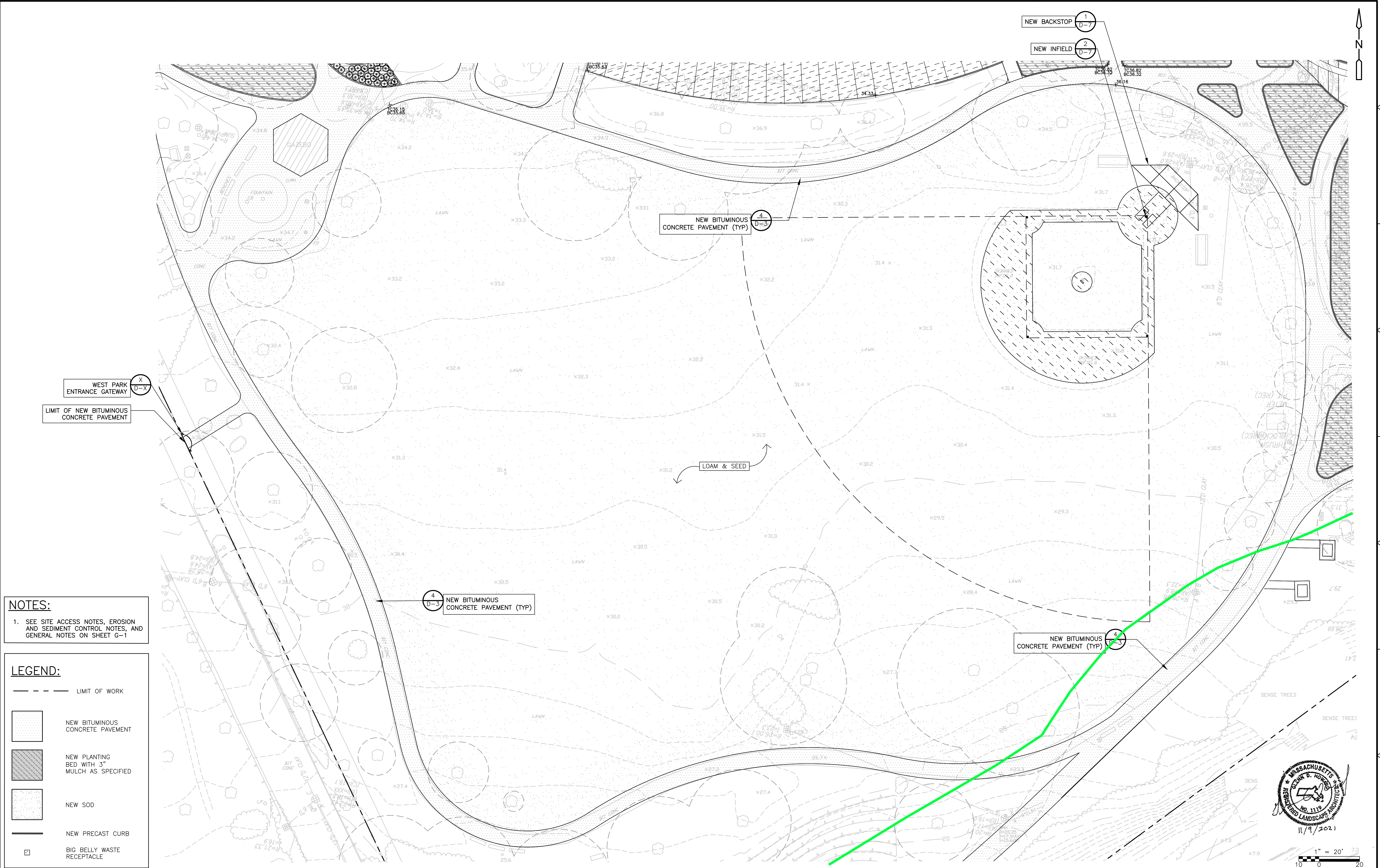
PROJECT NO. 56318-253750
FILE NAME:
SHEET NO.
L-5

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						DESIGNED BY: <u>WATKINS/GUILFOIL</u>	 75 State Street Boston, MA 02109 Tel: (617) 452-6000	TOWN OF WATERTOWN, MASSACHUSETTS	ARSENAL PARK IMPROVEMENTS PROJECT PHASE B	LAYOUT AND MATERIALS PLAN III	PROJECT NO. 56318-253750
						DRAWN BY: <u>WATKINS/GUILFOIL</u>					FILE NAME: C002STPL
						SHEET CHK'D BY: <u>G.HOWARD</u>					SHEET NO.
						CROSS CHK'D BY: <u>--</u>					L-8
						APPROVED BY: <u>G.HOWARD</u>					
REV. NO.	DATE	DRWN	CHKD	REMARKS			DATE: <u>NOVEMBER 2021</u>				

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NOTES:

1. SEE SITE ACCESS NOTES, EROSION AND SEDIMENT CONTROL NOTES, AND GENERAL NOTES ON SHEET G-1

LEGEND:				
---	LIMIT OF WORK			
[Hatched Box]	NEW BITUMINOUS CONCRETE PAVEMENT			
[Dotted Box]	NEW PLANTING BED WITH 3" MULCH AS SPECIFIED			
[Solid Box]	NEW SOD			
---	NEW PRECAST CURB			
[Square Symbol]	BIG BELLY WASTE RECEPTACLE			

REV. NO.	DATE	DRWN	CHKD	REMARKS

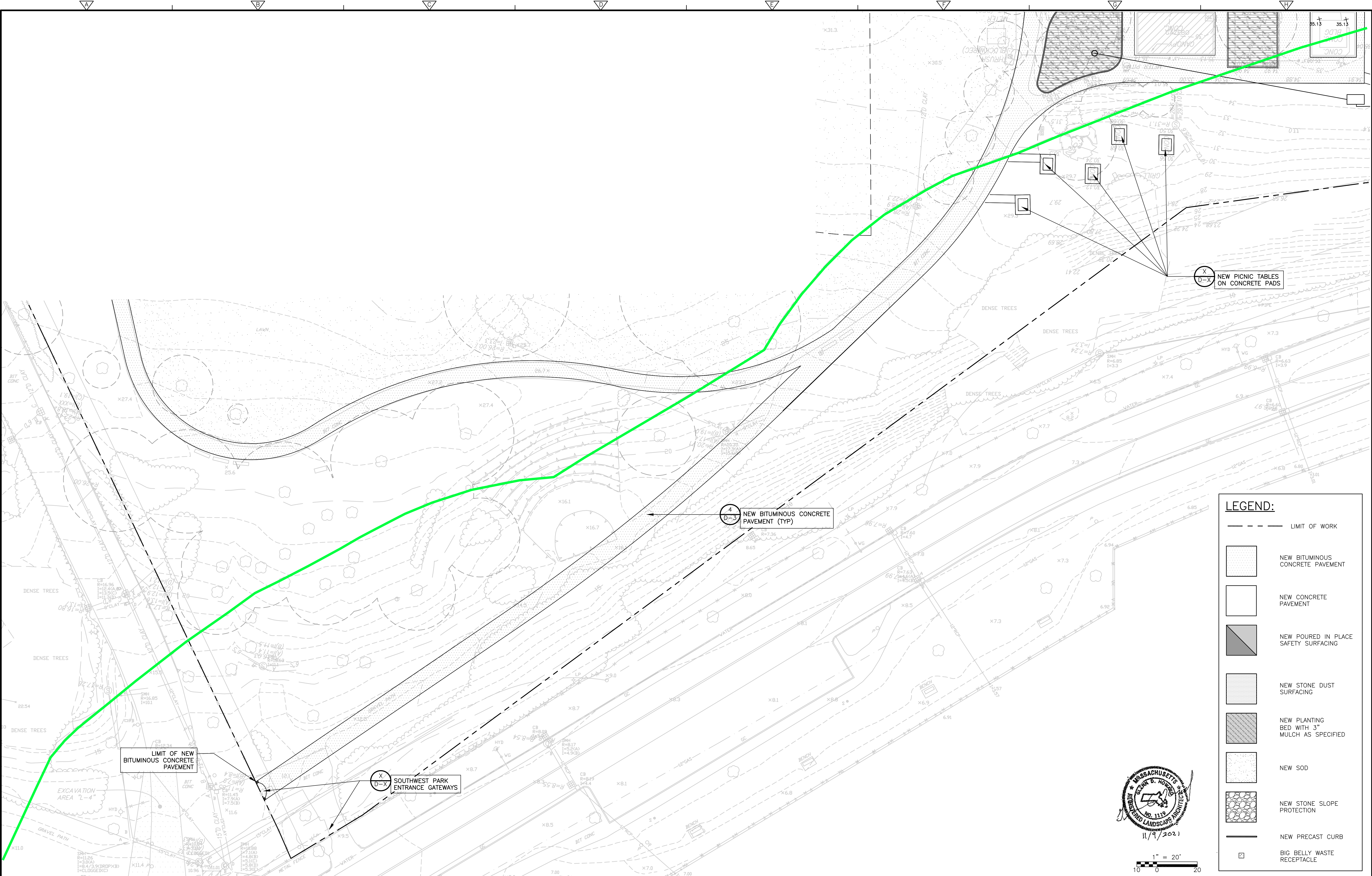
DESIGNED BY: WATKINS/GUILFOIL
DRAWN BY: WATKINS/GUILFOIL
SHEET CHK'D BY: G.HOWARD
CROSS CHK'D BY: ---
APPROVED BY: G.HOWARD
DATE: NOVEMBER 2021

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Boston, MA 02109
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TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

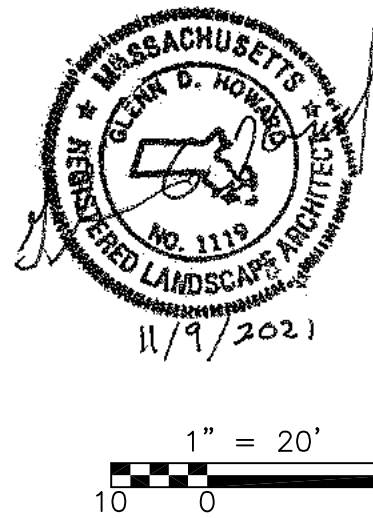
PROJECT NO. 56318-253750
FILE NAME:
SHEET NO.
L-9

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LEGEND:

- LIMIT OF WORK
- [Pattern] NEW BITUMINOUS CONCRETE PAVEMENT
- [Pattern] NEW CONCRETE PAVEMENT
- [Pattern] NEW POURED IN PLACE SAFETY SURFACING
- [Pattern] NEW STONE DUST SURFACING
- [Pattern] NEW PLANTING BED WITH 3" MULCH AS SPECIFIED
- [Pattern] NEW SOD
- [Pattern] NEW STONE SLOPE PROTECTION
- NEW PRECAST CURB
- [Symbol] BIG BELLY WASTE RECEPTACLE



REV. NO.	DATE	DRWN	CHKD	REMARKS

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DRAWN BY: WATKINS/GUILFOIL
SHEET CHK'D BY: G.HOWARD
CROSS CHK'D BY: ---
APPROVED BY: G.HOWARD
DATE: NOVEMBER 2021

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Boston, MA 02109
Tel: (617) 452-6000

TOWN OF WATERTOWN, MASSACHUSETTS

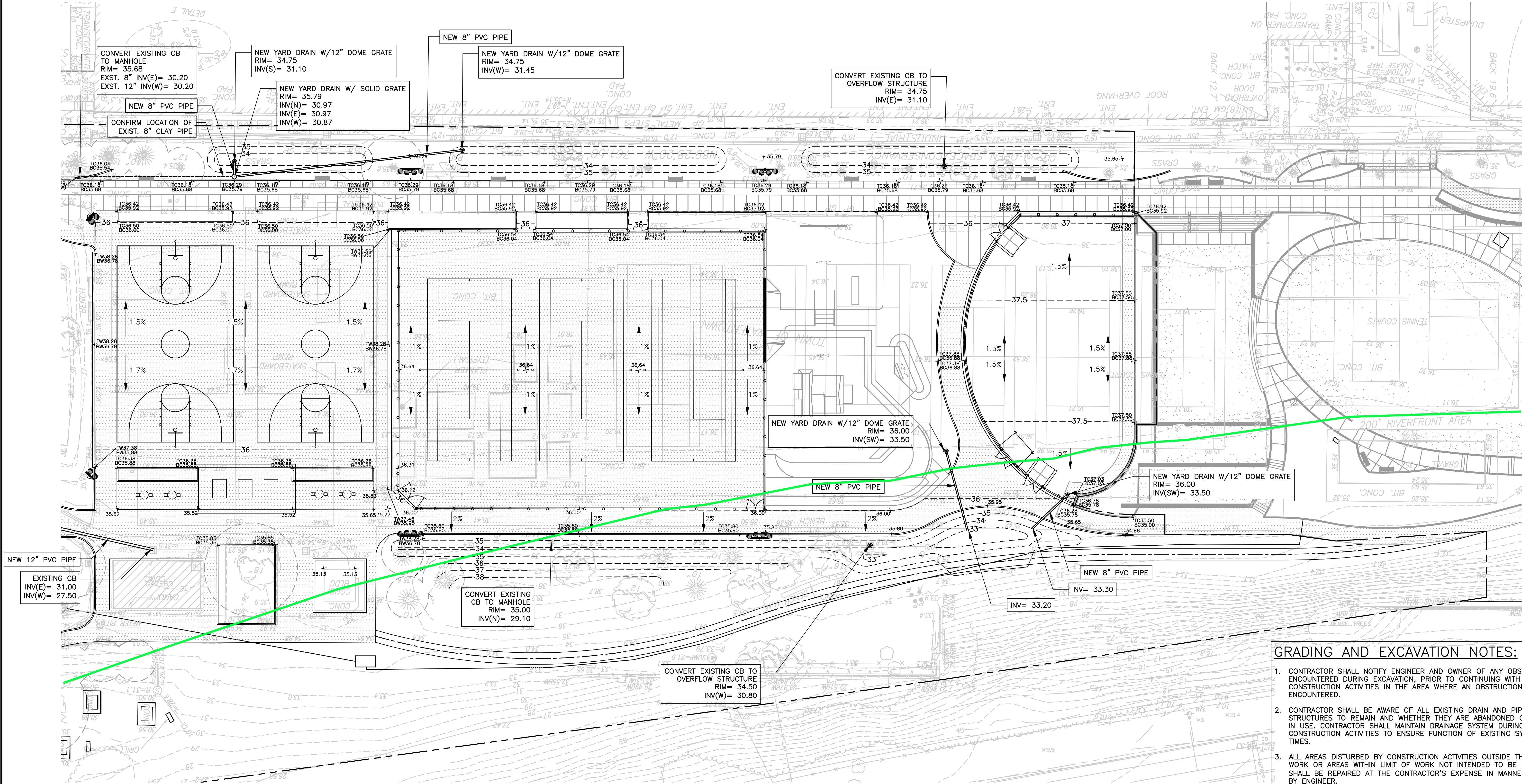
ARSENAL PARK IMPROVEMENTS PROJECT

PHASE B

LAYOUT AND MATERIALS PLAN V

PROJECT NO. 56318-253750
FILE NAME:
SHEET NO.
L-10

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LEGEND:

--- LIMIT OF WORK	NEW BITUMINOUS CONCRETE PATHWAY
NEW SOD	NEW FULL DEPTH BITUMINOUS CONCRETE PAVEMENT REPAIR

GRADING AND EXCAVATION NOTES:

1. CONTRACTOR SHALL NOTIFY ENGINEER AND OWNER OF ANY OBSTRUCTIONS ENCOUNTERED DURING EXCAVATION, PRIOR TO CONTINUING WITH CONSTRUCTION ACTIVITIES IN THE AREA WHERE AN OBSTRUCTION IS ENCOUNTERED.
2. CONTRACTOR SHALL BE AWARE OF ALL EXISTING DRAIN AND PIPE STRUCTURES TO REMAIN AND WHETHER THEY ARE ABANDONED OR TO REMAIN IN USE. CONTRACTOR SHALL MAINTAIN DRAINAGE SYSTEM DURING CONSTRUCTION ACTIVITIES TO ENSURE FUNCTION OF EXISTING SYSTEM AT ALL TIMES.
3. ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES OUTSIDE THE LIMIT OF WORK OR AREAS WITHIN LIMIT OF WORK NOT INTENDED TO BE MODIFIED SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE IN MANNER APPROVED BY ENGINEER.
4. NO SOIL SHALL BE REMOVED FROM THE SITE. EXCAVATED SOILS SHALL NOT BE LOCATED WITHIN 5 LATERAL FEET OF ANY WALKWAY, PRECAST STAIRS OR PRECAST WALLS. EXISTING SOILS SHALL BE AMENDED FOR RE-USE AS SPECIFIED.
5. TO ESTABLISH PROPER GRADES, CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF GRADE STAKES. THE NUMBER AND LOCATION SHALL BE AS APPROVED BY THE ENGINEER. CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR A FINAL FIELD CHECK OF FINISHED GRADES ACCEPTABLE TO THE OWNER AND THE ENGINEER PRIOR TO FINE GRADING ACTIVITIES FIELD SHALL BE LASER GRADED AS SPECIFIED.
6. IF EXISTING TREES, UTILITIES, OR STRUCTURES IMPEDE EXCAVATION ACTIVITIES IN ANY MANNER, CONTRACTOR SHALL INFORM THE ENGINEER AND OWNER PRIOR TO CONTINUING WITH CONSTRUCTION ACTIVITIES.
7. SLOPE OF WALKWAYS SHALL BE 5% (MAX.) LONGITUDINAL AND 2% (MAX.) CROSS SLOPE EXCEPT AS SHOWN ON THE DRAWINGS.
8. REGRADED SLOPES SHALL NOT EXCEED 3:1 UNLESS APPROVED BY ENGINEER.



1" = 20'
10 0 20

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: WATKINS/GUILFOIL	
DRAWN BY: WATKINS/GUILFOIL	
SHEET CHK'D BY: G.HOWARD	
CROSS CHK'D BY: G.HOWARD	
APPROVED BY: G.HOWARD	
DATE: NOVEMBER 2021	

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TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

GRADING, DRAINAGE, AND UTILITIES PLAN III

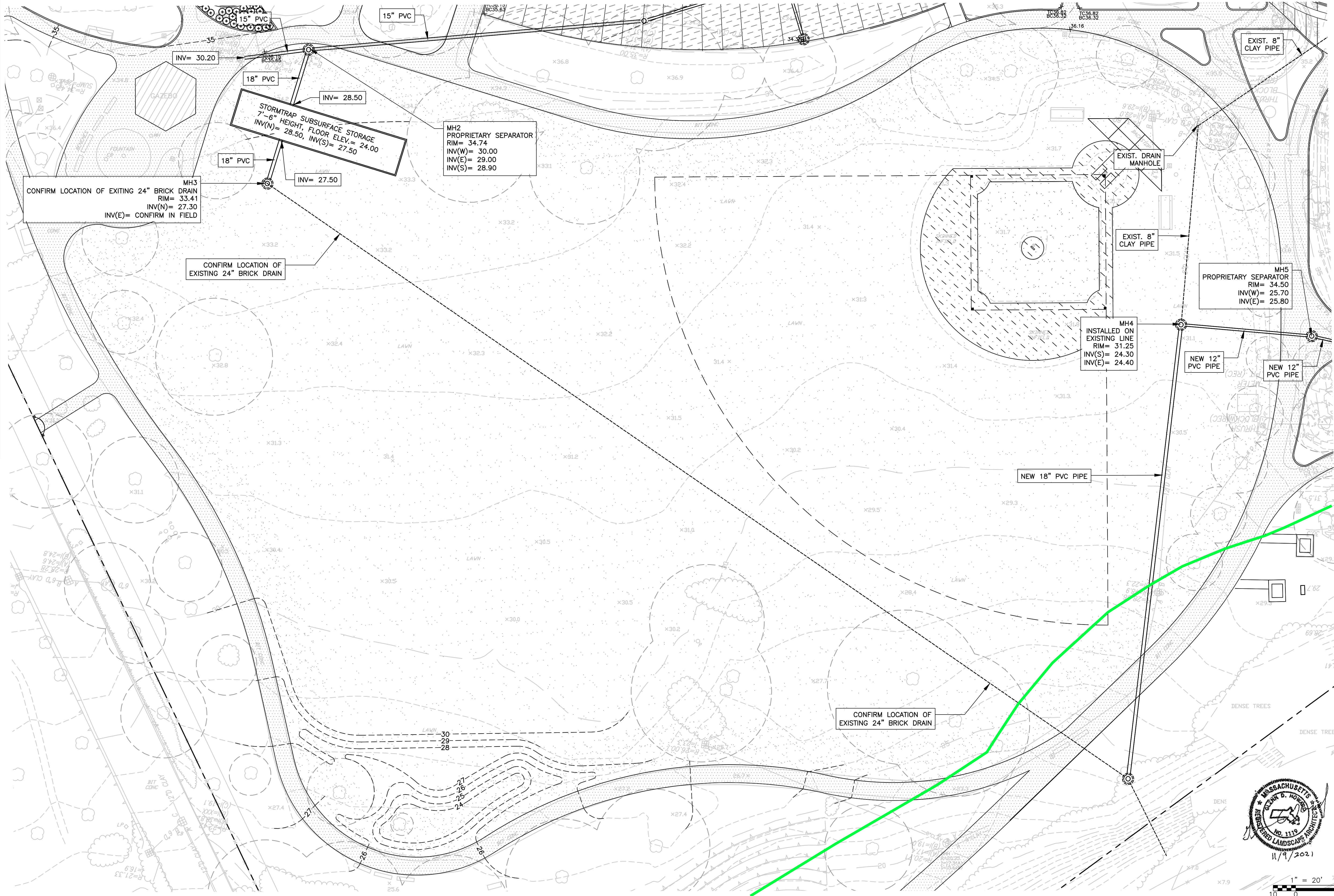
PROJECT NO. 56318-253750
FILE NAME: C0045TPL
SHEET NO.
L-13

GRADING AND
EXCAVATION NOTES:

1. CONTRACTOR SHALL NOTIFY ENGINEER AND OWNER OF ANY OBSTRUCTIONS ENCOUNTERED DURING EXCAVATION, PRIOR TO CONTINUING WITH CONSTRUCTION ACTIVITIES IN THE AREA WHERE AN OBSTRUCTION IS ENCOUNTERED.
2. CONTRACTOR SHALL BE AWARE OF ALL EXISTING DRAIN AND PIPE STRUCTURES TO REMAIN AND WHETHER THEY ARE ABANDONED OR TO REMAIN IN USE. CONTRACTOR SHALL MAINTAIN DRAINAGE SYSTEM DURING CONSTRUCTION ACTIVITIES TO ENSURE FUNCTION OF EXISTING SYSTEM AT ALL TIMES.
3. ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES OUTSIDE THE LIMIT OF WORK OR AREAS WITHIN LIMIT OF WORK NOT INTENDED TO BE MODIFIED SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE IN MANNER APPROVED BY ENGINEER.
4. NO SOIL SHALL BE REMOVED FROM THE SITE. EXCAVATED SOILS SHALL NOT BE LOCATED WITHIN 5 LATERAL FEET OF ANY WALKWAY, PRECAST STAIRS OR PRECAST WALLS. EXISTING SOILS SHALL BE AMENDED FOR RE-USE AS SPECIFIED.
5. TO ESTABLISH PROPER GRADES, CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF GRADE STAKES. THE NUMBER AND LOCATION SHALL BE AS APPROVED BY THE ENGINEER. CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR A FINAL FIELD CHECK OF FINISHED GRADES ACCEPTABLE TO THE OWNER AND THE ENGINEER PRIOR TO FINE GRADING ACTIVITIES FIELD SHALL BE LASER GRADED AS SPECIFIED.
6. IF EXISTING TREES, UTILITIES, OR STRUCTURES IMPEDE EXCAVATION ACTIVITIES IN ANY MANNER, CONTRACTOR SHALL INFORM THE ENGINEER AND OWNER PRIOR TO CONTINUING WITH CONSTRUCTION ACTIVITIES.
7. SLOPE OF WALKWAYS SHALL BE 5% (MAX.) LONGITUDINAL AND 2% (MAX.) CROSS SLOPE EXCEPT AS SHOWN ON THE DRAWINGS.
8. REGRADED SLOPES SHALL NOT EXCEED 3:1 UNLESS APPROVED BY ENGINEER.

LEGEND:

- LIMIT OF WORK
- NEW SOD
- NEW BITUMINOUS CONCRETE PATHWAY
- NEW FULL DEPTH BITUMINOUS CONCRETE PAVEMENT REPAIR



REV.	DATE	DRWN	CHKD	REMARKS	

DESIGNED BY: WATKINS/GUILFOIL
DRAWN BY: WATKINS/GUILFOIL
SHEET CHK'D BY: G.HOWARD
CROSS CHK'D BY: ---
APPROVED BY: G.HOWARD
DATE: NOVEMBER 2021

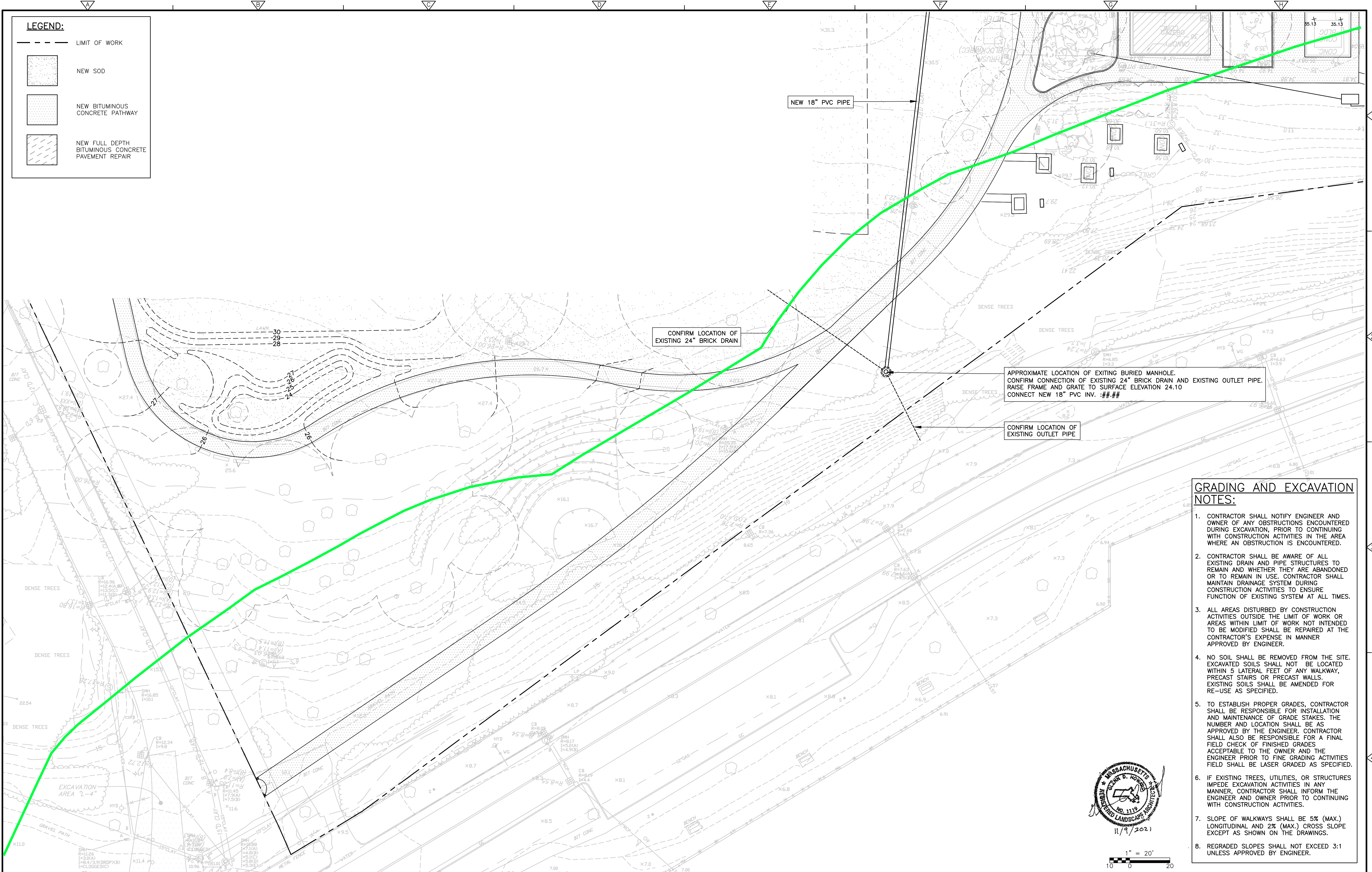
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TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

GRADING, DRAINAGE, AND UTILITIES PLAN IV

PROJECT NO. 56318-253750
FILE NAME: C004STPL
SHEET NO.
L-14

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SHEET CHK'D BY: G.HOWARD
CROSS CHK'D BY: ---
APPROVED BY: G.HOWARD
DATE: NOVEMBER 2021

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Smith**

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TOWN OF WATERTOWN, MASSACHUSETTS

ARSENAL PARK IMPROVEMENTS PROJECT

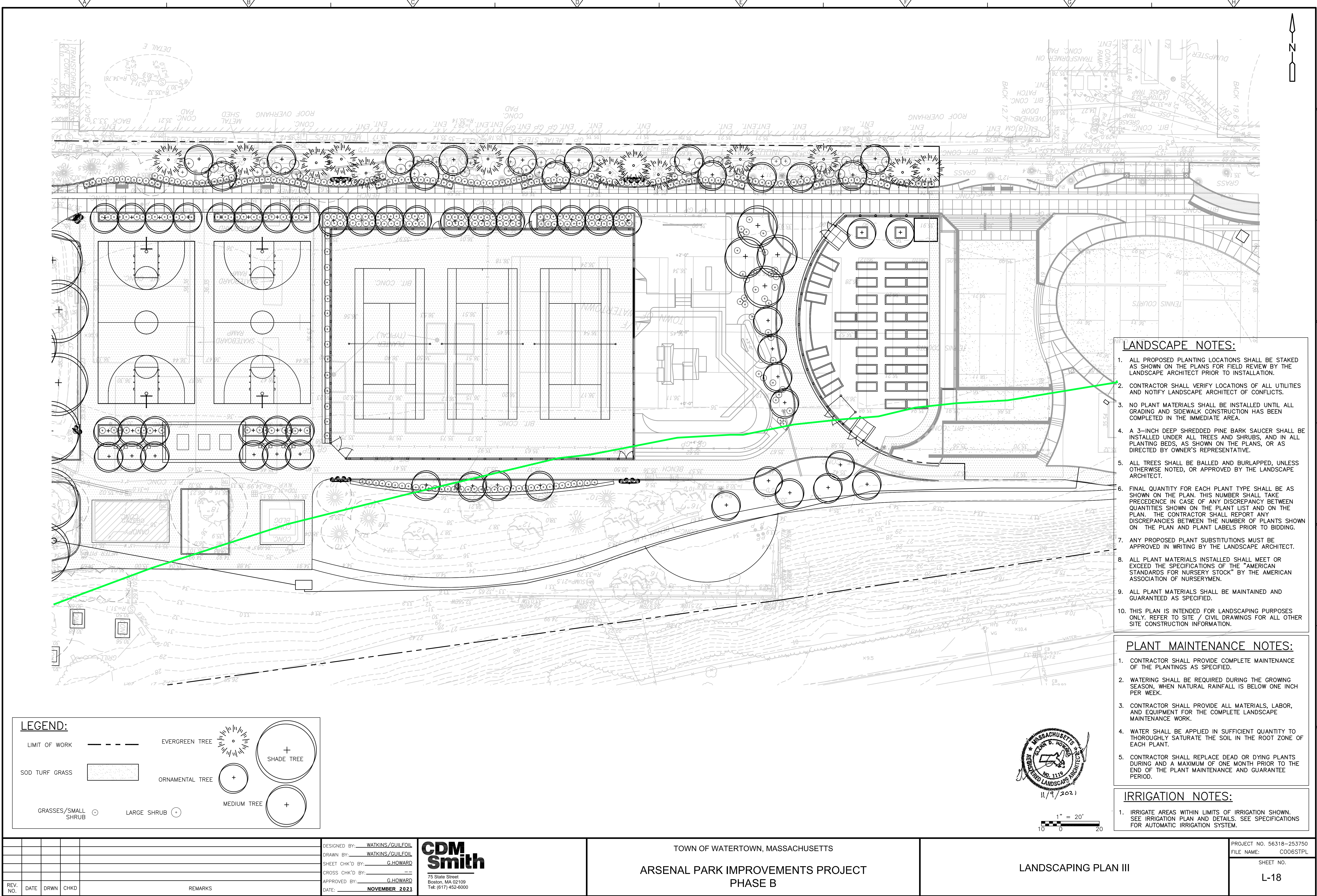
PHASE B

GRADING, DRAINAGE, AND UTILITIES PLAN V

SHEET NO. L-15

PROJECT NO. 56318-253750
FILE NAME: C004STPL

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LEGEND:

LIMIT OF WORK

SOD TURF GRASS

GRASSES/SMALL SHRUB

EVERGREEN TREE

ORNAMENTAL TREE

LARGE SHRUB

SHADE TREE

MEDIUM TREE

LANDSCAPE NOTES:

1. ALL PROPOSED PLANTING LOCATIONS SHALL BE STAKED AS SHOWN ON THE PLANS FOR FIELD REVIEW BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

2. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES AND NOTIFY LANDSCAPE ARCHITECT OF CONFLICTS.

3. NO PLANT MATERIALS SHALL BE INSTALLED UNTIL ALL GRADING AND SIDEWALK CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.

4. A 3-INCH DEEP SHREDDED PINE BARK SAUCER SHALL BE INSTALLED UNDER ALL TREES AND SHRUBS, AND IN ALL PLANTING BEDS, AS SHOWN ON THE PLANS, OR AS DIRECTED BY OWNER'S REPRESENTATIVE.

5. ALL TREES SHALL BE BALLED AND BURLAPPED, UNLESS OTHERWISE NOTED, OR APPROVED BY THE LANDSCAPE ARCHITECT.

6. FINAL QUANTITY FOR EACH PLANT TYPE SHALL BE AS SHOWN ON THE PLAN. THIS NUMBER SHALL TAKE PRECEDENCE IN CASE OF ANY DISCREPANCY BETWEEN QUANTITIES SHOWN ON THE PLANT LIST AND ON THE PLAN. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES BETWEEN THE NUMBER OF PLANTS SHOWN ON THE PLAN AND PLANT LABELS PRIOR TO BIDDING.

7. ANY PROPOSED PLANT SUBSTITUTIONS MUST BE APPROVED IN WRITING BY THE LANDSCAPE ARCHITECT.

8. ALL PLANT MATERIALS INSTALLED SHALL MEET OR EXCEED THE SPECIFICATIONS OF THE "AMERICAN STANDARDS FOR NURSERY STOCK" BY THE AMERICAN ASSOCIATION OF NURSERYMEN.

9. ALL PLANT MATERIALS SHALL BE MAINTAINED AND GUARANTEED AS SPECIFIED.

10. THIS PLAN IS INTENDED FOR LANDSCAPING PURPOSES ONLY. REFER TO SITE / CIVIL DRAWINGS FOR ALL OTHER SITE CONSTRUCTION INFORMATION.

PLANT MAINTENANCE NOTES:

1. CONTRACTOR SHALL PROVIDE COMPLETE MAINTENANCE OF THE PLANTINGS AS SPECIFIED.

2. WATERING SHALL BE REQUIRED DURING THE GROWING SEASON, WHEN NATURAL RAINFALL IS BELOW ONE INCH PER WEEK.

3. CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT FOR THE COMPLETE LANDSCAPE MAINTENANCE WORK.

4. WATER SHALL BE APPLIED IN SUFFICIENT QUANTITY TO THOROUGHLY SATURATE THE SOIL IN THE ROOT ZONE OF EACH PLANT.

5. CONTRACTOR SHALL REPLACE DEAD OR DYING PLANTS DURING AND A MAXIMUM OF ONE MONTH PRIOR TO THE END OF THE PLANT MAINTENANCE AND GUARANTEE PERIOD.

IRRIGATION NOTES:

1. IRRIGATE AREAS WITHIN LIMITS OF IRRIGATION SHOWN. SEE IRRIGATION PLAN AND DETAILS. SEE SPECIFICATIONS FOR AUTOMATIC IRRIGATION SYSTEM.

						DESIGNED BY: WATKINS/GUILFOIL
						DRAWN BY: WATKINS/GUILFOIL
						SHEET CHK'D BY: G.HOWARD
						CROSS CHK'D BY: ---
						APPROVED BY: G.HOWARD
						DATE: NOVEMBER 2021
REV. NO.	DATE	DRWN	CHKD		REMARKS	

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Tel: (617) 452-6000

TOWN OF WATERTOWN, MASSACHUSETTS

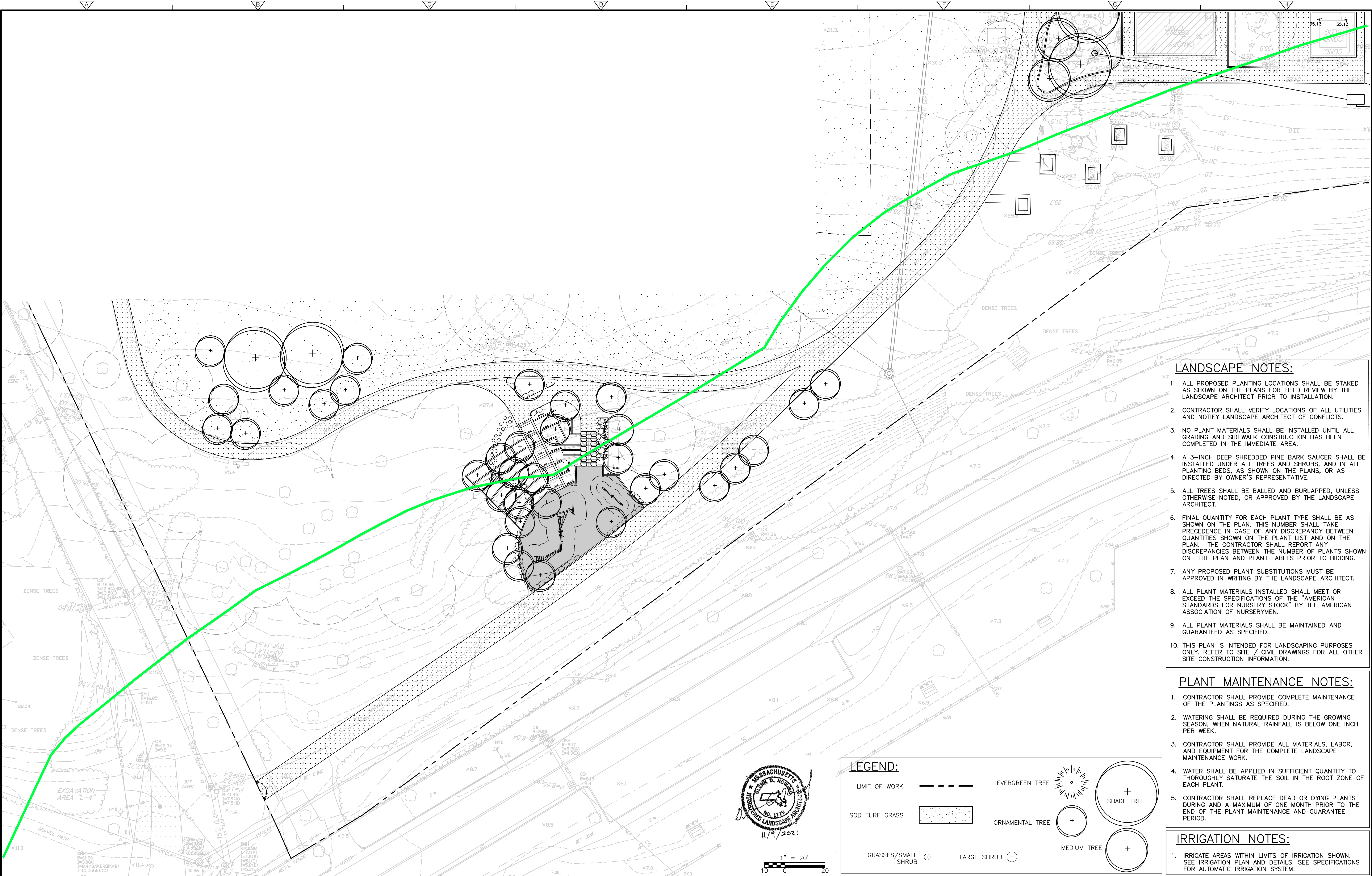
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

LANDSCAPING PLAN IV

PROJECT NO. 56318-253750
FILE NAME: C006STPL

SHEET NO.
L-19

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- LANDSCAPE NOTES:**
- ALL PROPOSED PLANTING LOCATIONS SHALL BE STAKED AS SHOWN ON THE PLANS FOR FIELD REVIEW BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
 - CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES AND NOTIFY LANDSCAPE ARCHITECT OF CONFLICTS.
 - NO PLANT MATERIALS SHALL BE INSTALLED UNTIL ALL GRADING AND SIDEWALK CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.
 - A 3-INCH DEEP SHREDDED PINE BARK SAUCER SHALL BE INSTALLED UNDER ALL TREES AND SHRUBS, AND IN ALL PLANTING BEDS, AS SHOWN ON THE PLANS, OR AS DIRECTED BY OWNER'S REPRESENTATIVE.
 - ALL TREES SHALL BE BALLED AND BURLAPPED, UNLESS OTHERWISE NOTED, OR APPROVED BY THE LANDSCAPE ARCHITECT.
 - FINAL QUANTITY FOR EACH PLANT TYPE SHALL BE AS SHOWN ON THE PLAN. THIS NUMBER SHALL TAKE PRECEDENCE IN CASE OF ANY DISCREPANCY BETWEEN QUANTITIES SHOWN ON THE PLANT LIST AND ON THE PLAN. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES BETWEEN THE NUMBER OF PLANTS SHOWN ON THE PLAN AND PLANT LABELS PRIOR TO BIDDING.
 - ANY PROPOSED PLANT SUBSTITUTIONS MUST BE APPROVED IN WRITING BY THE LANDSCAPE ARCHITECT.
 - ALL PLANT MATERIALS INSTALLED SHALL MEET OR EXCEED THE SPECIFICATIONS OF THE "AMERICAN STANDARDS FOR NURSERY STOCK" BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
 - ALL PLANT MATERIALS SHALL BE MAINTAINED AND GUARANTEED AS SPECIFIED.
 - THIS PLAN IS INTENDED FOR LANDSCAPING PURPOSES ONLY. REFER TO SITE / CIVIL DRAWINGS FOR ALL OTHER SITE CONSTRUCTION INFORMATION.

- PLANT MAINTENANCE NOTES:**
- CONTRACTOR SHALL PROVIDE COMPLETE MAINTENANCE OF THE PLANTINGS AS SPECIFIED.
 - WATERING SHALL BE REQUIRED DURING THE GROWING SEASON, WHEN NATURAL RAINFALL IS BELOW ONE INCH PER WEEK.
 - CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT FOR THE COMPLETE LANDSCAPE MAINTENANCE WORK.
 - WATER SHALL BE APPLIED IN SUFFICIENT QUANTITY TO THOROUGHLY SATURATE THE SOIL IN THE ROOT ZONE OF EACH PLANT.
 - CONTRACTOR SHALL REPLACE DEAD OR DYING PLANTS DURING AND A MAXIMUM OF ONE MONTH PRIOR TO THE END OF THE PLANT MAINTENANCE AND GUARANTEE PERIOD.

- IRRIGATION NOTES:**
- IRRIGATE AREAS WITHIN LIMITS OF IRRIGATION SHOWN. SEE IRRIGATION PLAN AND DETAILS. SEE SPECIFICATIONS FOR AUTOMATIC IRRIGATION SYSTEM.

DESIGNED BY: WATKINS/GUILFOIL	CDM Smith
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CROSS CHK'D BY: ---	Tel: (617) 452-6000
APPROVED BY: G.HOWARD	
DATE: NOVEMBER 2021	

REV. NO.	DATE	DRWN	CHKD	REMARKS

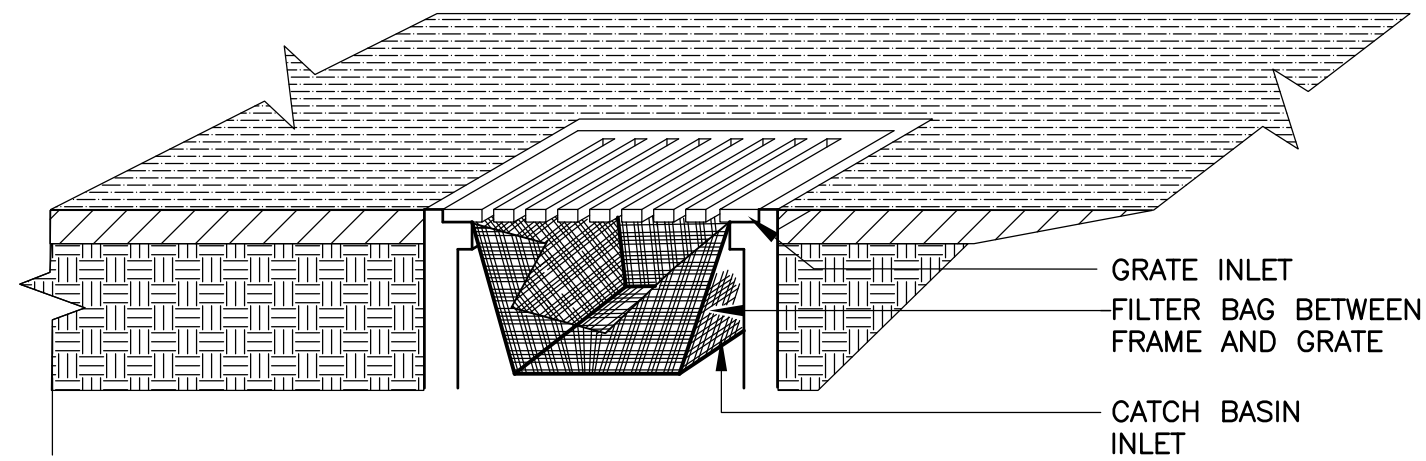
TOWN OF WATERTOWN, MASSACHUSETTS

ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

LANDSCAPING PLAN V

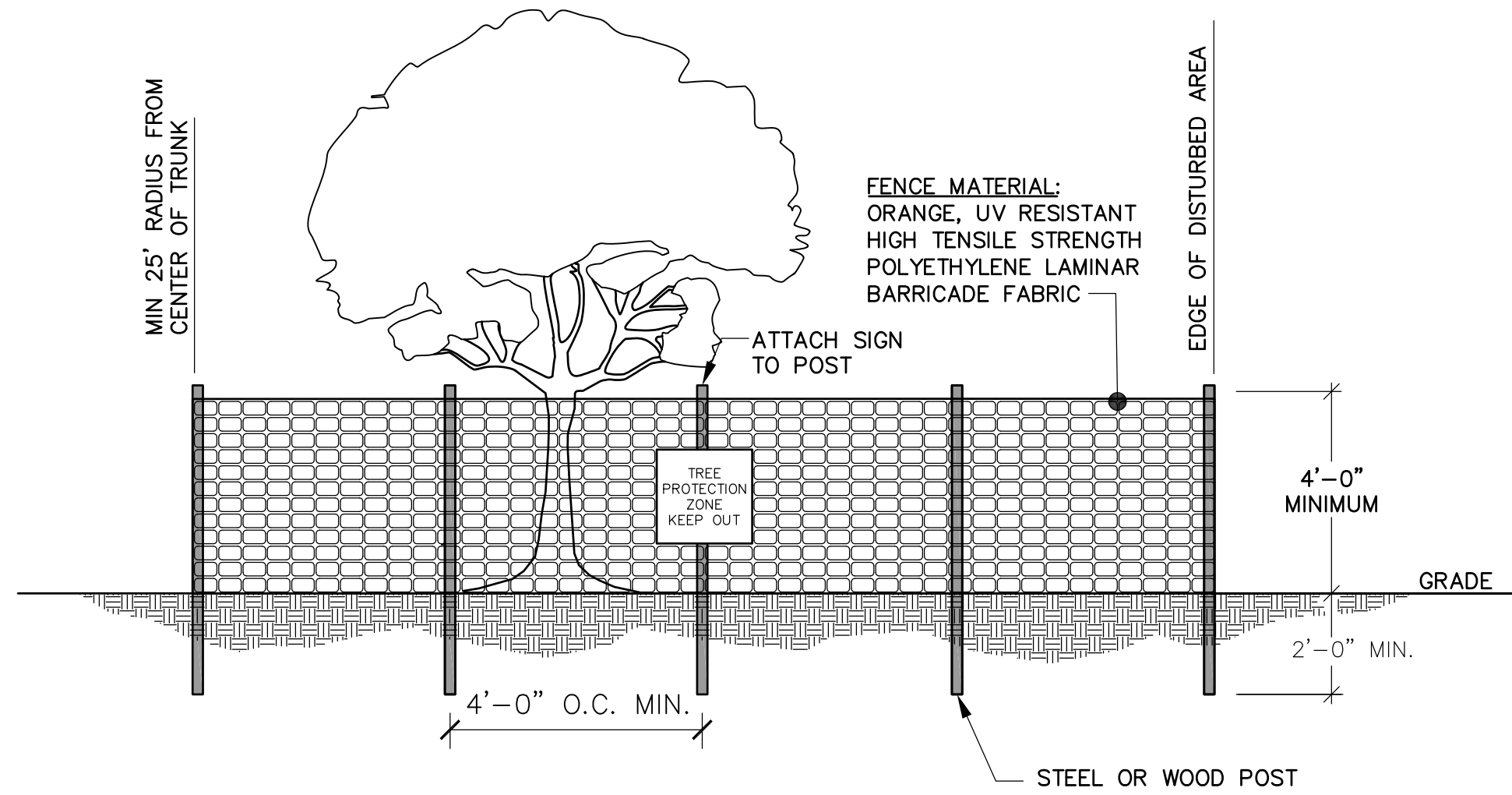
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FILE NAME: C006STPL
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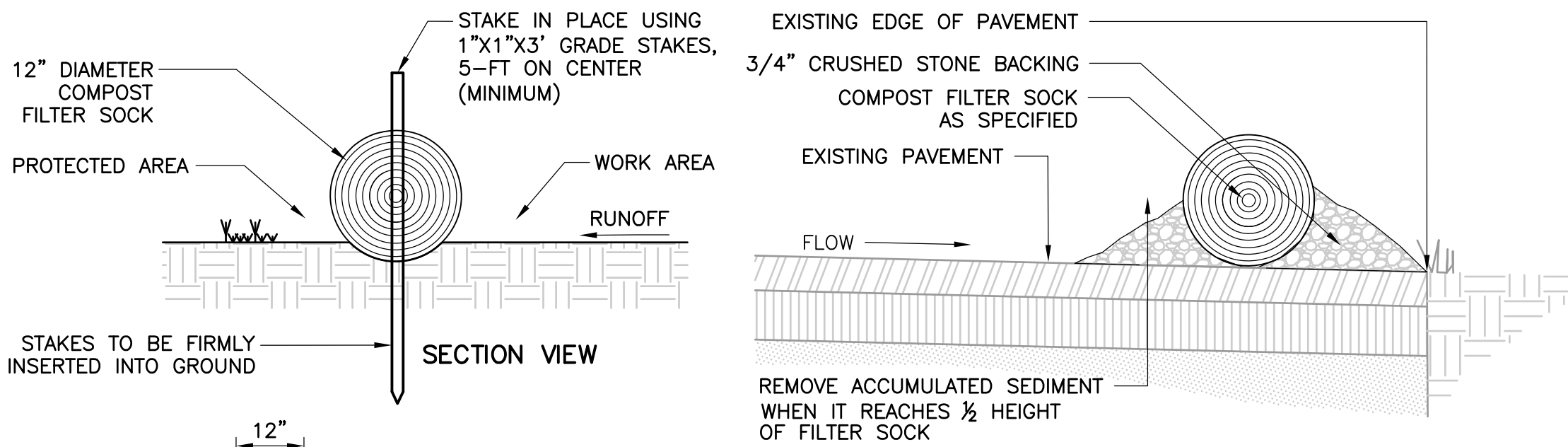
CATCH BASIN FILTER

DETAIL 1
D-1
NOT TO SCALE



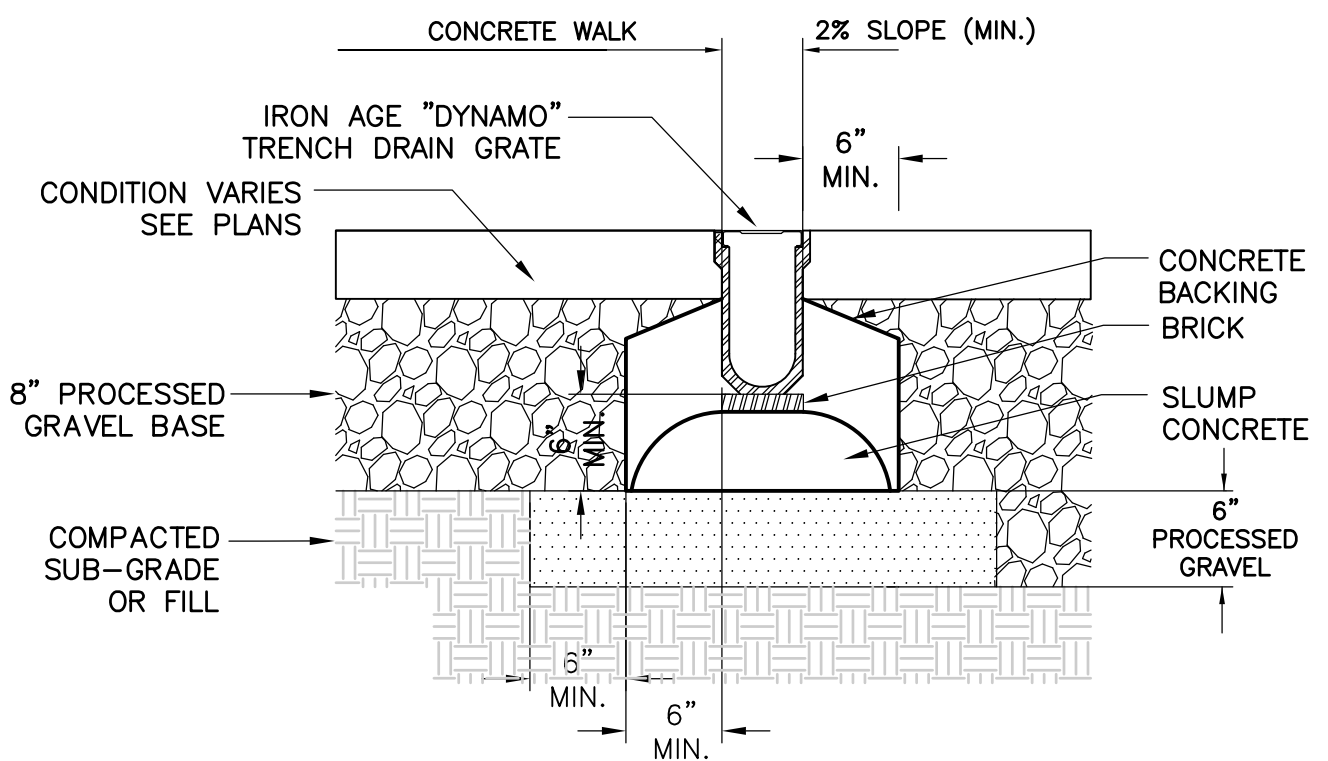
TREE PROTECTION FENCE

DETAIL 2
D-1
NTS



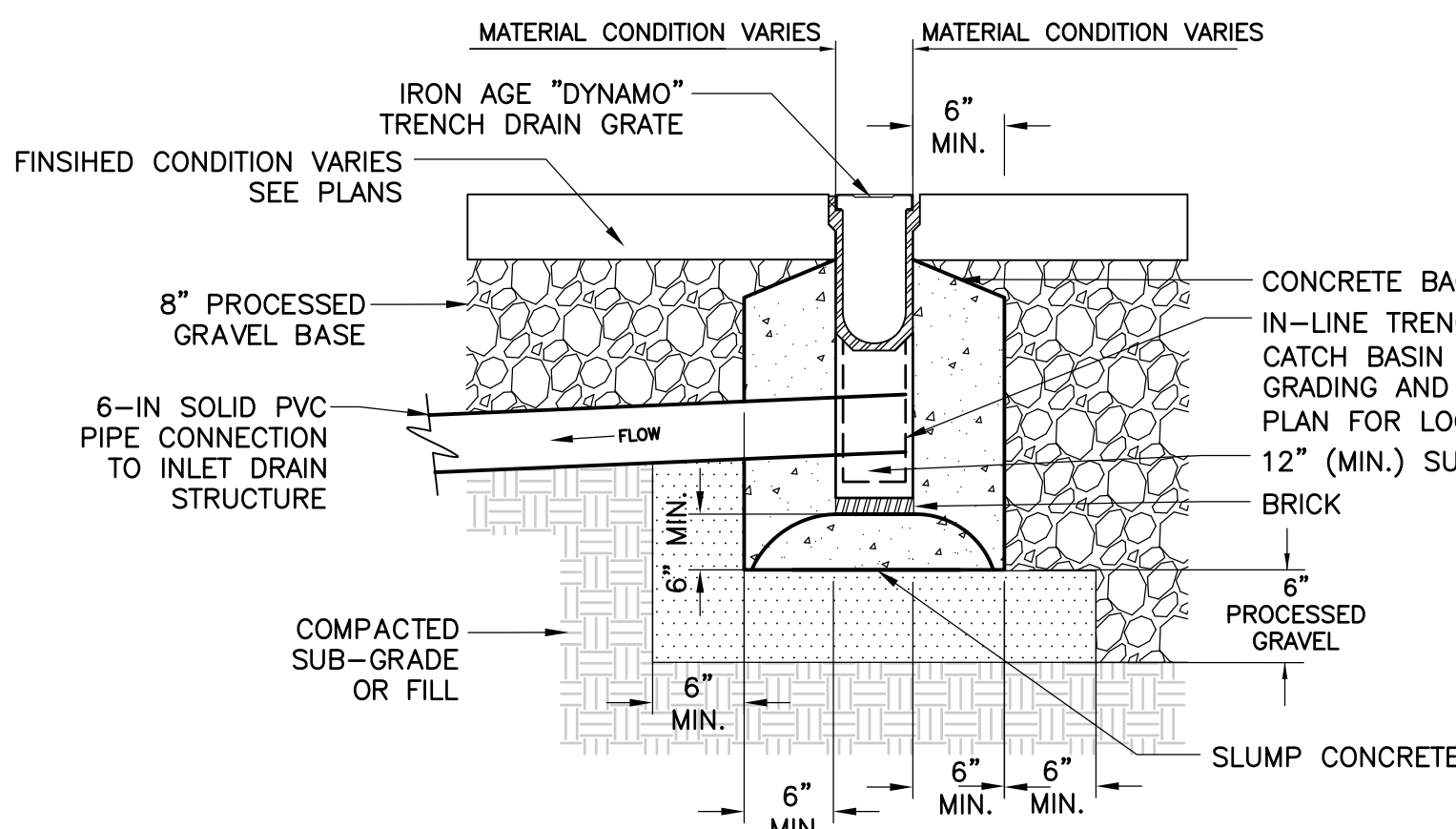
COMPOST FILTER SOCK

DETAIL 3
D-1
NOT TO SCALE



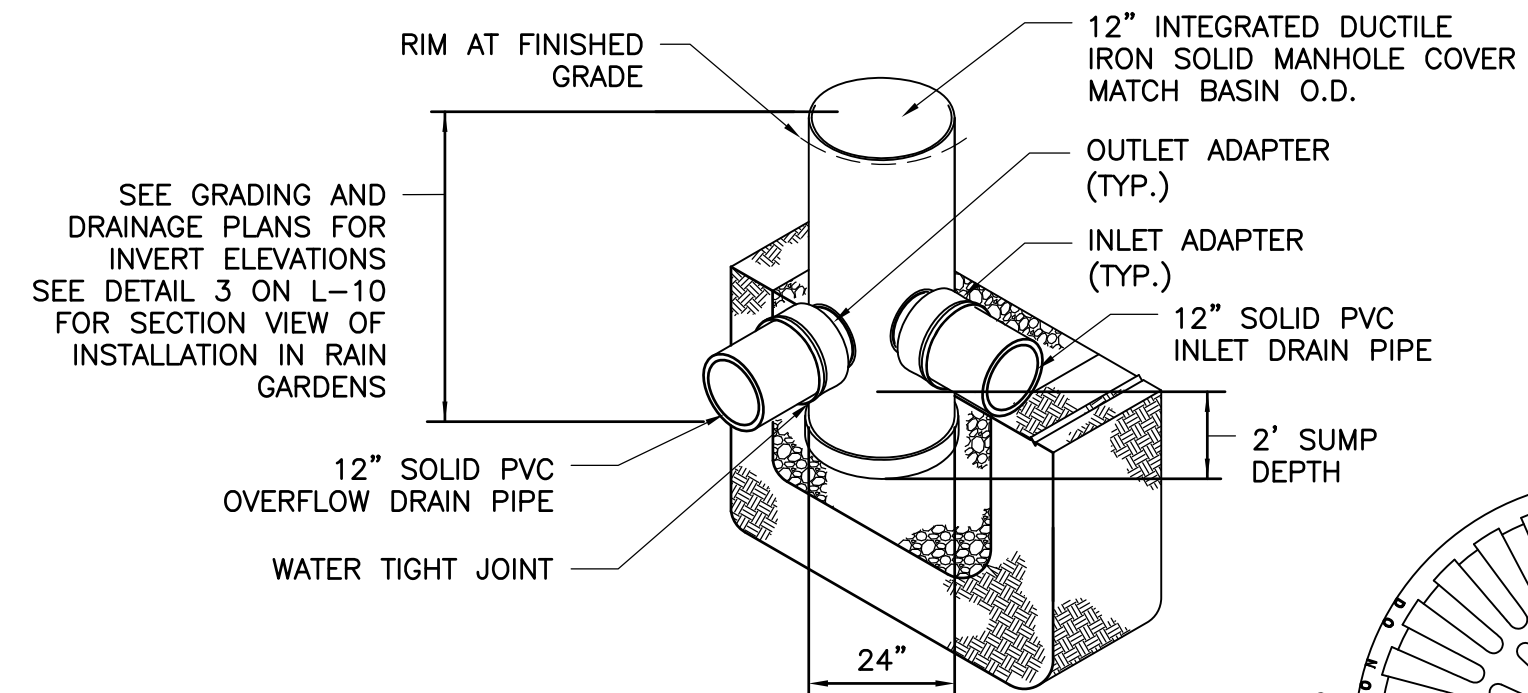
THRESHOLD DRAIN

DETAIL 4
D-1
SCALE: NTS



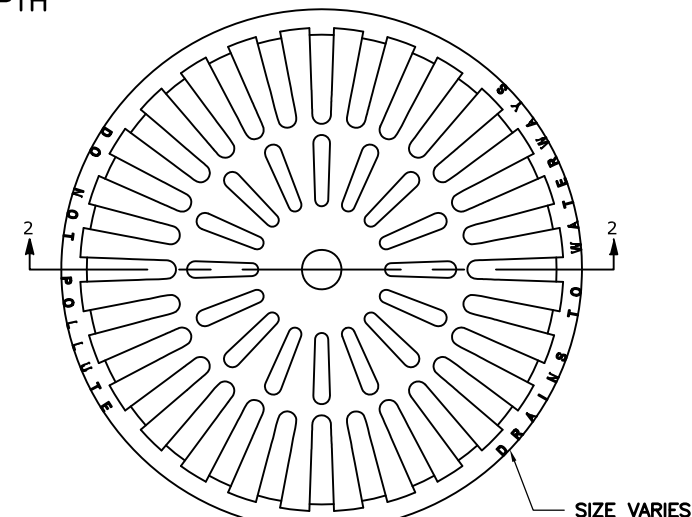
THRESHOLD DRAIN CATCH BASIN

DETAIL 4
D-1
NTS

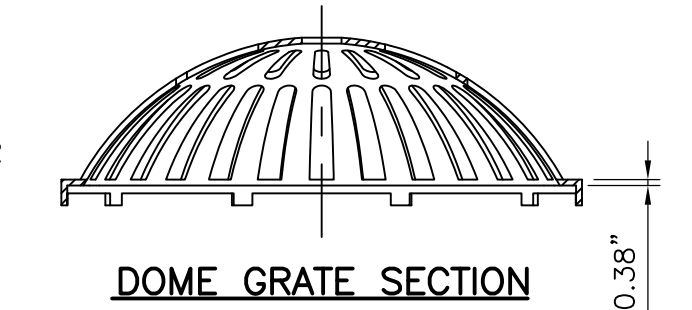


PVC YARD MANHOLE WITH SOLID COVER

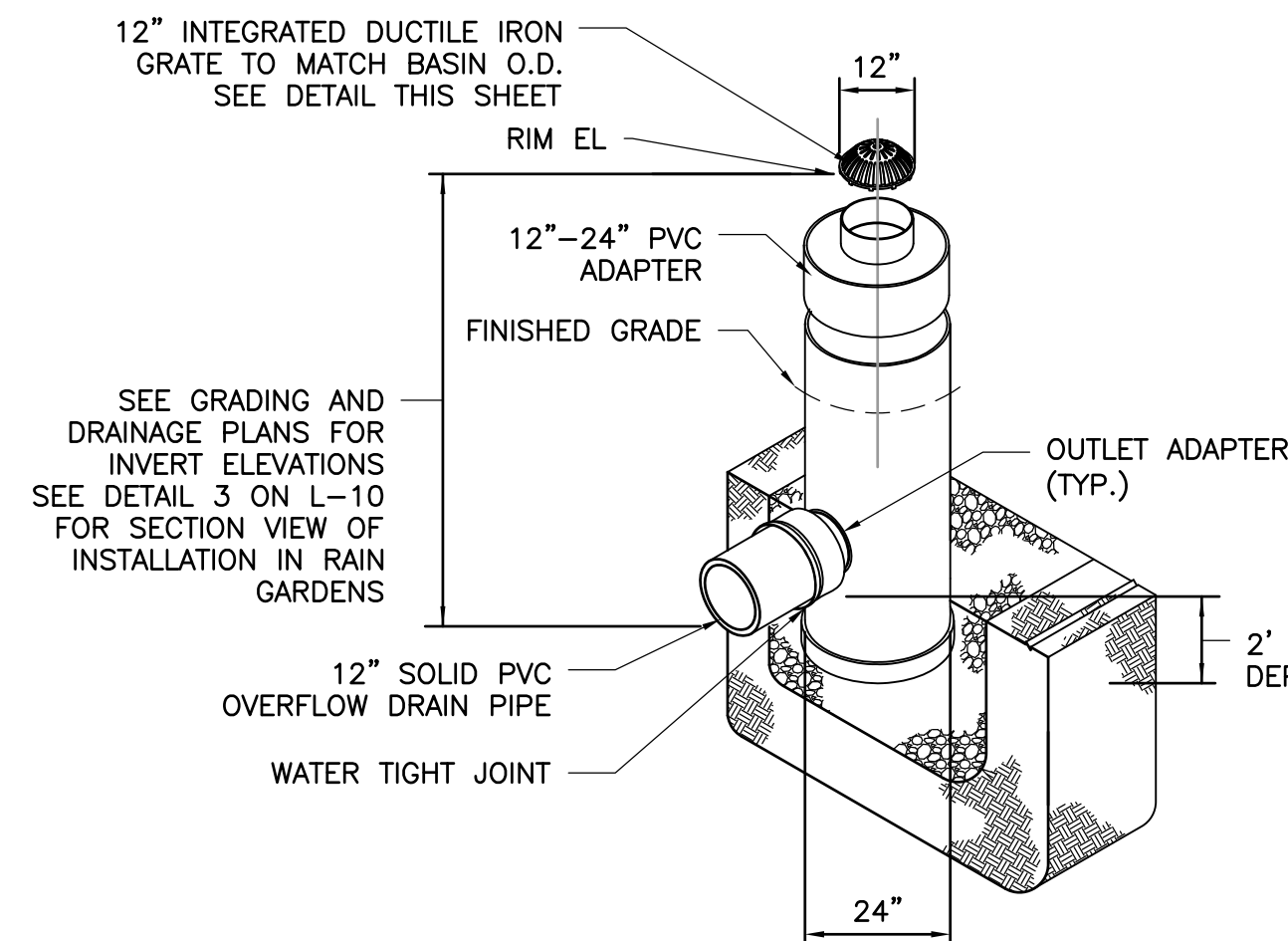
DETAIL 6
D-1
NTS



DOME GRATE PLAN



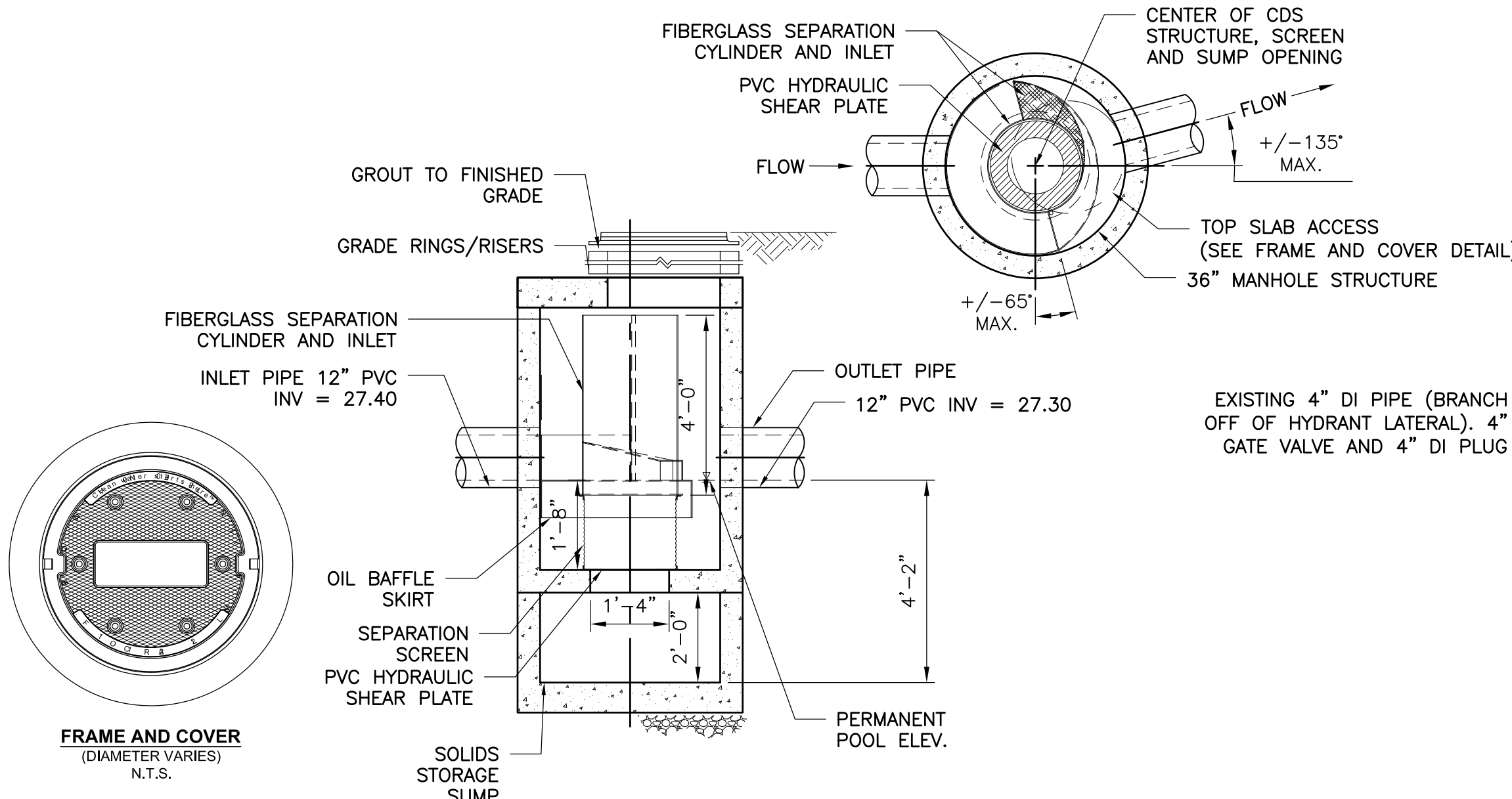
DOME GRATE SECTION



PVC YARD DRAIN WITH DOME GRATE

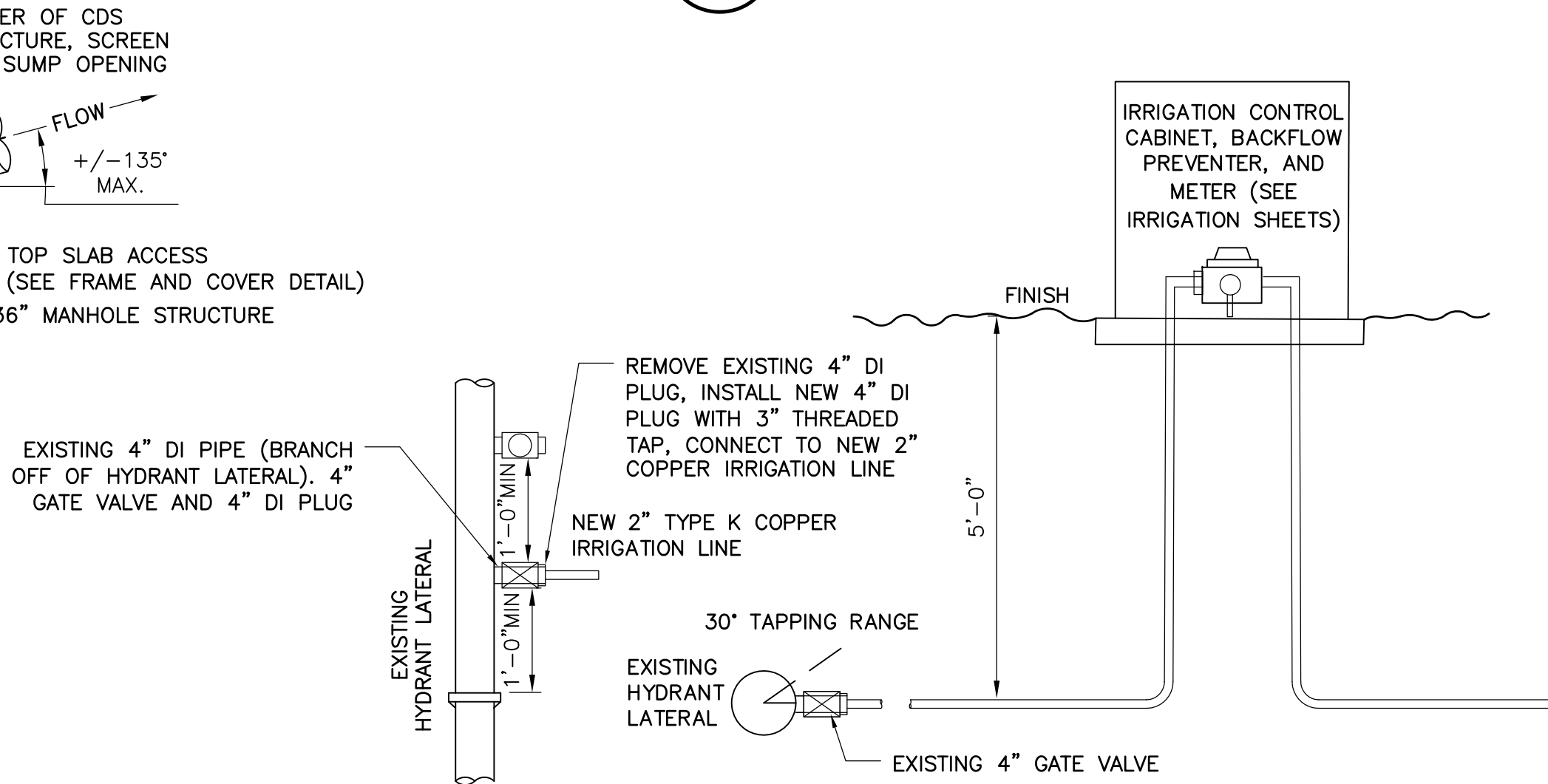
DETAIL 6
D-1
NTS

YARD DRAIN WITH DOME GRATE / YARD MANHOLE



INLINE PROPRIETARY SEPARATOR UNIT

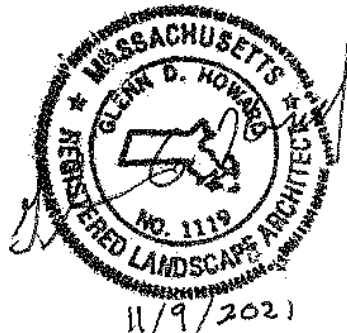
DETAIL 5
D-1
NTS



WATER SERVICE CONNECTION

DETAIL 7
D-1
NTS

NOTE:
IRRIGATION CONNECTION SHALL
BE INSTALLED TO MEET ALL CITY
OF WATERTOWN STANDARDS



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: WATKINS/GUILFOIL
DRAWN BY: WATKINS/GUILFOIL
SHEET CHK'D BY: G.HOWARD
CROSS CHK'D BY: ---
APPROVED BY: G.HOWARD
DATE: NOVEMBER 2021

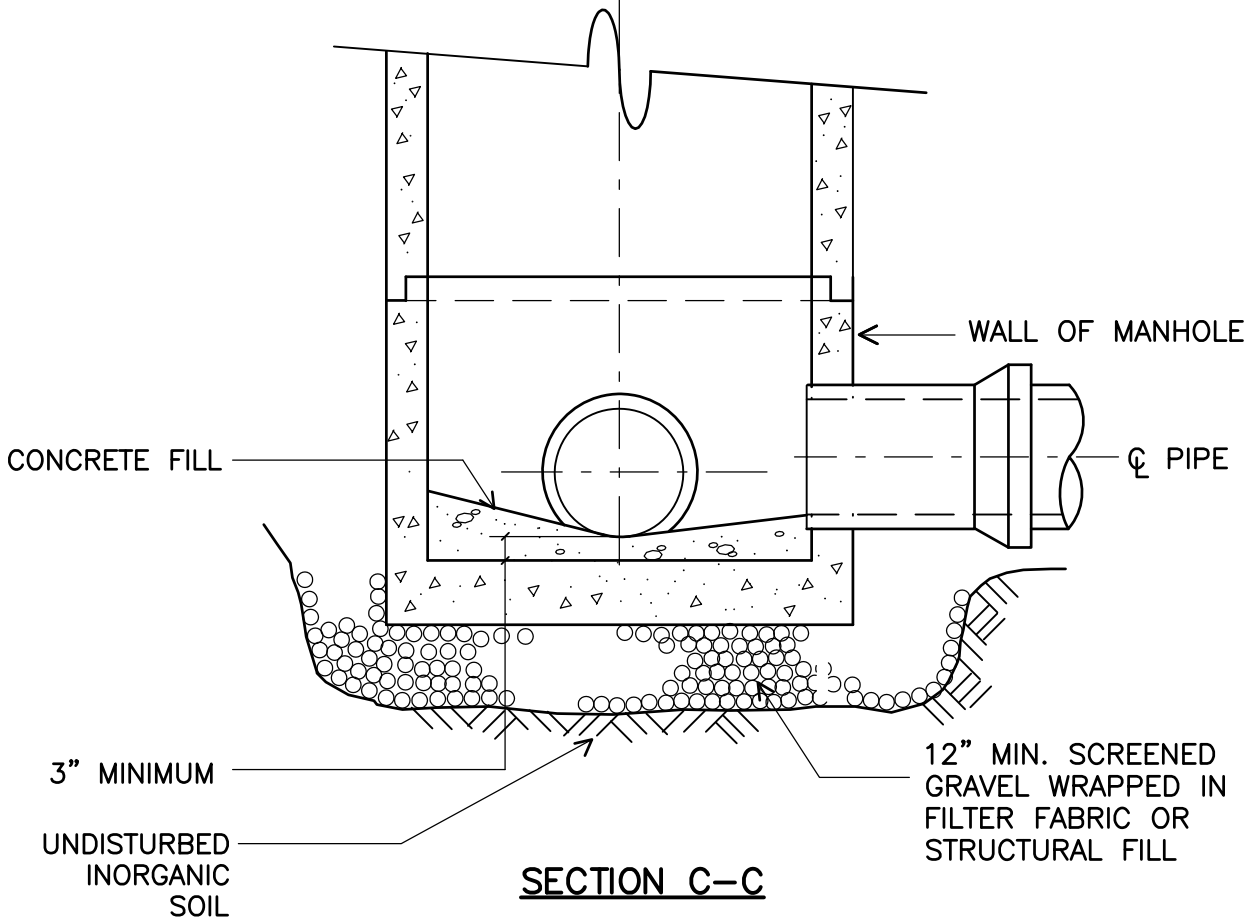
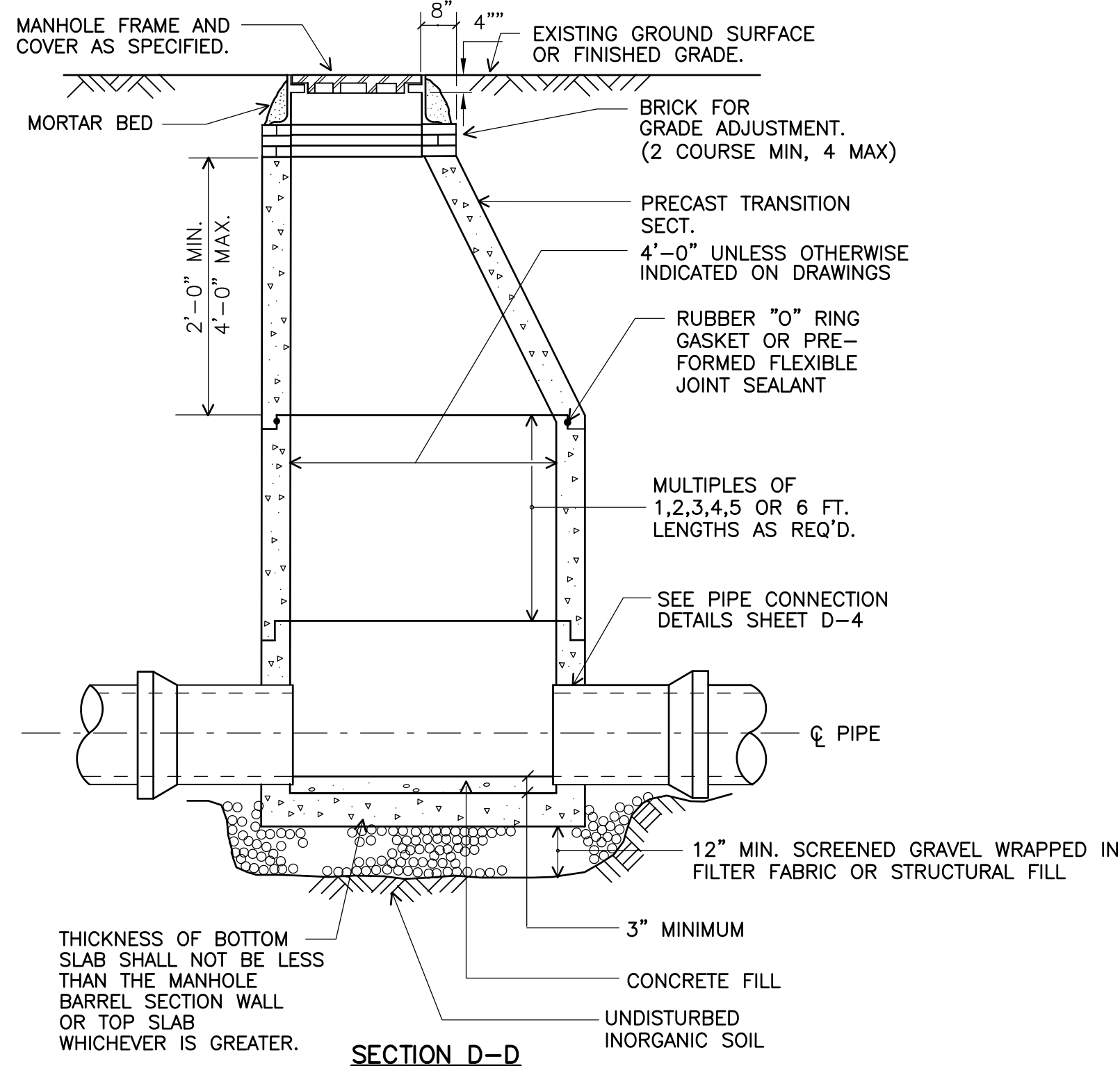
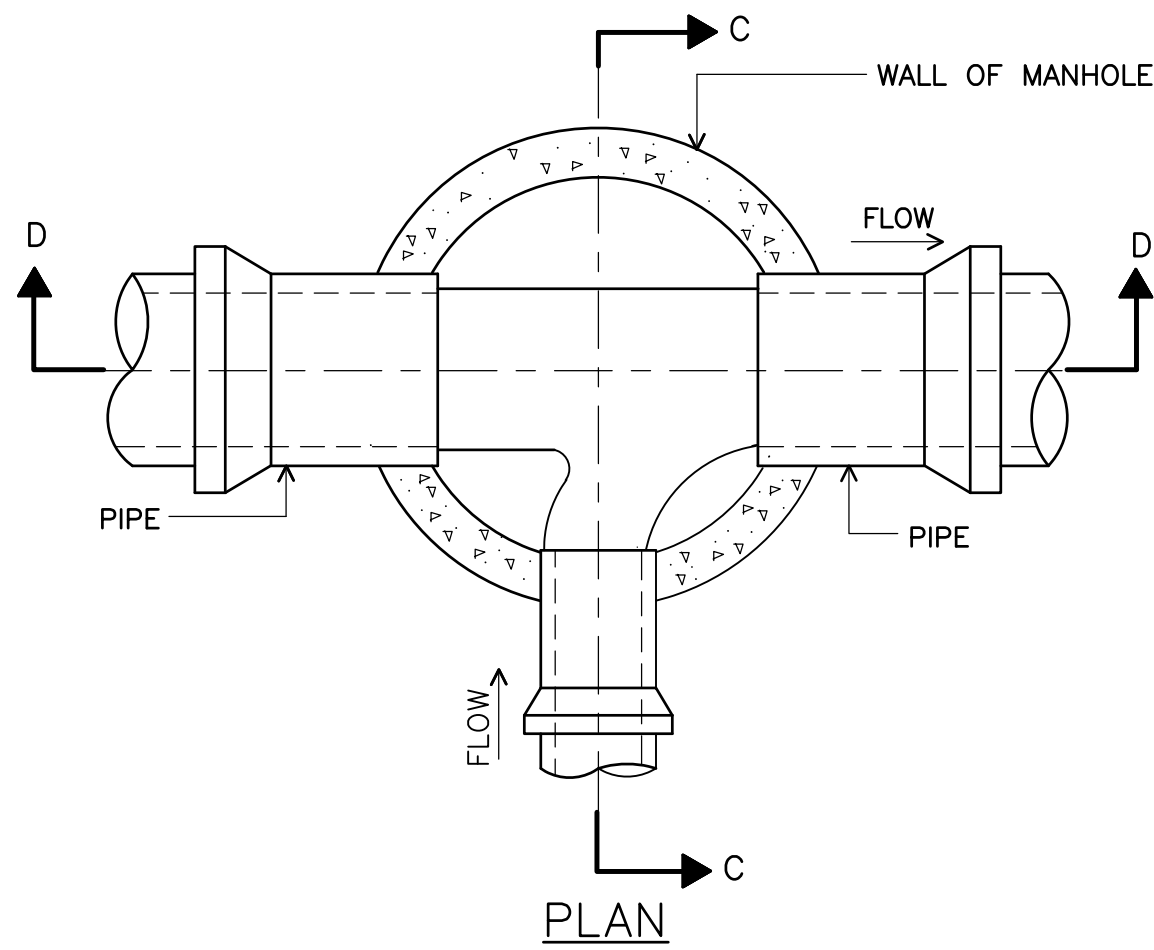
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Tel: (617) 452-6000

TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

DETAILS I

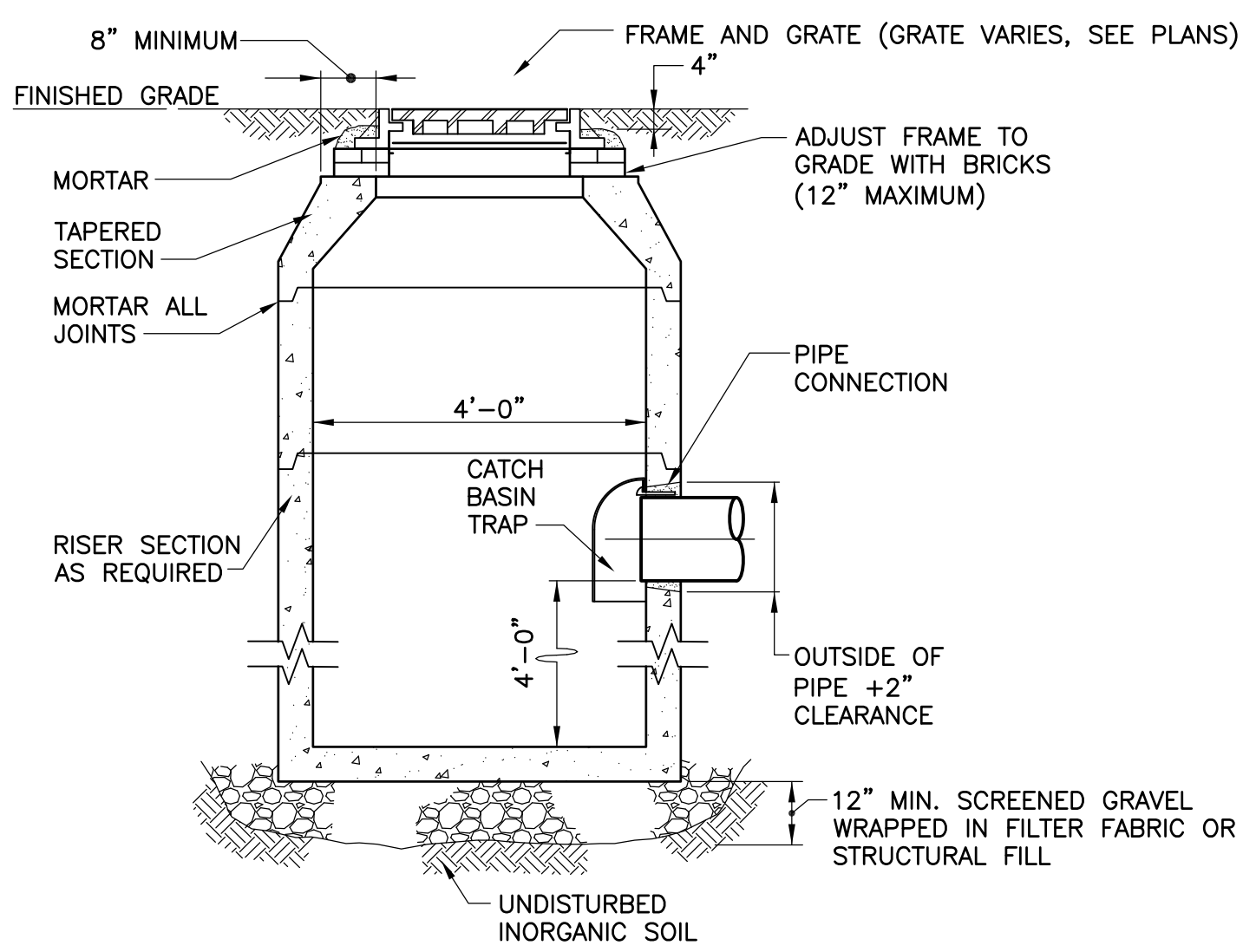
PROJECT NO. 56318-253750
FILE NAME: C007STPL
SHEET NO.
D-1

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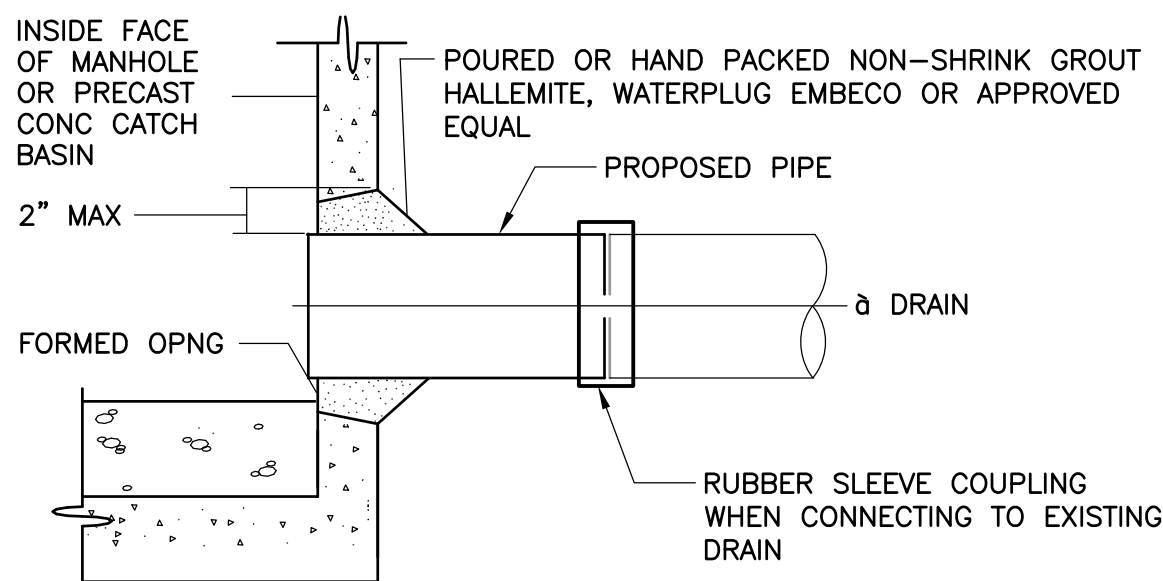
TYPICAL PRECAST DRAIN MANHOLE

DETAIL 1
NOT TO SCALE D-2



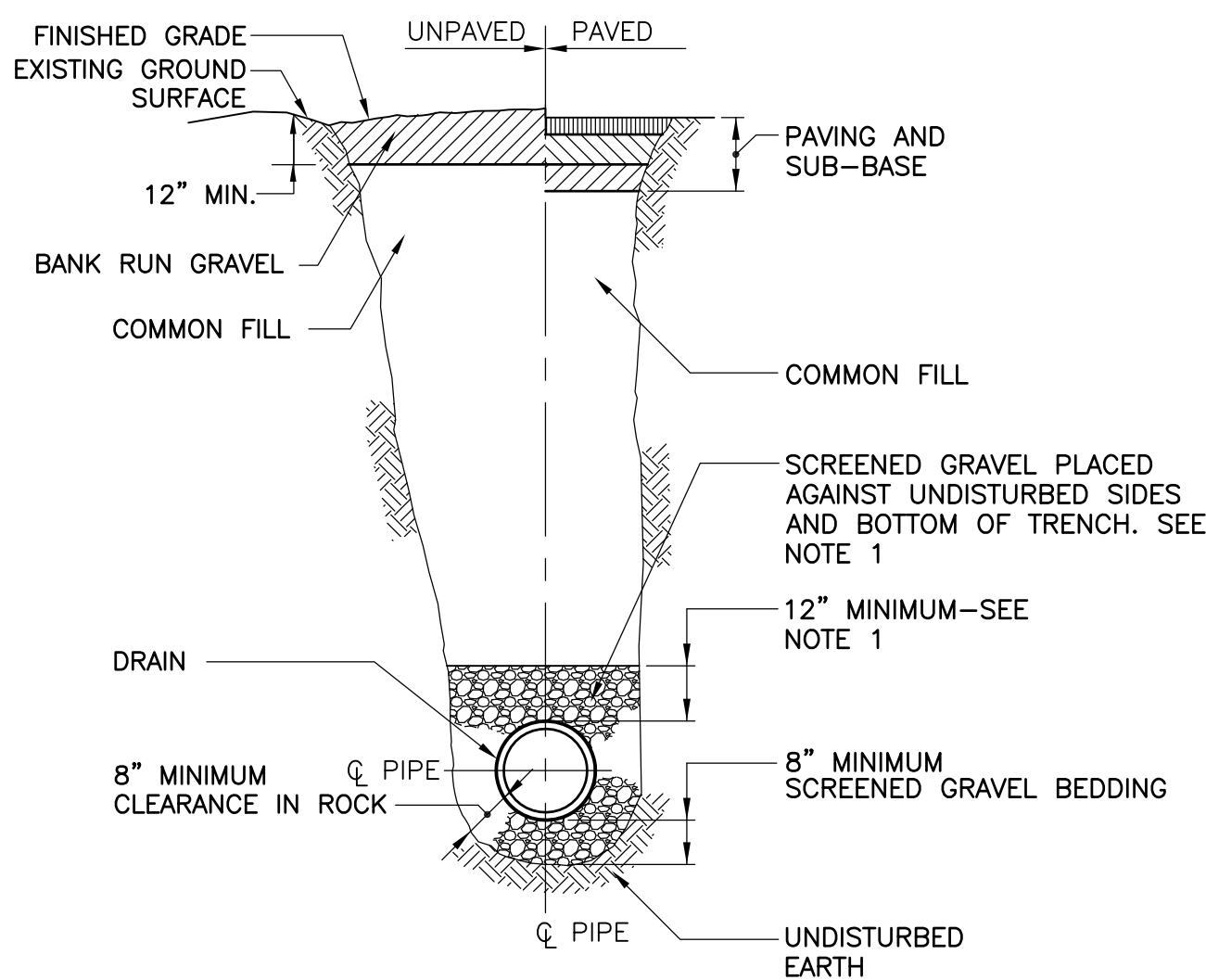
PRECAST CONCRETE CATCH BASIN

DETAIL 2
NOT TO SCALE D-2



DRAIN MANHOLE PIPE CONNECTION DETAIL

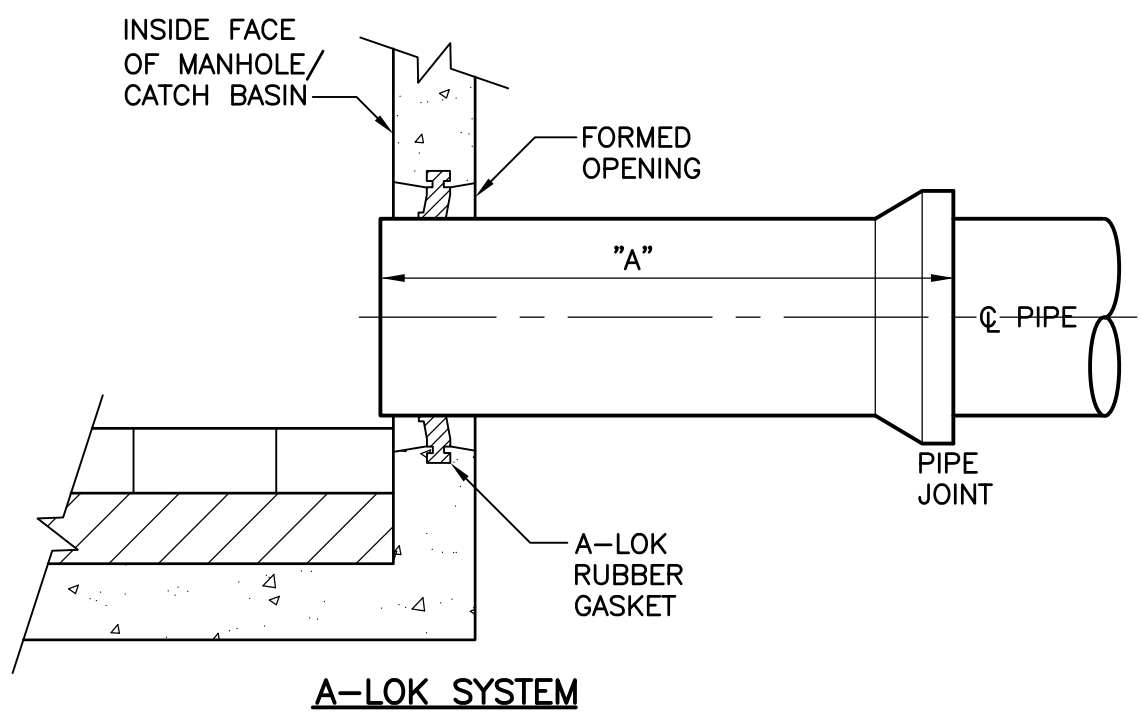
DETAIL 3
NOT TO SCALE D-2



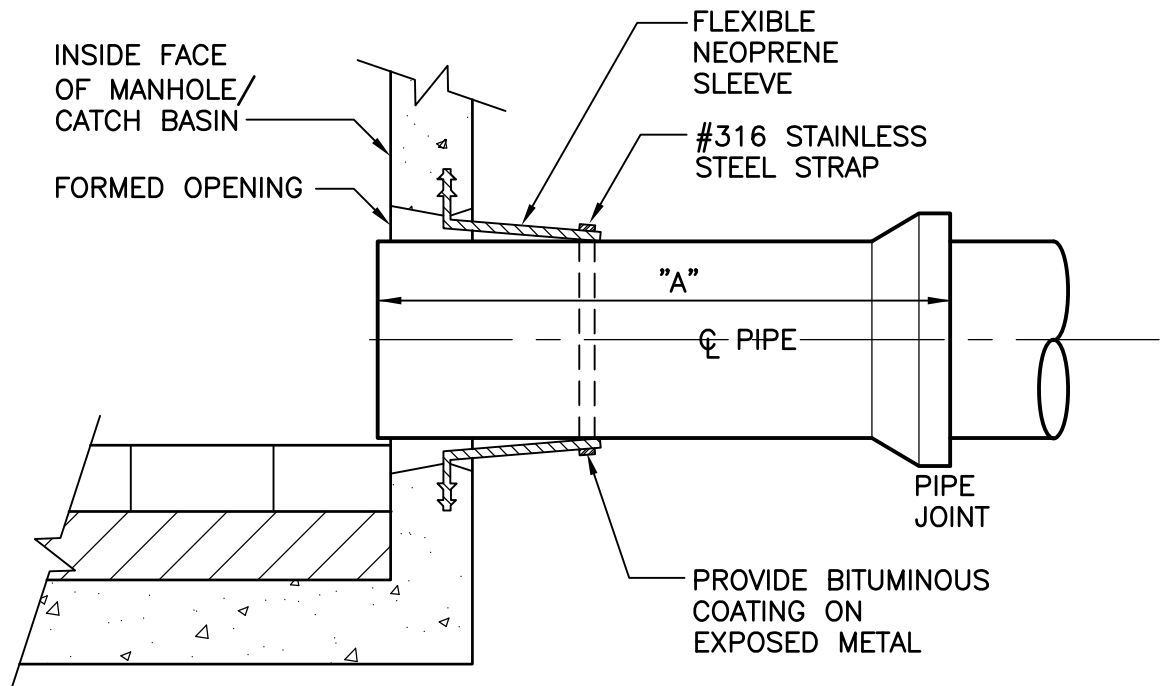
TYPICAL TRENCH FOR GRAVITY PIPE AND SEWER FORCE MAIN

DETAIL 4
NOT TO SCALE D-2

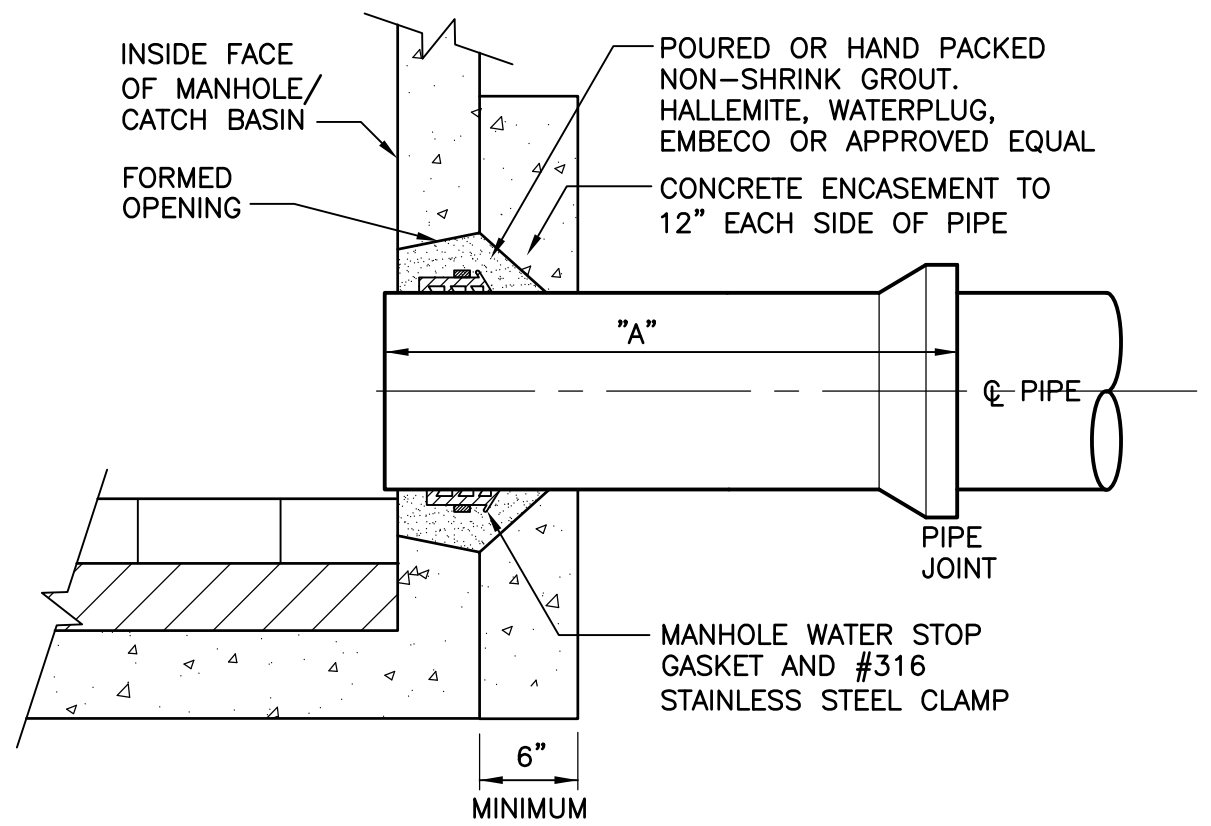
PIPE MATERIAL	"A" (MAX.)
RC	4'-0"
PVC	3'-3"
DI	4'-6"



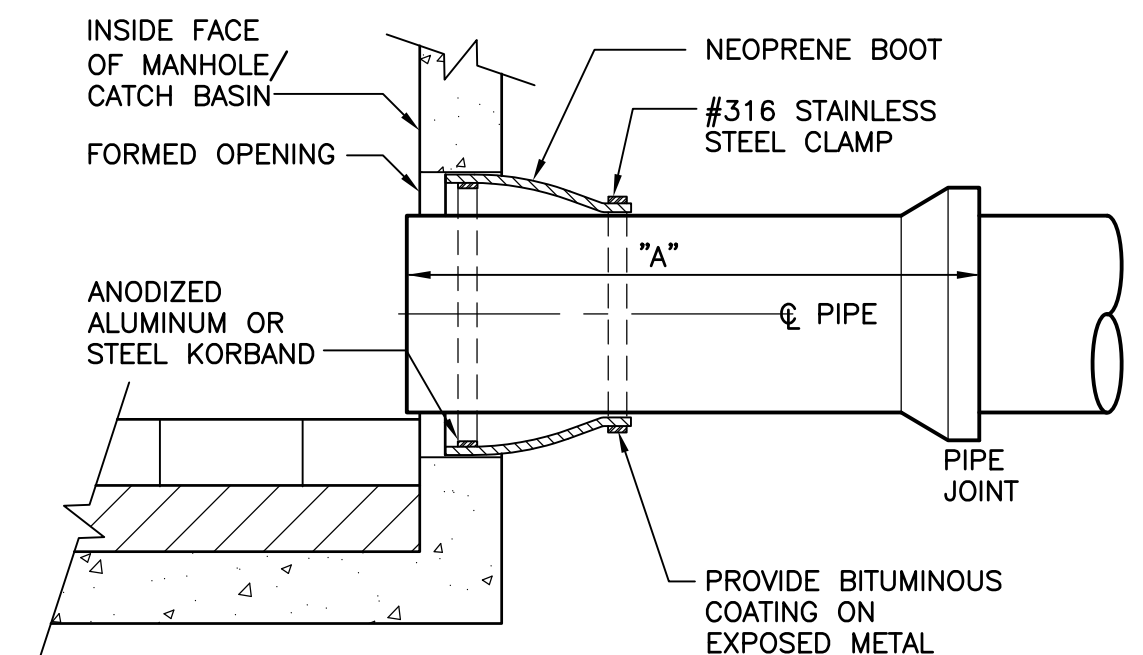
A-LOK SYSTEM



FLEXIBLE SLEEVE



CONCRETE ENCASEMENT



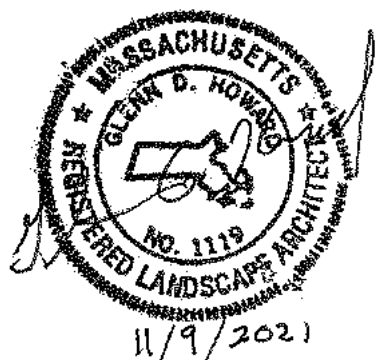
KOR-N-SEAL BOOT

OTHER PIPE CONNECTIONS

DETAIL 5
NTS D-2

NOTES:

- FOR PIPES OTHER THAN PVC AND HDPE, SELECT COMMON FILL MAY BE USED FROM MID-DIAMETER OF PIPE TO 12" ABOVE TOP OF PIPE.
- TRENCHES LOCATED ON THE ROAD SHOULDER SHALL BE THE SAME AS IN STREET EXCEPT FOR PAVING. PROVIDE AT LEAST ONE IMPERVIOUS DAM IN GRAVEL BEDDING BETWEEN EACH MANHOLE OR EVERY 300 FT., WHICHEVER IS LESS.



REV. NO.	DATE	DRWN	CHKD	REMARKS

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SHEET CHK'D BY: G.HOWARD
CROSS CHK'D BY: ---
APPROVED BY: G.HOWARD
DATE: NOVEMBER 2021

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Tel: (617) 452-6000

TOWN OF WATERTOWN, MASSACHUSETTS

ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

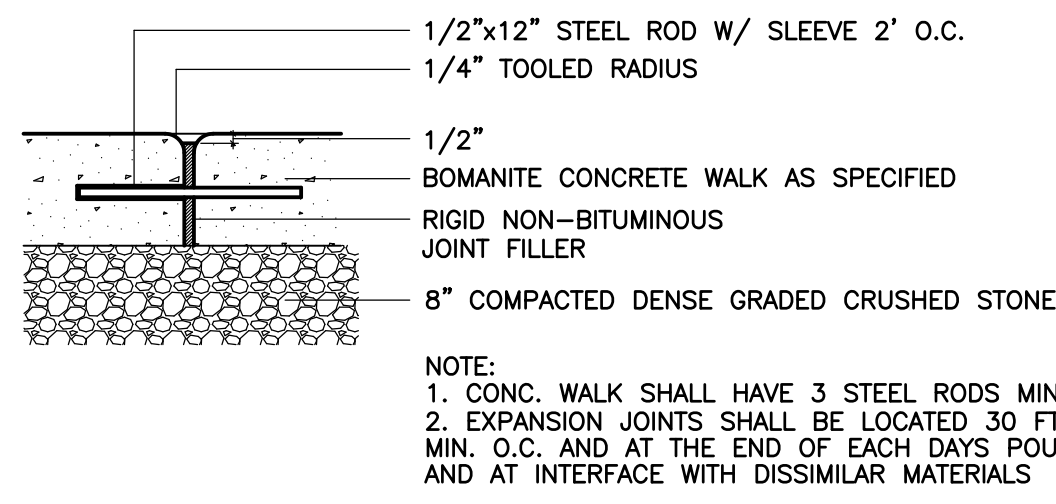
DETAILS II

PROJECT NO. 56318-253750
FILE NAME: C008STDT

SHEET NO.

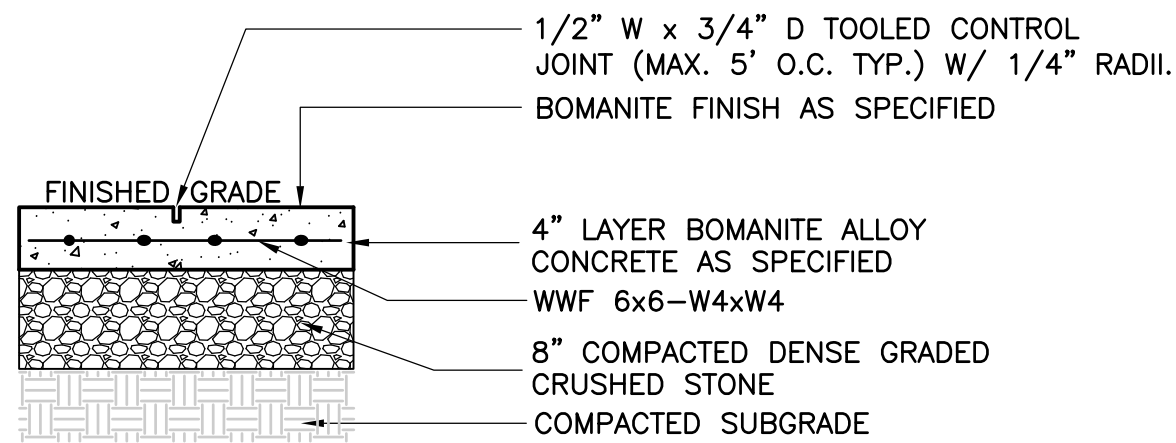
D-2

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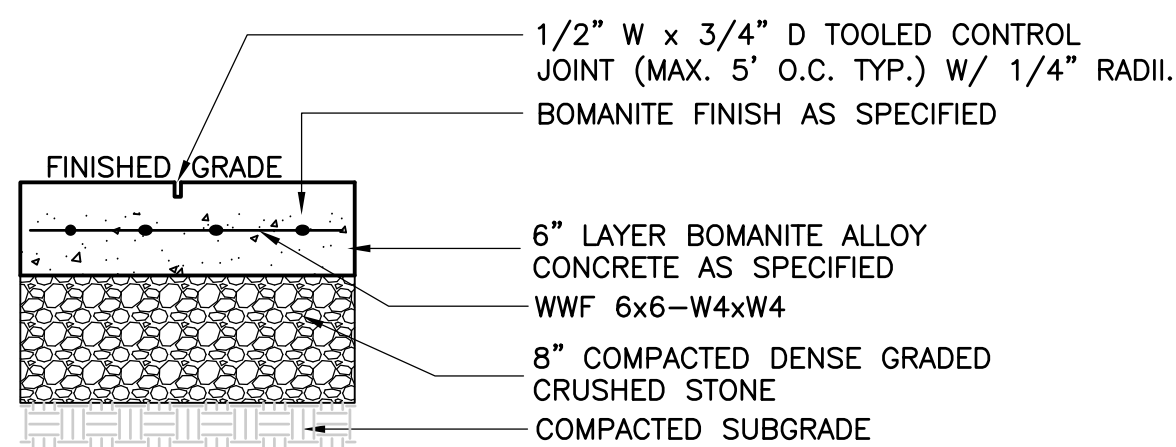
CONCRETE WALKWAY EXPANSION JOINT

DETAIL 1
NOT TO SCALE
D-3



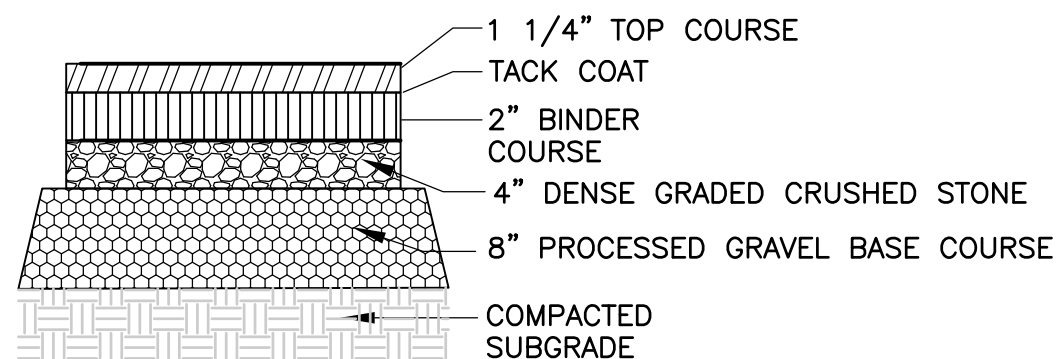
CONCRETE WALKWAY

DETAIL 2
NOT TO SCALE
D-3



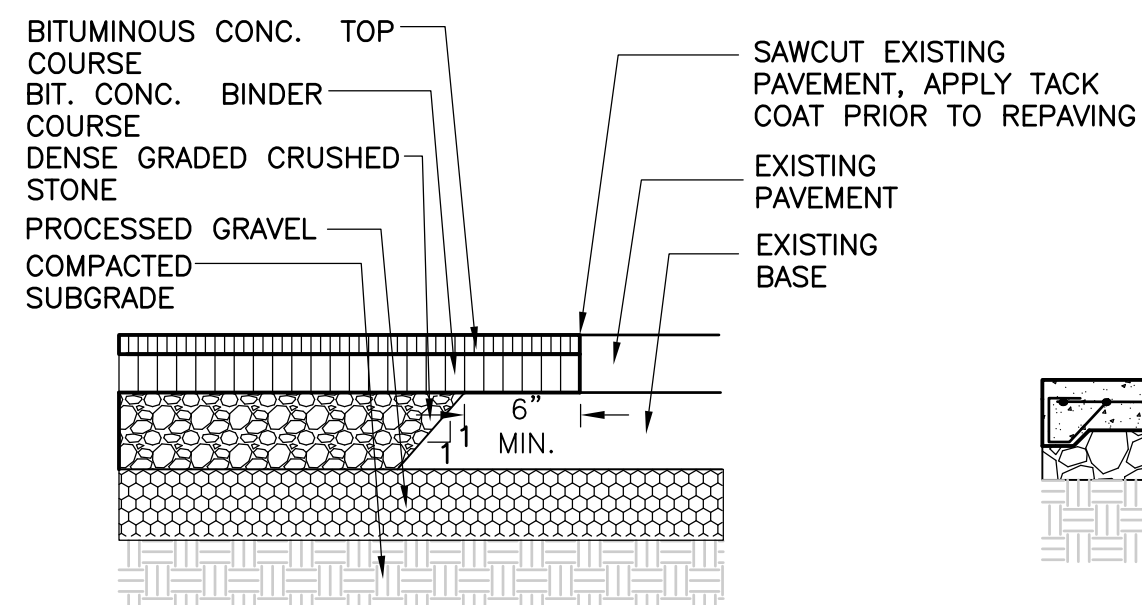
CONCRETE PROMENADE

DETAIL 3
NOT TO SCALE
D-3



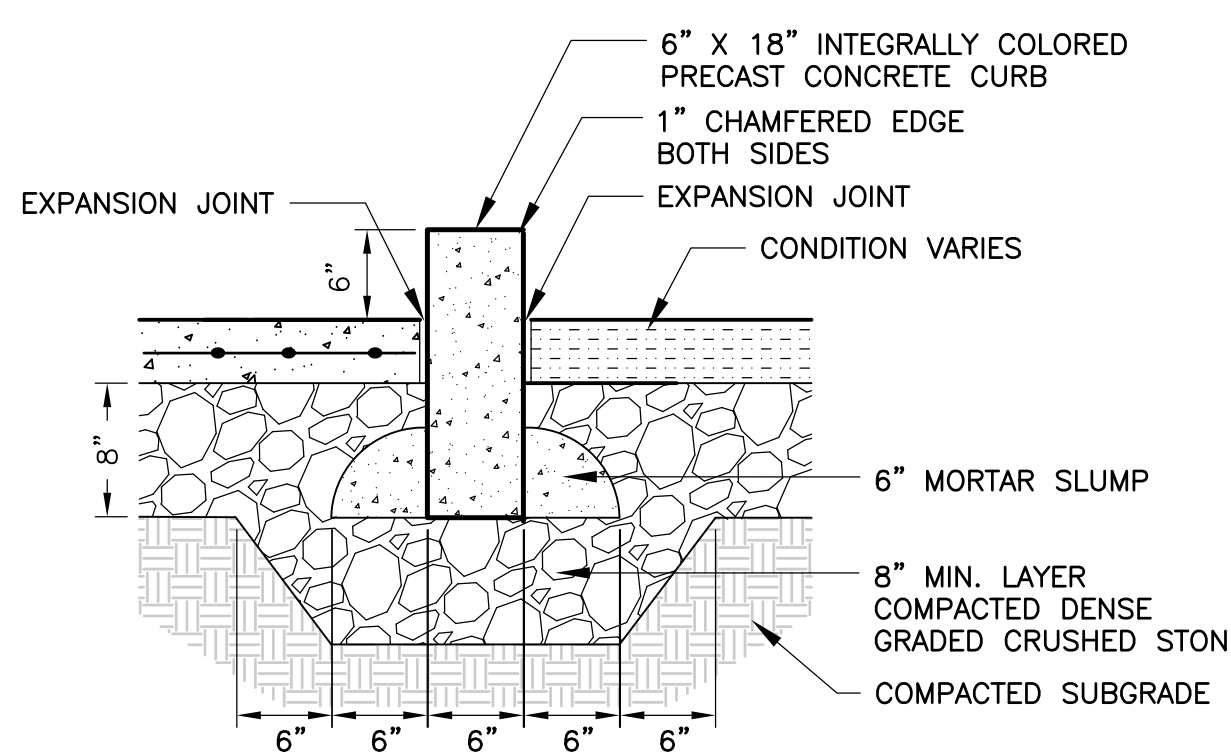
BIT. CONC. PAVEMENT

DETAIL 4
NOT TO SCALE
D-3



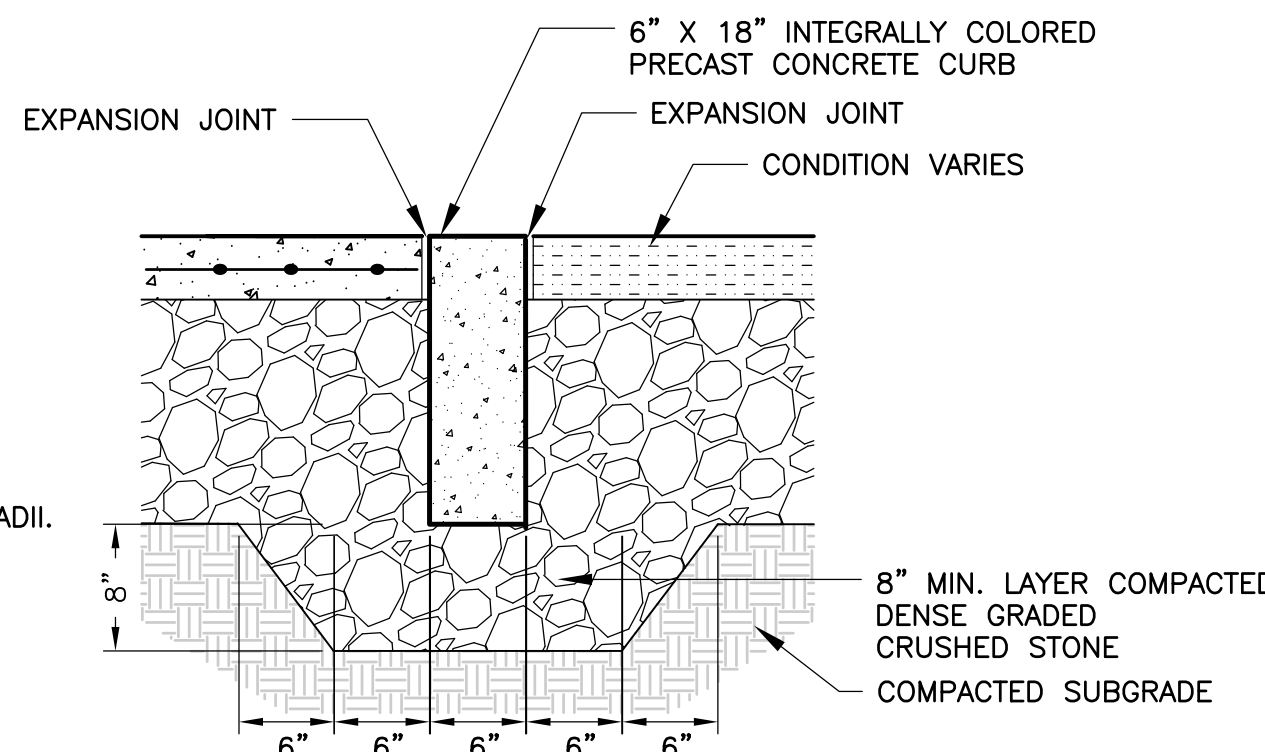
PAVEMENT MATCH

DETAIL 5
NOT TO SCALE
D-3



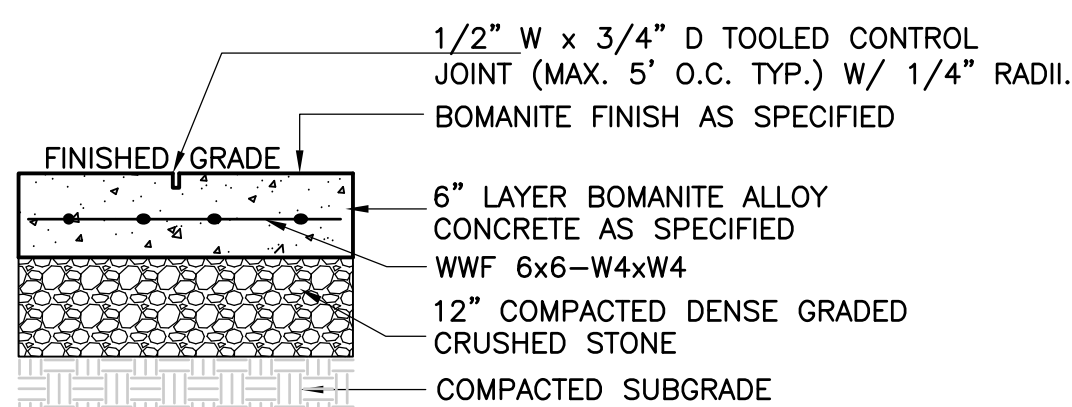
PRECAST VERTICAL CONCRETE CURB

DETAIL 6
NOT TO SCALE
D-3



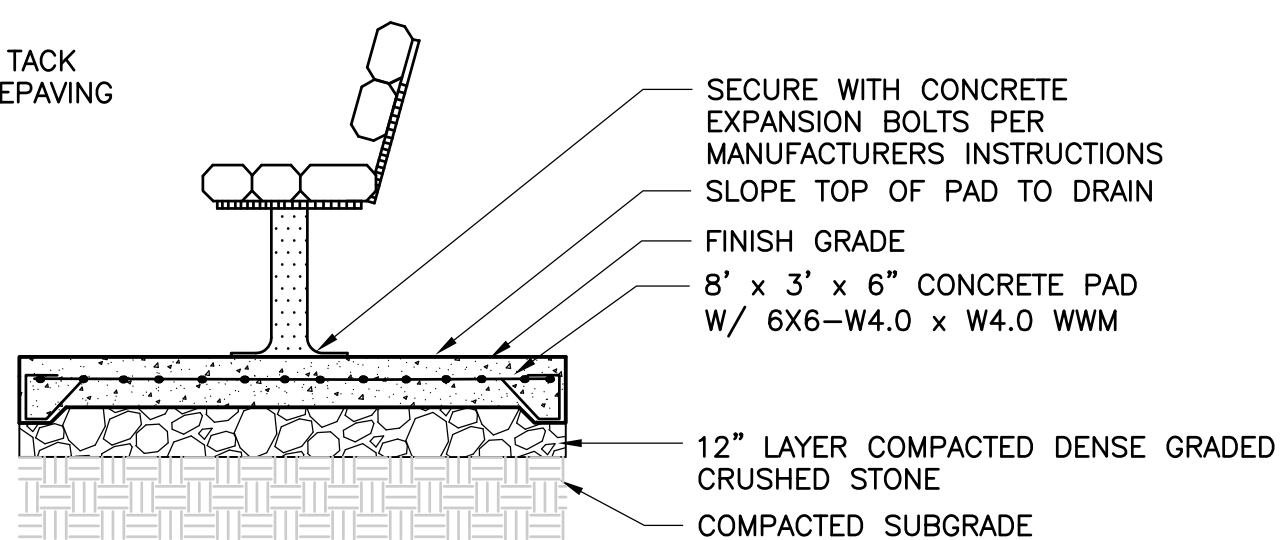
PRECAST FLUSH CONCRETE CURB

DETAIL 7
NOT TO SCALE
D-3



CONCRETE PAD

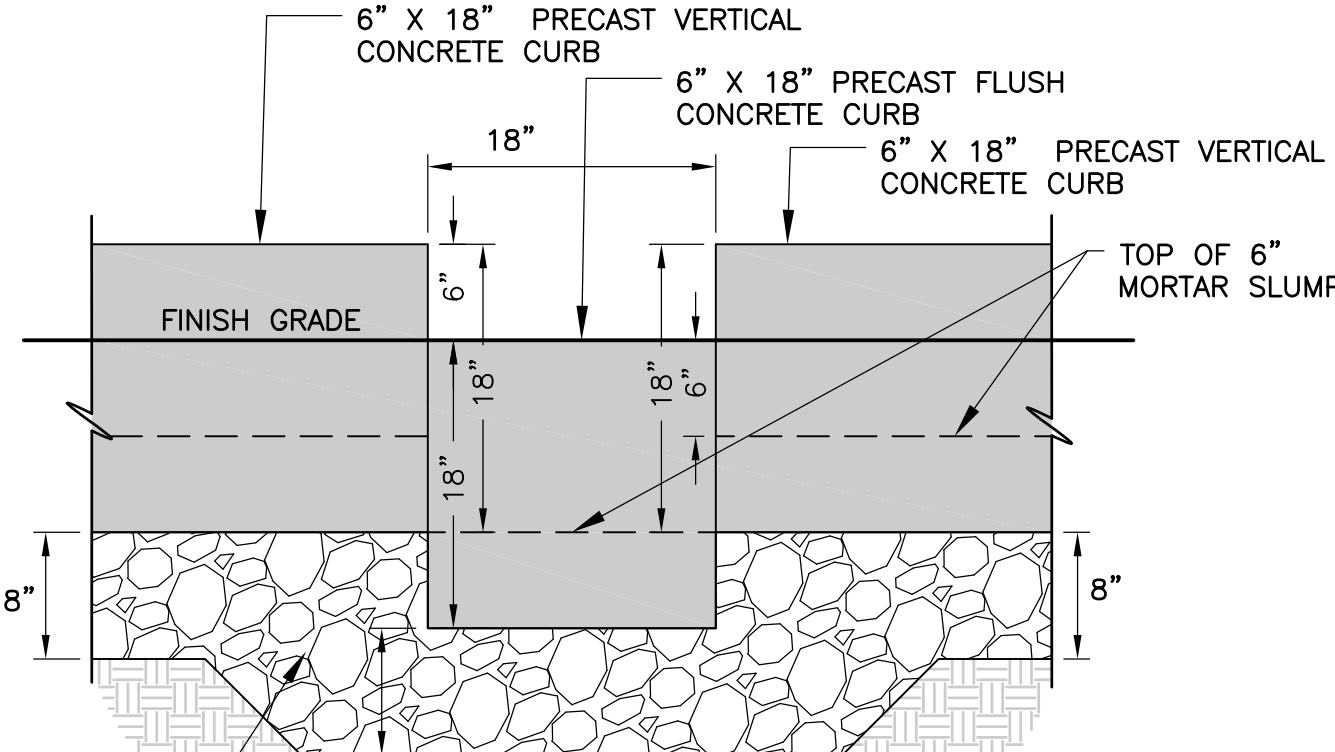
DETAIL 8
NOT TO SCALE
D-3



PARK BENCH ON BOMANITE CONCRETE PAD

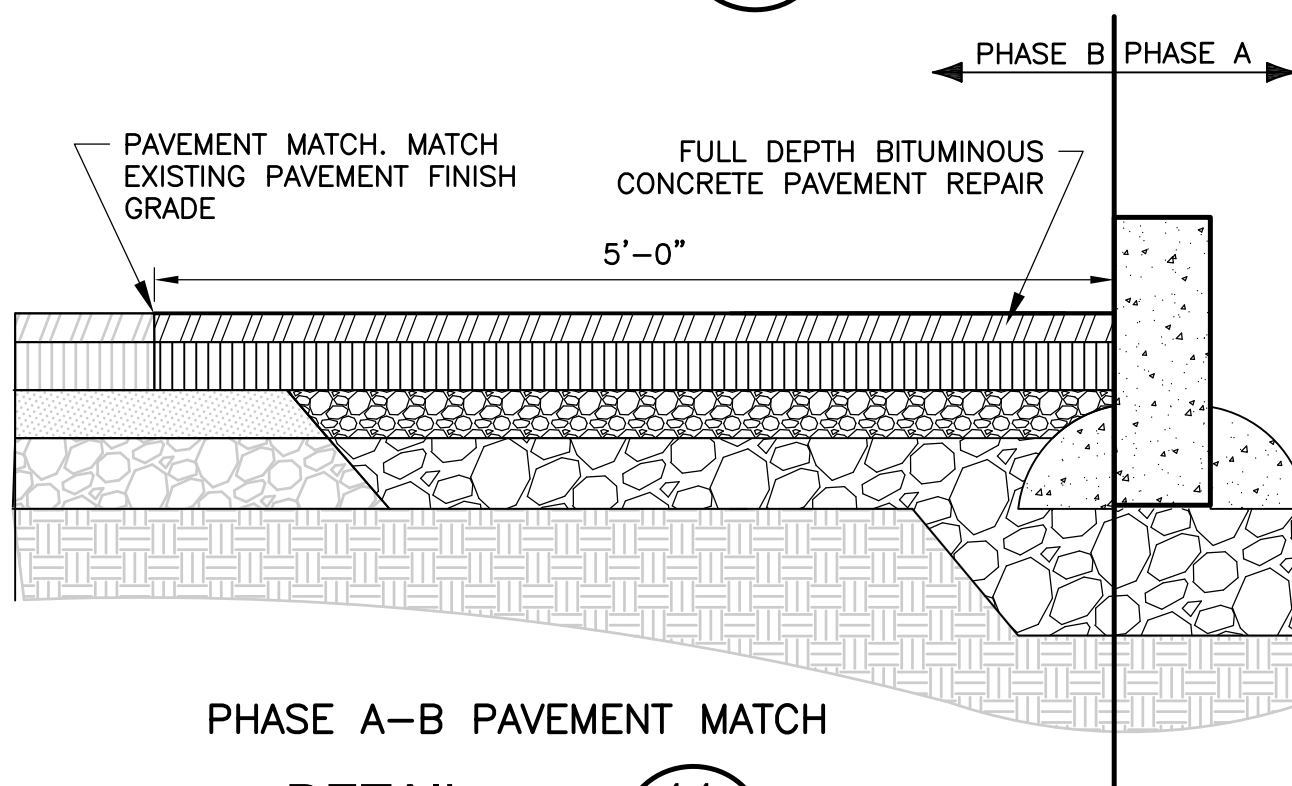
DETAIL 9
NTS
D-3

NOTE:
1. SLOPE PAD 1% MIN -2% MAX TO DRAIN



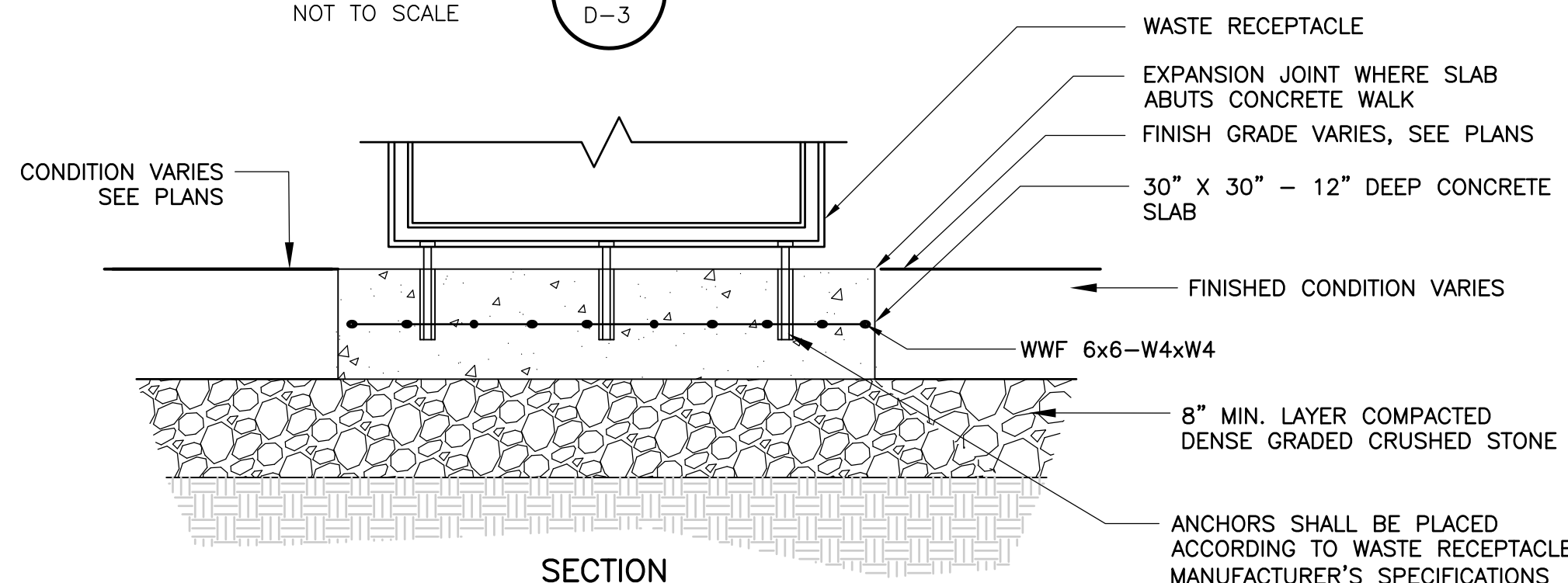
PRECAST CONCRETE CURB CUT

DETAIL 10
NOT TO SCALE
D-3



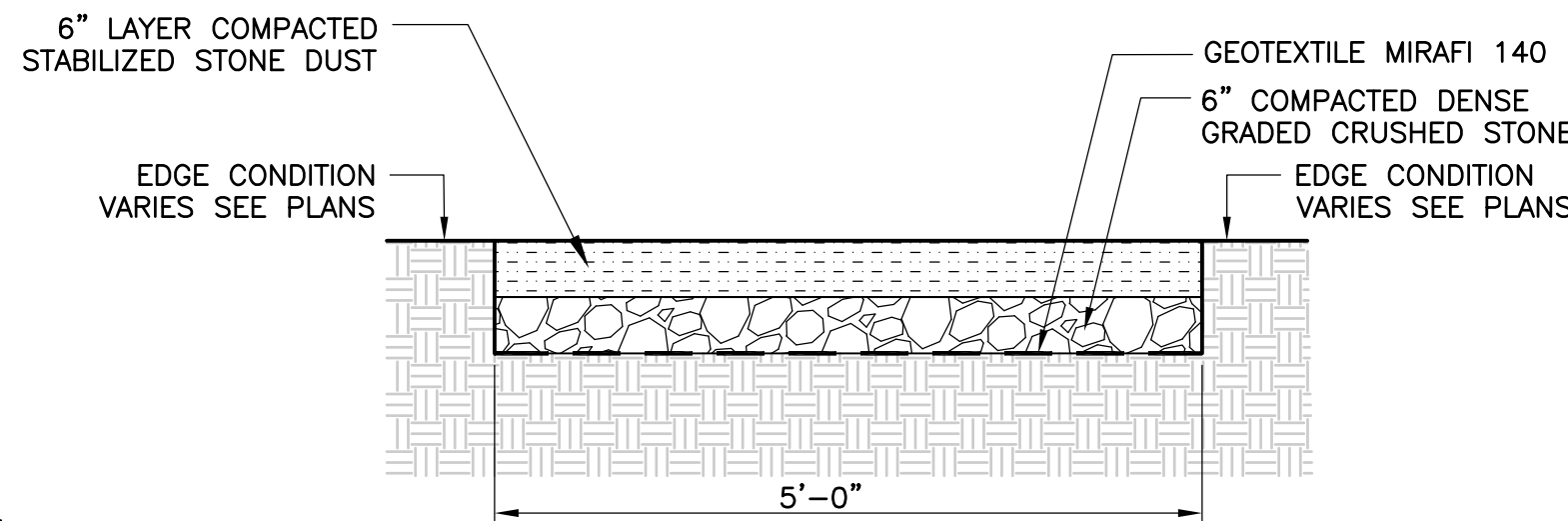
PHASE A-B PAVEMENT MATCH

DETAIL 11
NOT TO SCALE
D-3



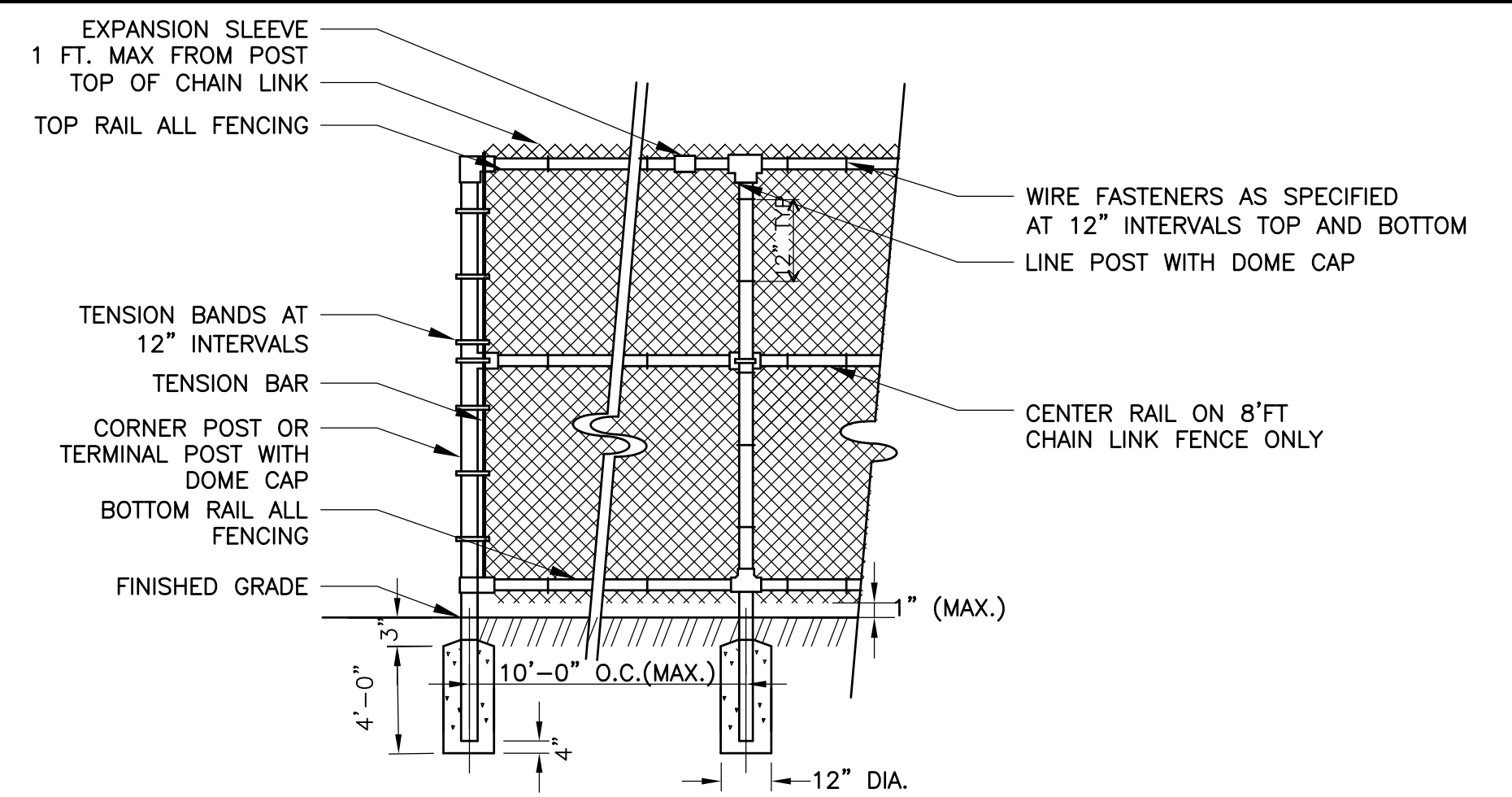
WASTE RECEPTACLE PAD

DETAIL 12
NTS
D-3



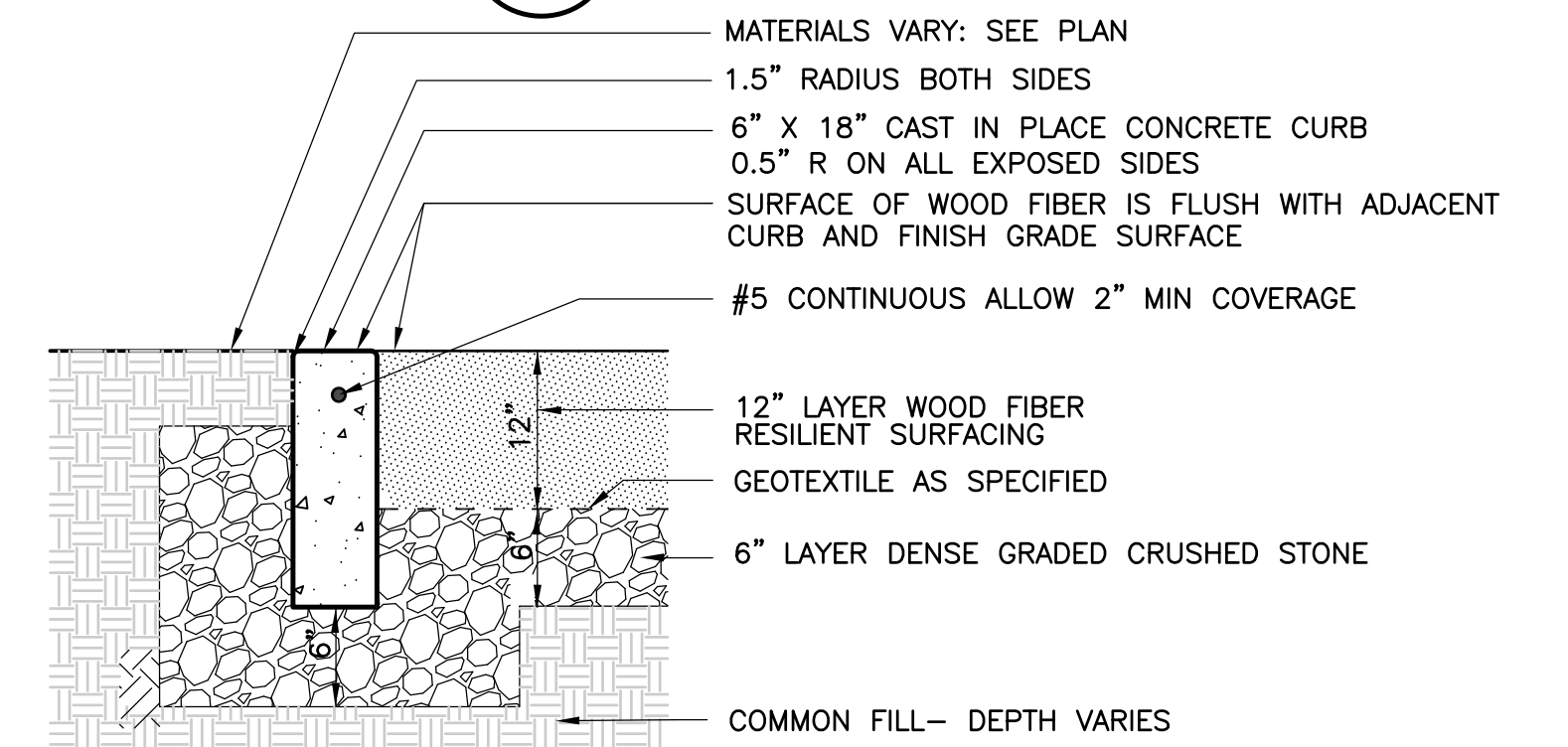
STABILIZED STONE DUST PATHWAY

DETAIL 13
NOT TO SCALE
D-3



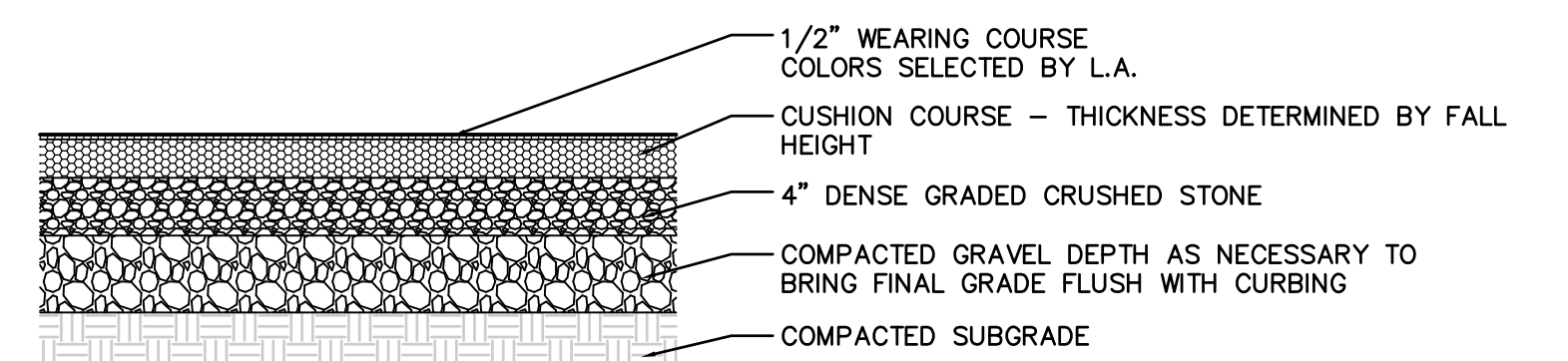
6-FT CHAIN LINK FENCE

DETAIL 14
NOT TO SCALE
D-3



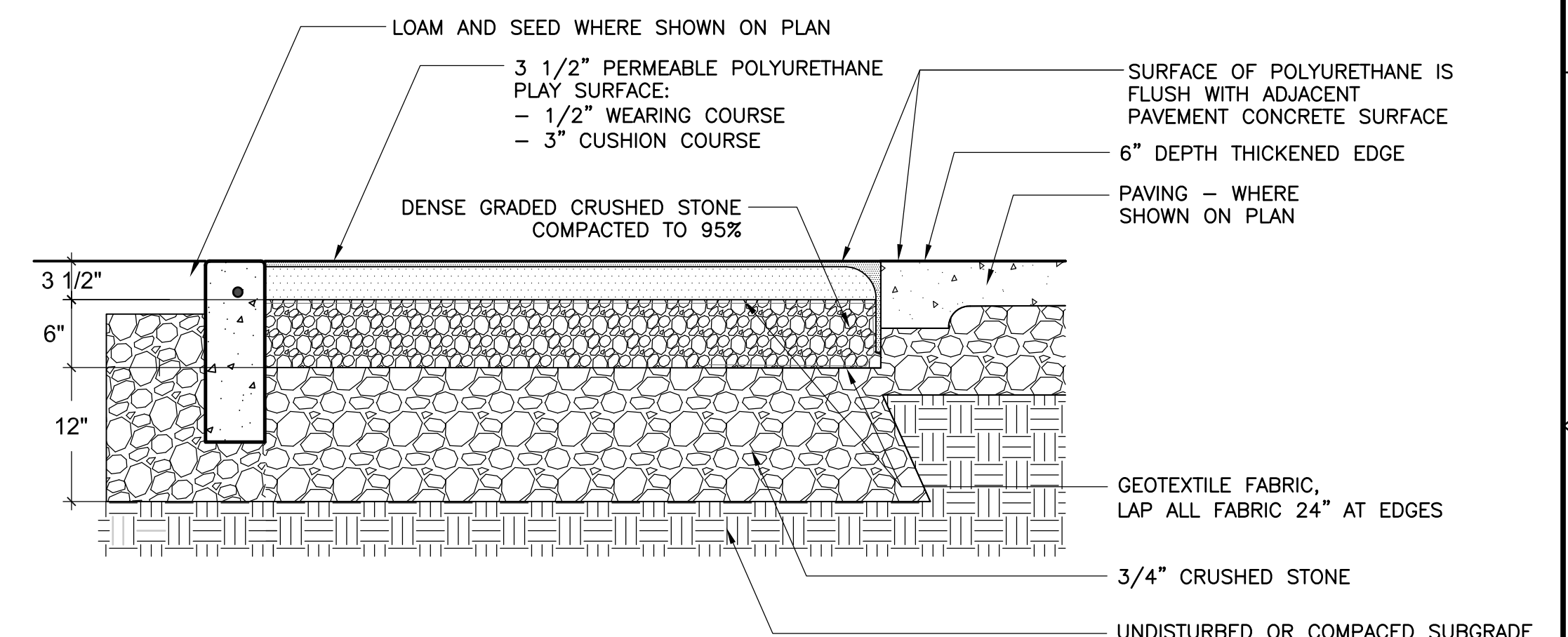
WOOD FIBER SURFACING WITH POURED IN PLACE CONCRETE CURB

DETAIL 15
NOT TO SCALE
D-3



POURED-IN-PLACE RUBBER SURFACING

DETAIL 16
NOT TO SCALE
D-3



POURED IN PLACE RESILIENT SURFACING WITH POURED IN PLACE CONCRETE CURB

DETAIL 17
NOT TO SCALE
D-3

REV. NO.	DATE	DRWN	CHKD	REMARKS

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CROSS CHK'D BY: ---
APPROVED BY: G.HOWARD
DATE: NOVEMBER 2021

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Tel: (617) 452-6000

TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B



DETAILS III

PROJECT NO. 56318-253750
FILE NAME: C009STD01
SHEET NO.
D-3

DETAIL 1
NTS D-4

DETAIL 4
NTS D-4

DETAIL 6
SCALE: NTS L-11

REQUIRED PLANT PIT DIAMETER	
ROOT BALL DIAMETER	PLANT PIT DIAMETER
UNDER 2'-0"	3X THE ROOT BALL DIAMETER
FROM 2'-0" TO 4'-0"	2.5X THE ROOT BALL DIAMETER
OVER 4'-0"	2X THE ROOT BALL DIAMETER

DETAIL 7

NTS D-4

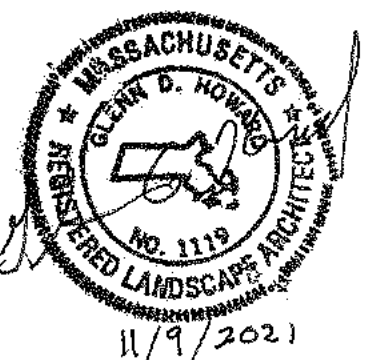
1. HEIGHT OF PLANTING SAUCER PERIMETER EDGE SHALL BE 2" ABOVE ROOT FLARE.
2. MULCH SHALL BE A MINIMUM OF 3" DEEP AND TAPERED TO LEAVE ROOT FLARE EXPOSED. WHEN PLANTING ON SLOPES, UPHILL AND DOWNHILL SIDES MUST BE STABILIZED WITH VEGETATION.
3. MATERIALS FOR SUPPORTING PLANTS SHALL BE COMMERCIALY AVAILABLE PRODUCTS OR SYSTEMS FOR SUPPORTING OF TREES.
4. ALL TAGS, LABELS, ETC. SHALL BE REMOVED AND DISPOSED FROM THE PLANTS AFTER ON-SITE INSPECTION OF DELIVERED PLANT MATERIAL BY LANDSCAPE ARCHITECT.
5. THE ROOT FLARE SHALL BE VISIBLE AND INSTALLED 1-2" ABOVE SURROUNDING SOIL.

DETAIL 2
NTS D-4

NOTE:
SPACING DIMENSIONS
VARY SEE LAYOUT
PLAN

DETAIL 5
NOT TO SCALE D-4

DETAIL 3
SCALE: NTS D-4



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TOWN OF WATERTOWN, MASSACHUSETTS

ARSENAL PARK IMPROVEMENTS PROJECT PHASE B

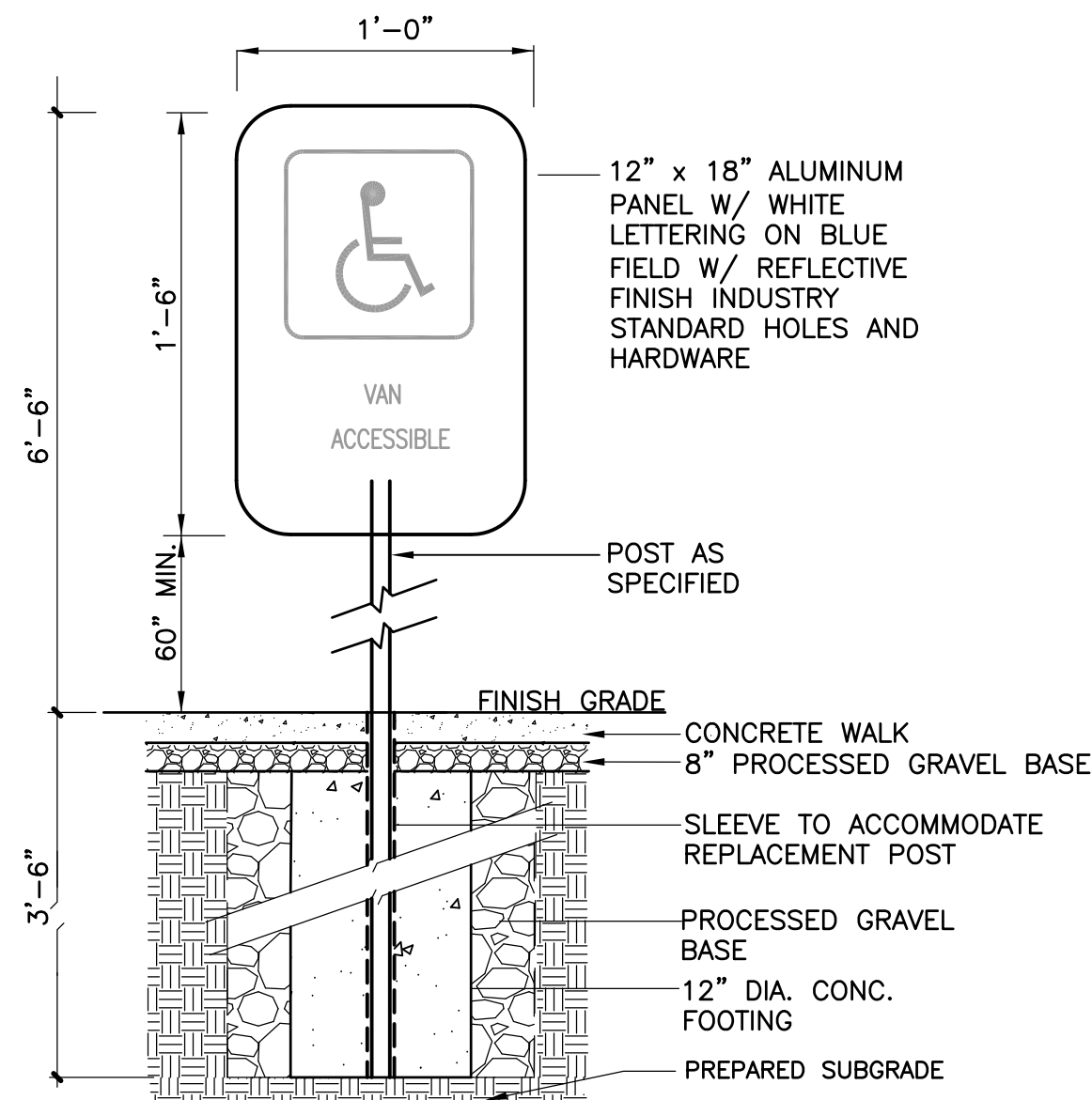
DETAILS IV

PROJECT NO. 56318-253750
FILE NAME: C010STDT

SHEET NO.

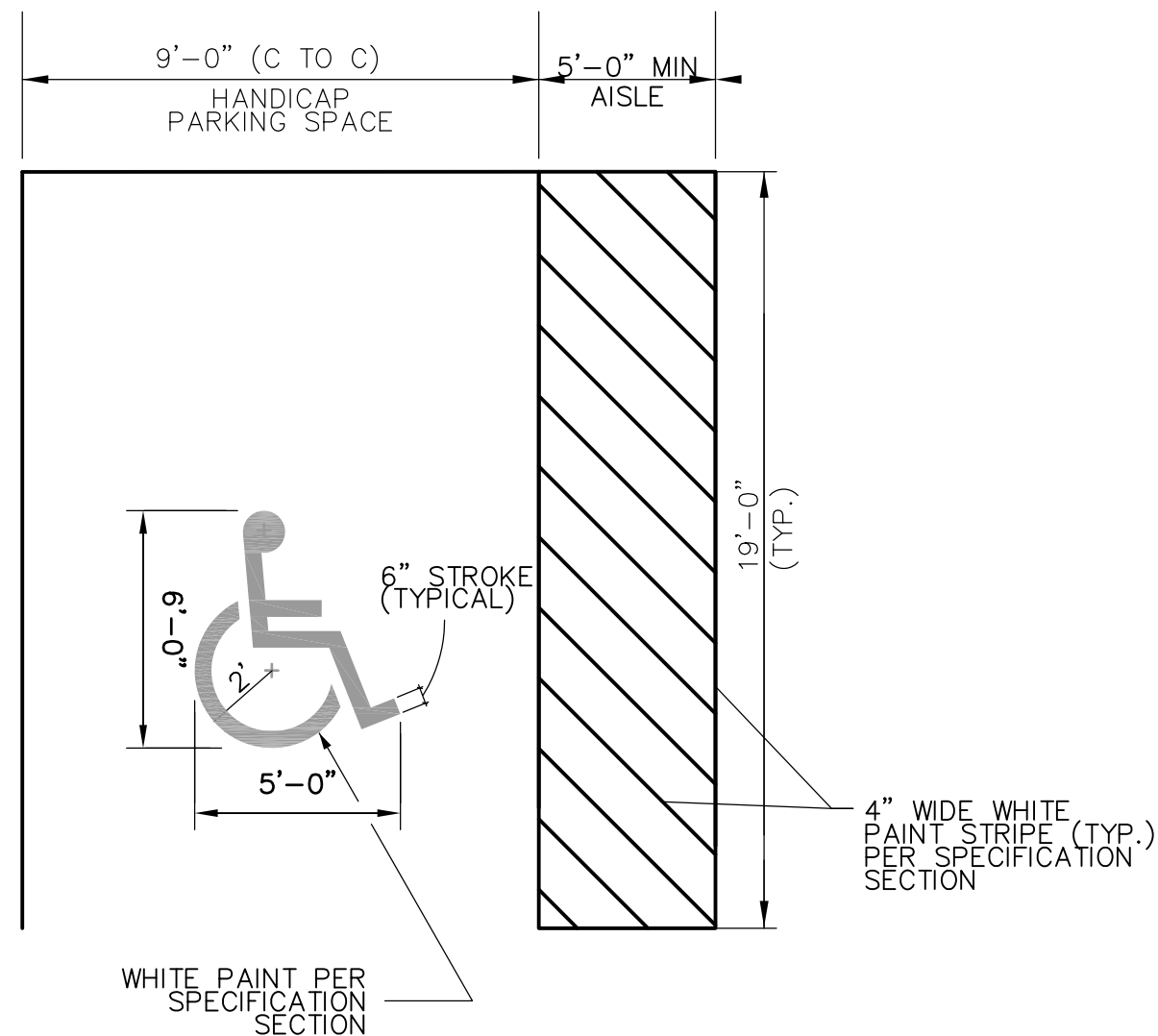
0-4

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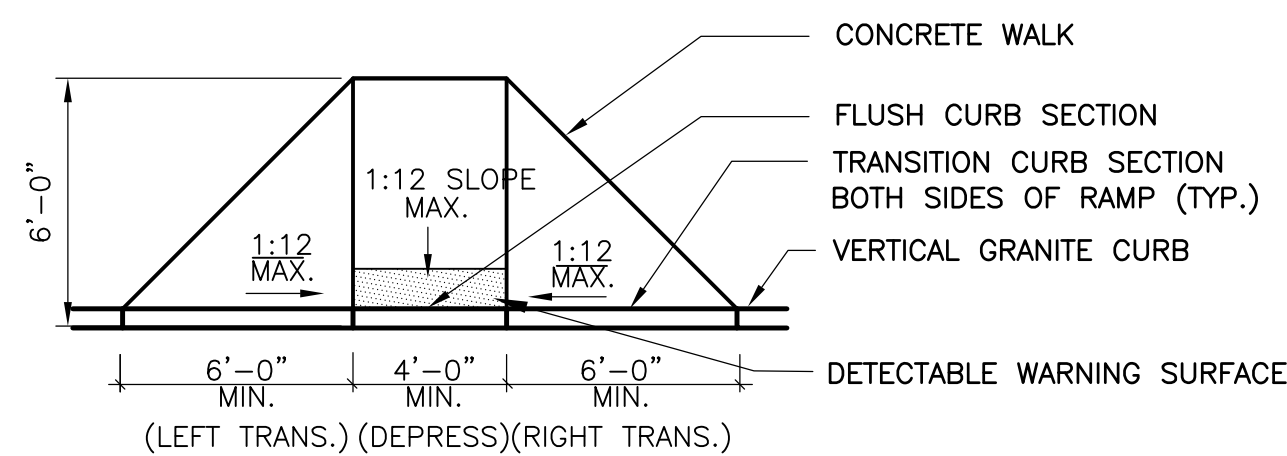
HANDICAP ACCESSIBLE PARKING SIGN

DETAIL 1
N.T.S. D-5



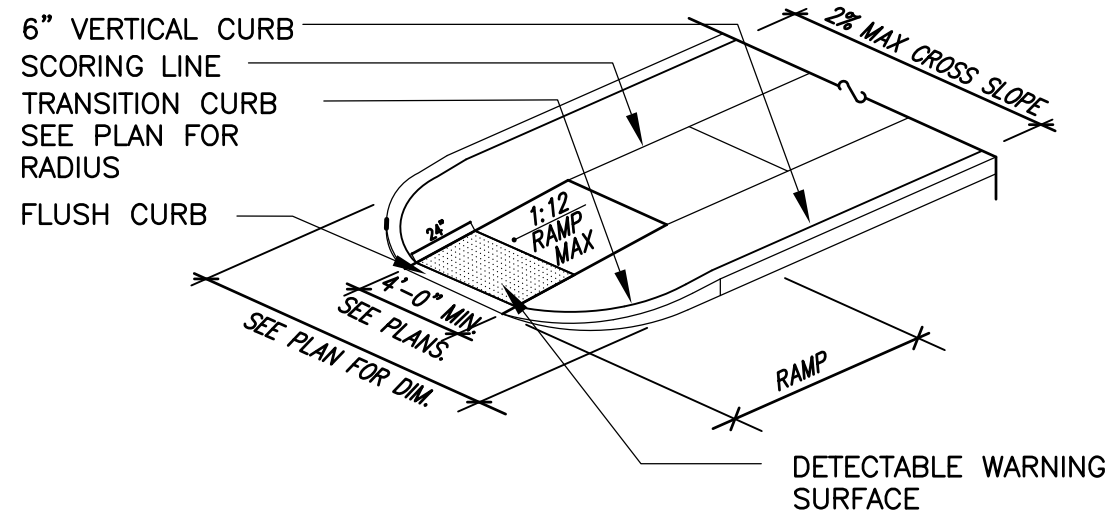
HANDICAP ACCESSIBLE PARKING SPACE

DETAIL 2
NTS D-5



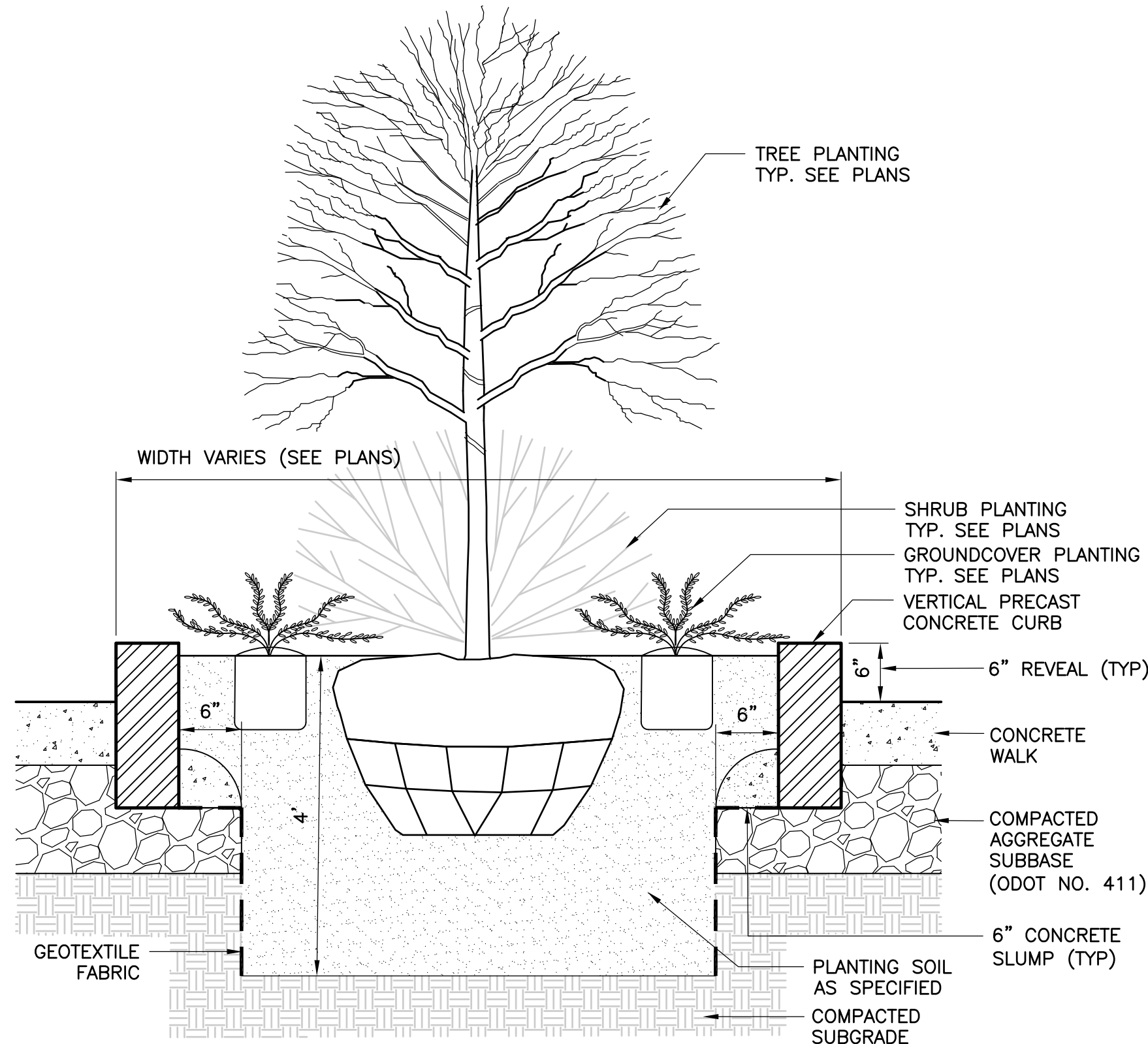
ACCESSIBLE CURB RAMP TYPE 1

DETAIL 3
NOT TO SCALE D-5



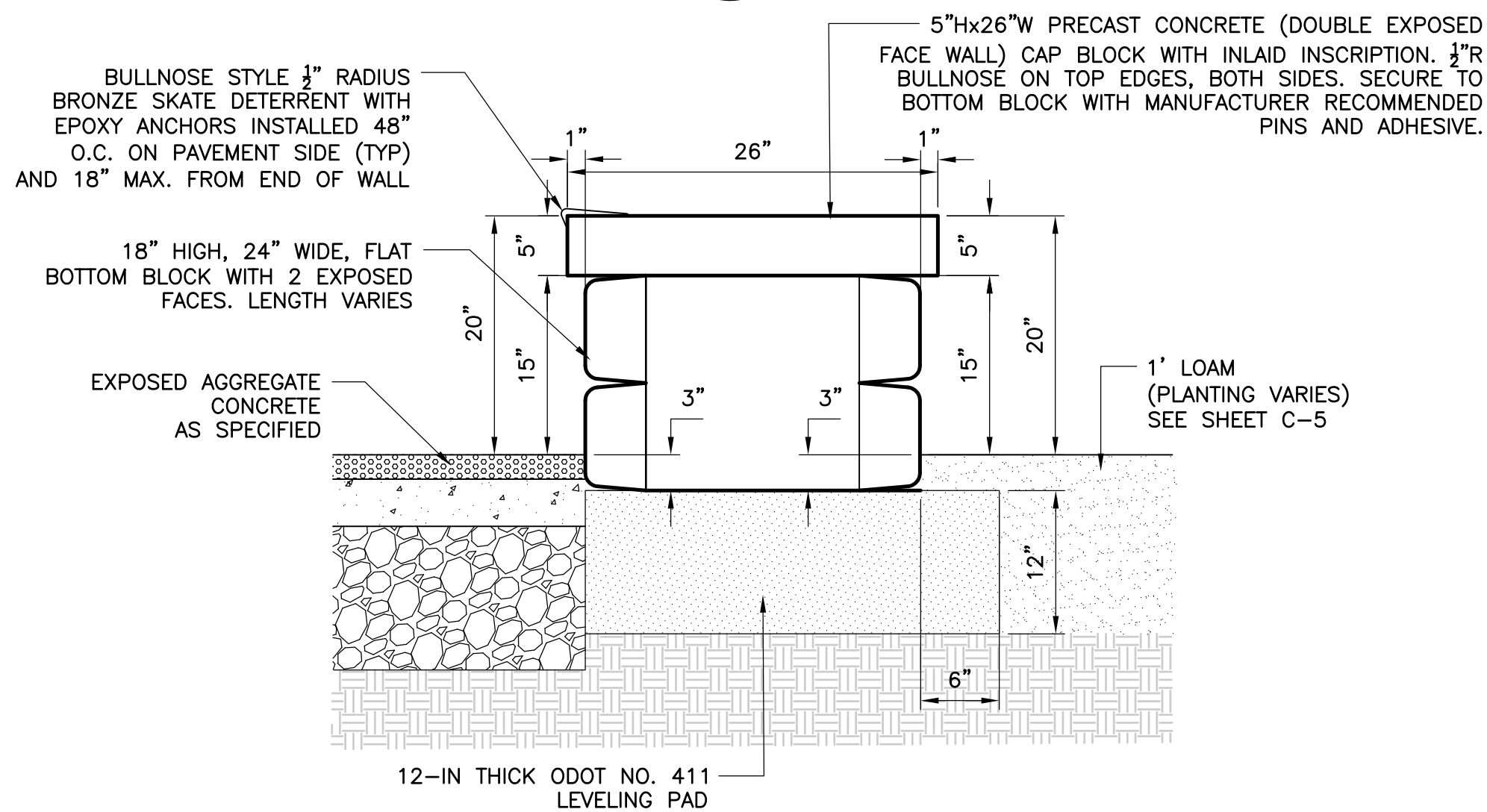
ACCESSIBLE CURB RAMP, TYPE II

DETAIL 4
NOT TO SCALE D-5



CONCRETE CURB PLANTER

DETAIL 5
SCALE: NTS D-5



DOUBLE FACED SEGMENTAL BIG BLOCK RETAINING WALL

DETAIL 6
NTS D-5

- NOTES:
- DIMENSIONS ARE SUBJECT TO CHANGE IN FIELD. ALL SLOPES AND DIMENSIONS TO COMPLY WITH A.D.A. AND MAAB REQUIREMENTS.
 - PROVIDE EXPANSION JOINT AT TOPS OF RAMP AND AT BACK OF WALK AT INTERFACE OF CURB.
 - PROVIDE HEAVY BROOM FINISH ON RAMP AND SIDE SLOPES PERPENDICULAR TO FLOW OF TRAFFIC.
 - MINIMUM WALK DIMENSIONS ARE FROM BACK OF CURB. TRANSITION CURB LENGTH AS REQUIRED TO MEET CODE.
 - FIXED OBJECTS (I.E. UTILITY POLES, HYDRANTS ETC.) MUST NOT ENCR OACH ON ANY PART OF A WHEELCHAIR RAMP, INCLUDING TRANSITION SLOPES.
 - AT NO TIME IS ANY PART OF THE WHEELCHAIR RAMP, EXCLUDING CURB TRANSITIONS, TO BE LOCATED OUTSIDE OF THE CROSSWALK.

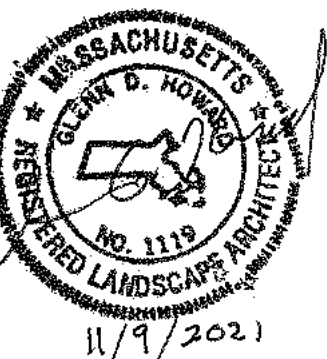
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TOWN OF WATERTOWN, MASSACHUSETTS
ARSENAL PARK IMPROVEMENTS PROJECT
PHASE B

DETAILS V



PROJECT NO. 56318-253750
FILE NAME: C011STD1
SHEET NO.
D-5





CITY OF WATERTOWN
Conservation Commission
Administration Building
149 Main Street
WATERTOWN, MASSACHUSETTS 02472

Leo Martin, Chairperson
Maria Rose, Vice Chair
Charles C. Bering, Member
Patrick W. Fairbairn, Member
Jamie O'Connell, Member

2022 CONSERVATION COMMISSION MEETINGS
AND FILING SCHEDULE
1st Wednesday of Each Month
7:00 p.m.

Please check the updated meeting agenda on the City Website for the specific meeting participation information within 48 hours of the scheduled meeting.

Filing Date 5:00 p.m.	Additional Deadline 12:00 p.m.	Meeting Date 7:00 PM
December 15	December 29	January 5
January 12	January 26	February 2
February 9	February 23	March 2
March 16	March 30	April 6
April 13	April 27	May 4
May 11	May 25	June 1
*June 22	July 6	July 13-4th
No August Meeting		
*August 24	September 7	September 14-LD
*September 21	October 5	October 12-Yom Kip
October 12	October 26	November 2
November 16	November 30	December 7

FILING DEADLINE – This is last day to file to be scheduled for next month's Public Hearing.

ADDITIONAL INFORMATION DEADLINE – For applicants who have filed, this date is for additional supporting documentation not submitted at filing date.

*Moved for a holiday.