FLORENCE ROCHE SCHOOL
342 MAIN STREET
Groton, MA 01450

MAJOR SITE PLAN REVIEW – PHASE 2

Submitted to:
Town of Groton Planning Board

Applicant:
Mark Haddad – Town of Groton/GDRSD
342 Main Street
Groton, MA 01450

Architect:
Studio G Architects
179 Boylston Street
Jamaica Plain, MA 02130

General Contractor:
Gilbane Building Company
10 Channel Center St, Suite 100
Boston, MA 02210

Landscape Architect:
Terraink
7 Central St
Arlington, MA 02476

Light Consultant:
LightThis! Inc.
P.O Box 380404
Cambridge, MA 02238

Transportation Engineer:
MDM Transportation Consultants, Inc.
28 Lord Rd
Marlborough, MA 01752

Civil Engineer / Land Surveyor:
Samiotes Consultants, Inc.
20 A Street
Framingham, MA 01701

14 April 2022

TOWN OF GROTON
PLANNING BOARD
173 Main Street
Groton, Massachusetts 01450
Telephone (978) 448-1105
FAX: (978) 448-1113

APPLICATION FOR APPROVAL
ZONING BY-LAW § 218-2.5C(2) MAJOR SITE PLAN REVIEW

Applicant	Mark Haddad - Town of Groton/GDRSD	Landowner	Groton-Dunstable Regional School District; Town of Groton
Address	Town Hall, 173 Main Street	Address	344 Main Street
	Groton, MA 01450		Groton, MA 01450
Telephone	978-448-1111	Telephone	978-448-5505
E-mail	mhaddad@grotonma.gov	E-mail	

This application is accompanied by an application for:

N/A § 218-5.2 Schedule of Use Regulations

N/A § 218-5.5 Special Permits for Business or Manufacturing Use

N/A § 218-8 F Shared Driveways

N/A § 218-10.3 Large-scale ground mounted solar photovoltaic facilities

N/A § 218-9.3 Multifamily Use

N/A § 218-7.2 Water Resource Protection Districts

N/A § 218-7.3 Town Center Overlay District

Please list other required permits: Earth Removal & Stormwater Permit, Conservation Commission Order of Conditions

Property location:

The property is located on the following public way MAIN STREET & CHAMPNEY STREET

Zoning district: X R-A _____ R-B _____ VCN _____ NB

_____ GB _____ I _____ O X P

Overlay district _____ WRPD _____ Recreational _____ TCOD _____ Floodplain

Town of Groton Assessors' Map 111,110, Parcels 111-34, 110-43, 110-42

Recording information:

The owner's title to the land is derived under deed from Village Homes
Town of Groton
Louise B. Harrington,
dated 9/18/1991
7/13/1992
6/6/1950, recorded in Registry of Deeds, Book 21444
22392
7591, Page 502
34
109
OR Land Court Certificate of Title No. 70046, Book 468, Page 365.

Proposed use(s) Phase 2 Major Site Plan review submission includes the proposed 109,855 gross square foot (GSF) 2-story new Florence Roche Elementary School , demolition of the existing school, earthwork for the new/reconfigured main parking lot, all hard-scape elements, all remaining proposed utilities, all landscaping as well as site lighting surrounding the existing and new school site locations.

Total gross floor area	109,855 gsf
Number of employees	TBD
Number of seats in restaurant	N/A
Number of dwelling units (multifamily)	N/A
Capacity in place of public assembly	N/A
Number of rooms in lodging facility	N/A
Number of rooms in hospital/care facility	N/A
Number of classrooms in school	31

Parking Requirements:

Total number of required parking spaces	46.5
Proposed number of on-site parking spaces	108
Proposed number of on-street parking spaces	N/A

Proposed number of shared parking spaces N/A

Proposed number of accessible parking spaces 15
(See Architectural Access Board 521 CMR)

The following information must be submitted with the application:

X Three (3) copies of signed application form 2X HARDCOPIES, 1 ELECTRONIC

X Three (3) full-sized (24” x 36”) copies of the plan 2X HARDCOPIES, 1 ELECTRONIC

N/A Eight (8) reduced (11" x 17") copies of the plan for distribution to Town departments and Board members. **PDF of plans should be submitted electronically or on CD.**

X Supporting documentation required in § 218-2.5 G (1 & 2) and § 381-39. Plans shall be prepared, signed & stamped by a registered professional engineer & professional land surveyor at a minimum scale of 1”=40’.

X a) Boundary line information;

X b) Dimensions & locations of existing & proposed structures;

X c) General description of existing & proposed topography;

X d) Parking, loading, access & egress provisions;

X e) Storm drainage, including direction of flow & means of disposal;

X f) Provisions for and location of private/public sewer & water supply, including fire protection measures;

X g) Location of all existing & proposed utilities, signage, lighting, outdoor storage & trash disposal areas; size & capacity of utilities;

X h) Existing & proposed planting, landscaping & screening;

X i) Areas subject to protection under Wetlands Protection Act, MGL Chapter 131, Section 40;

X j) All easements, restrictions & covenants;

X k) Copies of variances or special permits, if applicable;

X l) Location & dimensions of any temporary structure, outdoor material storage & staging areas;

X m) Locus plan at scale of 1”=200’ showing all structures, streets, water bodies, floodplain elevations, landscape features, historic sites, and environmental features within 300’ of the subject parcel(s);

X n) Zoning district boundary lines & chart;

WAIVER REQUEST o) Existing & proposed topography at 2’ contour intervals for the site and land within 200’ of the property;

X p) Stormwater calculations;

X q) Traffic Impact Study prepared by professional traffic engineer;

X r) Landscaping plan, prepared by registered landscape architect, that includes location, size, type, & number of proposed landscape features;

X s) Location, size & type of parking, loading, storage, & service areas, hours of operation, delivery/export hours, lighting hours, public address systems, snow removal & snow storage areas;

X t) Photometric lighting plan & hours of operation;

WAIVER REQUEST u) Development Impact Report (if required);

X v) Existing conditions plan;

X w) Floor, elevation (scale of 1/8”=1’ or ¼”=2’) & façade plans for proposed & existing structures including external mechanical systems, screening and materials list;

X x) Location, name, ownership (public vs. private), and width of all streets within 300’ of the site;

X y) Written statement of development consequences;

X z) Physical or 3-dimensional model of project;

X aa) Cut & fill analysis, including proposed final grades of any on-site sewage disposal system;

X bb) Seven signature lines and statement that “This Site Plan Approval does not necessarily indicate compliance with Groton Zoning Bylaw.”

X Written statement addressing the criteria set forth in Groton Zoning By-Law § 218-2.3 C

X A list of abutters within 300 ft (verified by the Board of Assessors)

N/A Filing fee in accordance with the Fee Schedule § 381-29 B. *A Six Percent (6%) administrative fee will added to the filing fee (checks made out to the Town of Groton)*

INVOICE TO TOWN Project Review Fee in accordance with the Fee Schedule § 381-30.

Property Ownership Category (check one):

_____ Individual Ownership _____ Institutional/Non-profit

_____ Corporate Ownership _____ Institutional/Non-profit

_____ Corporate Ownership _____ Condominium Ownership

Other Ownership Type (specify) Groton Education C: GROTON-DUNSTABLE REGIONAL SCHOOL DIST.

DocuSigned by: Mark Haddad DED605666F27476...
Signature of applicant[1]

DocuSigned by: Laura Chesson 7BED7ABE73414DF...
Signature of landowner

3/31/2022
Date

4/4/2022
Date

Approved as to Completeness:

_____ _____
Land Use Director Date

Received by the Town Clerk:

_____ _____
Town Clerk Date

[1] *Where the owner is a corporation, institution, non-profit organization, or condominium association (whether residential or non-residential) the attached "Certificate of Authority" must be submitted indicating who has authority to sign this application on behalf of the owner.*

PROJECT NARRATIVE

Introduction:

The existing Florence Roche Elementary School is located at 342 Main Street in Groton, MA. The school is part of a larger campus, consisting of the Groton-Dunstable Regional Middle School (North and South Buildings) and the Peter Twomey Youth Center. The campus is owned and controlled by the Groton-Dunstable Regional School District. The campus is bordered by the Craftsmen Lumber Company and undeveloped areas to the North. To the South, are residential homes along Champney Street, and Main Street (Route 111) borders the property to the West. To the East of the site is Luina Greine Farm and undeveloped areas. The existing site includes a network of interconnected concrete walkways and asphalt driveway/parking areas adjacent to the campus buildings. An athletic track and grass playfields are located east of the schools. The entirely of the site is located within Zoning Districts: P,O, and RA

The Groton-Dunstable Regional School District (GDRSD) is a high performing, top-tier district, focusing upon academic achievement, social-emotional learning, and universally designed teaching and learning. The GDRSD's goal is to create a community of expert learners who are elevated and celebrated and provided with an education that addresses their unique and variable needs while also preparing them to be successful global citizens in the future. To achieve the GDRSD's goal a multi-tiered system of support with a focus on frameworks-based curriculum, Universal Design for Learning (UDL) and co-teaching must be developed and implemented at the new school. The new building will need to be student centered, as all programs within the building and will support Universal Design for Learning (UDL) so students can self-differentiate and receive targeted support and enrichment through a multi-tiered system of support (MTSS). Such a curriculum requires a variety of spaces that will support the pedagogical practices. Examples of spaces needed include core academic spaces for flexible use, spaces that emphasize collaboration, and additional dedicated breakout spaces. Thus, the ability to provide adequate and functional space within the new design is critical to the success of the educational structure. The building project for the Florence-Roche Elementary School will address the issues of the current overcrowding and the spatial needs for implementation of the district's target curriculum. Thus, the project aligns with the district's vision, mission, goals, and philosophy and allows the district to continue to provide a high quality education to the youngest learners as they prepare for their future.

During the feasibility study, it was found that the repair of the existing Florence Roche school building and site would require several major issues be addressed for code compliance, life safety, and durability. Although the basic structure of the school is sound, in order to retain the school building for durable use over the next several decades, virtually all systems within the building would have to be renovated or replaced. Additionally, the intent of the project is to address the needs for the implementation of an educational program consistent with the district and lifting the school boundary lines that were redrawn in Groton which would return approximately 107-120 Groton-students who currently attend school at the Swallow Union Elementary School located in Dunstable due to severe overcrowding. The study determined that a code upgrade or a renovation with an addition would not address all of the programmatic and space deficiencies. It was therefore decided to move forward with a new building and site. Further evaluation of all options established the preferred solution to be the construction of a new building east of the existing elementary school.

Existing Conditions:

The site for Florence Roche Elementary School project limit of work is 16± acres in size, Existing Condition Plans EX-1.1- EX-1.5 show the entire site including the land use, topographic features, site features and identified resources areas.

The primary entrance to the Florence Roche School site is located off of the arterial road Main Street (Route 111). A secondary access to the school is provided from the residential local road Champney Street, which extends to the south eastern side of the school. The primary parking area for the School campus is located on the west side of the main buildings and drop - off area. Secondary parking areas are located to the west and north of the Groton Dunstable Middle School and Florence Roche Elementary School. The site is comprised of a network of concrete / asphalt sidewalks and asphalt drive aisles providing vehicular and pedestrian access throughout the campus. The majority of these walkways, curbs, steps and drive aisles are in significant disrepair. Several of the buildings egresses and walkways appear not to be ADA accessible. All major utilities (water, sewer, drainage, gas, telecom, and electric) are available in vicinity of the existing sites and within adjacent public streets and drives.

Four (4) wetland resource areas have been delineated within project limits. The first is the wetland located on the northern portion of the school campus; the second environmentally-protected area is a wetland north-east of the existing athletic track; and the third and fourth areas are hydrologically connected wetlands along the southern portion of the site on either side of the lot.

Proposed Project:

The new elementary school consists of a proposed 109,855 gross square foot (GSF) 2-story new construction building located to the east of the existing Florence Roche Elementary School. Additionally, the project includes site improvements adjacent to the Elementary School, and a new 400m running track located northeast of the existing Middle School South building. The new Elementary School will have a total design enrollment of 645 students (Kindergarten through 4th grade) for the Town of Groton and the Groton-Dunstable Regional School District.

The proposed project will be a Phased project broken out into two (2) separate phases that are being permitted separately through the Planning Board Site Plan Approval process. Please see below for a detailed breakdown of the proposed phased construction.

The overall project scope consists of the demolition of the current elementary school (converting the area to mostly pervious open space) and existing track, in favor of the construction of a new elementary school building and relocated/new track. The majority of the new parking would be located to the southwest of the new school building. The school's driveway will extend east off the existing Main Street driveway, continue through the proposed parking lot, and loop in front of the southwest building entrance/drop-off zone. An emergency access road will be constructed from the proposed parking lot, looping around the new building, and connecting to the existing driveway south of the existing Groton Middle School. The emergency access road will also connect to the relocated track. The new building will be serviced via new utility connections, extending from existing on-site services (utility routing are shown on Civil plans C-4.1 – C-5.3) . The building will be oriented as close as possible to an east-west axis, and is positioned within the buffer zones of two separate wetland systems located to the north and south. (Note: The building is located within the 100' buffer, but outside of the 50' buffer zones on both sides) . New walkways are proposed throughout the site to meet MAAB/ADA regulations, and provide accessible paved paths throughout the site. New play areas will be also be constructed, and made ADA accessible with poured-in-place rubber surfaces.

Throughout the site, new plantings will be added to help soften the transition between the building, plazas, and lawns. The plantings used on site will have more function than just being purely ornamental. The landscaped areas will also be utilized as part of the outdoor classrooms. The outdoor classrooms provide opportunities for the students to learn about soils, forestry, wildlife, and plant and seed identification. Portions of the site contain resource areas and buffers. The use of native plants in these sensitive areas, and throughout the site help create a pollinator-friendly garden. With pollinators in decline, especially bees, providing a pollinator-friendly garden, will provide food and host plant benefits beyond what most non-native plants can offer in any landscape.

Phase 1 Previous Submittal:

As noted above, the proposed project is to be built in two phases. Phase 1 will incorporate the following (previously filed on February 28, 2022):

- Installation of all erosion and sediment control measures for the entire project (Phases 1 & 2).
- Full construction of new 400m track, including clearing/grubbing, earthwork, utility connections, track and field component installation, retaining wall construction, fence and gate installation, storm drainage conveyance system, including Underground Infiltration system #4, installation of turf, grasses and upland wetlands buffer seed mix (per Conservation Commission submittal).
- All Earthwork associated with the construction of the new school and proposed track (as noted above)
- Construction of new stormwater conveyance system throughout property, including areas north (rear drive) and east of Middle School (South), south of Middle School/north of existing Florence Roche school (along new bus pick-up/drop off route); surrounding the area of the new building location (along the emergency access road).
- Construction of Infiltration System #3 located along the new bus pick-up/drop off route
- Installation of new sanitary service along new bus pick-up/drop off route, that will serve the future school.
- Installation of new water service main connecting to existing on-site main within utility easement located between the existing school and future school building site. Water service main will be looped around the future school building site within the emergency access road.
- Construction of the small parking lot (28 total spaces) northwest of the existing school adjacent to the new bus pick-up/drop off route, asphalt paving not included.
- Underground electrical work extending through the utility easement that heads west in between the existing elementary and middle schools and extends to Champney Street, and the portions

Phase 2 Submittal:

Phase 2 will incorporate the following (and limits of work are designated on the Phase 2 Plan set submittal):

- Construction of the new elementary school building.
- Installation of Underground Infiltration Basins #1 and #2.
- Installation of all hardscape elements; including asphalt paving, concrete sidewalks, open space hardscape elements (courtyards, basketball court, etc.).
- Earthwork for the new/reconfigured main parking lot, including construction of retaining wall along south side of main parking lot.
- Demolition of existing school.

- Construction of open space area in place of existing school (as shown in plan set), including grading, underdrains, lighting and hardscape areas.
- All of the remaining utilities (including the final stormwater conveyance system connections) and all final connections not covered in Phase 1.
- Landscaping surrounding existing and new school site locations, including presentation of materials.
- Site lighting, including presentation of photometric site plans
- Battery Energy Storage System (BESS) – This system will be designed by GELD and will provide battery storage (storing unused electrical power from the grid) for emergency situations where the surrounding area may lose power (i.e. severe weather).

This planning board submission is for all work related to Phase 2 construction of the project and excludes all components of Phase 1 construction. Major Site Plan application for Phase 1 work was submitted on February 28, 2022 by Samiotes Consultants, Inc. Additionally, please reference Minor Site Plan application for trailers submitted on March 24, 2022 by the Gilbane Building Company.

Special Permits Criteria (Groton Section 218-2.3):

(1) Social, economic or community needs which are served by the proposal:

Due to severe overcrowding at the existing Florence Roche Elementary School, the school boundary lines that were redrawn in Groton which would return approximately between 107-120 Groton-students who currently attend elementary school at the Swallow Union Elementary School located in Dunstable. The proposed project will lift the redrawn school boundary lines with a total design enrollment of 645 students at the new Florence Roche Elementary School. Additionally, the proposed project will support the District's educational structure for academic success and will also provide the community benefits with a new athletic track and ADA accessible outdoor play areas.

(2) Traffic flow and safety:

The proposed project maintains the pedestrian access from main Street, while adding new separate drop-off/pick-up areas designated for school bus and private (parent/guardian drop-off/pick-up) traffic. An assessment was completed by MDM Transportation Consultants, Inc. (MDM), which found that the proposed increase of student enrollment and staffing is expected to result in less than 50 additional peak hour trips compared to the existing baseline conditions. The review indicated that the site can accommodate queues of more than 32 passenger cars (the maximum queue anticipated under normal operations) and a queue of 13 school buses with no impact to the main driveway circulation. MDM also provided an AutoTurn® analysis that indicates that the preferred parent drop- off/pick-up loop area can accommodate passenger vehicle turns. Likewise, the preferred bus drop-off/pick-up loop can accommodate standard 36-foot school buses

(3) Adequacy of utilities and other public services:

All major on-site utilities have the capacity to meet the needs of the proposed project. New utility extensions/connections are proposed to upgrade utility services to the site and new school building. A new, dedicated fire protection service for the school and hydrant loop will be installed to meet the requirements of the local fire department A separate new domestic water line will be installed off of the existing on-site main. All existing sewer lines and structures will be removed up within the limit of the new building. The new sewer service and manholes will tie into the 8" existing sewer main at a new manhole located within the school site. A new gas line will be tied into the existing underground service in the north parking lot and brought into the mechanical room. The electrical services will be updated to accommodate the loading requirements for the proposed project. Communications (Telephone, Cable TV, and Fiber Optic) located within the limits of proposed work will be replaced

and routed underground from the existing systems within the right-of-way into a new manhole. The proposed on-site stormwater management system meets or exceeds the Massachusetts Stormwater Regulations and the Groton Stormwater Bylaws. The Stormwater Management Design has been reviewed by the Town's Peer Review Consultant and approved by the local jurisdictional authority.

(4) Neighborhood character:

The Florence Roche Elementary School project is the proposed reconstruction of the existing Florence Roche Elementary school and athletic track on an existing campus with three active schools. Thus, it will not introduce a new incompatible use to the neighborhood. In fact, the updated school elements: new school, designed open space, landscaping and updated track will serve to enhance the neighborhood character.

(5) Impacts on the environment:

The project has been proposed to occur predominantly within previously developed/maintained land with portions within the 100' buffer zones, but outside the 50' buffer zones. To mitigate the potential for adverse impacts on the resource areas caused by work in the buffer zones during construction, a detailed soil erosion and sediment control plan has been developed and is represented within the submitted plan set. Proposed landscape enhancements to the buffer zones and a proposed enhanced planting area connecting 100' buffers on the east of the site are proposed and will be included as part of our future Phase 2 submission. The majority of parcel 111-34, lot east of the proposed track, as well as some land north of the proposed track, have been also be designated as a conservation restricted area (limits and legal documentation is being finalized as part of our Conservation Commission approval).

Furthermore, R.W. Sullivan Engineering conducted an energy model analysis, which confirmed that the proposed new Florence Roche Elementary School greatly exceeds MA Stretch Code requirements and puts the building on target for significant energy use reductions (with LEED V4 savings at 36% and 14 points). Design strategies contributing to the proposed building's energy efficiency include an improved building envelope, variable speed & energy recovery ventilation systems, displacement ventilation, demand controlled ventilation, high performance LED lighting, daylighting, and a DDC automatic temperature control system.

(6) Potential fiscal impact on the Town:

The total project budget is $78,650,734, which is all-inclusive. The Town is anticipating a reimbursement rate, including incentive points, of 51.92% of Eligible Costs from the Massachusetts School Building Authority (MSBA) grant reimbursement. The calculated reimbursement rate of eligible costs in a potential maximum facilities grant for the Florence Roche Elementary School is $25,740,090. The Local Share of the total project budget is estimated to be $52,910,644. The brunt of the tax impact to Groton taxpayers for the Florence Roche Elementary Building Project would be in the year 2025, upon construction completion. This project results in Groton Taxpayers being solely responsible for the capital expenses of Florence Roche Elementary School, instead of both Florence Roche and Swallow Union Elementary Schools per the regional agreement.

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(Hard-copy attached as a separate document)

APPENDIX 1:
ZONING MAP
USGS LOCUS MAP
STREET WIDTHS AND NAMES
SUPPLEMENTARY BUILDING VIEWS

Zoning Districts

Florence Roche Elementary School

February 22, 2022

1 inch = 500 Feet

0 500 1000 1500

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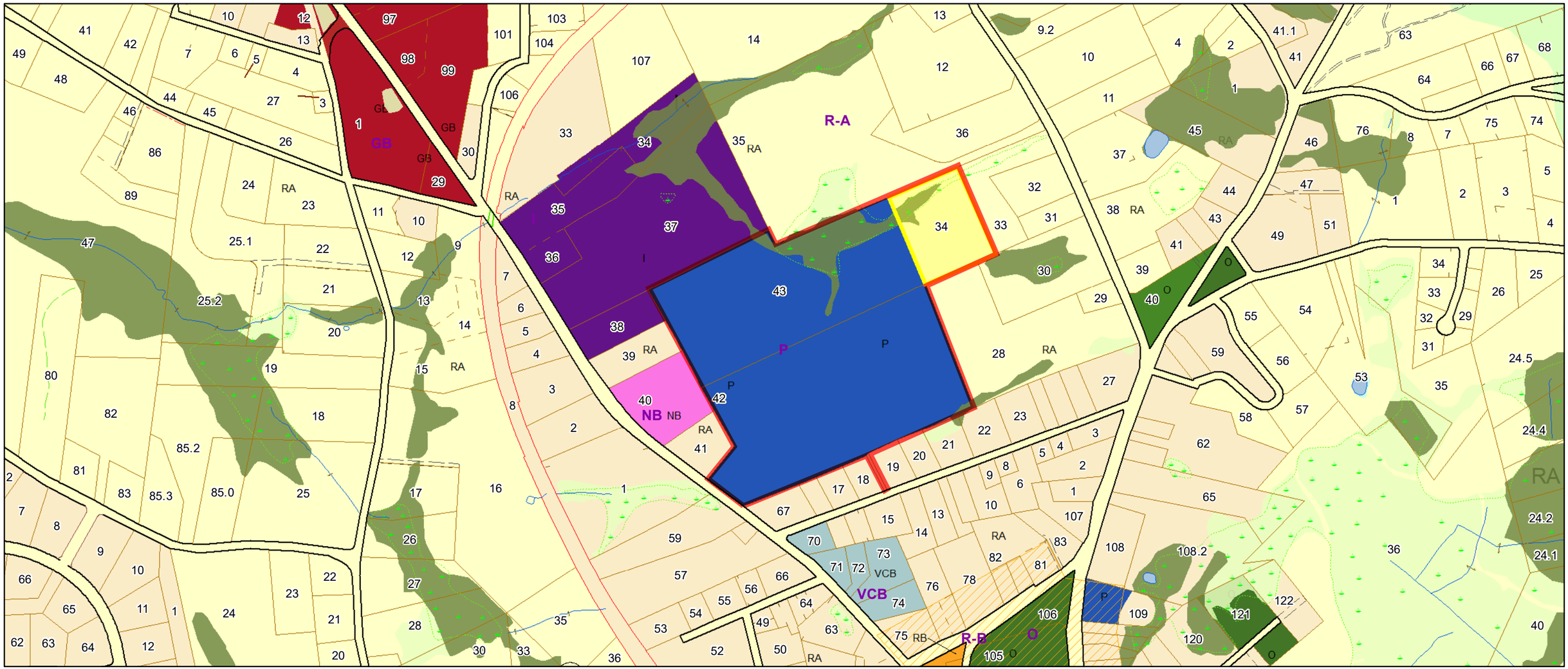

- Trail
- Wetland
- WaterLines
- Right of Way
- Utility
- Wet Areas
- Water-poly
- DEP Zone III
- 1
- GB: GENERAL/BUSINESS
- I: INDUSTRIAL
- NB: NEIGHBORHOOD BUSINESS
- O: OFFICIAL OPEN SPACE
- P: PUBLIC USE DISTRICT
- R-A: RESIDENTIAL/AGRICULTURAL
- R-B: RESIDENTIAL/BUSINESS
- VCB: VILLAGE CENTER BUSINESS
- Consolidated Center District

site

346 MAIN STREET
GROTON DUNSTABLE REGIONAL MIDDLE SCHOOL NORTH
BRICK BUILDING

344 MAIN STREET
GROTON DUNSTABLE REGIONAL MIDDLE SCHOOL SOUTH
BRICK BUILDING

342 MAIN STREET
FLORENCE ROCHE ELEMENTARY SCHOOL
BRICK BUILDING

MAIN STREET (AKA ROUTE 111 – S.H.L.O 690)

CHAMPNEY ST

CHAMPNEY STREET

MATCH LINE A

MATCH LINE B

MATCH LINE C

100 50 0 100 200

1 inch =100feet

Sketch No.	SKCE-001
Reference Drawing	

Job #:	19088.00
Drawn by:	CPDL
Scale:	1" = 100'
Date:	03-31-22

Project: FLORENCE ROCHE ELEMENTARY SCHOOL

Title: USGS LOCUS MAP

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Civil Engineers + Land Surveyors

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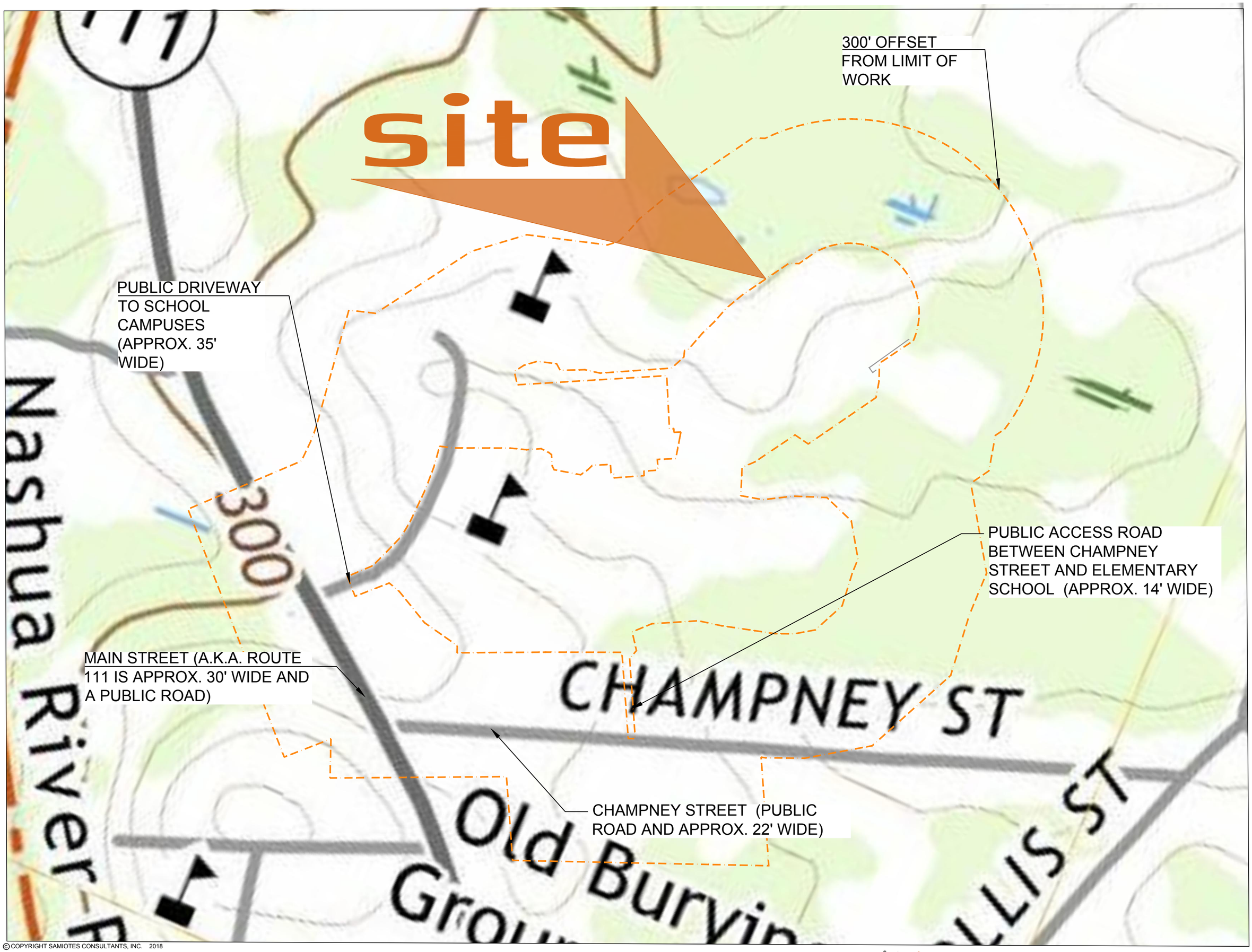

Sketch No.	SKCE-002
Reference Drawing	

Job #:	19088.00
Drawn by:	CPDL
Scale:	1" = 150'
Date:	03-31-22

Project: FLORENCE ROCHE ELEMENTARY SCHOOL

Title: STREET WIDTHS AND NAMES WITHIN 300' OF LOW

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samiotes

site

200' OFFSET FROM LIMIT OF WORK

Main Street

Groton Dunstable Regional Middle School

Florence Roche School

Champney Street

Hollis St

344-ft

MassHistoric Commission Inventory (Points)
- National Register of Historic Places
- Preservation Restriction
- Massachusetts Historic Landmark
- Local Historic District
- NRHP and LHD
- Inventoried Property

DEP Wetlands Outlines Only

NHESP Priority Habitats of Rare Species

Property Tax Parcels

Sketch No.	SKCE-003
Reference Drawing	
Job #:	19088.00
Drawn by:	CPDL
Scale:	1" = 150'
Date:	03-31-22

Project: FLORENCE ROCHE ELEMENTARY SCHOOL

Title: SUPPLEMENTARY BUILDING VIEWS WITHIN 200' OF LOW

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APPENDIX 2:
TRAFFIC IMPACT STUDY

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

PRINCIPALS
Robert J. Michaud, P.E.
Daniel J. Mills, P.E., PTOE

MEMORANDUM

DATE: December 1, 2020

TO: Ms. Meryl Nistler, AIA, MCPPO, LEED AP
Studio G Architects
179 Boylston Street
Jamaica Plain, MA 02130

FROM: Daniel J. Mills, P.E., PTOE – Principal
Daniel A. Dumais, P.E. – Senior Project Manager

RE: **Proposed Florence Roche Elementary School**
342 Main Street, Groton, MA

MDM Transportation Consultants, Inc. (MDM) has prepared an initial assessment of on-site circulation for the proposed Florence Roche Elementary School, to be located at 342 Main Street in Groton, Massachusetts. The location of the Site relative to the adjacent roadway network is shown in **Figure 1**. This initial effort provides an estimate for site trips generated during peak traffic hours, pick-up/drop-off operations, and recommendations to enhance site access and circulation as the site design advances.

PROJECT DESCRIPTION

Existing Conditions

The existing Florence Roche Elementary School is currently located at 342 Main Street in Groton in a shared campus environment with other Groton-Dunstable Regional School District facilities, including the Groton-Dunstable Regional Middle Schools, Groton-Dunstable Regional School District Administration and the Peter Twomey Youth Center. Access to these facilities are all provided via a single driveway along Main Street (342-346 Main Street). A sidewalk is provided along both sides of the main site driveway with individual drop-off/pick up areas dedicated to each of the facilities.

Proposed Florence Roche Elementary School

Under the proposed development plan, the Groton-Dunstable School District proposes to construct a new Florence Roche Elementary School (grades K through 4) and associated parking and outdoor space to provide primary education opportunities for its students. The existing school and its associated one-way drop-off/pick-up loops will be removed. Vehicle and pedestrian access from Main Street will be maintained while new separate drop-off/pick-up areas will be designated for both school bus and private (parent/guardian) traffic.

Figure 1

Site Location

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: December 2020
Dwg No. 1080 MR01.dwg

The following assumptions are made based on information provided by the Project Team:

- *Enrollment/Staffing.* The school is expected to accommodate a maximum of 645 elementary students and approximately 85 staff. The new school will allow for 120± elementary age students to relocate back into Groton's Florence Roche Elementary School from Dunstable's Swallow Union Elementary School.

- *Typical Operating Hours.* Similar to existing scheduling, the general hours of operation for Florence Roche Elementary School will be 8:45 AM to 3:20 PM with before school care between 7:00 AM to 8:45 AM and after school programming until 6:00 PM held at the Twomey Youth Center. The primary morning drop-off periods is 7:55 AM to 8:55 AM and the afternoon pick-up period will occur between 2:30 PM to 3:30 PM. Kindergarten is a half day program and releases at 12:15 PM.

- *School Bus/Van Fleet.* The operations anticipate up to 13 school buses and up to 4 vans during the morning drop-off period and afternoon pick-up period.

- *Staff Arrival/Dismissal.* Consistent with operations at other schools that are located in the Commonwealth, it is anticipated that the majority of professional staff will typically arrive 30 minutes or more before school starting hours and leave approximately 15 minutes after dismissal unless leading an after-school activity.

- *Before School Program.* The school provides a before school program between 7:00 AM and 8:45 AM with 60± students expected to participate in the program. School bus service is not available for the program.

- *Kindergarten Half Day Program.* The school provides a half day Kindergarten program with approximately 25 students expected to participate in the program. The program is dismissed at 12:15 PM each day with pick-up expected to be provided by two (2) school buses and parent vehicles.

- *After School Program.* The after-school programs are held at the Twomey Youth Center and are scheduled between 3:20 PM and 6:00 PM with an expected participation by approximately 25% of the projected student enrollment (i.e., 160± students). School bus service is not available for the after school program.

- *Transportation Mode.* Based on a typical school day with standard arrival/dismissal, the school anticipates 90% of the students (580± students) will be transported via school bus, 10% (65± students) via parent drop-off/pick-up, and very few if any students will walk or bike to school.

- *Parking*. As shown on the preliminary site plan, 90 total parking spaces are allocated for the elementary school which include 6 accessible parking spaces.

The above-mentioned assumptions are based on information provided by the Florence Roche Elementary School staff. Due to the school closure in March 2020 for the Covid-19 pandemic, actual site trip generation, travel mode split data and arrival and dismissal patterns were not able to be collected.

A traffic management plan (TMP) should be implemented at Florence Roche Elementary School to manage pick-up/drop-off activity at the Site and vehicle queue management. These TMP practices are assumed for the proposed facility as described in more detail under *Site Access and Circulation*.

Trip Generation – Florence Roche Elementary School

Trip generation estimates are derived for the critical school activity periods including morning and afternoon pick-up/drop-off periods based on projected site programming characteristics for Florence Roche Elementary School. A detailed trip generation summary for the site, based on a projected maximum student enrollment of 645 students and approximately 85 staff members, including a breakdown of vehicular trips by staff member and student pick-up/drop off is presented in **Table 1** and is described below. It is expected that most of the students will use a school bus to/from school, based on data provided by the school staff.

TABLE 1
DETAILED TRIP-GENERATION SUMMARY
FLORENCE ROCHE ELEMENTARY SCHOOL (645 STUDENTS & 85 STAFF)

	Vehicle-trips[1]			
Period	Staff Auto	Student Auto	School Bus	Total
Morning Peak-Hour (7:55-8:55 AM):				
Enter	77	65	13	**155**
Exit	--	65	13	**78**
Total	77	130	26	**233**
Evening Peak-Hour (2:30-3:30 PM):				
Enter	--	48	13	**61**
Exit	64	48	13	**125**
Total	64	96	26	**186**

[1] Peak hour trip estimates based on empirical trip generation data provided by the Florence Roche Elementary School assuming full capacity (645 students) and 85± staff. The analysis also assumes that 8% of the students would participate in the before school program and 25% would participate in the after-school program with the proportional percentage of staff arriving prior to 7:55 AM and departing after 3:30 PM.

As presented in **Table 1,**

- *Morning Peak Hour.* Trip generation during the morning peak hour is approximately 233 vehicle-trips (155 entering and 78 exiting), including 65 parent/guardian drop-off vehicles, 13 school buses, and 77 staff vehicles.

- *Evening Peak Hour.* Trip generation during the evening peak hour is approximately 186 vehicle-trips (61 entering and 125 exiting), including 48 parent/guardian pick-up vehicles, 13 buses, and 64 staff vehicles.

In summary, the projected peak design volume for school pick-up/drop-off activity (i.e., trips that must be actively managed by staff within the Site) is 65 autos and 13 school buses during the drop/off period and 48 autos and 13 school buses during the afternoon pick-up periods. MDM notes that the project will result in an increase in enrollment at the Site by approximately 20% (120 students) whom will be re-assigned back to Groton's Florence Roche Elementary School from Dunstable's Swallow Union Elementary School. Overall, the projected increase student enrollment as well as staffing is expected to result in less than 50 additional peak hour trips compared to the Baseline conditions.

SITE ACCESS AND CIRCULATION

Site access and circulation recommendations should be incorporated into the preliminary site plan to facilitate safe and efficient pedestrian, school bus, and passenger vehicle operations at the Site. MDM recommends that the Florence Roche Elementary School develop a traffic management plan (TMP) aimed at enhancing school pick-up/drop off operations, parking activity and site circulation including elements noted in this evaluation.

The preliminary site access and circulation plan will need to accommodate approximately 90 parking spaces for staff with a dedicated parent vehicle pick-up/drop-off area, separate bus pick-up/drop-off area, and 2 to 4 van spaces. Based on transportation mode data provide by the school, vehicle queue capacity for this plan will need to accommodate approximately (32) passenger cars during peak pick-up/drop-off periods and 13 school buses.

MDM has provided an AutoTurn® analysis that indicates that the preferred parent drop-off/pick-up loop area can accommodate passenger vehicle turns (see **Figure 2**). Likewise, the preferred bus drop-off/pick-up loop can accommodate standard 36-foot school buses (see **Figure 2**). The review indicates that the site can accommodate queues of more than 32 passenger cars (the maximum queue anticipated under normal operations) and a queue of 13 school buses with no impact to the main driveway circulation (see **Figure 3**). The maximum

NOTES

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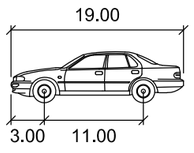
2. FINAL DESIGN IS SUBJECT TO FIELD SURVEY BY OTHERS.
3. PROPERTY LINES AND ACCESS LINE LOCATIONS ARE APPROXIMATE ONLY AND ARE SUBJECT TO DEED AND TITLE RECORDS.

FIGURE 2



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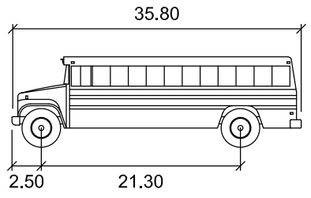
Track	:	6.00 FT.
Lock to Lock Time	:	6.0 SEC.
Steering Angle	:	31.6°



S-BUS-36

Width	:	8.00 FT.
Track	:	8.00 FT.
Lock to Lock Time	:	6.0 SEC.
Steering Angle	:	37.6°

SCALE
0 15 30 60 90 FEET

Autoturn Analysis

FLORENCE ROCHE ELEMENTARY SCHOOL
342 MAIN STREET
GROTON, MASSACHUSETTS
PREPARED FOR:
STUDIO G ARCHITECTS
179 BOYLSTON STREET
JAMAICA PLAIN, MA 02130

MDM TRANSPORTATION CONSULTANTS, INC.
PLANNERS & ENGINEERS
28 Lord Road, Suite 280
Marlborough, MA 01752
Tel: (508) 303-0370
Fax: (508) 303-0371

DATE: December 1, 2020 | SCALE: As Noted
PROJECT No. 1080 | File: 1080 MR01.dwg | Sheet 1 of 1

NOTES

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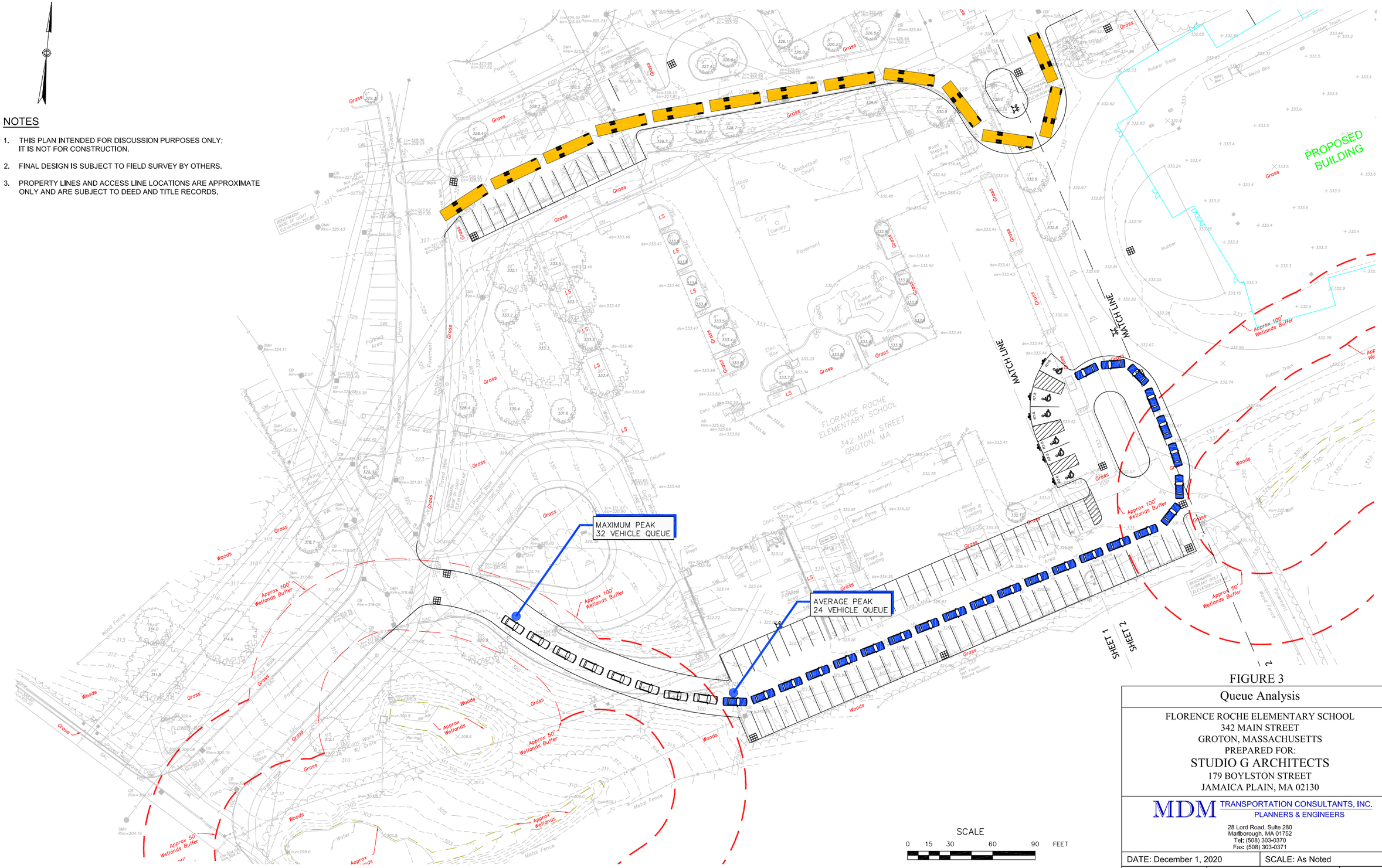

FIGURE 3

Queue Analysis

FLORENCE ROCHE ELEMENTARY SCHOOL
342 MAIN STREET
GROTON, MASSACHUSETTS
PREPARED FOR:
STUDIO G ARCHITECTS
179 BOYLSTON STREET
JAMAICA PLAIN, MA 02130

MDM TRANSPORTATION CONSULTANTS, INC.
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DATE: December 1, 2020	SCALE: As Noted	
PROJECT No. 1080	File: 1080 MR01.dwg	Sheet 1 of 1

vehicle queues would occur during the weekday afternoon peak dismissal period and would block approximately 50% of the parking spaces at the school.

RECOMMENDATIONS AND CONCLUSIONS

Based on our review of the proposed site programming, projected trip generation characteristics, mode share use, site circulation and queue impacts and parking needs, MDM recommends consideration of the following items as the site design advances with the key items noted on **Figure 4**.

A. The corner radii for the proposed bus loop back to the shared main driveway aisle should be further reviewed and improved if necessary, to accommodate school bus entering and exit movements. Currently, the area to be used for the bus loop is restricted to right turns only with the main driveway for the school complex restricted to one-way northbound operations in this area, therefore, bus traffic exiting the bus loop will be required to either:
    - Turn right and loop around the central parking lot to exit the school complex, or
    - The left turn restriction will need to be reviewed and rescinded to allow for two-way travel along the main driveway for the school complex.

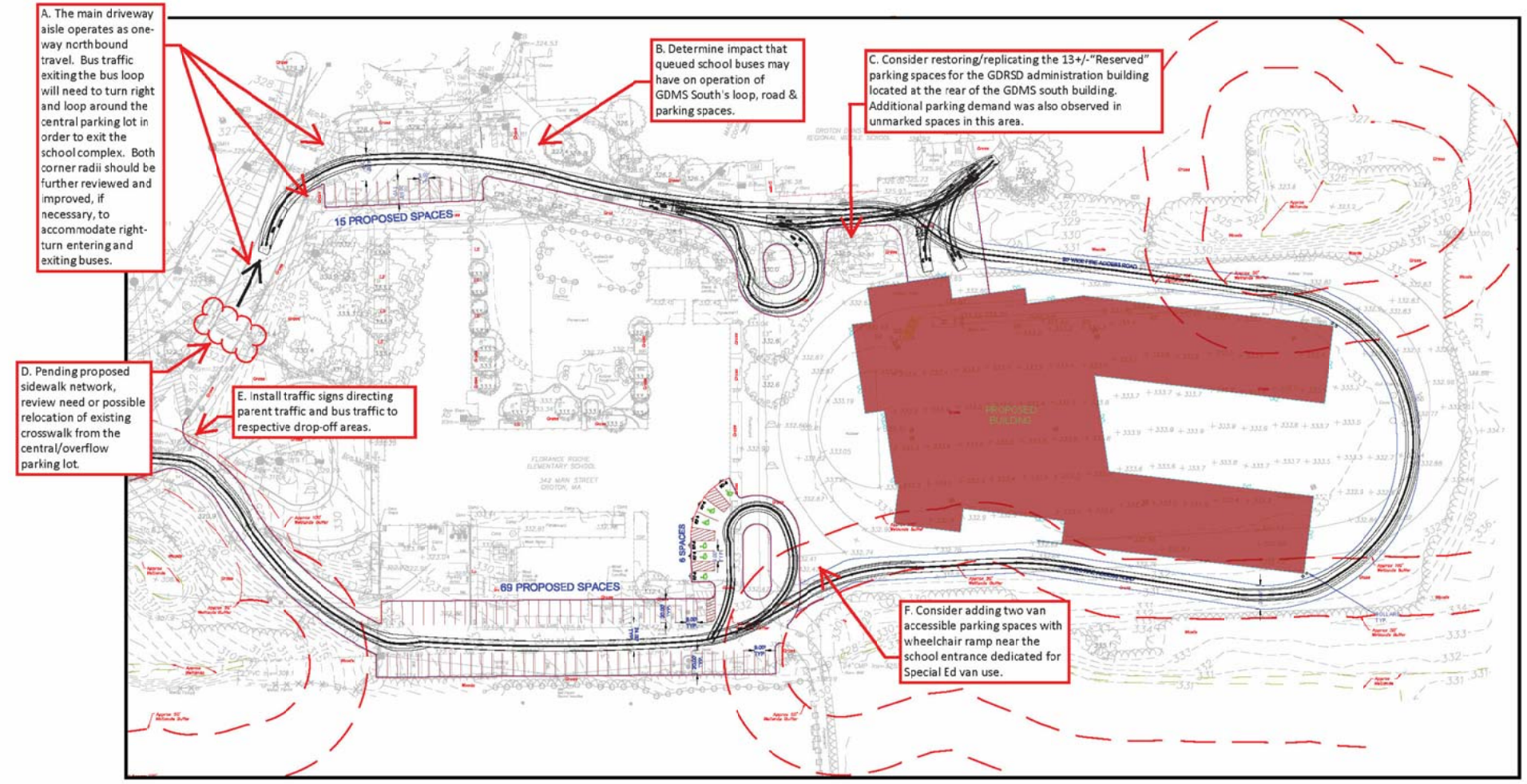
B. Determine the impact that the queued school buses (primarily an afternoon issue) may have on operations of the Groton-Dunstable Middle School South loop road and parking spaces. Likewise, the main parking area (75± spaces) for the Florence Roche Elementary school will likely be blocked during the afternoon pick-up period.

C. Consider restoring/replicating the 13± "reserved" parking spaces for the Groton-Dunstable Regional School District administration building which is located at the rear of the Groton-Dunstable Middle School South building. MDM notes that additional parking demand was observed in this area within unmarked spaces which should be accommodated elsewhere.

D. The proposed sidewalk network should account for the existing connections/crosswalks that connects the elementary school to the central/overflow parking lot. Relocating the crosswalks may be necessary to maintain connectivity.

E. Install directional traffic signs to guide parent and bus traffic to their respective drop-off/pick-up areas.

F. Consider adding two van accessible parking spaces with a wheelchair ramp near the proposed school entrance and designate for special education van use.



Site Plan Source: Samiotes Consultants, Inc.

Figure 4

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Florence Roche Elementary School Project
Annotated Site Plan

Date: December 2020
Dwg No. 1080 MR01.dwg

APPENDIX 3:
STAMPED CUT & FILL ANALYSIS

Florence Roche Grading Analysis

Revised 1-25-2022

Project Total Quantities - Phase 1 (C302 and C303)		
Cut / Over-excavate / Haul offsite	19,267	cy
Cut to Fill	6,710	cy
Borrow at Bldg Pad	13,447	cy
Borrow at Roadway and Parking	981	cy
Borrow at Track & Field Areas	5,963	cy

Project Total Quantities - Phase 2 (C301)		
Strip Topsoil, amend, reuse onsite	1,753	cy
Total Cut	7,748	cy
Backfill From Cut Above to Landscape Areas	4,159	cy
Borrow Fill required	3,589	cy

Cut & Fill By Drawing

P2	**Dwg C301**		
	Strip to Haul Offsite	1,753	cy
	Cut to Fill	4,159	cy
	Cut to Haul	3,589	cy
P1	**Dwg C302**		
	Over-excavate / Strip @ Pad, 36"	6,550	cy
	Over-excavate / Strip @ other areas outside building Pad	7,246	cy
	Additional Cut	886	cy
	Total Cut	**14,682**	**cy**
	Haul Offsite Surplus Over Excavated Material (less Fill in Landscaped Area:	**12,583**	cy
	Fill in Landscaped Areas (From Over-excavated Material Above)	2,099	cy
	Borrow Fill @ Over Excavated Areas / Bldg Pad (w/o expansion factor)	10,525	cy
	Borrow Fill under Roadyways (w/o expansion factor)	981	cy
	Add'l Fill outside Bldg Pad (w/o expansion factor)	2,922	cy
	Total Borrow Fill (Import)	**14,428**	cy
	Total Fill Including Borrow and Cut to fill	**16,527**	cy
P1	**Dwg C303**		
	Strip to Haul Offsite	6,684	cy
	Cut to Fill	4,611	cy
	Borrow Fill Required (w/o expansion factor)	5,963	cy

3-30-22

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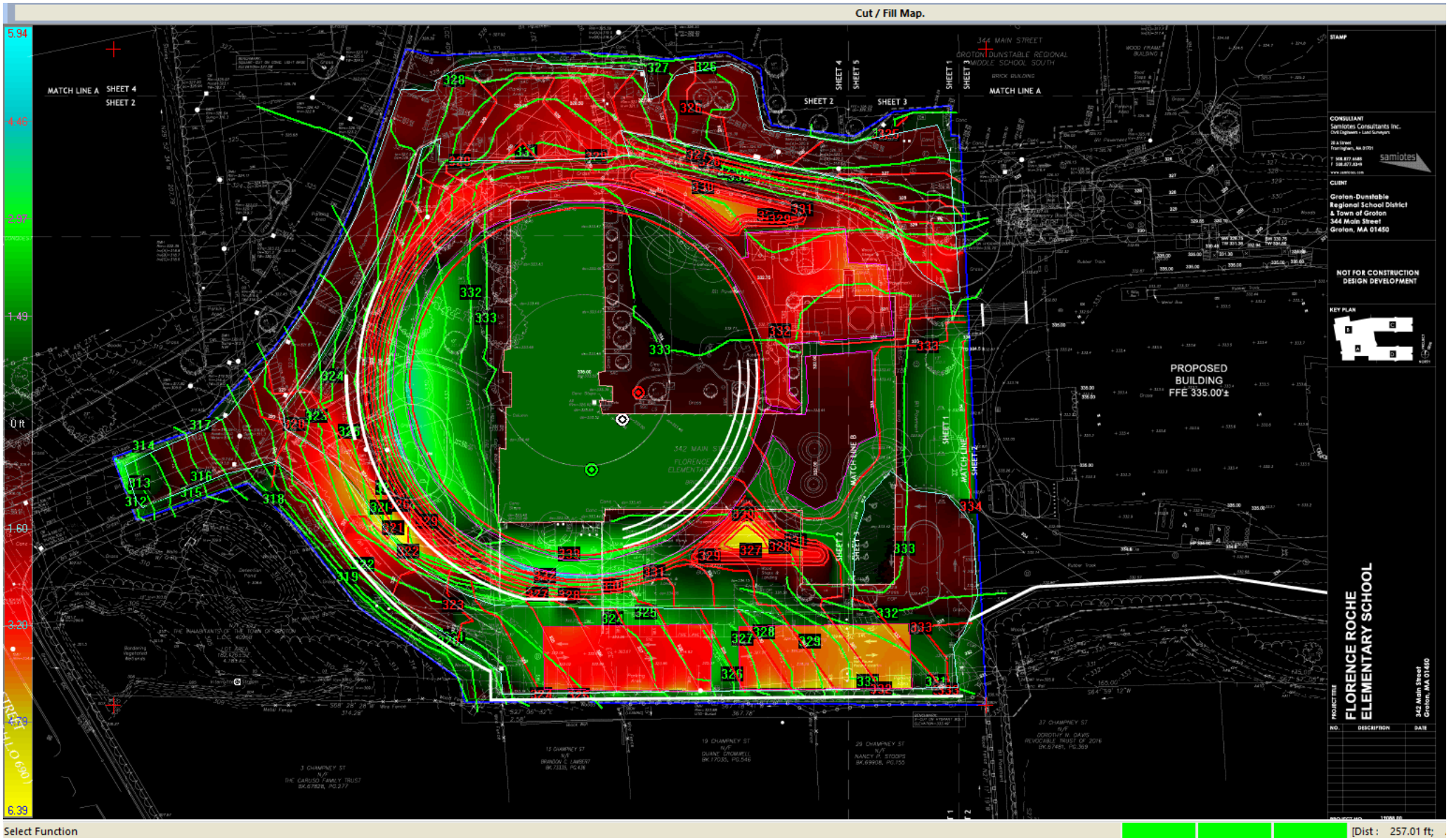

WinEx Master Site Report

File: FLORENCE GRADING C301 Boundry Dwg C301 Jan 25, 2022 6:13 am
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Start layer: Existing End layer: Proposed Final

COMPREHENSIVE QUANTITIES FOR JOB

Site Adjustments

Proposed grades adjusted down by subgrade areas:

Paving	11.00 in
Reloam Areas	4.00 in
Reloam Areas	4.00 in
Infiltration Fields	60.00 in
Hardscape	17.00 in

Basic Site Info	Area	Acres
Total Work Area	243022 ft²	5.58 acres
Existing Surface Area	245154 ft²	5.63 acres
Proposed Surface Area	251485 ft²	5.77 acres
Plan View Area Cut	137472 ft²	3.16 acres
Plan View Area Fill	102269 ft²	2.35 acres
Perimeter	2123 ft	

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Job - Boundry Dwg C301

Bank Site Cut:	**7748 yd³**
Bank Site Fill:	**4159 yd³**
Export:	**3588 yd³**
Import Required (Bank):	**0 yd³**
Import Required (Estimated):	**0 yd³**
Average Haul Distance:	**69 ft**
Imported Materials:	**3711 yd³**

Over Excavation :

Side Cut :	0 yd³
Fill Volume :	0 yd³

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Cut/Fill Breakdown: Boundry Dwg C301

SITE CUTS

Total Bank Cut	7748 yd³	Expanded Cut	7748 yd³

SITE FILLS

Total Bank Fill	4159 yd³

IMPORTED MATERIALS

Total Imported Materials	**3711 yd³**	**5371 tons**
Comprised of:	Volume	Tons
Crushed Stone	3318 yd³	4978 tons
Concrete	393 yd³	393 tons

WinEx Master Region Report

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Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Region: Paving

Region Adjustments

Downward for Subgrade materials: 11.00 in

Basic Region Info	Area	Acres
Region Area	74545 ft²	1.71 acres
Existing Surface Area	74814 ft²	1.72 acres
Proposed Surface Area	77620 ft²	1.78 acres
Plan View Area Cut	61355 ft²	1.41 acres
Plan View Area Fill	12928 ft²	0.30 acres

Perimeter 3315 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Paving

Bank Region Cut:	**3911 yd³**
Bank Region Fill:	**424 yd³**
Region Export:	**3486 yd³**
Region Borrow Required (Bank):	**0 yd³**
Region Borrow Required (Estimated):	**0 yd³**

Average Haul Distance: **137 ft**

Cut/Fill Breakdown: Paving

REGION CUTS
Region Bank Cut 3911 yd³ Expanded Cut 3911 yd³

REGION FILLS
Region Bank Fill 424 yd³

WinEx Master Region Report

File: FLORENCE GRADING C301 Boundry Dwg C301 Jan 25, 2022 6:13 am
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Start layer: Existing **End layer: Proposed Final**

Subtotals for Region: Reloam Areas

Region Adjustments

Downward for Subgrade materials: 4.00 in

Basic Region Info	Area	Acres
Region Area	5380 ft²	0.12 acres
Existing Surface Area	5468 ft²	0.13 acres
Proposed Surface Area	5412 ft²	0.12 acres
Plan View Area Cut	3236 ft²	0.07 acres
Plan View Area Fill	2082 ft²	0.05 acres

Perimeter 714 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Reloam Areas

Bank Region Cut:	**94 yd³**
Bank Region Fill:	**38 yd³**
Region Export:	**57 yd³**
Region Borrow Required (Bank):	**0 yd³**
Region Borrow Required (Estimated):	**0 yd³**
Average Haul Distance:	**111 ft**

Cut/Fill Breakdown: Reloam Areas

REGION CUTS
Region Bank Cut 94 yd³ Expanded Cut 94 yd³

REGION FILLS
Region Bank Fill 38 yd³

WinEx Master Region Report

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Subtotals for Region: Reloam Areas

Region Adjustments

Downward for Subgrade materials: 4.00 in

Basic Region Info	Area	Acres
Region Area	41187 ft²	0.95 acres
Existing Surface Area	41640 ft²	0.96 acres
Proposed Surface Area	42556 ft²	0.98 acres
Plan View Area Cut	29144 ft²	0.67 acres
Plan View Area Fill	11910 ft²	0.27 acres

Perimeter 2190 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Reloam Areas

Bank Region Cut:	**2066 yd³**
Bank Region Fill:	**680 yd³**
Region Export:	**1387 yd³**
Region Borrow Required (Bank):	**0 yd³**
Region Borrow Required (Estimated):	**0 yd³**
Average Haul Distance:	**142 ft**

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Cut/Fill Breakdown: Reloam Areas

REGION CUTS
Region Bank Cut 2066 yd³ Expanded Cut 2066 yd³

REGION FILLS
Region Bank Fill 680 yd³

WinEx Master Region Report

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Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Region: Infiltration Fields

Region Adjustments

Downward for Subgrade materials: 60.00 in

Basic Region Info	Area	Acres
Region Area	12784 ft²	0.29 acres
Existing Surface Area	12800 ft²	0.29 acres
Proposed Surface Area	12825 ft²	0.29 acres
Plan View Area Cut	12798 ft²	0.29 acres
Plan View Area Fill	0 ft²	0 acres
Perimeter	717 ft	

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Infiltration Fields

Bank Region Cut:	**1706 yd³**
Bank Region Fill:	**0 yd³**
Region Export:	**1706 yd³**
Region Borrow Required (Bank):	**0 yd³**
Region Borrow Required (Estimated):	**0 yd³**
Imported Materials:	**2375 yd³**

Cut/Fill Breakdown: Infiltration Fields

REGION CUTS
Region Bank Cut 1706 yd³ Expanded Cut 1706 yd³

REGION FILLS
No Native Fill

IMPORTED MATERIALS
Region Imported Materials **2375 yd³** **3563 tons**

Comprised of:	Volume	Tons
Crushed Stone	2375 yd³	3563 tons

WinEx Master Region Report

File: FLORENCE GRADING C301 Boundry Dwg C301 Jan 25, 2022 6:13 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Region: Hardscape

Region Adjustments

Downward for Subgrade materials: 17.00 in

Basic Region Info	Area	Acres
Region Area	25446 ft²	0.58 acres
Existing Surface Area	25671 ft²	0.59 acres
Proposed Surface Area	25470 ft²	0.58 acres
Plan View Area Cut	20873 ft²	0.48 acres
Plan View Area Fill	4592 ft²	0.11 acres

Perimeter 2384 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Hardscape

Bank Region Cut:	**1183 yd³**
Bank Region Fill:	**294 yd³**
Region Export:	**890 yd³**
Region Borrow Required (Bank):	**0 yd³**
Region Borrow Required (Estimated):	**0 yd³**
Average Haul Distance:	**263 ft**
Imported Materials:	**1336 yd³**

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Cut/Fill Breakdown: Hardscape

REGION CUTS
Region Bank Cut 1183 yd³ Expanded Cut 1183 yd³

REGION FILLS
Region Bank Fill 294 yd³

IMPORTED MATERIALS
Region Imported Materials **1336 yd³** **1808 tons**

Comprised of:	Volume	Tons
Concrete	393 yd³	393 tons
Crushed Stone	943 yd³	1415 tons

WinEx Master Region Report

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Start layer: Existing End layer: Proposed Final

Subtotals for Region: Reloam Areas

Region Adjustments

Basic Region Info	Area	Acres
Region Area	58052 ft²	1.33 acres
Existing Surface Area	58654 ft²	1.35 acres
Proposed Surface Area	58059 ft²	1.33 acres
Plan View Area Cut	11530 ft²	0.26 acres
Plan View Area Fill	44964 ft²	1.03 acres

Perimeter 858 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Reloam Areas

Bank Region Cut:	**106 yd³**
Bank Region Fill:	**1894 yd³**
Region Export:	**0 yd³**
Region Borrow Required (Bank):	**1788 yd³**
Region Borrow Required (Estimated):	**1788 yd³**
Average Haul Distance:	**75 ft**

Cut/Fill Breakdown: Reloam Areas

REGION CUTS
Region Bank Cut 106 yd³ Expanded Cut 106 yd³

REGION FILLS
Region Bank Fill 1894 yd³

Borrow Required (Bank) 1788 yd³

WinEx Master Pad Report

File: FLORENCE GRADING C301 Boundry Dwg C301 Jan 25, 2022 6:13 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Pad: Extg Bldg SOG and foundations 18" (no basement)

Pad Adjustments

Existing grades adjusted down by stripping: 18 in Stripping Volume 2555 yd³

Basic Pad Info	Area	Acres
Pad Area	45984 ft²	1.06 acres
Existing Surface Area	45984 ft²	1.06 acres
Proposed Surface Area	45984 ft²	1.06 acres
Plan View Area Cut	11010 ft²	0.25 acres
Plan View Area Fill	34868 ft²	0.80 acres

Perimeter 1476 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Extg Bldg SOG and foundations 18" (...

Bank Pad Cut:	**342 yd³**
Bank Pad Fill:	**1263 yd³**
Pad Export:	**0 yd³**
Pad Borrow Required (Bank):	**920 yd³**
Pad Borrow Required (Estimated):	**920 yd³**
Average Haul Distance:	**142 ft**

Cut/Fill Breakdown: Extg Bldg SOG and foundations 18" (...

PAD CUTS
Pad Bank Cut 342 yd³

PAD FILLS
Pad Bank Fill 1263 yd³

Borrow Required (Bank) 920 yd³

WinEx Master Material Report

File: FLORENCE GRADING C301 Boundry Dwg C301 Jan 25, 2022 6:13 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Material Totals for Job

	Volume	Tons
Crushed Stone	**3318 yd³**	**4978 tons**
Infiltration Fields	2375 yd³	3563 tons
Hardscape	943 yd³	1415 tons
Concrete	**393 yd³**	**393 tons**
Hardscape	393 yd³	393 tons

Town of Groton Planning Board
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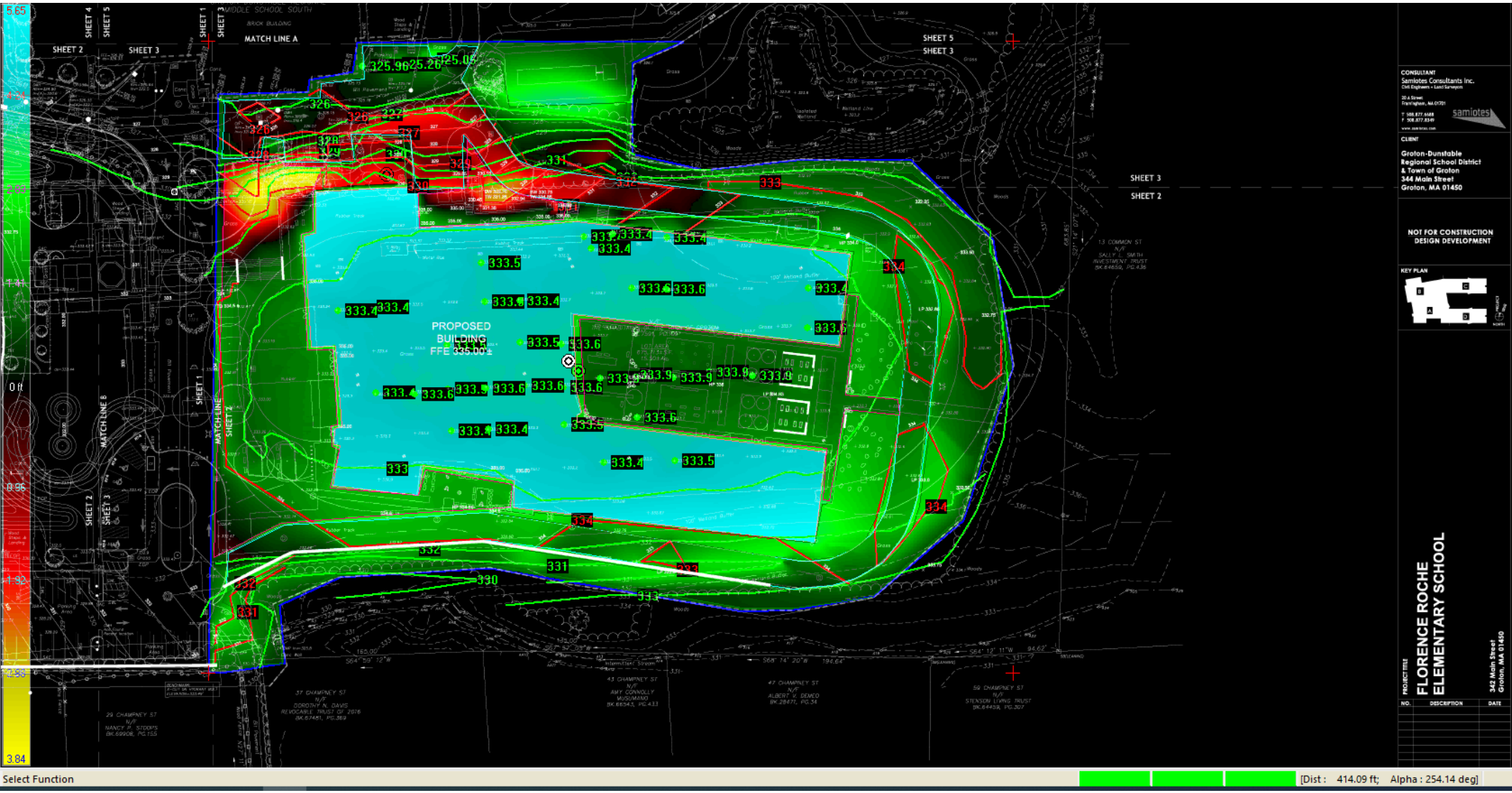

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WinEx Master Site Report

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Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

COMPREHENSIVE QUANTITIES FOR JOB

Note : Proposed work entered outside of LOD has been ignored!

Site Adjustments

Existing grades adjusted down by stripping:

Boundry Dwg C302 (Less any Excluded Areas)	10.00 in	Stripping Volume (bank)	6550 yd³
PAD <no name>	36.00 in	Stripping Volume (bank)	7246 yd³

Total Strip Volume (Expanded @ 0%) **13796 yd³**

Proposed grades adjusted down by subgrade areas:

PAD <no name>	15.00 in
Paving	11.00 in
Reloam Areas	4.00 in
Reloam Areas	6.00 in
Hardscape	13.00 in

Basic Site Info	Area	Acres
Total Work Area	207452 ft²	4.76 acres
Existing Surface Area	212226 ft²	4.87 acres
Proposed Surface Area	211583 ft²	4.86 acres
Plan View Area Cut	20760 ft²	0.48 acres
Plan View Area Fill	186332 ft²	4.28 acres
Perimeter	2058 ft	

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Job - Boundry Dwg C302

Bank Site Cut:	**886 yd³**
Bank Site Fill:	**16527 yd³**
Export:	**0 yd³**
Import Required (Bank):	**15641 yd³**
Import Required (Estimated):	**15641 yd³**

Town of Groton Planning Board
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Average Haul Distance: **204 ft**
Imported Materials: **5851 yd³**

Over Excavation :
Side Cut : 0 yd³
Fill Volume : 0 yd³

Cut/Fill Breakdown: Boundry Dwg C302

SITE CUTS
Total Bank Cut 886 yd³ Expanded Cut 886 yd³

SITE FILLS
Total Bank Fill 16527 yd³

Borrow Required (Bank) 15641 yd³

IMPORTED MATERIALS

Total Imported Materials	**5851 yd³**	**7946 tons**
Comprised of:	Volume	Tons
SOB 5"	1006 yd³	2013 tons
Gravel Base 10"	2013 yd³	2013 tons
Asphalt	309 yd³	464 tons
Gravel Base 8"	825 yd³	1238 tons
Concrete	653 yd³	653 tons
Crushed Stone	1044 yd³	1567 tons

WinEx Master Region Report

File: FLORENCE GRADING C302 Boundry Dwg C302 Jan 25, 2022 6:24 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing **End layer: Proposed Final**

Subtotals for Region: Paving

Region Adjustments

Downward for Subgrade materials: 11.00 in

Basic Region Info	Area	Acres
Region Area	33376 ft²	0.77 acres
Existing Surface Area	33462 ft²	0.77 acres
Proposed Surface Area	33423 ft²	0.77 acres
Plan View Area Cut	10864 ft²	0.25 acres

Plan View Area Fill 22273 ft² 0.51 acres

Perimeter 2811 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Paving

Bank Region Cut:	**359 yd³**
Bank Region Fill:	**981 yd³**
Region Export:	**0 yd³**
Region Borrow Required (Bank):	**623 yd³**
Region Borrow Required (Estimated):	**623 yd³**
Average Haul Distance:	**263 ft**
Imported Materials:	**1135 yd³**

Cut/Fill Breakdown: Paving

REGION CUTS
Region Bank Cut 359 yd³ Expanded Cut 359 yd³

REGION FILLS
Region Bank Fill 981 yd³

Borrow Required (Bank) 623 yd³

IMPORTED MATERIALS
Region Imported Materials **1135 yd³** **1702 tons**

Comprised of:	Volume	Tons
Asphalt	309 yd³	464 tons
Gravel Base 8"	825 yd³	1238 tons

WinEx Master Region Report

File: FLORENCE GRADING C302 Boundry Dwg C302 Jan 25, 2022 6:24 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Region: Reloam Areas

Region Adjustments

Downward for Subgrade materials: 4.00 in

Town of Groton Planning Board
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Basic Region Info	Area	Acres
Region Area	29581 ft²	0.68 acres
Existing Surface Area	29681 ft²	0.68 acres
Proposed Surface Area	29669 ft²	0.68 acres
Plan View Area Cut	1027 ft²	0.02 acres
Plan View Area Fill	28508 ft²	0.65 acres
Perimeter	2501 ft	

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Reloam Areas

Bank Region Cut:	**12 yd³**
Bank Region Fill:	**1227 yd³**
Region Export:	**0 yd³**
Region Borrow Required (Bank):	**1215 yd³**
Region Borrow Required (Estimated):	**1215 yd³**
Average Haul Distance:	**190 ft**

Cut/Fill Breakdown: Reloam Areas

REGION CUTS
Region Bank Cut 12 yd³ Expanded Cut 12 yd³

REGION FILLS
Region Bank Fill 1227 yd³

Borrow Required (Bank) 1215 yd³

WinEx Master Region Report

File: FLORENCE GRADING C302 Boundry Dwg C302 Jan 25, 2022 6:24 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Region: Reloam Areas

Region Adjustments

Downward for Subgrade materials: 6.00 in

Basic Region Info	Area	Acres
Region Area	14267 ft²	0.33 acres
Existing Surface Area	14287 ft²	0.33 acres
Proposed Surface Area	14352 ft²	0.33 acres
Plan View Area Cut	1917 ft²	0.04 acres
Plan View Area Fill	12369 ft²	0.28 acres
Perimeter	1685 ft	

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Reloam Areas

Bank Region Cut:	**92 yd³**
Bank Region Fill:	**872 yd³**
Region Export:	**0 yd³**
Region Borrow Required (Bank):	**780 yd³**
Region Borrow Required (Estimated):	**780 yd³**
Average Haul Distance:	**378 ft**

Cut/Fill Breakdown: Reloam Areas

REGION CUTS
Region Bank Cut 92 yd³ Expanded Cut 92 yd³

REGION FILLS
Region Bank Fill 872 yd³

Borrow Required (Bank) 780 yd³

WinEx Master Region Report

File: FLORENCE GRADING C302 Boundry Dwg C302 Jan 25, 2022 6:24 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Region: Hardscape

Region Adjustments

Downward for Subgrade materials: 13.00 in

Basic Region Info	Area	Acres

Town of Groton Planning Board
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Region Area	42160 ft²	0.97 acres
Existing Surface Area	42201 ft²	0.97 acres
Proposed Surface Area	42298 ft²	0.97 acres
Plan View Area Cut	5999 ft²	0.14 acres
Plan View Area Fill	36139 ft²	0.83 acres
Perimeter	2123 ft	

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Hardscape

Bank Region Cut:	**398 yd³**
Bank Region Fill:	**1584 yd³**
Region Export:	**0 yd³**
Region Borrow Required (Bank):	**1186 yd³**
Region Borrow Required (Estimated):	**1186 yd³**
Average Haul Distance:	**197 ft**
Imported Materials:	**1697 yd³**

Cut/Fill Breakdown: Hardscape

REGION CUTS

Region Bank Cut	398 yd³	Expanded Cut	398 yd³

REGION FILLS

Region Bank Fill	1584 yd³
Borrow Required (Bank)	1186 yd³

IMPORTED MATERIALS

Region Imported Materials	**1697 yd³**	**2219 tons**

Comprised of:	Volume	Tons
Concrete	653 yd³	653 tons
Crushed Stone	1044 yd³	1567 tons

WinEx Master Pad Report

File: FLORENCE GRADING C302 Boundry Dwg C302 Jan 25, 2022 6:24 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Pad:

Town of Groton Planning Board
Florence Roche Elementary School Project
Major Site Plan Review-Phase 2
April 14, 2022

Pad Adjustments

Existing grades adjusted down by stripping: 36 in Stripping Volume 7246 yd³
Downward for Subgrade materials: 15.00 in

Basic Pad Info	Area	Acres
Pad Area	65205 ft²	1.50 acres
Existing Surface Area	65213 ft²	1.50 acres
Proposed Surface Area	65205 ft²	1.50 acres
Plan View Area Cut	0 ft²	0 acres
Plan View Area Fill	65205 ft²	1.50 acres

Perimeter 1685 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of PAD <no name>

Bank Pad Cut:	**0 yd³**
Bank Pad Fill:	**10525 yd³**
Pad Export:	**0 yd³**
Pad Borrow Required (Bank):	**10525 yd³**
Pad Borrow Required (Estimated):	**10525 yd³**
Imported Materials:	**3019 yd³**

Cut/Fill Breakdown: PAD <no name>

There is No Cut

PAD FILLS
Pad Bank Fill 10525 yd³

Borrow Required (Bank) 10525 yd³

IMPORTED MATERIALS

Pad Imported Materials	**3019 yd³**	**4025 tons**
Comprised of:	Volume	Tons
SOB 5"	1006 yd³	2013 tons
Gravel Base 10"	2013 yd³	2013 tons

WinEx Master Material Report

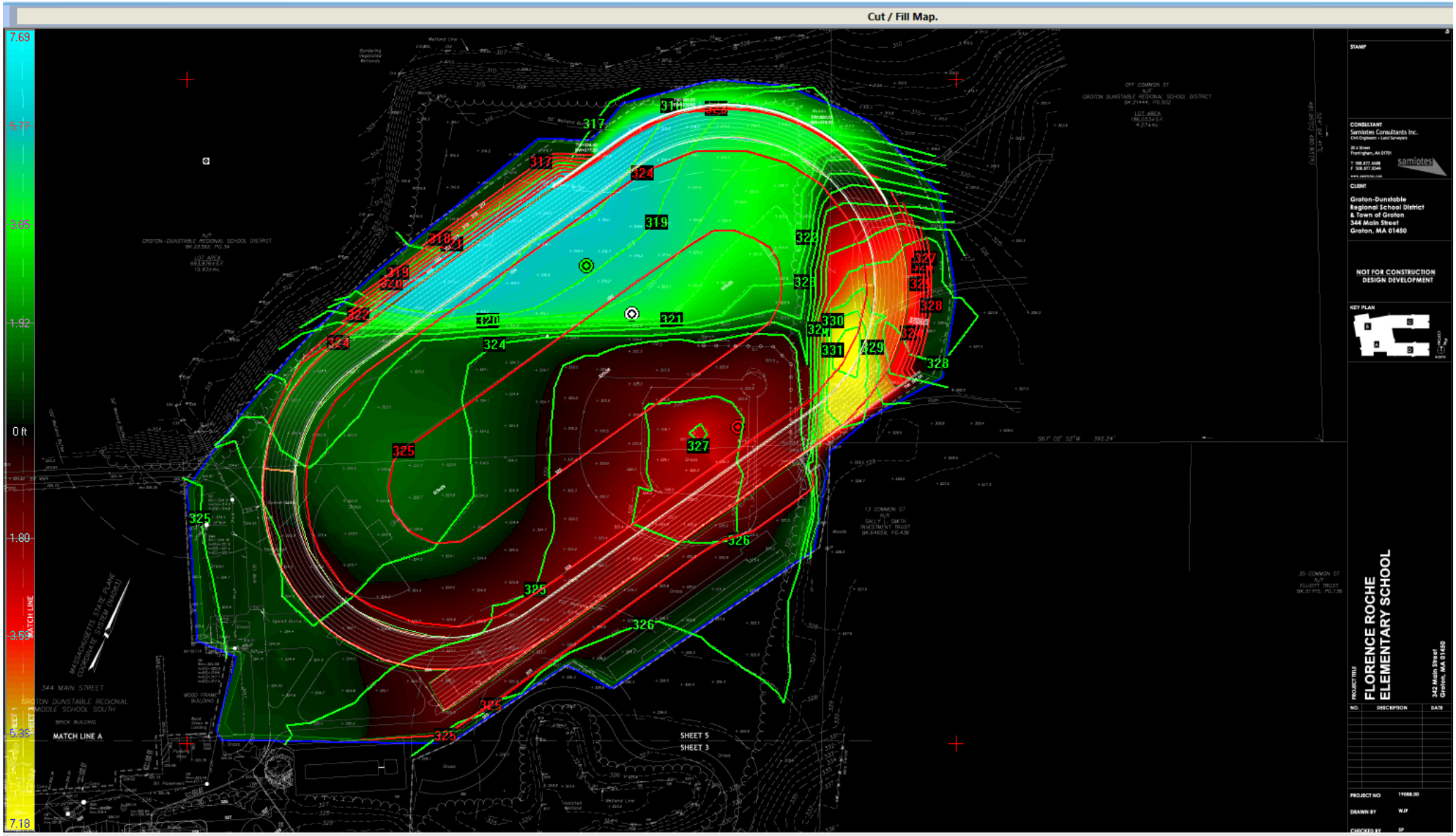
File: FLORENCE GRADING C302 Boundry Dwg C302 Jan 25, 2022 6:24 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Town of Groton Planning Board
Florence Roche Elementary School Project
Major Site Plan Review-Phase 2
April 14, 2022

Material Totals for Job

	Volume	Tons
SOB 5"	**1006 yd³**	**2013 tons**
	1006 yd³	2013 tons
Gravel Base 10"	**2013 yd³**	**2013 tons**
	2013 yd³	2013 tons
Asphalt	**309 yd³**	**464 tons**
Paving	309 yd³	464 tons
Gravel Base 8"	**825 yd³**	**1238 tons**
Paving	825 yd³	1238 tons
Concrete	**653 yd³**	**653 tons**
Hardscape	653 yd³	653 tons
Crushed Stone	**1044 yd³**	**1567 tons**
Hardscape	1044 yd³	1567 tons


Cut / Fill Map.
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4.77
3.85
1.92
0 ft
1.80
3.59
5.33
7.18
MATCH LINE
MATCH LINE A
344 MAIN STREET
BROTON DUNSTABLE REGIONAL MIDDLE SCHOOL SOUTH
SHEET 5
SHEET 3
FLORENCE ROCHE ELEMENTARY SCHOOL
342 Main Street
Groton, MA 01450
NOT FOR CONSTRUCTION
DESIGN DEVELOPMENT
Groton-Dunstable Regional School District & Town of Groton
344 Main Street
Groton, MA 01450
Samiotes Consultants Inc.

WinEx Master Site Report

File: FLORENCE GRADING C303 Boundry Dwg C303 Jan 25, 2022 6:28 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

COMPREHENSIVE QUANTITIES FOR JOB

Site Adjustments

Existing grades adjusted down by stripping:
Boundry Dwg C303 (Less any Excluded Areas) 10.00 in Stripping Volume (bank) 6684 yd³

Total Strip Volume (Expanded @ 0%) **6684 yd³**

Proposed grades adjusted down by subgrade areas:
Running Track 12.00 in
Playing Field 12.00 in
Reloam Areas 4.00 in

Basic Site Info	Area	Acres
Total Work Area	216027 ft²	4.96 acres
Existing Surface Area	216554 ft²	4.97 acres
Proposed Surface Area	218749 ft²	5.02 acres
Plan View Area Cut	83711 ft²	1.92 acres
Plan View Area Fill	131570 ft²	3.02 acres
Perimeter	1869 ft	

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Job - Boundry Dwg C303

Bank Site Cut:	**4611 yd³**
Bank Site Fill:	**10574 yd³**
Export:	**0 yd³**
Import Required (Bank):	**5963 yd³**
Import Required (Estimated):	**5963 yd³**
Average Haul Distance:	**178 ft**
Imported Materials:	**4133 yd³**

Over Excavation :
Side Cut : 0 yd³
Fill Volume : 0 yd³

Town of Groton Planning Board
Florence Roche Elementary School Project
Major Site Plan Review-Phase 2
April 14, 2022

Cut/Fill Breakdown: Boundry Dwg C303

SITE CUTS
Total Bank Cut 4611 yd³ Expanded Cut 4611 yd³

SITE FILLS
Total Bank Fill 10574 yd³

Borrow Required (Bank) 5963 yd³

IMPORTED MATERIALS
Total Imported Materials **4133 yd³** **4133 tons**

Comprised of:	Volume	Tons
Landscape Area	4133 yd³	4133 tons

WinEx Master Region Report

File: FLORENCE GRADING C303 Boundry Dwg C303 Jan 25, 2022 6:28 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Region: Playing Field

Region Adjustments

Downward for Subgrade materials: 12.00 in

Basic Region Info	Area	Acres
Region Area	111585 ft²	2.56 acres
Existing Surface Area	111915 ft²	2.57 acres
Proposed Surface Area	111601 ft²	2.56 acres
Plan View Area Cut	43377 ft²	1.00 acres
Plan View Area Fill	67845 ft²	1.56 acres

Perimeter 1310 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Playing Field

Bank Region Cut: **2263 yd³**
Bank Region Fill: **6164 yd³**
Region Export: **0 yd³**

Region Borrow Required (Bank):	**3901 yd³**
Region Borrow Required (Estimated):	**3901 yd³**
Average Haul Distance:	**138 ft**
Imported Materials:	**4133 yd³**

Cut/Fill Breakdown: Playing Field

REGION CUTS
Region Bank Cut 2263 yd³ Expanded Cut 2263 yd³

REGION FILLS
Region Bank Fill 6164 yd³

Borrow Required (Bank) 3901 yd³

IMPORTED MATERIALS
Region Imported Materials **4133 yd³** **4133 tons**

Comprised of:	Volume	Tons
Landscape Area	4133 yd³	4133 tons

WinEx Master Region Report

File: FLORENCE GRADING C303 Boundry Dwg C303 Jan 25, 2022 6:28 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Region: Reloam Areas

Region Adjustments

Downward for Subgrade materials: 4.00 in

Basic Region Info	Area	Acres
Region Area	56874 ft²	1.31 acres
Existing Surface Area	56956 ft²	1.31 acres
Proposed Surface Area	57552 ft²	1.32 acres
Plan View Area Cut	16887 ft²	0.39 acres
Plan View Area Fill	39706 ft²	0.91 acres

Perimeter 3221 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Reloam Areas

Bank Region Cut:	**500 yd³**
Bank Region Fill:	**1615 yd³**
Region Export:	**0 yd³**
Region Borrow Required (Bank):	**1116 yd³**
Region Borrow Required (Estimated):	**1116 yd³**
Average Haul Distance:	**229 ft**

Cut/Fill Breakdown: Reloam Areas

REGION CUTS
Region Bank Cut 500 yd³ Expanded Cut 500 yd³

REGION FILLS
Region Bank Fill 1615 yd³

Borrow Required (Bank) 1116 yd³

WinEx Master Pad Report

File: FLORENCE GRADING C303 Boundry Dwg C303 Jan 25, 2022 6:28 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Subtotals for Pad: Running Track

Pad Adjustments

Downward for Subgrade materials: 12.00 in

Basic Pad Info	Area	Acres
Pad Area	36569 ft²	0.84 acres
Existing Surface Area	36655 ft²	0.84 acres
Proposed Surface Area	36569 ft²	0.84 acres
Plan View Area Cut	20736 ft²	0.48 acres
Plan View Area Fill	15778 ft²	0.36 acres

Perimeter 2905 ft

ALL CUT/FILL CALCULATIONS REFLECT THE ABOVE - QUANTITIES FIGURED FROM STRIP TO SUBGRADE

Summary of Running Track

Bank Pad Cut:	**1696 yd³**
Bank Pad Fill:	**2341 yd³**
Pad Export:	**0 yd³**
Pad Borrow Required (Bank):	**645 yd³**
Pad Borrow Required (Estimated):	**645 yd³**
Average Haul Distance:	**234 ft**

Cut/Fill Breakdown: Running Track

PAD CUTS
Pad Bank Cut 1696 yd³

PAD FILLS
Pad Bank Fill 2341 yd³

Borrow Required (Bank) 645 yd³

WinEx Master Material Report

File: FLORENCE GRADING C303 Boundry Dwg C303 Jan 25, 2022 6:28 am
Info: New header info feature Options: Use File..Options to change this line

Start layer: Existing End layer: Proposed Final

Material Totals for Job

	Volume	Tons
Landscape Area	**4133 yd³**	**4133 tons**
Playing Field	4133 yd³	4133 tons

APPENDIX 4:
CONSTRUCTION PHASING AND SITE UTILIZATION PLAN

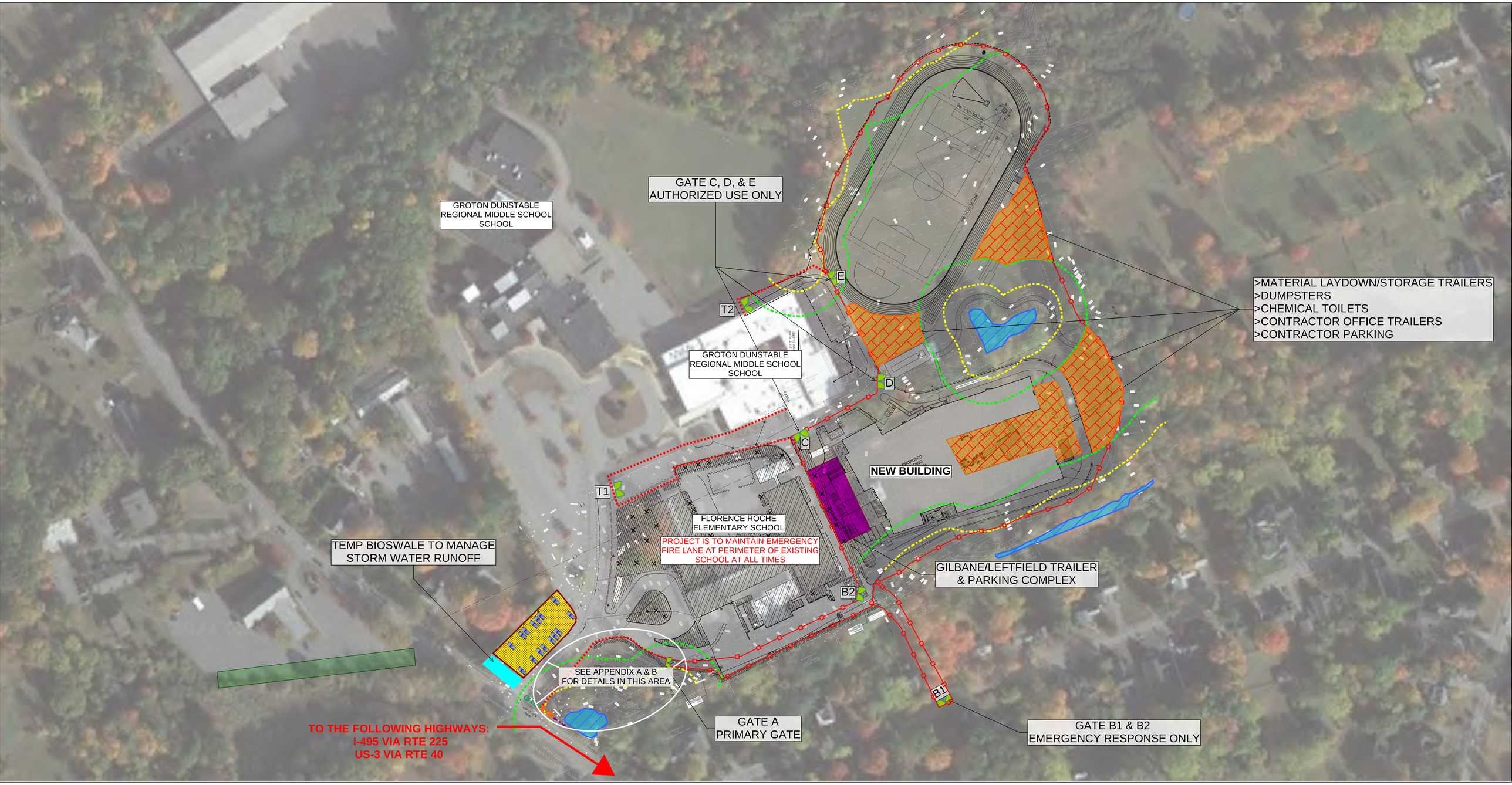
SITE UTILIZATION PLAN

FLORENCE ROCHE ELEMENTARY SCHOOL PROJECT
342 MAIN STREET
GROTON, MA 01450

Town of Groton Planning Board
Florence Roche Elementary School Project
Major Site Plan Review-Phase 2
April 14, 2022

Gilbane

Revised Date: 03/15/22



LEGEND

- Construction Gate & Stone Tracking Pad
- Fence
- 50' Wetland Buffer Zone
- 100' Wetland Buffer Zone
- Wetland
- Temporary Construction Displaced Staff Parking
- Potential Trade Overflow Parking
- Laydown-Storage Area
- Temporary Hydrant
- Project Sign
- Construction Entrance Project Sign
- Temp. Fence Outside of Site Limits
- Construction Access Road
- Active Public and Campus Entrace
- Truck Route

CONSTRUCTION PHASE:
NEW BUILDING AND ATHLETIC TRACK & FIELD

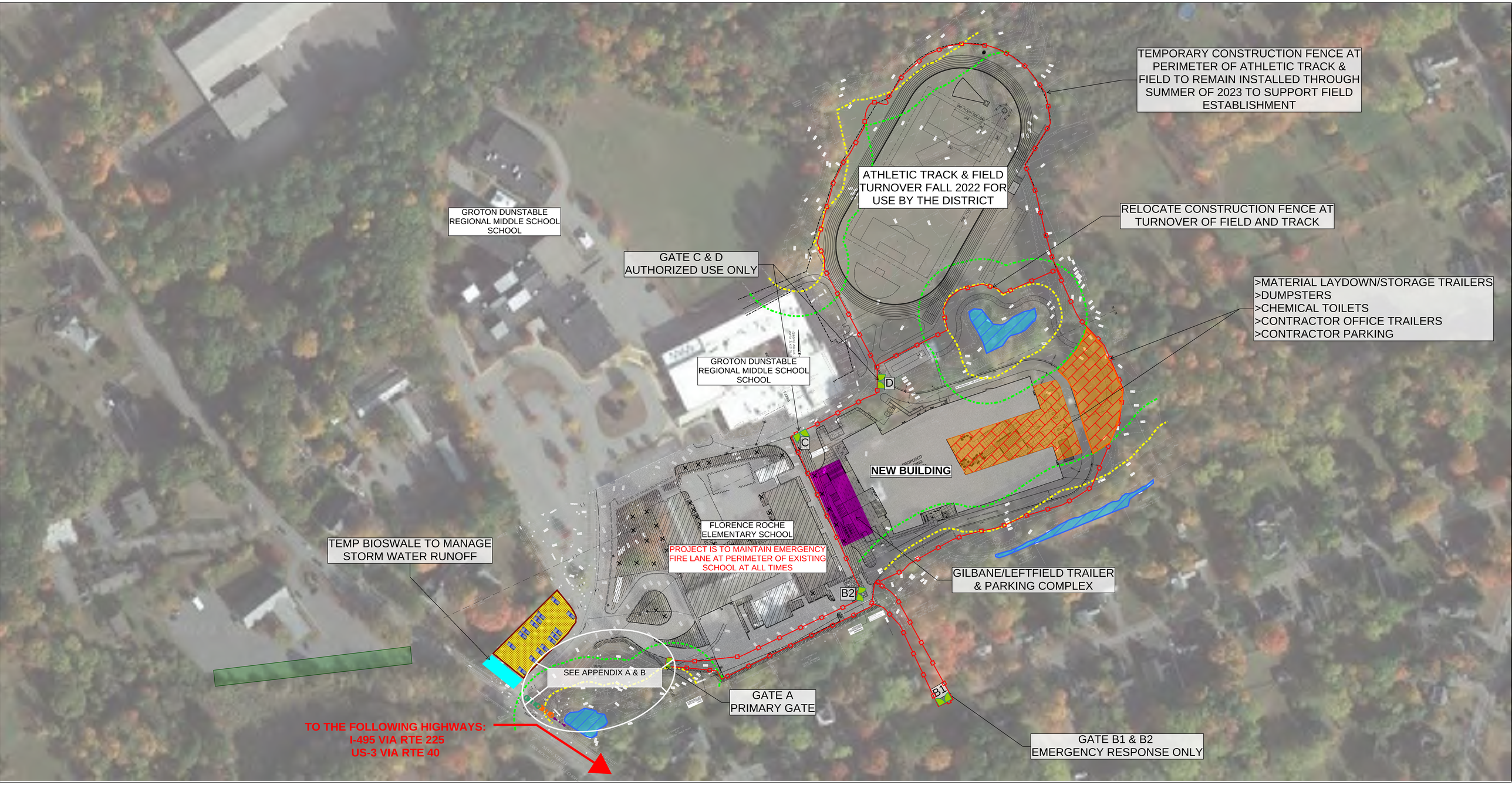
SITE UTILIZATION PLAN

FLORENCE ROCHE ELEMENTARY SCHOOL PROJECT
342 MAIN STREET
GROTON, MA 01450

Town of Groton Planning Board
Florence Roche Elementary School Project
Major Site Plan Review-Phase 2
April 14, 2022

Gilbane

Revised Date: 03/15/22



LEGEND

- Construction Gate
- Fence
- 50' Wetland Buffer Zone
- 100' Wetland Buffer Zone
- Wetland
- Temporary Construction Displaced Staff Parking
- Potential Trade Overflow Parking
- Laydown-Storage Area
- Temporary Hydrant
- Project Sign
- Construction Entrance Project Sign
- Temp. Fence Outside of site Limits
- Construction Access Road
- Active Public and Campus Entrace
- Truck Route

CONSTRUCTION PHASE:
CONTINUATION OF BUILDING CONSTRUCTION AND COMPLETION OF ATHLETIC TRACK & FIELD

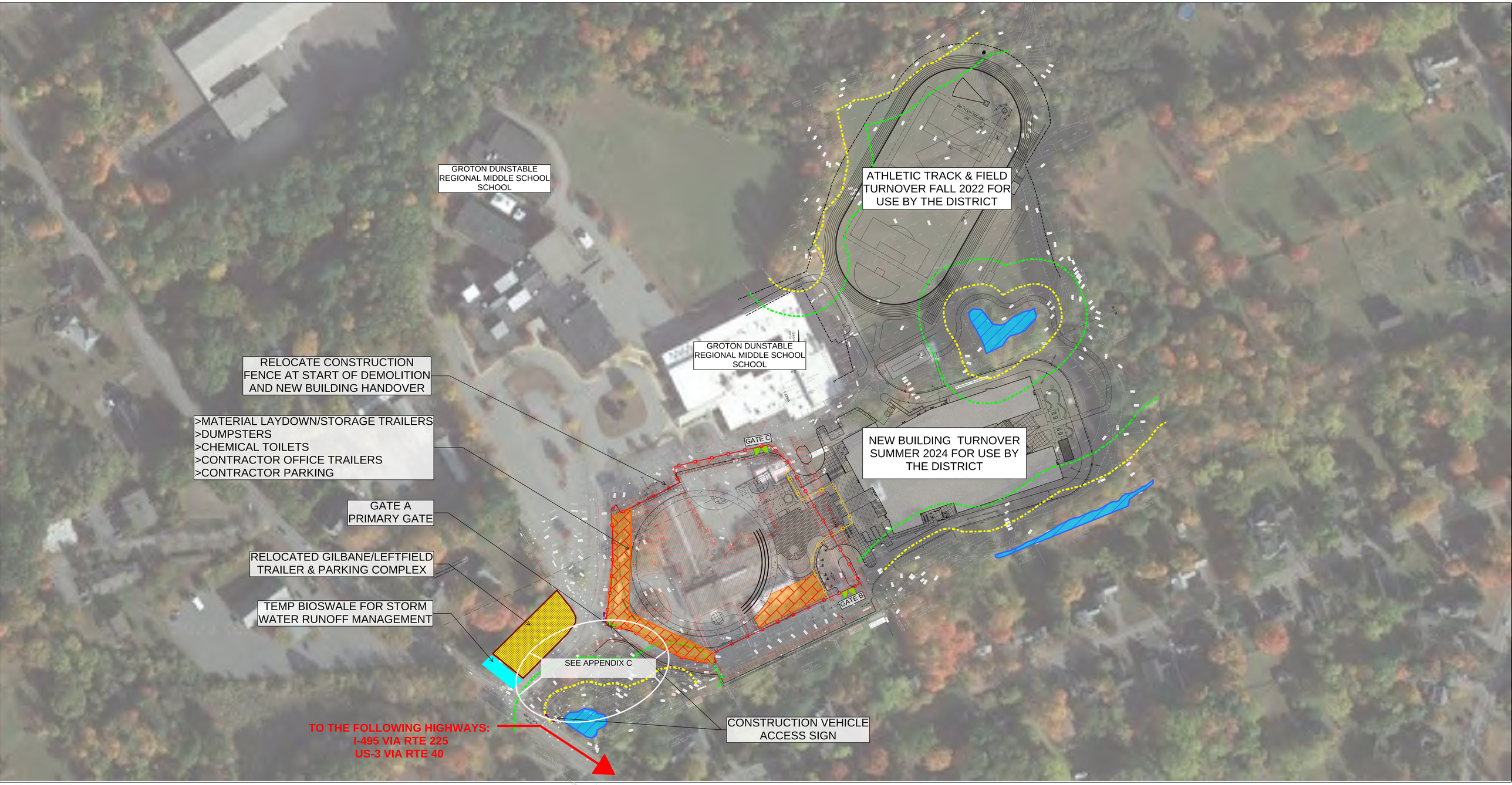
SITE UTILIZATION PLAN

FLORENCE ROCHE ELEMENTARY SCHOOL PROJECT
342 MAIN STREET
GROTON, MA 01450

Town of Groton Planning Board
Florence Roche Elementary School Project
Major Site Plan Review-Phase 2
April 14, 2022

Gilbane

Revised Date: 03/15/22



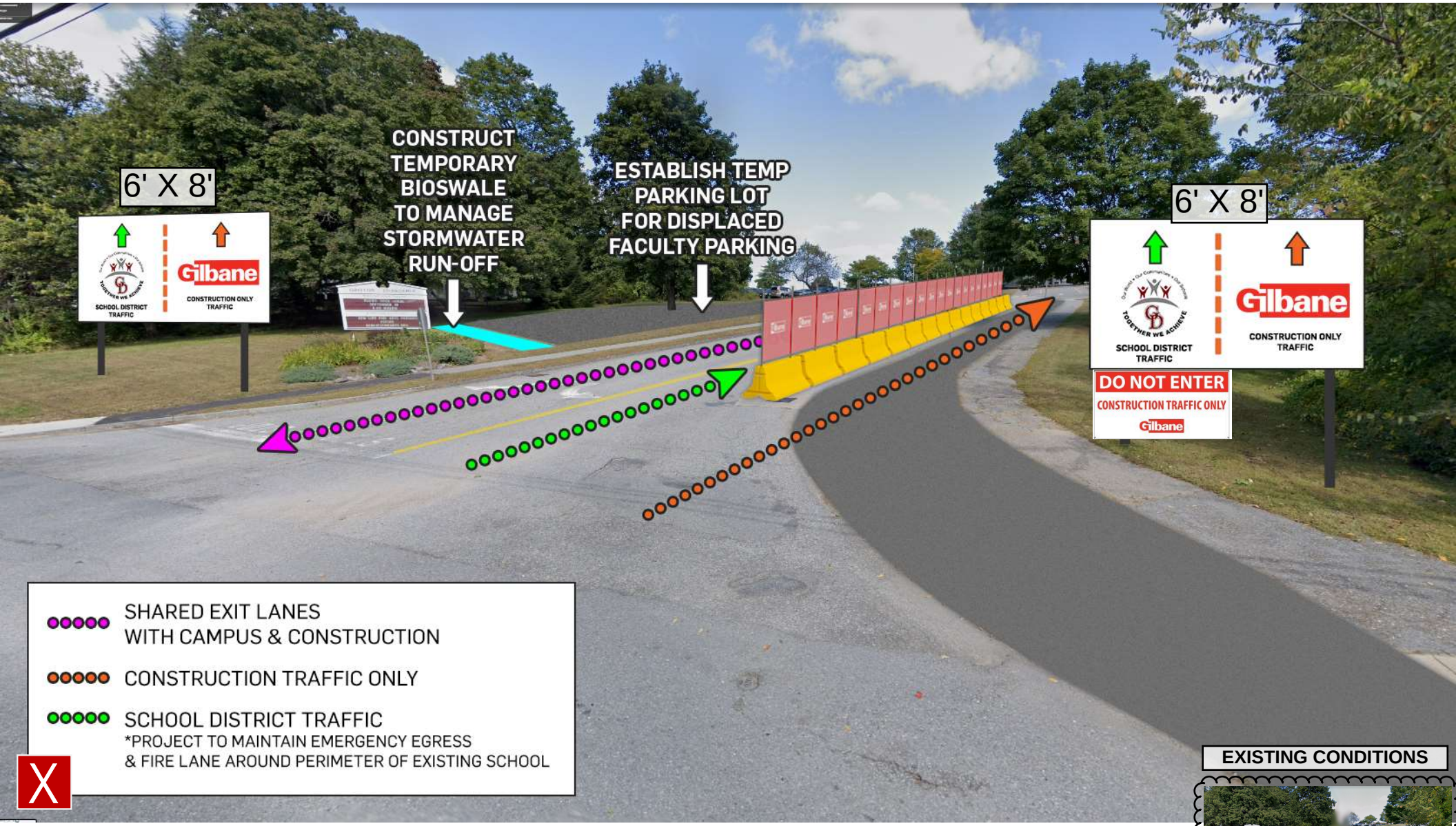
LEGEND

- Construction Gate
- Building Demo Construction Fence
- Building Demo Construction Fence
- 50' Wetland Buffer Zone
- 100' Wetland Buffer Zone
- Wetland
- Temporary Construction Displaced Staff Parking
- Potential Trade Overflow Parking
- Laydown-Storage Area
- Temporary Hydrant
- Project Sign
- Construction Entrance Project Sign
- Jersey Barriers
- Construction Access Road
- Active Public and Campus Entrace
- Truck Route

CONSTRUCTION PHASE:
EXISTING BUILDING ABATEMENT, DEMOLITION AND FINAL SITE UTILITY & FINISHES

APPENDIX A

Revised Date: 03/15/22

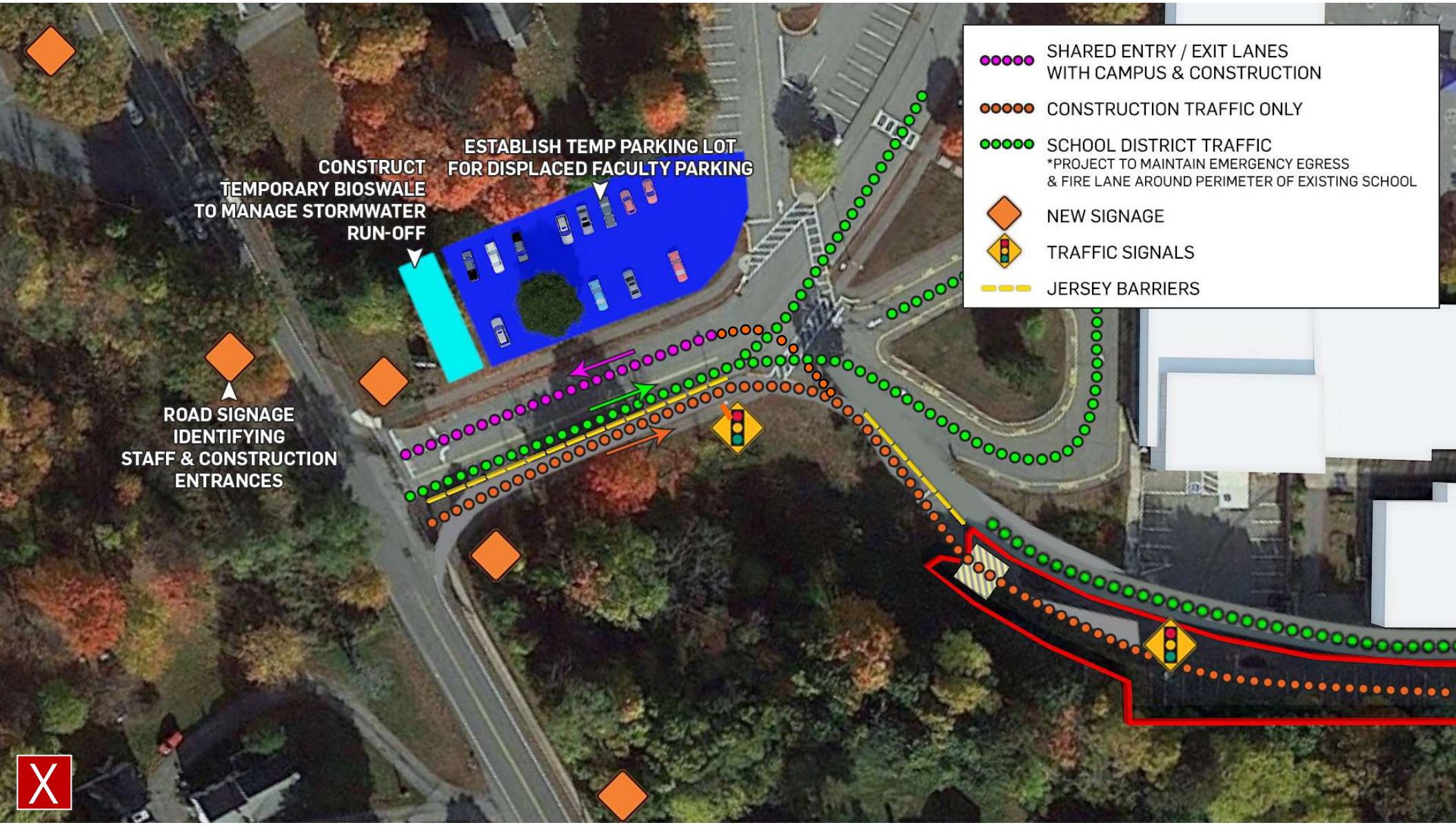


EXISTING CONDITIONS

Town of Groton Planning Board
Florence Roche Elementary School Project
Major Site Plan Review-Phase 2
April 14, 2022

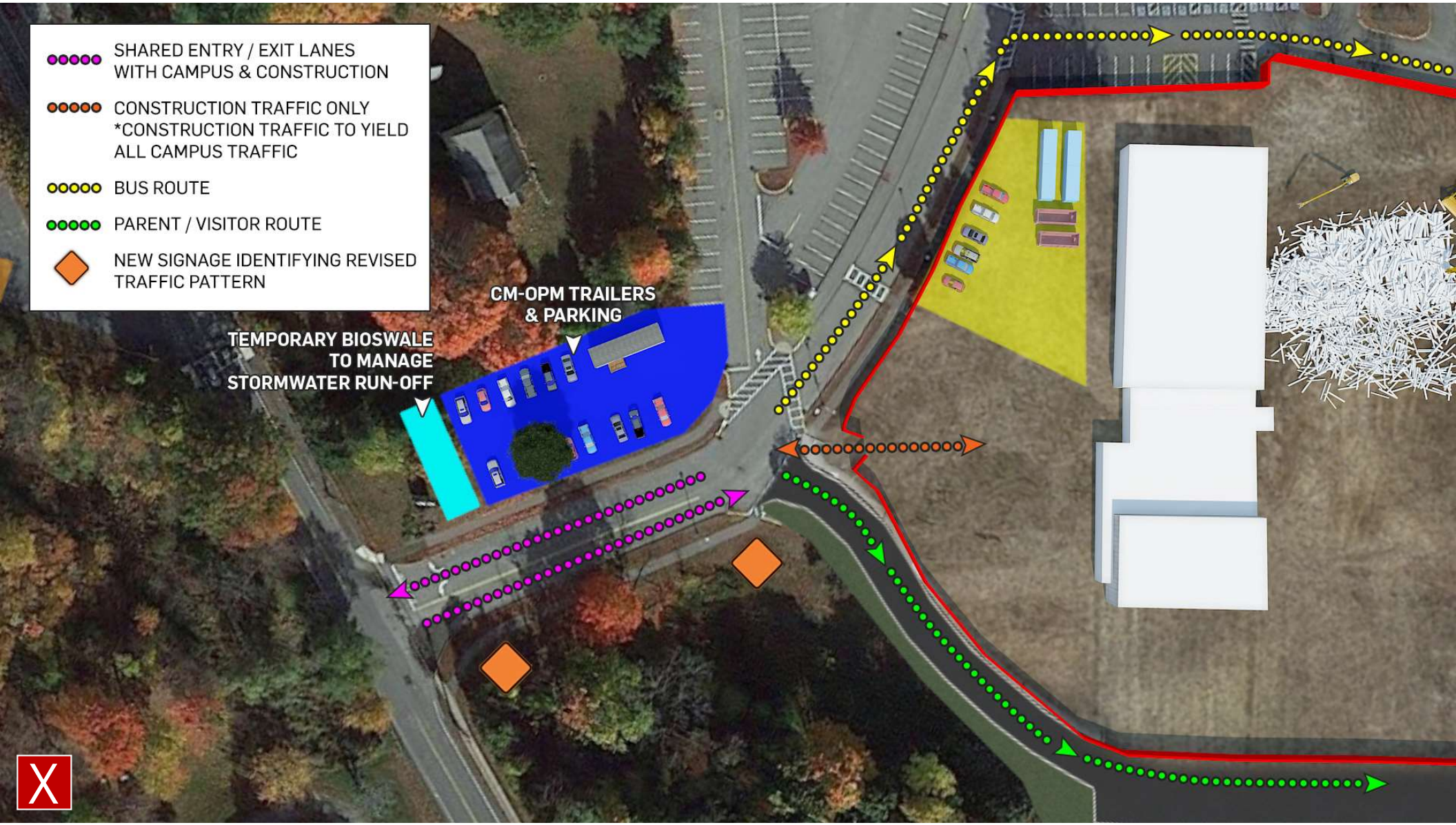
APPENDIX B

Revised Date: 03/15/22



APPENDIX C

Revised Date: 03/15/22



APPENDIX 5:
VERIFIED ABUTTERS LIST

TOWN OF GROTON
Office of the Board of Assessors
173 Main Street
Groton, MA 01450
(978) 448-1127
FAX: (978) 448-1115
www.grotonma.gov

Date: 2/15/2021

Map:	Parcel:	Lot:
111	34	0
110	43	0
110	42	0

Address: FLORENCE ROCHE ELEMENTARY SCHOOL

CERTIFICATION OF ABUTTERS

Abutters are within 300 feet of any requested parcel's lot lines. We hereby certify that the enclosed list includes the name and addresses of all parties taken from the Board of Assessor's Real Estate property files per the deeds received as of 12/31/2021. It is with interest under MGL Chapter 40A, Section 11 as amended to the best of our knowledge and belief.

This abutter's list will not satisfy legal requirements for notice, if ninety days have elapsed from the date of request.

Megan Foster – Principal Assistant Assessor
Ravilla Garthe- Assistant Assessor

300 foot Abutters List Report

Groton, MA
April 07, 2022

Subject Properties:

Parcel Number:	110-42	Mailing Address:	GROTON-DUNSTABLE REGIONAL SCHOOL DIST. 344 MAIN ST GROTON, MA 01450
CAMA Number:	110-42		
Property Address:	342 MAIN ST		
Parcel Number:	110-43	Mailing Address:	GROTON-DUNSTABLE REGIONAL SCHOOL DIST. 344 MAIN STREET GROTON, MA 01450
CAMA Number:	110-43		
Property Address:	346 MAIN ST		
Parcel Number:	111-34	Mailing Address:	TOWN OF GROTON, SCHOOL - BOUTWELL 173 MAIN ST GROTON, MA 01450
CAMA Number:	111-34		
Property Address:	OFF COMMON ST		

Abutters:

Parcel Number:	109-57	Mailing Address:	SULLIVAN, SHAUN F. 323 MAIN STREET GROTON, MA 01450
CAMA Number:	109-57		
Property Address:	323 MAIN ST		
Parcel Number:	109-58	Mailing Address:	ROWCLIFFE, SHAWN 329 MAIN ST ,
CAMA Number:	109-58		
Property Address:	329 MAIN ST		
Parcel Number:	109-59	Mailing Address:	RICE, TIMOTHY B. 335 MAIN STREET GROTON, MA 01450
CAMA Number:	109-59		
Property Address:	335 MAIN ST		
Parcel Number:	110-1	Mailing Address:	FIRST BAPTIST CHURCH OF GROTON P.O. BOX 499 GROTON, MA 01450
CAMA Number:	110-1		
Property Address:	365 MAIN ST		
Parcel Number:	110-37	Mailing Address:	INSCO CORPORATION P.O. BOX 489 GROTON, MA 01450
CAMA Number:	110-37		
Property Address:	412 MAIN ST		
Parcel Number:	110-38	Mailing Address:	COOKE, ROBERT K. 396 MAIN STREET GROTON, MA 01450
CAMA Number:	110-38		
Property Address:	396 MAIN ST		
Parcel Number:	110-39	Mailing Address:	DEFURIA, JASON 386 MAIN ST GROTON, MA 01450
CAMA Number:	110-39		
Property Address:	386 MAIN ST		

Parcel Number:	110-40	Mailing Address:	GILSON, DAVID W.
CAMA Number:	110-40		P.O. BOX 74
Property Address:	368 MAIN ST		GROTON, MA 01450
Parcel Number:	110-41	Mailing Address:	CONQUEST, JASON M.
CAMA Number:	110-41		356 MAIN ST
Property Address:	356 MAIN ST		GROTON, MA 01450
Parcel Number:	111-10	Mailing Address:	HALLOCK, REBECCA
CAMA Number:	111-10		54 CHAMPNEY ST
Property Address:	54 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-11	Mailing Address:	HORGAN, CAROL ANNE
CAMA Number:	111-11		10 WACHUSETT AVENUE
Property Address:	50 CHAMPNEY ST		AYER, MA 01432
Parcel Number:	111-12	Mailing Address:	ACUCENA, ROSS
CAMA Number:	111-12		46 CHAMPNEY ST
Property Address:	46 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-13	Mailing Address:	MOULTON, STEPHEN
CAMA Number:	111-13		44 CHAMPNEY ST
Property Address:	44 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-14	Mailing Address:	BELLIVEAU REVOCABLE TRUST OF 2014
CAMA Number:	111-14		36 CHAMPNEY ST
Property Address:	36 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-15	Mailing Address:	YOUNG, LOIS H.
CAMA Number:	111-15		28 CHAMPNEY STREET
Property Address:	28 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-16	Mailing Address:	LAMBERT, BRANDON C.
CAMA Number:	111-16		13 CHAMPNEY ST
Property Address:	13 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-17	Mailing Address:	CROMWELL, DUANE
CAMA Number:	111-17		19 CHAMPNEY STREET
Property Address:	19 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-18	Mailing Address:	STOOPS, NANCY P.
CAMA Number:	111-18		29 CHAMPNEY ST
Property Address:	29 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-19	Mailing Address:	DOROTHY N. DAVIS REVOCABLE TRUST OF 2016
CAMA Number:	111-19		37 CHAMPNEY ST
Property Address:	37 CHAMPNEY ST		GROTON, MA 01450

Parcel Number:	111-20	Mailing Address:	KANE, KEVIN R.
CAMA Number:	111-20		43 CHAMPNEY ST
Property Address:	43 CHAMPNEY ST		,
Parcel Number:	111-21	Mailing Address:	DEMEO, ALBERT V.
CAMA Number:	111-21		47 CHAMPNEY STREET
Property Address:	47 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-22	Mailing Address:	STENSON LIVING TRUST
CAMA Number:	111-22		59 CHAMPNEY ST
Property Address:	59 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-23	Mailing Address:	CROTEAU, JOHN E.
CAMA Number:	111-23		23 DIGITAL DR #411
Property Address:	71 CHAMPNEY ST		NASHUA, NH 03062
Parcel Number:	111-23	Mailing Address:	THISTLE-BOND, JEAN R.
CAMA Number:	111-23-1		71 CHAMPNEY ST A
Property Address:	71 CHAMPNEY ST #A		GROTON, MA 01450
Parcel Number:	111-23	Mailing Address:	PETRALIA, JASON V.
CAMA Number:	111-23-2		71 CHAMPNEY ST B
Property Address:	71 CHAMPNEY ST #B		GROTON, MA 01450
Parcel Number:	111-23	Mailing Address:	ERICKSMOEN, LYMAN J.
CAMA Number:	111-23-3		71 CHAMPNEY ST C
Property Address:	71 CHAMPNEY ST #C		GROTON, MA 01450
Parcel Number:	111-23	Mailing Address:	SMITH, DOUGLAS V.C.
CAMA Number:	111-23-4		71 CHAMPNEY ST D
Property Address:	71 CHAMPNEY ST #D		GROTON, MA 01450
Parcel Number:	111-28	Mailing Address:	SMITH INVESTMENT TRUST, SALLY L.
CAMA Number:	111-28		13 COMMON ST
Property Address:	13 COMMON ST		GROTON, MA 01450
Parcel Number:	111-30	Mailing Address:	ELLIOTT TRUST
CAMA Number:	111-30		P.O. BOX 193
Property Address:	35 COMMON ST		GROTON, MA 01450
Parcel Number:	111-31	Mailing Address:	CARMICHAEL FAMILY REALTY TRUST
CAMA Number:	111-31		43 COMMON ST
Property Address:	43 COMMON ST		GROTON, MA 01450
Parcel Number:	111-32	Mailing Address:	MCCROSSAN FAMILY TRUST, JOHN E.
CAMA Number:	111-32		57 COMMON ST
Property Address:	57 COMMON ST		GROTON, MA 01450

Parcel Number:	111-33	Mailing Address:	CHRIST, GEOFFREY C.
CAMA Number:	111-33		53 COMMON STREET
Property Address:	53 COMMON ST		GROTON, MA 01450
Parcel Number:	111-35	Mailing Address:	SULLIVAN, JOHN T.
CAMA Number:	111-35		65 COMMON ST
Property Address:	COMMON ST		GROTON, MA 01450
Parcel Number:	111-36	Mailing Address:	SULLIVAN, JOHN T.
CAMA Number:	111-36		65 COMMON ST
Property Address:	65 COMMON ST		GROTON, MA 01450
Parcel Number:	111-6	Mailing Address:	LACAVA, BRANDON
CAMA Number:	111-6		68 CHAMPNEY ST
Property Address:	68 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-8	Mailing Address:	MCGRANAHAN, ERIC
CAMA Number:	111-8		64 CHAMPNEY ST
Property Address:	64 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	111-9	Mailing Address:	HENRY, CHRISTOPHE
CAMA Number:	111-9		58 CHAMPNEY STREET
Property Address:	58 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	112-67	Mailing Address:	CARUSO FAMILY TRUST, THE
CAMA Number:	112-67		3 CHAMPNEY ST
Property Address:	3 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	112-68	Mailing Address:	MEAGHER, R. MICHEAL
CAMA Number:	112-68		22 CHAMPNEY ST
Property Address:	22 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	112-69	Mailing Address:	POULIN, MICHELLE
CAMA Number:	112-69		18 CHAMPNEY ST
Property Address:	18 CHAMPNEY ST		GROTON, MA 01450
Parcel Number:	112-70	Mailing Address:	HEG 318 MAIN STREET LLC
CAMA Number:	112-70		2 INTERNATIONAL WAY
Property Address:	318 MAIN ST		LAWRENCE, MA 01843
Parcel Number:	112-72	Mailing Address:	MACAIDAN REALTY TRUST
CAMA Number:	112-72		306 MAIN ST
Property Address:	306 MAIN ST		GROTON, MA 01450
Parcel Number:	112-73	Mailing Address:	MENHAUNT REALTY, INC.
CAMA Number:	112-73		300 MAIN STREET
Property Address:	300 MAIN ST		GROTON, MA 01450

300 foot Abutters List Report

Groton, MA
April 07, 2022

Parcel Number:	225-12	Mailing Address:	LANE, ARTHUR S. JR.
CAMA Number:	225-12		67 COMMON ST
Property Address:	67 COMMON ST		GROTON, MA 01450

Parcel Number:	225-12	Mailing Address:	LANE, ARTHUR S. JR.
CAMA Number:	225-12.1A		67 COMMON ST
Property Address:	COMMON ST		GROTON, MA 01450

APPENDIX 6:
WAIVER REQUEST LETTER

April 14, 2022

Town of Groton Planning Board
ATTN: Scott Wilson, Chairman
173 Main St
Groton, MA 01450

Re: Florence Roche Elementary School Project SCI#: 19088.00
342 Main St
Planning Board Phase 2 Submission Waiver Requests

Dear Mr. Wilson:

As part of our Major Site Plan Review submission, we are preparing this letter for submission to request site plan content waivers. As noted in our project narrative, we are proposing to split the scope of work into two (2) Phases.

For the Florence Roche Elementary School Phase 2 submission, we hereby submit this request for waivers to the following Groton Zoning Bylaws Code Sections:

(1) 218-2.5.G(2)(i) regarding the submission of a Development Impact Report. The Development Impact Report is to be provided at the discretion of the Planning Board. Additionally, within the attached appendices the following documents are provided: (1) Traffic Impact Study, (2) Stamped Cut and Fill Analysis, and (3) Stormwater Management Report. These reports provide analysis of the impacts of the proposed project on the environment, infrastructure, and services.

(2) 381-39.G regarding the submission of site plans containing existing and proposed topography contour lines at two-foot intervals within 200 feet of the property. The existing conditions survey was only performed within the project site. The site plans contain existing and proposed topography contour lines at one-foot intervals within the project site.

(3) 381-39.N regarding the submission of site plans at a scale of 1″= 40′. Site plans are provided at a scale of 1″ = 30′.

(4) 381-40.A.3. regarding the requirement that a minimum of four-foot-wide landscaping strips are to be provided along the foundation walls of all nonresidential building(s). There is no exposed foundation for the building. The proposed building has a full brick and mortar façade, in keeping with other school buildings on this site. Existing buildings on site do not have continuous landscaping strips along the foundation walls. The Groton Fire Chief has also requested not to plant large trees close to the building that grow above the roof line, as they can cause restrictions for access to the building from the fire truck. For the proposed building and sitework, plant material budget has been concentrated as shown in planting plans. The current planting areas are arranged to; support the delivery of education, shape outdoor recreational spaces, and provide buffer planting areas to protect existing wetland areas.

Samiotes Consultants, Inc.
Civil Engineers + Land Surveyors

20 A Street
Framingham, MA 01701-4102

T 508.877.6688
F 508.877.8349

www.samiotes.com

(5) 381-40.A.5. regarding the requirement that parking lots with 10 or more parking spaces shall have at least one tree per 8 parking spaces. Proposed parking area layouts do not include planting islands for plant material due to the site constraints and the parking demands of the Florence Roche Elementary School. The smaller of the two proposed lots is an existing parking lot that will retain current configuration, including the necessary existing accessible parking spaces currently serving the middle school. There are existing tree plantings and proposed tree plantings on the perimeter of this lot.

The Larger of the two lots will contain the majority of below grade stormwater storage for the site and as such will preclude plantings of trees due to limited available planting depth. The perimeter of the larger lot will contain both proposed tree plantings and existing densely planted trees and adjacent wetland resource areas. Both proposed parking areas will be partially shaded throughout the day by perimeter plantings.

(6) 381-40.D.5 regarding the requirement that curbing shall be Vertical Granite (VGC) at the access drive radii. Cape Cod Berm is proposed for the curbing of the fire access road, while the rest of the curbing along the drive radii shall be vertical granite. Cape Cod Berm is better suited for the wear that the curbing along the fire access road is expected to receive compared to VGC. The existing site curbing is predominately Cape Cod Berm.

(7) 381-40.D.7 regarding the requirement that curbing shall be Vertical Granite at the edges of all surfaced areas. Cape Cod Berm is proposed for the curbing of the fire access road, while curbing for all other surfaced areas shall be vertical granite. Cape Cod Berm is better suited for the wear that the curbing along the fire access road is expected to receive compared to VGC. The existing site curbing is predominately Cape Cod Berm.

(8) 381-40.G regarding retaining walls shall not exceed a height of four feet as the retaining wall north of the proposed building's north west corner exceeds four feet in height. All retaining walls are to be designed by a registered design professional prior to commencement of construction.

(9) 381-40.B.2 regarding access road/parking light poles walls shall not exceed a height of twenty feet, as five proposed light poles will be at a height of thirty feet. These light poles eliminate the need of multiple light poles within areas of multiple utilities, hardscape/walls, and proximity to property line.

(10) 381-40.E.2 regarding Roof top utility structures shall be screened with a facade to block views from abutters and public ways. Roof top utility structures and equipment are not visible on the new school building from public ways. It may be possible for select abutters to see small portions of rooftop equipment from windows located in abutters' upper floors seasonally when dense tree plantings along property line have shed leaves.

(11) 381-40. I. regarding the location and dimensions of all signs to be shown on the site plan. It is the intent of the phase 2 scope to show the majority of site signage. Building identification signage for the new elementary school will be shown on exterior elevations. In addition, if budget allows, there may be a building identification sign for the new elementary school located in the front lawn area to greet visitors. This scope and design will be developed in the Spring of 2023 and can be reviewed with Planning Board at that time.

(12) 381-40.D.8 regarding the requirement that wooden guardrails or an approved equal are required where parking lots and driveways do not provide a minimum five foot wide shoulder area. Wooden guardrails are provided along the southern driveway leading to the main parking lot and wooden guardrails are also provided along the main parking lot. Wooden guardrails are not provided along the emergency access road, which has limited access via a vehicular access gate and is to be accessed only by emergency vehicles. The emergency access road is provided to allow emergency vehicles access to all sides of the proposed school building.

This submission only includes Phase 2 Scope as detailed in the attached narrative. If you have any questions, or require further information, please do not hesitate to call Stephen Powers P.E. (508) 877-6688 x14 or myself at x23.

Sincerely,

Jeffrey Pilat
Project Manager

cc: Meryl Nistler - Studio G Architects, Inc.
David Saindon – Leftfield, Inc.

P:\Projects\2019\19088.00 Florence Roche School Groton\Documents\Planning Board\Phase 2\Waivers\19088.00 Florence Roche Elementary School - PB Waiver Letter.doc

APPENDIX 7:
STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

NPDES FORM 3510-9	EPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY WASHINGTON, DC 20460 NOTICE OF INTENT (NOI) FOR THE 2022 NPDES CONSTRUCTION PERMIT	FORM Approved OMB No. 2040-0305

Submission of this Notice of Intent (NOI) constitutes notice that the operator identified in Section III of this form requests authorization to discharge pursuant to the NPDES Construction General Permit (CGP) permit number identified in Section II of this form. Submission of this NOI also constitutes notice that the operator identified in Section III of this form meets the eligibility requirements of Part 1.1 CGP for the project identified in Section IV of this form. Permit coverage is required prior to commencement of construction activity until you are eligible to terminate coverage as detailed in Part 8 of the CGP. To obtain authorization, you must submit a complete and accurate NOI form. Discharges are not authorized if your NOI is incomplete or inaccurate or if you were never eligible for permit coverage. Refer to the instructions at the end of this form.

Permit Information

NPDES ID: MAR1003TR

State/Territory to which your project/site is discharging: MA

Is your project/site located on federally recognized Indian Country lands? No

Are you requesting coverage under this NOI as a *"Federal Operator"* or a *"Federal Facility"* as defined in Appendix A (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-a-definitions.pdf)?

No

Have stormwater discharges from your current construction site been covered previously under an NPDES permit? No

Will you use polymers, flocculants, or other treatment chemicals at your construction site? No

Has a Stormwater Pollution Prevention Plan (SWPPP) been prepared in advance of filling this NOI, as required? Yes

Are you able to demonstrate that you meet one of the criteria listed in Appendix D (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-d-endangered-species-protection.pdf) with respect to protection of threatened or endangered species listed under the Endangered Species Act (ESA) and federally designated critical habitat?

Yes

Have you completed the screening process in Appendix E (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-e-historic-properties.pdf) relating to the protection of historic properties?

Yes

Indicating "Yes" below, I confirm that I understand that CGP only authorized the allowable stormwater discharges in Part 1.2.1 and the allowable non-stormwater discharges listed in Part 1.2.2. Any discharges not expressly authorized in this permit cannot become authorized or shielded from liability under CWA section 402(k) by disclosure to EPA, state or local authorities after issuance of this permit via any means, Including the Notice of Intent (NOI) to be covered by the permit, the Stormwater Pollution Prevention Plan (SWPPP), during an Inspection, etc. If any discharges requiring NPDES permit coverage other than the allowable stormwater and non-stormwater discharges listed in Parts 1.2.1 and 1.2.2 will be discharged, they must be covered under another NPDES permit.

Yes

Operator Information

Operator Information

Operator Name: Gilbane Building Company

Operator Mailing Address:

Address Line 1: 10 Channel Center Street

Address Line 2:

City: Boston

ZIP/Postal Code: 02210

State: MA

County or Similar Division: Suffolk

Operator Point of Contact Information

First Name Middle Initial Last Name: Tripp McElroy

Title: Project Executive

Phone: 603-969-3426 **Ext.:**

Email: HMcelroy@GilbaneCo.com

NOI Preparer Information

☐ **This NOI is being prepared by someone other than the certifier.**

Project/Site Information

Project/Site Name: Florence Roche Elementary School

Project/Site Address

Address Line 1: 324 Main Street

Address Line 2:

City: Groton

ZIP/Postal Code: 01450

State: MA

County or Similar Division: Middlesex

Latitude/Longitude: 42.61531°N, 71.57893°W

Latitude/Longitude Data Source: Map

Horizontal Reference Datum: NAD 83

Project Start Date: 04/15/2022 **Project End Date:** 07/01/2025 **Estimated Area to be Disturbed:** 15.5

Types of Construction Sites:

- Elementary School

Will there be demolition of any structure built or renovated before January 1, 1980? Yes

➔ **Do any of the structures being demolished have at least 10,000 square feet of floor space?** Yes

Will you be discharging dewatering water from your site? Yes

Was the pre-development land use used for agriculture? No

Are there other operators that are covered under this permit for the same project site? No

Have earth-disturbing activities commenced on your project/site? No

Is your project/site located on federally recognized Indian Country lands? No

Is your project/site located on a property of religious or cultural significance to an Indian tribe? No

Discharge Information

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? Yes

Are there any waters of the U.S. within 50 feet of your project's earth disturbances? Yes

Are any of the waters of the U.S. to which you discharge designated by the state or tribal authority under its antidegradation policy as a Tier 2 (or Tier 2.5) water (water quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water) or as a Tier 3 water (Outstanding National Resource Water)? See Resources, Tools and Templates (https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates)

No

001: Unnamed wetland

Latitude/Longitude: 42.614827°N, 71.579669°W

Tier Designation: N/A

Is this receiving water impaired (on the CWA 303(d) list)? No

Has a TMDL been completed for this receiving waterbody? No

002: Unnamed wetland

Latitude/Longitude: 42.616277°N, 71.575074°W

Tier Designation: N/A

Is this receiving water impaired (on the CWA 303(d) list)? No

Has a TMDL been completed for this receiving waterbody? No

Stormwater Pollution Prevention Plan (SWPPP)

Will all required personnel, including those conducting inspections at your site, meet the training requirements in Part 6 of this permit? Yes

First Name **Middle Initial** **Last Name:** Tripp McElroy

Organization:

Title: Project Executive

Phone: 603-969-3426 **Ext.:**

Email: HMcelroy@GilbaneCo.com

Endangered Species Protection Worksheet: Criterion C

Determine ESA Eligibility Criterion

Are your discharges and discharge-related activities already addressed in another operator's valid certification of eligibility for your "action area" under the current 2022 CGP? No

Has consultation between you, a Federal Agency, and the USFWS and/or the NMFS under section 7 of the Endangered Species Act (ESA) concluded? No

Are your construction activities the subject of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat?

No

You must determine whether species listed as either threatened or endangered, or their critical habitat(s) are located in your site's action area (i.e., all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action, including areas beyond the footprint of the site that are likely to be affected by stormwater discharges, discharge-related activities, and authorized non-stormwater discharges).

Determine your Action Area

You must consider the following in determining the action area for your site, and **confirm that all the following are true**:

- **In determining my "action area", I have considered that discharges of pollutants into downstream areas can expand the action area well beyond the footprint of my site and the discharge point(s). I have taken into account the controls I will be implementing to minimize pollutants and the receiving waterbody characteristics (e.g., perennial, intermittent, ephemeral) in determining the extent of physical, chemical, and/or biotic effects of the discharges. I confirm that all receiving waterbodies that could receive pollutants from my site are included in my action area.**

  True

- **In determining my "action area", I have considered that discharge-related activities must also be accounted for in determining my action area. I understand that discharge-related activities are any activities that cause, contribute to, or result in stormwater and authorized non-stormwater point source discharges, and measures such as the siting, construction timing, and operation of stormwater controls to control, reduce, or prevent pollutants from being discharged. I understand that any new or modified stormwater controls that will have noise or other similar effects, and any disturbances associated with construction of controls, are part of my action area.**

  True

Determine is ESA-listed species and/or critical habitat are in your site action area.

ESA-listed species and designated critical habitat are under the purview of the NMFS and the USFWS, and in many cases, you will need to acquire species and critical habitat lists from both federal agencies.

National Marine Fisheries Service (NMFS)

For NMFS species and designated critical habitat information, use the following webpage:
- https://www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility (https://www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility)

I have checked the webpage listed above and confirmed that:

- (◉) There are no NMFS-protected species and/or designated critical habitat in my action area.
- ( ) There are NMFS-protected species and/or designated critical habitat in my action area.

U.S. Fish and Wildlife Service (USFWS)

For USFWS species and critical habitat information, use the following webpage:
- https://www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility (https://www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility)

I have checked the webpage listed above and confirmed that:

- ( ) There are no FWS-protected species and/or designated critical habitat in my action area.
- (◉) There are FWS-protected species and/or designated critical habitat in my action area.

For FWS species, include the full printout from your IPaC query/Official Species List.

Name	Uploaded Date	Size
Groton_Species List_ New England Ecological Services Field Office.pdf (attachment/1493601)	04/01/2022	282.11 KB

You may be eligible under **Criterion C**. You must assess whether your discharges or discharge-related activities are likely to result in short- or long-term adverse effects to ESA-listed threatened or endangered species or designated critical habitat. In order to make a determination of your site's likelihood of short- or long-term adverse effects, you must complete the Criterion C Eligibility fields below.

Discharges not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. True

You are eligible under **Criterion C**.

I confirm that both ESA-listed species and designated critical habitat under the jurisdiction of the USFWS and/or NMFS were considered in my evaluation. Yes

Identify the USFWS information sources used (Note: state resources are not acceptable):

IPaC project request and review of data. While a Threaten species and a Candidate species was identified within the action area, no critical habitats were noted. In addition, as part of the proposed construction upgrades, all stormwater generated by the site is proposed to exceed applicable state and local treatment regulations. Due to the size of the site, no direct discharges or stormwater will occur - all discharges will be treated to meet and/or exceed applicable state and local treatment regulations.

Identify the NMFS information sources used (Note: state resources are not acceptable):

Review of NOAA Fisheries Great Atlantic Region ESA Section 7 Mapper. No threatened, endanger species or critical habitat was reported as part of this review

You must provide a list of all ESA-listed species and/or designated critical habitat that are located in your "action area". Select one of the options below and provide the required information:

- (◉) Option 1: Enter ESA-listed species

What ESA-listed species and/or designated critical habitat are located in your "action area"?

Northern Long-eared Bat
Monarch Butterfly
No critical habitats are proximate to the project site

Option 2: Attach the species list(s)

What is the distance between your site and the ESA-listed species and/or designated critical habitat within the action area (in miles, state "on site" if the ESA-listed species and/or designated critical habitat is within the area to be disturbed)?

0

Provide the rationale describing specifically how adverse effects to ESA-listed species will be avoided from the discharge and discharge-related activities.

The existing site is currently developed with and elementary school, track and athletic fields and there are no areas of of critical concern proximate to the site. The two listed species (Monarch Butterfly - Candidate and Northern Long-ear Bat - Threatened) do not have any designated critical habitat areas and as such none of the stormwater discharges will have an impact. With regards to stormwater discharges to the two unnamed wetlands, DIscharge No 1 is via an on-site catch basin drainage system and Discharge No 2 is via sheet flow through a vegetative buffer. BMPs to be installed as part of the construction project will not result in an impairments to the noted waters; no direct discharges are anticipated - all discharges will be treated to meet and/or exceed applicable state and local treatment regulations.

Attach a copy of your site map showing the upland and in-water extent of your "action area".

Note: A copy of this site map must also be included with your SWPPP

Name	Uploaded Date	Size
Groton _Aerial.pdf (attachment/1493623)	04/01/2022	1.07 MB

Have you provided documentation in your SWPPP supporting your eligibility under Criterion C? Yes

Historic Preservation

Are you installing any stormwater controls as described in Appendix E (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-e-historic-properties.pdf) that require subsurface earth disturbances? (Appendix E (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-e-historic-properties.pdf), Step 1)

Yes

Have prior surveys or evaluations conducted on the site already determined historic properties do not exist, or that prior disturbances have precluded the existence of historic properties? (Appendix E (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-e-historic-properties.pdf), Step 2):

Yes

Certification Information

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. Signing an electronic document on behalf of another person is subject to criminal, civil, administrative, or other lawful action.

Certified By: Mark Winslow

Certifier Title: Project Executive

Certifier Email: mwinslow@gilbaneco.com

Certified On: 04/01/2022 4:28 PM ET

Stormwater Pollution Prevention Plan (SWPPP)

For Construction Activities At:

Florence Roche Elementary School
342 Main Street
Groton, MA 01450

SWPPP Prepared For:

Gilbane Building Company
Tripp McElroy
10 Channel Center Street, Suite 100
Boston, MA 02210
HMcelroy@GilbaneCo.com

WPPP Prepared By:

Gilbane Building Company
Mark A. Winslow
7 Jackson Walkway
Providence, RI 02903
mwinslow@gilbaneco.com

SWPPP Preparation Date:

02/14/2022

Estimated Project Dates:

Project Start Date: 04/11/2022

Project Completion Date: 07/01/2025

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SECTION 1: CONTACT INFORMATION/RESPONSIBLE PARTIES

1.1 Operator(s) / Subcontractor(s)

Instructions (see definition of "operator" at CGP Part 1.1.1):

- Identify all site operators who will be engaged in construction activities at the site and the areas of the site over which each operator has control (Part 7.2.1). Indicate respective responsibilities, where appropriate. Also include the 24-hour emergency contact.
- List subcontractors expected to work on-site. Notify subcontractors of stormwater requirements applicable to their work.
- Consider using Subcontractor Agreements such as the type included as a sample in Appendix G of this Template.

Operator(s):

Gilbane Building Company
Tripp McElroy
10 Channel Center Street, Suite 100
Boston, MA 02210
603-969-3426
HMcelroy@GilbaneCo.com

Subcontractor(s):

TBD

Emergency 24-Hour Contact:

Primary Contact:

Gilbane Building Company
John Roche
617-592-8025

Secondary Contacts:

Gilbane Building Company
Jonathan May
925-326-8715

Gilbane Building Company
Tripp McElroy
603-939-3462

1.2 Stormwater Team

Instructions (see CGP Parts 6 and 7.2.2):

- Identify the individuals (by name and position) that you have made part of the project's stormwater team pursuant to CGP Part 6.1, their individual responsibilities, and which members are responsible for inspections. At a minimum the stormwater team is comprised of individuals who are responsible for the design, installation, maintenance, and/or repair of stormwater controls; the application and storage of treatment chemicals (if applicable); conducting inspections as required in CGP Part 4.1; and taking corrective actions as required in Part 5.
- Each member of the stormwater team must have ready access to either an electronic or paper copy of applicable portions of the 2022 CGP and the SWPPP.
- Each member of the stormwater team must understand the requirements of the 2022 CGP and their specific responsibilities with respect to those requirements, including the information in Part 6.2.
- For projects that receive coverage under the 2022 CGP on or after February 17, 2023, to be considered a qualified person under Part 4.1 to conduct inspections under Part 4, you must, at a minimum, either:
  - ✓ Have completed the EPA construction inspection course developed for this permit and have passed the exam; or
  - ✓ Hold a current valid construction inspection certification or license from a program that, at a minimum, covers the following:
    - Principles and practices of erosion and sediment control and pollution prevention practices at construction sites;
    - Proper installation, and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites; and
    - Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4.

  Note that if one of the following topics (e.g., installation and maintenance of pollution prevention practices) is not covered by the non-EPA training program, you may consider supplementing the training with the analogous module of the EPA course (e.g., Module 4) that covers the missing topic.
- Include documentation showing completion of trainings in Appendix I of this SWPPP template.
- For projects that receive coverage under the 2022 CGP prior to February 17, 2023, any personnel conducting site inspections pursuant to Part 4 on your site must, at a minimum:
  - ✓ Be knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention,
  - ✓ Possess the appropriate skills and training in conditions at the construction site that could impact stormwater quality, and
  - ✓ Possess the appropriate skills and training in the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Stormwater Team

Name and/or Position, and Contact	Responsibilities	I Have Completed Training Required by CGP Part 6.2	I Have Read the CGP and Understand the Applicable Requirements
Tripp McElroy Project Executive 603-969-3426 HMcelroy@GilbaneCo.com	Compliance and Inspections	☐ Yes ☐ No	☐ Yes Date: Click here to enter a date.
Jonathan May Senior Project Engineer 925-326-8715 Jmay1@gilbaneco.com	Compliance and Inspections	☐ Yes ☐ No	☐ Yes Date: Click here to enter a date.
John Roche Senior General Superintendent 617-592-8025 jroche@gilbaneco.com	Compliance and Inspections	☐ Yes ☐ No	☐ Yes Date: Click here to enter a date.
TBD	Inspections and Maintenance	☐ Yes ☐ No	☐ Yes Date: Click here to enter a date.

Stormwater Team Members Who Conduct Inspections Pursuant to CGP Part 4

Name and/or Position and Contact	Training(s) Received	Date Training(s) Completed	If Training is a Non-EPA Training, Confirm that it Satisfies the Minimum Elements of CGP Part 6.3.b
Tripp McElroy Project Executive 603-969-3426 HMcelroy@GilbaneCo.com	See note below	Date: Click here to enter a date.	☐ Principles and practices of erosion and sediment control and pollution prevention practices at construction sites ☐ Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites ☐ Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4
Jonathan May Senior Project Engineer 925-326-8715 Jmay1@gilbaneco.com	See note below	Date: Click here to enter a date.	☐ Principles and practices of erosion and sediment control and pollution prevention practices at construction sites ☐ Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites ☐ Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4
TBD	Insert Title of Training Received	Date: Click here to enter a date.	☐ Principles and practices of erosion and sediment control and pollution prevention practices at construction sites ☐ Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites ☐ Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4

NOTE: in accordance with the EPA FAQs issued regarding the new 2022 regulations (see below), the new training requirements do not take effect until after 2/17/2023. The below referenced EPA training class has not been release as of this time; estimated release date by the EPA June/July 2022.

For projects that receive permit coverage prior to February 17, 2023, operators may continue to comply with the training requirements as they were worded in the 2017 CGP.

For projects that receive permit coverage on or after February 17, 2023, CGP Part 6.3 specifies that anyone carrying out inspections must either (1) complete the EPA construction inspection course developed for this permit and pass the exam, or (2) hold a current valid certification or license from a non-EPA training program that covers essentially the same principles. The requirements specify that the non-EPA training program must cover, at a minimum, the following:

- Principles and practices of erosion and sediment control and pollution prevention practices at construction sites
- Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites
- Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4.

Excerpt from 2017 CGP:

Part 4.1 clarifies that the person(s) inspecting the site may be a person on the project staff or a third party hired to conduct such inspections. Whoever will be charged with conducting the inspections must be a "qualified person," who is knowledgeable in the principles and practice of erosion and sediment controls, and pollution prevention, who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality, and the appropriate skills and training to assess the effectiveness of any stormwater control measures selected and installed to meet the requirements of the permit.

All Gilbane staff by having attended an in-house mandatory 8 hour training class -"Introduction to Environmental Operations" class meet the 2017 definition of "qualified person". However, prior to 2/17/2023 deadline, representatives of on-site Gilbane team will complete the new EPA training class as referenced within the FAQs.

SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

2.1 Project/Site Information

Instructions (see "Project/Site Information," Section IV of Appendix H – NOI Form and Instructions):

- In this section, compile basic site information that will be helpful when you file your NOI.

Project Name and Address

Project/Site Name: Florence Roche Elementary School
Street/Location: 342 Main Street
City: Groton
State: MA
ZIP Code: 01450
County or Similar Government Division: Middlesex County

Project Latitude/Longitude

Latitude: 42.61531° N
(decimal degrees)

Longitude: - -7157893 ° W
(decimal degrees)

Latitude/longitude data source: ☒ Map ☐ GPS ☐ Other (please specify): _____

Horizontal Reference Datum: ☐ NAD 27 ☒ NAD 83 ☐ WGS 84

Additional Site Information

Is your site located on Indian country lands, or on a property of religious or cultural significance to an Indian Tribe? ☐ Yes ☒ No

If yes, provide the name of the Indian Tribe associated with the area of Indian country (including the name of Indian reservation if applicable), or if not in Indian country, provide the name of the Indian Tribe associated with the property: N/A

2.2 Discharge Information

Instructions (see "Discharge Information," Section V of Appendix H – NOI Form and Instructions):

- In this section, include information relating to your site's discharge. This information corresponds to the "Discharge Information" section of the NOI form.
- List all of the stormwater points of discharge from your site. Identify each point of discharge with a unique 3-digit ID (e.g., 001, 002).
- For each unique point of discharge you list, specify the name of the first receiving water that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to. You may have multiple points of discharge that discharge to the same receiving water.
- Next, specify whether any waters of the U.S. that you discharge to are listed as "impaired" as defined in Appendix A, and the pollutants causing the impairment. Identify any Total Maximum Daily Loads (TMDL) that have been completed for any of the waters of the U.S. that you discharge to and the pollutants for which there is a TMDL. For more information on impaired waters and TMDLs, including a list of TMDL contacts and links by State, visit https://www.epa.gov/tmdl.
- Finally, indicate whether any receiving water that you discharge to is designated as a Tier 2, Tier 2.5, or Tier 3 water and if so, what the designation is (2, 2.5, or 3). A list of Tier 2, 2.5, and 3 waters located in the areas eligible for coverage under this permit can be found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates.

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)?	☒ Yes ☐ No
Are there any waters of the U.S. within 50 feet of your project's earth disturbances?	☐ Yes ☒ No

For each point of discharge, provide a point of discharge ID (a unique 3-digit ID, e.g., 001, 002), the name of the first receiving water that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to, and the following receiving water information, if applicable:

Point of Discharge ID	Name of receiving water that receives stormwater discharge:	Is the receiving water impaired (on the CWA 303(d) list)?	If yes, list the pollutants that are causing the impairment:	Has a TMDL been completed for this receiving waterbody?	If yes, list TMDL Name and ID:	Pollutant(s) for which there is a TMDL:	Is this receiving water designated as a Tier 2, Tier 2.5, or Tier 3 water?	If yes, specify which Tier (2, 2.5, or 3)?
[001]	Unnamed wetland	☐ Yes ☒ No		☐ Yes ☒ No			☐ Yes ☒ No	
[002]	Unnamed wetland	☐ Yes ☒ No		☐ Yes ☒ No			☐ Yes ☒ No	

Discharge Mapping Tool Report x

Number of Catchments Found: 2

Number of Assessments Found: 0

Catchment ID Related Waters	Causes of Impairment Assessments (Assessment Unit ID)	TMDL (TMDL ID)	TMDL Pollutant
6075527 Unidentified Water			
6075567 Unidentified Water			

2.3 Nature of the Construction Activities

Instructions (see CGP Parts 1.2.1.c and 7.2.3):

- Provide a general description of the nature of the construction activities at your site.
- Describe the size of the property (in acres or length in miles if a linear construction site), the total area expected to be disturbed by the construction activities (to the nearest quarter acre or quarter mile if a linear construction site), and the maximum area expected to be disturbed at any one time.
- A description of any on-site and off-site construction support activity areas covered by this permit;
- Indicate the type of construction site, whether there will be certain demolition activities, and whether the predevelopment land use was for agriculture.
- Provide a list and description of all pollutant-generating activities (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations) and indicate for each activity the associated pollutants or pollutant constituents (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels) which could be discharged in stormwater from your construction site.
- Describe the construction support activities covered by this permit (see Part 1.2.1.c of

General Description of Project

Provide a general description of the nature of your construction activities, including the age or dates of past renovations for structures that are undergoing demolition:

Construction of a new 109,855 SF Elementary School, athletic track and fields and demolition of the existing elementary school.

Business days and hours for the project: M – F 7:00am – 4:00pm

Size of Construction Site

Size of Property	39.88 acres
Total Area Expected to be Disturbed by Construction Activities	15.44 acres
Maximum Area Expected to be Disturbed at Any One Time, Including On-site and Off-site Construction Support Areas	12 acres

Type of Construction Site *(check all that apply):*

☐ Single-Family Residential ☐ Multi-Family Residential ☐ Commercial ☐ Industrial

☒ Institutional ☐ Highway or Road ☐ Utility ☒ Other Elementary School

Will you be discharging dewatering water from your site?	☒ Yes ☐ No
If yes, will you be discharging dewatering water from a current or former Federal or State remediation site?	☐ Yes ☒ No

Pollutant-Generating Activities

List and describe all pollutant-generating activities and indicate for each activity the associated pollutants or pollutant constituents that could be discharged in stormwater from your construction site. Take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed during construction.

Pollutant-Generating Activity (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations)	**Pollutants or Pollutant Constituents** (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels)
Paving Operations	Petroleum
Concrete Foundation Work	Concrete/Portland Cement
Construction Waste	Discarded C&D waste placed in Dumpsters
Portable Toilets	Biocides, Dye, Fragrance and Detergents
On-site Fueling operations – wet hose delivery	Diesel Fuel
Landscaping	Fertilizers, Sediment
Construction Vehicles	Diesel Fuel, Gasoline, Oils

Construction Support Activities *(only provide if applicable)*

Describe any construction support activities for the project (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas): N/A

Contact information for construction support activity: N/A

2.4 Sequence and Estimated Dates of Construction Activities

Instructions (see CGP Part 7.2.3):

- Describe the intended construction sequence and duration of major activities.
- For each portion or phase of the construction site, include the following:
  - ✓ Commencement and duration of construction activities, including clearing and grubbing, mass grading, demolition activities, site preparation (i.e., excavating, cutting and filling), final grading, and creation of soil and vegetation stockpiles requiring stabilization;
  - ✓ Temporary or permanent cessation of construction activities in each portion of the site;
  - ✓ Temporary or final stabilization of exposed areas for each portion of the site. The dates for stabilization must reflect the applicable deadlines to which you are subject to in Part 2.2.14; and
  - ✓ Removal of temporary stormwater controls and construction equipment or vehicles, and cessation of any construction-related pollutant-generating activities.
- The construction sequence must reflect the following requirements:
  - ✓ Part 2.1.3 (installation of stormwater controls); and
  - ✓ Parts 2.2.14 (stabilization deadlines).

Construction Phase	
Estimated Start Date of Construction Activities for this Phase	3/15/2022
Estimated End Date of Construction Activities for this Phase	6/30/2025
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	5/1/2023
Estimated Date(s) when Stormwater Controls will be Removed	Stormwater controls will remain in place and be maintained as part of the construction phase

Sequence of work:

a. Site development
b. Site utilities
c. Concrete building foundations
d. Erect structural steel structure
e. Place Slabs
f. Exterior envelope
g. Building fit out
h. Demolition of existing structure
i. Complete landscaping and finish sitework

2.5 Authorized Non-Stormwater Discharges

Instructions (see CGP Parts 1.2.2 and 7.2.5):

- Identify all authorized non-stormwater discharges. The authorized non-stormwater discharges identified in Part 1.2.2 of the 2022 CGP include:
  - ✓ Discharges from emergency fire-fighting activities;
  - ✓ Fire hydrant flushings;
  - ✓ Landscape irrigation;
  - ✓ Waters used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes;
  - ✓ Water used to control dust;
  - ✓ Potable water including uncontaminated water line flushings;
  - ✓ External building washdown, provided soaps, solvents and detergents are not used, and external surfaces do not contain hazardous substances as defined in CGP Appendix A (e.g., paint or caulk containing polychlorinated biphenyls (PCBs));
  - ✓ Pavement wash waters provided spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and detergents are not used. You are prohibited from directing pavement wash waters directly into any receiving water, storm drain inlet, or constructed or natural site drainage features, unless the conveyance is connected to a sediment basin, sediment trap, or similarly effective control;
  - ✓ Uncontaminated air conditioning or compressor condensate;
  - ✓ Uncontaminated, non-turbid discharges of ground water or spring water;
  - ✓ Foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water; and
  - ✓ Uncontaminated construction dewatering water discharged in accordance with Part 2.4.

List of Authorized Non-Stormwater Discharges Present at the Site

Authorized Non-Stormwater Discharge	Will or May Occur at Your Site?
Discharges from emergency fire-fighting activities	☐ Yes ☒ No
Fire hydrant flushings	☒ Yes ☐ No
Landscape irrigation	☒ Yes ☐ No
Water used to wash vehicles and equipment	☐ Yes ☒ No
Water used to control dust	☒ Yes ☐ No
Potable water including uncontaminated water line flushings	☒ Yes ☐ No
External building washdown (soaps/solvents are not used and external surfaces do not contain hazardous substances)	☐ Yes ☒ No
Pavement wash waters	☐ Yes ☒ No
Uncontaminated air conditioning or compressor condensate	☒ Yes ☐ No

Authorized Non-Stormwater Discharge	**Will or May Occur at Your Site?**
Uncontaminated, non-turbid discharges of ground water or spring water	☒ Yes ☐ No
Foundation or footing drains	☐ Yes ☒ No
Uncontaminated construction dewatering water	☒ Yes ☐ No

2.6 Site Maps

Instructions (see CGP Part 7.2.4):

- Attach site maps in Appendix A of the Template. For most projects, a series of site maps is necessary and recommended. The first should show the undeveloped site and its current features. An additional map or maps should be created to show the developed site or, for more complicated sites, show the major phases of development.

These maps must include the following features:

- Boundaries of the property and of the locations where construction will occur, including:
  - ✓ Locations where earth-disturbing activities will occur, noting any phasing of construction activities and any demolition activities;
  - ✓ Approximate slopes before and after major grading activities. Note any areas of steep slopes, as defined in CGP Appendix A;
  - ✓ Locations where sediment, soil, or other construction materials will be stockpiled;
  - ✓ Locations of any crossings of receiving waters;
  - ✓ Designated points where vehicles will exit onto paved roads;
  - ✓ Locations of structures and other impervious surfaces upon completion of construction; and
  - ✓ Locations of on-site and off-site construction support activity areas covered by the permit (see CGP Part 1.2.1.c).
- Locations of any receiving waters, including wetlands, within your site and all receiving waters within one mile downstream of the site's discharge point(s). Indicate which receiving waters are listed as impaired, and which are identified by your State, Tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 waters.
- Any areas of Federally-listed critical habitat for endangered or threatened species within the action area of the site as defined in CGP Appendix A (Helpful resources: CGP Appendix D and www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility).
- Type and extent of pre-construction cover on the site (e.g., vegetative cover, forest, pasture, pavement, structures).
- Drainage pattern(s) of stormwater and authorized non-stormwater before and after major grading activities.
- Stormwater and authorized non-stormwater discharge locations, including:
  - ✓ Locations where stormwater and/or authorized non-stormwater will be discharged to storm drain inlets, including a notation of whether the inlet conveys stormwater to a sediment basin, sediment trap, or similarly effective control; and
  - ✓ Locations where stormwater or allowable non-stormwater will be discharged directly to receiving waters, including wetlands (i.e., not via a storm drain inlet).
  - ✓ Locations where turbidity benchmark monitoring will take place to comply with Part 3.3, if applicable to your site.
- Locations of all potential pollutant-generating activities identified in Part 7.2.3g (note: you should have those identified in Section 2.3 (Nature of the Construction Activities) in this SWPPP Template).
- Designated areas where construction wastes that are covered by the exception in Part 2.3.3e.ii (i.e., they are not pollutant-generating) will be stored.

SECTION 3: DOCUMENTATION OF COMPLIANCE WITH OTHER FEDERAL REQUIREMENTS

3.1 Endangered Species Protection

Instructions (see CGP Parts 1.1.5, 7.2.9.a, Appendix D, and the "Endangered Species Protection" section of the Appendix H – NOI Form and Instructions as well as resources available at www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility):

Using the instructions in Appendix D of the permit, determine which criterion listed below (A-F) applies with respect to the protection of endangered species. To make this determination, you must use information from **BOTH** the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). Both the NMFS and USFWS maintain lists of Endangered Species Act-listed (ESA-listed) species and designated critical habitat. Operators must consult both when determining their eligibility.

- Check only 1 box, include the required information, and provide a sound basis for supporting the criterion selected. Select the most conservative criterion that applies.
- Include documentation supporting your determination of eligibility required in the Endangered Species Protection section of the NOI in NeT or the ESA worksheet in CGP Appendix D.

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☒ **Criterion A**: No ESA-listed species and/or designated critical habitat present in action area. Using the process outlined in Appendix D of the CGP, you certify that ESA-listed species and designated critical habitat(s) under the jurisdiction of the USFWS or NMFS are not likely to occur in your site's "action area" as defined in Appendix A of the CGP. *Please Note: NMFS' jurisdiction includes ESA-listed marine and estuarine species that spawn in inland rivers.*

☒ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D (Note: reliance on State resources is not acceptable; see CGP Appendix D).

Documentation:

USFWA IPaC Project code: 2022-0007195

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion B:** Eligibility requirements met by another operator under the 2022 CGP. The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for your "action area" under eligibility Criterion A, C, D, E, or F of the 2022 CGP and you have confirmed that no additional ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS not considered in the that certification may be present or located in the "action area." To certify your eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other CGP operator's certification. By certifying eligibility under this criterion, you agree to comply with any conditions upon which the other CGP operator's certification was based. You must include in your NOI the NPDES ID from the other 2022 CGP operator's notification of authorization under this permit and list any measures that you must comply with. If your certification is based on another 2022 CGP operator's certification under criterion C, you must provide EPA with the relevant supporting information required of existing dischargers in Criterion C.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: N/A

☐ **Criterion C:** Discharges not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. ESA-listed species and/or designated critical habitat(s) under the jurisdiction of the USFWS and/or NMFS are likely to occur in or near your site's "action area," and you certify to EPA that your site's discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects to ESA-listed threatened or endangered species and/or designated critical habitat. This certification may include consideration of any stormwater controls and/or management practices you will adopt to ensure that your discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. To certify your eligibility under this criterion, indicate 1) the ESA-listed species and/or designated habitat located in your "action area" using the process outlined in Appendix D of this permit; 2) the distance between the site and the listed species and/or designated critical habitat in the action area (in miles); and 3) a rationale describing specifically how short- or long-term adverse effects to ESA-listed species will be avoided from the discharges and discharge-related activities. (Note: You must include a copy of your site map from your SWPPP showing the upland and in-water extent of your "action area" with your NOI.)

☒ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: N/A

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion D**: Coordination with USFWS and/or NMFS has successfully concluded.

Coordination between you and the USFWS and/or NMFS has concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS, and resulted in a written confirmation from USFWS and/or NMFS that the effects of your site's discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects. By certifying eligibility under this criterion, you agree to comply with any conditions you must meet for your site's discharges and discharge-related activities to not likely result in any short- or long-term adverse effects. You must include copies of the correspondence with the participating agencies in your SWPPP and this NOI.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: N/A

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion E:** ESA Section 7 consultation has successfully concluded. Consultation between a Federal agency and the USFWS and/or NMFS under section 7 of the ESA has concluded. Consultations can be either formal or informal, and would have occurred only as a result of a separate Federal action (e.g., during application for an individual wastewater discharge permit or the issuance of a wetlands dredge and fill permit), and the consultation must have addressed the effects of your construction activity's discharges and discharge-related activities on all ESA-listed threatened or endangered species and all designated critical habitat under the jurisdiction of each Service, as appropriate, in your action area. The result of this consultation must be either:

i. A biological opinion currently in effect that determined that the action in question (taking into account the effects of your facility's discharges and discharge-related activities) is likely to adversely affect, but is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The biological opinion must have included the effects of your facility's discharges and discharge-related activities on all the listed species and designated critical habitat in your action area under the jurisdiction of each Service, as appropriate. To be eligible under (i), any reasonable and prudent measures specified in the incidental take statement must be implemented;

ii. Written concurrence (e.g., letter of concurrence) from the applicable Service(s) with a determination that your facility's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. The concurrence letter must have included the effects of your facility's discharges and discharge-related activities on all the ESA-listed species and/or designated critical habitat on your species list(s) acquired from USFWS and/or NMFS as part of this worksheet.

The consultation does not warrant reinitiation under 50 CFR §402.16; or, if reinitiation of consultation is required (e.g., due to a new species listing, critical habitat designation, or new information), the Federal action agency has reinitiated the consultation and the result of the consultation is consistent with the statements above. (Note: you must include any reinitiation documentation from the Services or consulting Federal agency with your NOI.) -

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: N/A

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion F:** Issuance of section 10 permit. Potential take is authorized through the issuance of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of the site's discharges and discharge-related activities on ESA-listed species and designated critical habitat. You must include copies of the correspondence between yourself and the participating agencies in your SWPPP and your NOI.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: N/A

3.2 Historic Property Screening Process

Instructions (see CGP Part 1.1.6, 7.2.9.b, Appendix E, and the "Historic Preservation" section of the Appendix H – NOI Form and Instructions):

Follow the screening process in Appendix E of the permit to determine whether your installation of subsurface earth-disturbing stormwater controls will have an effect on historic properties.

- Include documentation supporting your determination of eligibility.
- To contact your applicable State historic preservation office, information is available at *https://ncshpo.org/directory/*
- To contact your applicable Tribal historic preservation office, information is available at *https://grantsdev.cr.nps.gov/THPO_Review/index.cfm*

Appendix E, Step 1

Do you plan on installing any stormwater controls that require subsurface earth disturbance, including, but not limited to, any of the following stormwater controls at your site? Check all that apply below, and proceed to Appendix E, Step 2.

☐ Dike

☒ Berm

☒ Catch Basin

☐ Pond

☐ Constructed Site Drainage Feature (e.g., ditch, trench, perimeter drain, swale, etc.)

☐ Culvert

☐ Channel

☒ Other type of ground-disturbing stormwater control: Below grade stormwater recharge system

Appendix E, Step 2

If you answered yes in Step 1, have prior professional cultural resource surveys or other evaluations determined that historic properties do not exist, or have prior disturbances at the site have precluded the existence of historic properties? ☒ YES ☐ NO

- If yes, no further documentation is required for Section 3.2 of the Template and you may provide the prior documentation in your SWPPP.
    - Site consists of an existing elementary and regional middle school. All planned construction activities will take place with previously devleoped portions of the site. In addition, an ASTM Phase I Environmental Site Assessment and a Massachusetts Historical Commission MACRIS database search was conducted as well as a formal Project Notificaiton Form submitted to the Massachusetts Historical Commission to support this conclusion.

- If no, proceed to Appendix E, Step 3.

Appendix E, Step 3

If you answered no in Step 2, have you determined that your installation of subsurface earth-disturbing stormwater controls will have no effect on historic properties? ☐ YES ☐ NO

- If yes, provide documentation of the basis for your determination. N/A
- If no, proceed to Appendix E, Step 4.

Appendix E, Steps 4 and 5

If you answered no in Step 3, did the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Office (THPO), or other Tribal representative (whichever applies) respond to you within 15 calendar days to indicate their views as to the likelihood that historic properties are potentially present on your site and may be impacted by the installation of stormwater controls that require subsurface earth disturbance? ☐ YES ☐ NO

- If yes, describe the nature of their response:
    - ☐ Written indication that no historic properties will be affected by the installation of stormwater controls. N/A
    - ☐ Written indication that adverse effects to historic properties from the installation of stormwater controls can be mitigated by agreed upon actions. N/A
    - ☐ No agreement has been reached regarding measures to mitigate effects to historic properties from the installation of stormwater controls. N/A
    - ☐ Other: N/A

- If no, no further documentation is required for Section 3.2 of the Template.

3.3 Safe Drinking Water Act Underground Injection Control Requirements

Instructions (see CGP Part 7.2.9.c):

- If you will use any of the identified controls in this section, document any contact you have had with the applicable State agency or EPA Regional Office responsible for implementing the requirements for underground injection wells in the Safe Drinking Water Act and EPA's implementing regulations at 40 CFR Parts 144-147.
- For State UIC program contacts, refer to the following EPA website: https://www.epa.gov/uic.

Do you plan to install any of the following controls? Check all that apply below.

- ☐ Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)
- ☒ Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow
- ☐ Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

If yes, insert copies of letters, emails, or other communication between you and the State agency or EPA regional office.

SECTION 4: EROSION AND SEDIMENT CONTROLS AND DEWATERING PRACTICES

General Instructions (See CGP Parts 2.2 and 7.2.6):

- Describe the erosion and sediment controls that will be implemented at your site to meet the requirements of CGP Part 2.2.
- Describe any applicable stormwater control design specifications (including references to any manufacturer specifications and/or erosion and sediment control manuals/ordinances relied upon).
- Describe any routine stormwater control maintenance specifications.
- Describe the projected schedule for stormwater control installation/implementation.

4.1 Natural Buffers or Equivalent Sediment Controls

Instructions (see CGP Parts 2.2.1 and 7.2.6.b.i, and Appendix F):

This section only applies to you if discharge to a receiving water is located within 50 feet of your site's earth disturbances. If this is the case, consult CGP Part 2.2.1 and Appendix F for information on how to comply with the buffer requirements.

- Describe the compliance alternative (CGP Part 2.2.1.a.i, ii, or iii) that you will implement to meet the buffer requirements, and include any required documentation supporting the alternative selected. For alternative 3, also include why it is infeasible for you to provide and maintain an undisturbed natural buffer of any size. For "linear construction sites" where it is infeasible to implement alternative 1, 2, or 3, also include a description of any buffer width retained and/or supplemental erosion and sediment controls installed. The compliance alternative selected must be maintained throughout the duration of permit coverage. However, if you select a different compliance alternative during your period of permit coverage, you must modify your SWPPP to reflect this change.
- If you qualify for one of the exceptions in CGP Part 2.2.1.b, include documentation related to your qualification for such exceptions.

Buffer Compliance Alternatives

Are there any receiving waters within 50 feet of your project's earth disturbances? ☐ YES ☐ NO

(Note: If no, no further documentation is required for Section 4.1 in the SWPPP Template. Continue to Section 4.2.)

Check the compliance alternative that you have chosen:

☒ (i) I will provide and maintain a 50-foot undisturbed natural buffer.

(Note 1: You must show the 50-foot boundary line of the natural buffer on your site map.)

(Note 2: You must show on your site map how all discharges from your construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

☒ (ii) I will provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by additional erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

(Note 1: You must show the boundary line of the natural buffer on your site map.)

(Note 2: You must show on your site map how all discharges from your construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

- Insert width of natural buffer to be retained
- Insert either of the following:

  (1) The estimated sediment removal from a 50-foot buffer using applicable tables in Appendix F, Attachment 1. Include information about the buffer vegetation and soil type that predominate at your site

  OR

  (2) If you conducted a site-specific calculation for the estimated sediment removal of a 50-foot buffer, provide the specific removal efficiency, and information you relied upon to make your site-specific calculation
- Insert description of additional erosion and sediment controls to be used in combination with natural buffer area
- Insert the following information:
  - (1) Specify the model or other tool used to estimate sediment load reductions from the combination of the buffer area and additional erosion and sediment controls installed at your site, and
  - (2) Include the results of calculations showing that the combination of your buffer area and the additional erosion and sediment controls installed at your site will meet or exceed the sediment removal efficiency of a 50-foot buffer

☐ (iii) It is infeasible to provide and maintain an undisturbed natural buffer of any size, therefore I will implement erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

☐ I qualify for one of the exceptions in Part 2.2.1.b. (If you have checked this box, provide information on the applicable buffer exception that applies, below.)

Buffer Exceptions

Which of the following exceptions to the buffer requirements applies to your site?

☐ There is no discharge of stormwater to waters of the U.S. through the area between the disturbed portions of the site and any waters of the U.S. located within 50 feet of your site

☐ No natural buffer exists due to preexisting development disturbances (e.g., structures, impervious surfaces) that occurred prior to the initiation of planning for this project.

☐ For "linear construction sites" (defined in Appendix A), site constraints (e.g., limited right-of-way) make it infeasible to meet any of the CGP Part 2.2.1.a compliance alternatives, provided that, to the extent feasible, you limit disturbances within 50 feet of the receiving water.

☐ The project qualifies as "small residential lot" construction (defined in Appendix A as "a lot being developed for residential purposes that will disturb less than 1 acre of land, but is part of a larger residential project that will ultimately disturb greater than or equal to 1 acre") (see Appendix F, Part F.3.2).

☐ For Alternative 1:

☐ For Alternative 2:

☐ Buffer disturbances are authorized under a CWA Section 404 permit.

☐ Buffer disturbances will occur for the construction of a water-dependent structure or water access area (e.g., pier, boat ramp, and trail).

4.2 Perimeter Controls

Instructions (see CGP Parts 2.2.3 and 7.2.6.b.ii):

- Describe sediment controls that will be used (e.g., silt fences, filter berms, compost filter socks, gravel barriers, temporary diversion dikes) to meet the Part 2.2.3 requirement to "install sediment controls along any perimeter areas of the site that are downslope from any exposed soil or other disturbed areas."
- For linear projects (as defined in Appendix A), where you have determined that the use of perimeter controls in portions of the site is infeasible (e.g. due to a limited or restricted right-of-way), document other practices that you will implement to minimize pollutant discharges to perimeter areas of the site.

General

- Straw Wattles and Silt Fences shall be installed as shown on Site Preparation Plan C101, C102 and C103 prior to the commencement of any demolition and construction activities. Additional erosion control barriers will be placed at the limit of work as needed and in any sensitive areas as work progresses.

Specific Perimeter Controls

Straw Wattles and Silt Fence	
Description: Straw Wattles shall be manufactured from rice straw and be wrapped in a tubular plastic netting. Straw Wattles shall be a minimum of 10 inches in diameter. Silt fence shall be set per Detail 2 on Civil Detail Sheet C601.	
Installation	Prior to the start of construction

Maintenance Requirements	Sedimentation shall at a minimum, be removed before it has accumulated to one-half of the above-ground height of any perimeter control.
Design Specifications	See Civil Detail Sheet C601

4.3 Sediment Track-Out

Instructions (see CGP Parts 2.2.4 and 7.2.6.b.iii):

- Describe stormwater controls that will be used to minimize sediment track-out.
- Describe location(s) of vehicle exit(s), procedures to remove accumulated sediment off-site (e.g., vehicle tracking), and stabilization practices (e.g., stone pads or wash racks or both) to minimize off-site vehicle tracking of sediment. Also include the design, installation, and maintenance specifications for each control.

General

- One construction entrance shall be installed; located near the southeasterly corner of the existing Elementary School (refer to Site Preparation Plan C101). In addition to the construction entrance, a mechanical street sweeper shall be utilized to clean the existing paved areas on a weekly basis; daily if sediment is observed within the public drive areas.

Specific Track-Out Controls

Stabilized Construction Entrance	
Description: The construction entrance shall be a minimum of 50-feet in length and 10-feet wide, and 6 inches thick. In addition, when necessary, wheels shall be cleaned to remove sediment prior to entrance onto public right-of-way. When washing is required, it shall be done on an area stabilized with crushed stone which drains into an approved sediment trap or sediment basin. All Sediment shall be prevented from entering any storm drain, ditch, or watercourse. In addition to the construction entrance, a mechanical street sweeper shall be utilized to clean the existing paved areas on an as-needed basis.	
Installation	Prior to the start of construction
Maintenance Requirements	The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-or-way. All sediment spoiled, dropped, washed, or tracked onto public rights of way must be removed immediately. The area of the construction entrance shall be cleared of all vegetation, roots, and other objectionable material. The filter fabric should be placed on the subgrade prior to the gravel placement. The gravel shall be placed to the specified dimensions depicted on the plans. The filter fabric should be placed on the subgrade prior to the gravel placement. The gravel shall be placed to the specified dimensions depicted on the plans
Design Specifications	See Civil Detail Sheet C601

4.4 Stockpiles or Land Clearing Debris Piles Comprised of Sediment or Soil

Instructions (see CGP Parts 2.2.5 and 7.2.6):

- Describe stormwater controls and other measures you will take to minimize the discharge of sediment or soil particles from stockpiled sediment or soil. Include a description of structural practices (e.g., diversions, berms, ditches, storage basins), including design, installation, and maintenance specifications, used to divert flows from stockpiled sediment or soil, retain or detain flows, or otherwise limit exposure and the discharge of pollutants from stockpiled sediment or soil.
- For piles that will be unused for 14 or more days, describe what cover or other appropriate temporary stabilization will be used.
- Also, describe any controls or procedures used to minimize exposure resulting from adding to or removing materials from the pile.

General
Cut and fill slopes and stockpiled materials shall be protected to prevent erosion with permanent erosion protection when erosion exposure period is expected to be greater than or equal to six months, and temporary erosion protection when erosion exposure period is expected to be less than six months.

Specific Stockpile Controls

Stockpile	
Description: Stripping and Stockpiling	
Installation	As needed
Maintenance Requirements	All temporary stockpiles will be surrounded by straw wattles and silt fences to minimize erosion and limit the discharge of pollutants. Stockpile remaining on site and note being worked after 14 days shall be covered or stabilized, e.g. temporary seed, straw mulch, wood chips.
Design Specifications	See Civil Detail Sheet C601

Silt Fence with Straw Wattles	
Description: Silt Fence with Straw Wattles	
Installation	• As needed
Maintenance Requirements	• Silt fence shall be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly set in the ground.
Design Specifications	See Civil Detail Sheet C601

4.5 Minimize Dust

Instructions (see CGP Parts 2.2.6 and 7.2.6):

Describe controls and procedures you will use at your site to minimize the generation of dust.

General
The Contractor shall employ dust control methods and materials at all times using sprinkled water or other approved means. Do not use oil or similar penetrants. Chemical materials may not be used on subgrades of areas to be seeded or planted.

Specific Dust Controls

Dust Control	
Description: On-site truck or connection to hydrant	
Installation	As Needed
Maintenance Requirements	• Water used for dust control and equipment washes shall be clean and free of salt, oil, and other injurious materials. • If water is not available on site, the contractor shall provide a source of water for dust control; either a water truck on-site or permitted connection to City Fire Hydrant throughout the period of construction. • No calcium chloride may be used
Design Specifications	N/A

Temporary Seeding	
Description: ▪ Grass seed for temporary seed cover shall be previous year's crop. Not more than 0.5% by weight shall be weed seed and not more than 1.75% by weight crop seed. Seed shall be delivered to the site in sealed containers, labeled with name of seed grower and seed formula, in form stated below. Seed shall be dry and free of mold. ▪ During construction it may be necessary to temporarily stabilize areas that will not be brought to final grade for a period longer than 14 working days. Temporary seeding is accomplished using fast-growing grass seed species such as ryegrass.	
Installation	Exposed grades for longer than 14 days
Maintenance Requirements	• Inspect weekly to see if stands are adequate. • Check for damage after heavy rains. • Stands should be uniform and dense. • Fertilize, reseed, and mulch damaged and sparse areas immediately. Track or tie down much as necessary. • Seeds should be supplied with adequate moisture. • Furnish water as needed.
Design Specifications	N/A

4.6 Minimize Steep Slope Disturbances

Instructions (see CGP Parts 2.2.7 and 7.2.6):

- Describe how you will minimize the disturbance to steep slopes (as defined by CGP Appendix A).
- Describe controls (e.g., erosion control blankets, tackifiers), including design, installation and maintenance specifications, that will be implemented to minimize sediment discharges from slope disturbances.

General
Steep slopes are not anticipated to occur on this project. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 2:1 (horizontal: vertical), cut slopes shall be limited to a grade of 1.5:1.

4.7 Topsoil

Instructions (see CGP Parts 2.2.8 and 7.2.6):

- Describe how topsoil will be preserved and identify these areas and associated control measures on your site map(s).
- If it is infeasible for you to preserve topsoil on your site, provide an explanation for why this is the case.

General
All temporary stockpiles will be surrounded by straw wattles and silt fences to minimize erosion and limit the discharge of pollutants. Refer to stockpile controls in Section 4.4

Specific Topsoil Controls

Silt Fence	
Description: Silt fence with Straw Wattles	
Installation	As Needed
Maintenance Requirements	Weekly inspection and after any significant rainstorm.
Design Specifications	N/A

4.8 Soil Compaction

Instructions (see CGP Parts 2.2.9 and 7.2.6):

- In areas where final vegetative stabilization will occur or where infiltration practices will be installed, describe the controls, including design, installation, and maintenance specifications that will be used to restrict vehicle or equipment access or condition the soil for seeding or planting.

General
Areas with fill, backfill and subgrades will be required for compaction. This includes any earthwork, paving, drainage trenches and retaining walls. See respective specifications for all description and maintenance requirements.

Specific Soil Compaction Controls

Soil Compaction	
Description: Soil compaction on site	
Installation	As needed

Maintenance Requirements	• Subgrade of areas to be paved shall be recompacted as required to bring top 9 in. of material immediately below gravel base course to a compaction of at least 90% of maximum dry density, as determined by ASTM D 1557, Method D. Subgrade compaction shall extend for a distance of at least 1 ft. beyond pavement edge. • Gravel shall be spread and compacted in layers not exceeding 8 inches in depth, except the last layer of gravel sub-base (conforming to MassDOT Specification Section M1.03.0 Type B) will be 4" in depth. Layers shall be compacted to 95 percent of the maximum dry density of the material as determined by Standard AASHTO Test Designation T99 compaction test Method C at optimum moisture content as determined by the Architect. • Dense graded crushed stone shall be spread and compacted in layers not exceeding 8 inches in depth, except the last layer of gravel sub-base (conforming to MassDOT Specification M1.03.0 Type B) will be 4" in depth. Layers shall be compacted to 95 percent of the maximum dry density of the material as determined by Standard AASHTO Test Designation T99 compaction test Method C at optimum moisture content as determined by the Architect. • If the Geotechnical Engineer determines that the fill material is too dry for proper compaction, water shall be added to provide the specified optimum moisture content, as necessary for proper compaction.
Design Specifications	N/A

4.9 Storm Drain Inlets

Instructions (see CGP Parts 2.2.10 and 7.2.6.iv):

– Describe controls (e.g., inserts, rock-filled bags, or block and gravel) including design, installation, and maintenance specifications that will be implemented to protect all inlets that carry stormwater flow from your site to a receiving water, provided you have the authority to access the storm drain inlet. Inlet protection measures are not required when storm drain inlets to which your site discharges are conveyed to a sediment basin, sediment trap, or similarly effective control.

General
Catch basin insert shall be used to filter suspended sediments from entering stormwater flow. These will be installed on all on-site catch basins as well as those proximate to the site entrance as detailed on the attached project drawings.

Specific Storm Drain Inlet Controls

Catch Basin Insert
Description: • Catch Basin insert shall be installed in retained existing and proposed catch basins and area drains as shown on Construction Documents and as required by the Engineer of Record.

• Catch basin filters shall be manufactured from a woven polypropylene geotextile and sewn by a double needle machine, using a high strength nylon thread. Seams have a certified average wide width strength per ASTM D-4884 of 165.0 lbs./in. • The filters will be manufactured to fit the opening of the catch basin or drop inlet. The filters will have the following features: two dump straps attached at the bottom to facilitate the emptying of the filters; the filters will also have lifting loops as an integral part of the system to be used to lift the filters from the basin. The filters will have a restraint cord approximately halfway up the sack to keep the sides away from the catch basin walls; this yellow cord shall also be a visual means of indicating when the sack should be emptied.	
Installation	• Catch basin, filters shall be placed at all inlets to drainage structures as structures are installed and prior to construction. Outlet protection work shall be constructed before runoff is allowed to enter the drainage system. Construction and location of catch basin filters shall be as indicated on the Drawings. • Once the strap is covered with sediment, the catch basin filter should be emptied, cleaned and placed back into the basin with a depth of 6 inches.
Maintenance Requirements	• The Contractor shall inspect the condition of catch basin insert after each rainstorm and during major rain events. • Catch basin insert shall be cleaned periodically to remove and disposed of accumulated debris as required. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department. • When emptying the catch basin insert, the contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractors expense. • The silt and sediment from the catch basin insert shall be legally disposed of offsite. Under no condition shall silt and sediment from the insert be deposited on site and used in construction. • All curb openings shall be blocked to prevent stormwater from bypassing the device.
Design Specifications	See Civil Detail Sheet C601

4.10 Constructed Site Drainage Feature

Instructions (see CGP Parts 2.2.11 and 7.2.6):

If you will be installing a constructed site drainage feature, describe control practices (e.g., erosion controls and/or velocity dissipation devices such as check dams and sediment traps), including design specifications and details (volume, dimensions, outlet structure), that will be implemented at the construction site.

General

Existing on-site conveyance channels shall be maintained.

Specific Constructed Site Drainage Features

Swales	
Description: Drainage Channels	
Installation	• Existing system to be maintained
Maintenance Requirements	• Check slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding and sedimentation. • Mowing, fertilizing, liming, watering, pruning, weed and pest control, and snow removal as needed. • Remove sediment and debris at least once per year.
Design Specifications	N/A

4.11 Sediment Basins or Similar Impoundments

Instructions (see CGP Parts 2.2.12 and 7.2.6.b.v):

If you will install a sediment basin or similar impoundment, include design specifications and other details (volume, dimensions, outlet structure) that will be implemented in conformance with CGP Parts 2.2.12 and 7.2.6.b.iv.

- Sediment basins must be situated outside of receiving waters and any natural buffers established under CGP Part 2.2.1; and designed to avoid collecting water from wetlands.
- At a minimum, sediment basins provide storage for either (1) the calculated volume of runoff from the 2-year, 24-hour storm (see https://www.epa.gov/npdes/construction-general-permit-2-year-24-hour-storm-frequencies), or (2) 3,600 cubic feet per acre drained.
- Sediment basins must also utilize outlet structures that withdraw water from the surface, unless infeasible.
- Use erosion controls and velocity dissipation devices to prevent erosion at inlets and outlets.

General

Sediment basins shall be installed if dewatering is required. Basins shall be used to re-infiltrate collected groundwater and stormwater only; they will ne be used to retain stormwater runoff and as such will be sized to address dewatering needs and not the size/volume referenced in the above instructions.

Specific Sediment Basin Controls

Sedimentation Basin
Description: • The pumping discharge shall not be allowed to enter directly into the wetlands. The water from the work areas shall be pumped to a temporary sedimentation and de-watering basin. Approximately 70 percent sedimentation trapping efficiency shall be achieved in sizing the basins to ensure that the basins are adequate to prevent overtopping from dewatering and to provide the required filtering. The outlet from the basin shall be located so as not to cause erosion of the surrounding area.

• Locations of the temporary sedimentation and de-watering basins are to be selected by the Contractor within Limit of Work Layout; outside of any buffer zones.	
Installation	Before any excavation that will require de-watering
Maintenance Requirements	• Inspect basin at least twice daily during dewatering operations. • Repair any damages to the basin immediately. • Clean basin outlet daily. • Remove sediments frequently to maintain efficiency and function of the basin. • Dispose sediments outside of wetland areas at a location approved by the Engineer.
Design Specifications	N/A

4.12 Chemical Treatment

Instructions (see CGP Parts 2.2.13 and 7.2.6.b.vi):

If you are using treatment chemicals (e.g., polymers, flocculants, coagulants) at your site, provide details for each of the items below. This information is required as part of the SWPPP requirements in CGP Part 7.2.6.b.vi.

Soil Types
List all the soil types including soil types expected to be exposed during construction in areas of the project that will drain to chemical treatment systems and those expected to be found in fill material: NONE

Treatment Chemicals
List all treatment chemicals that will be used at the site and explain why these chemicals are suited to the soil characteristics: N/A
Describe the dosage of all treatment chemicals you will use at the site or the methodology you will use to determine dosage: N/A

Provide information from any applicable Safety Data Sheets (SDS): N/A

Describe how each of the chemicals will be stored consistent with CGP Part 2.2.13c: N/A

Include references to applicable State or local requirements affecting the use of treatment chemicals, and copies of applicable manufacturer's specifications regarding the use of your specific treatment chemicals and/or chemical treatment systems: N/A

Special Controls for Cationic Treatment Chemicals (if applicable)
If the applicable EPA Regional Office authorized you to use cationic treatment chemicals, include the official EPA authorization letter or other communication, and identify the specific controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a discharge that does not meet water quality standards: N/A

Schematic Drawings of Stormwater Controls/Chemical Treatment Systems
Provide schematic drawings of any chemically-enhanced stormwater controls or chemical treatment systems to be used for application of treatment chemicals: Insert drawings here

Training
Describe the training that personnel who handle and apply chemicals have received prior to permit coverage, or will receive prior to the use of treatment chemicals: N/A

4.13 Dewatering Practices

Instructions (see CGP Parts 2.4 and 7.2.6):

If you will be discharging accumulated stormwater and/or ground water drained from building foundations, vaults, trenches, or other similar points of accumulation, include design specifications and details of all dewatering practices that are installed and maintained to comply with CGP Part 2.4.

- Do not place dewatering controls on steep slopes.
- Use a suitable filtration device if dewatering water is found or expected to contain materials that cause a visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water.
- Use well-vegetated, upland areas of the site to infiltrate dewatering water before discharging. Do not use receiving waters as part of the treatment area.
- Use stable, erosion-resistant surfaces to discharge from dewatering controls. Additionally, at all points where dewatering water is discharged, comply with the velocity dissipation requirements of Part 2.2.11.

General

- Dewatering activities due to elevated groundwater levels is not anticipated. Instead, removal of collected stormwater from foundations/footing and/or trenches may be necessary.

Specific Dewatering Practices

Dewatering	
Description: • Dewatering shall be used to remove collected stormwater from open excavation and/or trenches. • The discharge water generated by the construction dewatering will be directed to a temporary detention basin or settling basin sized to account for anticipated volume. • The pumping discharge shall not be allowed to enter directly into the wetlands buffer zones. The water from the work areas shall be pumped to a temporary sedimentation and/or de-watering basin. Basins shall be sized to ensure they are adequate to prevent overtopping from dewatering and to provide the required filtering. The outlet from the basin shall be located so as not to cause erosion of the surrounding area. • Locations of the temporary sedimentation and de-watering basins are to be selected by the Contractor within Limit of Work Layout subject to approval from the Design Engineer/ Landscape Architect.	
Installation	As needed and outside of any buffer zones

Maintenance Requirements	• Inspect basin at least twice daily during dewatering operations • Repair any damages to the basin immediately. • Clean basin outlet daily. • Remove any debris immediately. • Remove sediments frequently to maintain efficiency and function of the basin. • Legally dispose sediments outside of wetland areas • Systems are to be sized to permit the re-infiltration of stormwater back into the ground and not discharge off-site.
Design Specifications	N/A

4.14 Other Stormwater Controls

Instructions:

– Describe any other stormwater controls that do not fit into the above categories.

General

- Erosion control blankets, mulch and straw shall be utilized specifically to retain soil moisture, to hold soil temperatures and to generally stabilize soils where stormwater flows in channels, swales or recently planted slopes.

Specific Stormwater Control Practices

Erosion Control Blankets	
Description: Erosion control blankets shall be manufactured and constructed by weaving or bonding fibers made from natural, biodegradable materials. Mulch matting is typically made of jute, straw or wood fibers that are performed into sheets of mulch and delivered to the site in rolls. Netting is typically made of jute, wood fiber, or cotton and used to hold the mulch matting together. Netting and matting shall be held to the ground with biodegradable staples or anchors as furnished and in accordance with blanket manufacturers recommendations.	
Installation	▪ Erosion control blankets shall be installed as shown on the Drawings and as directed by the Engineer in accordance with manufacturer's instructions. • The area to be covered shall be properly prepared, fertilized and seeded with permanent vegetation before the blanket is applied. • The blankets shall be applied in the direction of water flow and stapled. Blankets shall be placed a minimum if three rows (of 4-ft) wide (total approx. 12-ft width) within the drainage swale/ditch and stapled together in accordance with manufacturer's instructions. Side overlaps shall be 4-in minimum. • Erosion stops shall be created every 25-ft by making a fold in the fabric and carrying the fold into a silt trench across the full width of the blanket. • To ensure full contact with soil surface, roll blanket with a roller weighing 100 lbs/ft of width perpendicular

Maintenance Requirements	Thoroughly inspect channel after completion. Correct any areas where blanket does not present a smooth surface in full contact with the soil below.
Design Specifications	N/A

Mulch/Straw	
Description: Apply Mulch/Hay to prevent erosion until all vegetative cover can be established	
Installation	• Apply Straw at a rate of 2 tons per acre; or • Apply Wood Mulch at a rate of 10 to 20 tons per acre until uniform depth of 2 to 6 inches
Maintenance Requirements	Thoroughly inspect after rainfall events; add additional material as required.
Design Specifications	N/A

4.15 Site Stabilization

Instructions (see CGP Parts 2.2.14 and 7.2.6.b.vii):

The CGP requires you to immediately initiate stabilization when work in an area of your site has permanently or temporarily stopped, and to complete certain stabilization activities within prescribed deadlines. Construction projects disturbing more than 5 acres at any one time have a different deadline than projects disturbing 5 acres or less at any one time. See CGP Part 2.2.14.a. Construction projects in arid, semi-arid, and drought-stricken areas during the seasonally dry period and projects discharging to a sediment- or nutrient-impaired water or a Tier 2, 2.5, or 3 water have different stabilization deadlines. See CGP Part 2.2.14.b. For your SWPPP, you must include the following:

- Describe the specific vegetative and/or non-vegetative practices that will be used to stabilize exposed soils where construction activities have temporarily or permanently ceased. Avoid using impervious surfaces for stabilization whenever possible.
- The stabilization deadline(s) that will be met in accordance with Part 2.2.14.a and 2.2.14.b.
- Once you begin construction, consider using the Grading/Stabilization Activities log in Appendix H of the Template to document your compliance with the stabilization requirements in CGP Part 2.2.14.

Total Amount of Land Disturbance Occurring at Any One Time

☐ *Five Acres or less*

☒ *More than Five Acres*

Temporary Seeding	
☒ *Vegetative* ☒ *Non-Vegetative* ☒ *Temporary* ☐ *Permanent*	
Description: ▪ During construction it may be necessary to temporarily stabilize areas that will not be brought to final grade for a period longer than 14 working days. Temporary seeding is accomplished using fast-growing grass seed species such as ryegrass. Or, when not feasible either wood chips and straw mulch shall be applied ▪ All exposed soil finish grades shall be immediately landscaped, riprapped, loamed, seeded, mulched or otherwise protected and stabilized as shown on the drawings with a layer of straw mulch hay.	
Installation	Exposed grades for longer than 7 days
Completion	As needed
Maintenance Requirements	• Inspect weekly to see if stands are adequate. • Check for damage after heavy rains. • Stands should be uniform and dense. • Fertilize, reseed, and mulch damaged and sparse areas immediately. Track or tie down much as necessary. • Seeds should be supplied with adequate moisture. • Furnish water as needed.
Design Specifications	N/A

Straw	
☐ *Vegetative* ☐ *Non-Vegetative* ☒ *Temporary* ☐ *Permanent*	
Description: ▪ All exposed soil finish grades shall be immediately landscaped, riprapped, loamed, seeded, mulched or otherwise protected and stabilized as shown on the drawings with a layer of straw mulch hay. ▪ Outside of the growing season, exposed soil finish grade surfaces shall be stabilized with a layer of straw hay until climate conditions allow for seeding.	
Installation	Exposed grades for longer than 7 days
Completion	As Needed
Maintenance Requirements	• Inspect weekly • Correct deficiencies as needed
Design Specifications	N/A

SECTION 5: POLLUTION PREVENTION CONTROLS

5.1 Potential Sources of Pollution

Instructions (see CGP Part 7.2.3.g):

- Identify and describe all pollutant-generating activities at your site (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal).
- For each pollutant-generating activity, include an inventory of pollutants or pollutant constituents associated with that activity (e.g., sediment, fertilizers, and/or pesticides, paints, solvents, fuels), which could be exposed to rainfall or snowmelt, and could be discharged in stormwater from your construction site. You must take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed or removed during construction.

Construction Site Pollutants

Potential sources of sediment to stormwater runoff:

- Stockpiles and construction staging
- Clearing and grubbing operations
- Grading and site excavation
- Topsoil stripping
- Landscape operations
- Soil tracking offsite from construction vehicles
- Runoff from unstabilized areas
- Construction debris

Potential pollutants and sources, other than sediment, to stormwater runoff:

- Combined Staging Area – fueling activities, equipment maintenance, sanitary facilities, and hazardous waste storage
- Materials Storage Area – building materials, solvents, adhesives, paving materials, paints, aggregates, trash, etc.
- Construction Activity-paving, curb installation, concrete pouring, and building construction

Construction Site Pollutants

Pollutant-Generating Activity	**Pollutants or Pollutant Constituents** (that could be discharged if exposed to stormwater)	**Location on Site** (or reference SWPPP site map where this is shown)
Pesticides (insecticides, fungicides, herbicides, rodenticides)	Chlorinated hydrocarbons, organophosphates, carbonates, arsenic	Herbicides used for noxious weed control
Fertilizers	Nitrogen, phosphorous	Newly seeded areas
Plaster	Calcium sulphate, calcium carbonate, sulfuric acid	Building construction
Cleaning Solvents	Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillates	No equipment cleaning allowed in project limits
Asphalt	Oil, petroleum distillates	Streets and parking lots
Concrete	Limestone, sand pH, chromium	Curb and gutter, sidewalk, building construction
Glue, Adhesives	Polymers, epoxies	Building construction
Paints	Metal oxides, Stoddard solvent, talc, calcium carbonate, arsenic	Building construction
Curing compounds	Naphtha	Curb and gutter, building construction
Wood preservatives	Stoddard solvent, petroleum distillates, arsenic, copper, chromium	Timber pads, bracing, building construction
Hydraulic Oils/fluids	Mineral oil	Leaks/broken hoses from equipment
Gasoline	Benzene, ethyl benzene, toluene, xylene, MTBE	Secondary containment/staging area
Diesel Fuel	Petroleum distillate, oil & grease, naphthalene, xylenes	Secondary containment/staging area
Kerosene	Coal oil, petroleum distillates	Secondary containment/staging area
Antifreeze/coolant	Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)	Leaks or broken hoses from equipment
Sanitary toilets	Bacteria, parasites, and viruses	Staging area

5.2 Spill Prevention and Response

Instructions (see CGP Parts 2.3.6 and 7.2.6.b.viii):

- Describe procedures you will use to prevent and respond to leaks, spills, and other releases. You must implement the following at a minimum:
  - ✓ Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or title of the employee(s) responsible for detection and response of spills or leaks; and
  - ✓ Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 2.3.6 and established under either 40 CFR part 110, 40 CFR part 117, or 40 CFR part 302, occurs during a 24-hour period. Contact information must be in locations that are readily accessible and available to all employees.
- Some projects/site may be required to develop a Spill Prevention Control and Countermeasure (SPCC) plan under a separate regulatory program (Section 311 of the CWA). If you are required to develop an SPCC plan, or you already have one, you should include references to the relevant requirements from your plan.

- **Material Management Practices:**
  The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.
- **Good Housekeeping:**
  The following good housekeeping practices will be followed on site during the construction project.
  1. A concerted effort shall be made to store only enough product required to complete a particular task.
  2. All materials stored on site shall be stored in a neat and orderly fashion in their appropriate containers and, if possible, under a roof or other secure enclosure.
  3. Products shall be kept in their original containers with the original manufacturer's label.
  4. Substances shall not be mixed with one another unless recommended by the manufacturer.
  5. Whenever possible, all of a product shall be used up before disposing of the container.
  6. Manufacturer's recommendations for proper use and disposal shall be followed.
  7. The site superintendent shall perform a daily site inspection to ensure proper use and disposal of materials on site.
- **Hazardous Products:**
  The following practices are intended to reduce the risks associated with hazardous materials.
  1. Products shall be kept in original containers unless they are not resealable.
  2. Where feasible, the original labels and material safety data shall be retained, whereas they contain important product information.
  3. If surplus product must be disposed, follow manufacturer's or local and state recommended methods for proper disposal.
- **Product Specific Practices:**

The following product specific practices shall be followed on site:

Petroleum Products:
All on site vehicles shall be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage. Petroleum products shall be stored in tightly sealed containers which are clearly labeled. Any bituminous concrete or asphalt substances used on site shall be applied according to the manufacturer's recommendations.

Fertilizers:
Fertilizers shall be applied in the minimum amounts recommended by the manufacturer. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater. Storage shall be in a covered shed or trailer. The contents of any partially used bags of fertilizers shall be transferred to a sealable plastic bag or bin to avoid spills. Fertilizers shall be applied in the minimum amounts recommended by the manufacturer. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater. Storage shall be in a covered shed or trailer. The contents of any partially used bags of fertilizers shall be transferred to a sealable plastic bag or bin to avoid spills.

Paints:
All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged into any catch basin, drain manhole, or any portion of the stormwater management system. Excess paint shall be properly disposed of according to manufacturer's recommendations or State and local regulations.

Concrete Trucks:
Concrete trucks shall not be allowed to wash out or discharge surplus concrete or drum wash water on site.

- **Spill Control Practices:**

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices shall be followed for spill prevention and cleanup:

1. Manufacturer's recommended methods for cleanup shall be readily available at the on site trailer and site personnel shall be made aware of the procedures and the location of the information.
2. Materials and equipment necessary for spill cleanup shall be kept in the material storage area on site. Equipment and materials shall include, but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
3. All spills shall be cleaned up immediately after discovery.
4. The spill area shall be kept well ventilated and personnel shall wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
5. Spills of toxic or hazardous material shall be reported to the appropriate State and/or local authority in accordance with local and/or State regulations.
6. The spill prevention plan shall be adjusted to include measures to prevent a particular type of spill from reoccurring and how to clean up the spill if there is another occurrence. A description of the spill, what caused it, and the clean up measures shall also be included.
7. The Town of Needham or their assigned designee shall be the spill prevention and cleanup coordinator. The c Saugus shall designate at least three other site personnel who will be trained in the spill control practices identified above.

If a substantial release occurs that is equal to or exceeds a reportable quantity (RQ) as defined under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, site personnel must notify the National Response Center (NRC) at 1-800-424-8802 as soon as knowledge of the discharge is obtained.
Additionally, releases exceeding an RQ as identified in the Massachusetts Contingency Plan

(310 CMR 40.0000) must be reported to the MA DEP. The local fire department should also be informed

- The following product specific practices shall be followed on site:

5.3 Fueling and Maintenance of Equipment or Vehicles

Instructions (see CGP Parts 2.3.1 and 7.2.6):

– Describe equipment/vehicle fueling and maintenance practices that will be implemented to eliminate the discharge of spilled or leaked chemicals (e.g., providing secondary containment *(examples: spill berms, dikes, spill containment pallets)* and cover where appropriate, and/or having spill kits readily available.)

General

Minor vehicle and equipment emergency maintenance can be performed onsite away from drainage structures. Major vehicle and equipment maintenance must be performed offsite. Equipment/vehicle storage areas and any onsite fuel tanks will be inspected weekly and after storm events. Equipment and vehicles will be inspected for leaks, equipment damage, and other service problems on each day of use. Any leaks will be repaired immediately, or the equipment/vehicle will be removed from the site. Minor vehicle and equipment emergency maintenance shall occur when a vehicle cannot be safely removed from the site. The vehicle should be repaired so it can be taken off-site so that the rest of the maintenance can occur. Major vehicle maintenance onsite is prohibited. Re-fueling or maintenance of vehicles within 25 feet of a drainage structure shall be prohibited. Drip pans, drip cloths, or absorbent pads should be used when replacing spent fluids. The fluids should be collected and stored prior to being disposed of offsite.

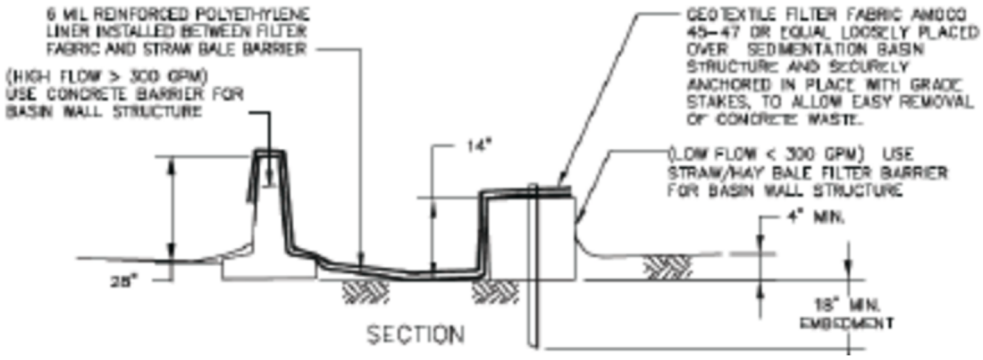
Specific Pollution Prevention Practices

Fueling of Vehicles and Minor Maintenance	
Description: If necessary, only minor equipment maintenance will occur on-site. All equipment fluids generated from maintenance activities will be disposed of into designated drums stored on spill pallets. Absorbent, spill-cleanup materials and spill kits will be available at the combined staging and materials storage area.	
Implementation	As Needed
Maintenance Requirements	Equipment shall be inspected daily
Design Specifications	N/A

5.4 Washing of Equipment and Vehicles

Instructions (see CGP Parts 2.3.2 and 7.2.6):

- Describe equipment/vehicle washing practices that will be used to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of wash waters (e.g., locating activities away from receiving waters and storm drain inlets or constructed or natural site drainage features and directing wash waters to a sediment basin or sediment trap, using filtration devices, such as filter bags or sand filters, or using other similarly effective controls).
- Describe how you will prevent the discharge of soaps, detergents, or solvents and provide storage by either (1) cover (*examples: plastic sheeting or temporary roofs*) to prevent these detergents from coming into contact with rainwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas.



General

- Construction equipment and vehicles shall be rinsed of dirt and debris before being stored or leaving the site.

Specific Pollution Prevention Practices

Washing of Equipment and Vehicles
Description: • Construction vehicles shall be rinsed thoroughly of dirt and debris at the construction entrance before leaving the site. • Concrete trucks will wash out, or discharge surplus concrete or drum wash water, at the site in the staging area. Concrete pours will not be conducted during or before an anticipated storm event. Concrete mixer trucks and chutes will be washed in the designated area or concrete will be properly disposed of off-site. • A washout area will be constructed before concrete pours occur on the site, if required. It shall be lined with a plastic sheet (6 mils thick) free of any holes or tears. Signs shall be posted marking designated washout areas to ensure the concrete equipment operators use the proper facility.

• Washing requiring soap or solvents shall be conducted in a tub, bucket, or barrier to contain contaminated water runoff. Wash water shall be discarded in the concrete washout station.	
Installation	Washout area will be installed before concrete is poured,
Maintenance Requirements	The washout area will be inspected daily to ensure all concrete washing is being discharges to the washout area, and no tears or leaks are present. When the temporary washout is full or no longer needed for the project, the hardened concrete be removed and disposed of legally.
Design Specifications	N/A

5.5 Storage, Handling, and Disposal of Building Products, Materials, and Wastes

Instructions (see CGP Parts 2.3.3 and 7.2.6):

– For any of the types of building products, materials, and wastes in Sections 5.5.1-5.5.6 below that you expect to use or store at your site, provide the information on how you will comply with the corresponding CGP provision and the specific practices that you will employ.

5.5.1 Building Materials and Building Products

Note: Examples include asphalt sealants, copper flashing, roofing materials, adhesives, concrete admixtures, and gravel and mulch stockpiles.

General

- All building products shall be stored under temporary cover.

Specific Pollution Prevention Practices

Building Products	
Description: Building products shall be covered with an impermeable barrier at the end of each working day.	
Installation	When necessary, as building products arrive.
Maintenance Requirements	• Materials shall be stored in a dry location, off the ground and in such manner as to prevent damage, intrusion of foreign matter and weather. All materials which have become damaged or otherwise unfit for use during delivery or storage shall be replaced at the expense of the Contractor. • Temporary covers shall be inspected at the end of each working day and replaced with new barriers as necessary.
Design Specifications	N/A

5.5.2 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

General

- The use of Pesticides, Herbicides, Insecticides, and Fertilizers shall be applied at a time, which shall be requested in writing by the Contractor, and approved in writing by the Owner's representative.

Specific Pollution Prevention Practices

Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials	
Description: Pesticides, herbicides, insecticides, fertilizers, and landscape materials shall be implemented within lawn areas	
Installation	• Fertilizer shall not be applied outside the growing season, defined as April 15th to October 31st. No late season fertilization is allowed. • No fertilizer shall be applied during rainfall or before prediction of rain.
Maintenance Requirements	• Spraying of insecticides or herbicides shall be done by State-licensed professionals. Spraying for insects, pests and diseases shall conform to the National Arborist Association Standards under the section entitled "Standards for Pesticide Application Operations", as currently adopted and as approved by the Landscape Architect. All insecticides, pesticides, and herbicides shall be EPA-approved and shall conform to the requirements MCRG: Massachusetts Control Recommendation Guide for Insect, Disease, and Weed Pests of Shade Trees and Woody Ornamentals, latest edition, University of Massachusetts, Amherst, College of Food and Natural Resources. • Absolutely no debris may be left on the site. Excavated material shall be removed, as directed. Repair any damage to the site or structures to restore them to their original condition, as directed by the Landscape Architect. • Do not allow fertilizer to spill onto pavements or hard surfaces. Fertilizer inadvertently applied to impervious surfaces shall be swept or blown back into the target area or returned to its original container.
Design Specifications	N/A

5.5.3 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

General

- Diesel fuel, oil, hydraulic fluids, other petroleum products and other chemicals shall be stored on site in the below manner. Truck beds shall be kept free of kerosene, gasoline, fuel, oil, solvents, or other materials.
- Contractor to provide off-site trucks to refuel on-site vehicles (backhoes, bulldozers, etc.).

Specific Pollution Prevention Practices

If any container has a storage **capacity of less than 55 gallons**:

- The containers must be water-tight, and must be kept closed, sealed, and secured when not being actively used
- If stored outside, use a spill containment pallet or similar device to capture small leaks or spills
- Have a spill kit available on site that is in good working condition (i.e., not damaged, expired, or used up) and ensure personnel are available to respond immediately in the event of a leak or spill.

If any container has a storage **capacity of 55 gallons or more**:

- The containers must be water-tight, and must be kept closed, sealed, and secured when not being actively used Store containers a minimum of 50 feet from receiving waters, constructed or natural site drainage features, and storm drain inlets.
- Provide either
    - (1) cover (e.g., temporary roofs) to minimize the exposure of these containers to precipitation and to stormwater, or
    - (2) secondary containment (e.g., curbing, spill berms, dikes, spill containment pallets, double-wall, above-ground storage tank)
- Have a spill kit available on site that is in good working condition (i.e., not damaged, expired, or used up) and ensure personnel are available to respond immediately in the event of a leak or spill.

Clean up spills immediately, using dry clean-up methods where possible, and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge.

5.5.4 Hazardous or Toxic Waste

Note: Examples include paints, caulks, sealants, fluorescent light ballasts, solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids.

General

- Remove, haul from site, and legally dispose of all waste materials and debris not required to be saved. Accumulation is not permitted.

Specific Pollution Prevention Practices

Hazardous or Toxic Waste	
Description: The container(s) storing hazardous and toxic materials shall be bolted or chained to a permanent structure and shall be locking with separate keys. If this container itself is not weather tight and is exposed to the weather, it shall be covered with an impermeable barrier at the end of each working day.	
Installation	As Needed
Maintenance Requirements	• Maintain disposal routes clear, clean, and free of debris. • On-site burning of combustible cleared materials is not permitted. • Cover trucks used for hauling, follow approved routes, obtain disposal permits required and pay all fees in connection with disposal of materials removed. • Upon completion of site preparation work. Clean areas of work remove tools and equipment. Provide site clear, clean, and free of materials and debris and suitable for site construction operations.
Design Specifications	N/A

5.5.5 Construction and Domestic Waste

General

- All waste materials will be collected and disposed of into metal trash dumpsters. Dumpsters will have a secure watertight lid, be placed away from stormwater conveyances and drains, and meet all federal, state, and municipal regulations. Only trash and construction debris from the site will be deposited in the dumpster. No construction materials will be buried on-site. All personnel will be instructed, during tailgate training sessions, regarding the correct disposal of trash and construction debris. Notices that state these practices will be posted in the office trailer and the individual who manages day-to-day site operations will be responsible for seeing that these practices are followed.

Specific Pollution Prevention Practices

Construction and Domestic Waste	
Description: Clean entire area daily. All trash and job-related debris shall be removed from the site or stored in an approved dumpster at the contractor's discretion. Dumpsters shall be covered at the end of each day and prior to any precipitation events.	
Installation	Prior to the start of Construction
Maintenance Requirements	Dumpsters shall be inspected once per week and immediately after storm events. Remove waste material promptly from premises. Store material and equipment in dry location, in neat and orderly fashion. Ensure adequate security for electrical material and equipment stored at job.
Design Specifications	N/A

5.5.6 Sanitary Waste

General

- Portable sanitary units will be provided for use by all workers throughout the life of the project. A licensed sanitary waste management contractor will regularly collect all sanitary waste from the portable units.

Specific Pollution Prevention Practices

Sanitary Waste	
Description: Portable toilets will be self-contained units meeting local, State and Federal requirements.	
Installation	• Prior to the start of Construction • The Contractor shall provide adequate sanitary facilities for the use of those employed on the Work. Such facilities shall be made available when the first employees arrive on the Site of the Work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the Work.
Maintenance Requirements	• Waste for the portable toilets shall be collected a minimum of once a week. The toilets shall be inspected weekly for sign of leaking. Toilets that are leaking shall be removed from the site and replaced.

	• The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use.
Design Specifications	N/A

5.6 Washing of Applicators and Containers used for Stucco, Paint, Concrete, Form Release Oils, Cutting Compounds, or Other Materials

Instructions (see CGP Parts 2.3.4 and 7.2.6):

– Describe how you will comply with the CGP Part 2.3.4 requirement for washing applications and containers.

General

- During the washing of the building associated with the planned exterior painting activities, all wash water must be captured and filtered or placed into leak proof containers.

Specific Pollution Prevention Practices

Direct wash water into a leak-proof container or leak-proof and lined pit designed so no overflows can occur due to inadequate sizing or precipitation; Handle washout or cleanout wastes as follows: For liquid wastes:

- Do not dump liquid wastes or allow them to enter into constructed or natural site drainage features, storm inlets, or receiving waters
- Do not allow liquid wastes to be disposed of through infiltration or to otherwise be disposed of on the ground
- Comply with applicable State or local requirements for disposal
- Locate any washout or cleanout activities as far away as possible from receiving waters, constructed or natural site drainage features, and storm drain inlets, and, to the extent feasible, designate areas to be used for these activities and conduct such activities only in these areas.

5.7 Application of Fertilizers

Instructions (CGP Parts 2.3.5 and 7.2.6.x):

Describe how you will comply with the CGP Part 2.3.5 requirement for the application of fertilizers.

General

- See Section *5.5.2 above for additional details*

Specific Pollution Prevention Practices

- *Apply at a rate and in amounts consistent with manufacturer's specifications*
- *Apply only during growing season for specific vegetation*
- *Avoid applying before heavy rains that could cause excess nutrients to be discharged*

- *Never apply to frozen ground*
- *Never apply to constructed or natural site drainage features*
- *Follow all other Federal, State, Tribal, and local requirements regarding fertilizer application.*

5.8 Other Pollution Prevention Practices

Instructions:

Describe any additional pollution prevention practices that do not fit into the above categories.

General

- N/A

SECTION 6: INSPECTION, MAINTENANCE, AND CORRECTIVE ACTION

6.1 Inspection Personnel and Procedures

Instructions (see CGP Parts 4, 5, and 7.2.7):

Describe the procedures you will follow for maintaining your stormwater controls, conducting inspections, and, where necessary, taking corrective actions in accordance with CGP Parts 4, 5, and 7.2.7.

Site Inspection Schedule

Select the inspection frequency(ies) that applies, based on CGP Parts 4.2, 4.3, or 4.4

Standard Frequency:

☒ Every 7 calendar days

☒ Every 14 calendar days and within 24 hours of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period (including when there are multiple, smaller storms that alone produce less than 0.25 inches but together produce 0.25 inches or more in 24 hours), or
- A storm event that produces 0.25 inches or more of rain within a 24-hour period on the first day of a storm and continues to produce 0.25 inches or more of rain on subsequent days (you conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the last day of the storm that produces 0.25 inches or more of rain (i.e., only two inspections would be required for such a storm event)), or
- A discharge caused by snowmelt from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

Increased Frequency (if applicable):

For areas of sites discharging to sediment or nutrient-impaired waters or to waters designated as Tier 2, Tier 2.5, or Tier 3

☐ Every 7 days and within 24 hours of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
- A discharge caused by snowmelt from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

Reduced Frequency (if applicable)

For stabilized areas

☐ Twice during first month, no more than 14 calendar days apart; then once per month after first month until permit coverage is terminated consistent with Part 9 in any area of your site where the stabilization steps in 2.2.14.a have been completed.

(Note: It is likely that you will not be able to include this in your initial SWPPP. If you qualify for this reduction (see CGP Part 4.4.1), you will need to modify your SWPPP to include this information. If construction activity resumes in this portion of the site at a later date, the inspection frequency immediately increases to that required in Parts 4.2 and 4.3, as applicable.)

For stabilized areas on "linear construction sites" (as defined in Appendix A)

☐ Twice during first month, no more than 14 calendar days apart; then once more within 24 hours of a storm event that produces 0.25 inches or more of rain within a 24-hour period, or within 24 hours of a snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period

(Note: It is likely that you will not be able to include this in your initial SWPPP. If you qualify for this reduction (see CGP Part 4.4.1), you will need to modify your SWPPP to include this information.)

For arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought

☐ Once per month and within 24 hours of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
- A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

Insert beginning and ending month identified as the seasonally dry period for your area or the valid period of drought:

- Beginning month of the seasonally dry period: Click or tap to enter a date.
- Ending month of the seasonally dry period: Click or tap to enter a date.

For frozen conditions where construction activities are being conducted

☐ Once per month

Insert beginning and ending dates of frozen conditions on your site:

- Beginning date of frozen conditions: Click or tap to enter a date.
- Ending date of frozen conditions: Click or tap to enter a date.

For frozen conditions where construction activities are suspended

☐ Inspections are temporarily suspended

Insert beginning and ending dates of frozen conditions on your site:

- Beginning date of frozen conditions: Click or tap to enter a date.
- Ending date of frozen conditions: Click or tap to enter a date.

Dewatering Inspection Schedule

Select the inspection frequency that applies based on CGP Part 4.3.2

Dewatering Inspection
☒ Once per day on which the discharge of dewatering water occurs.

Rain Gauge Location (if applicable)
Weather Underground website for Groton, MA
https://www.wunderground.com/weather/us/ma/groton

Inspection Report Forms
See Appendix D for copy

6.2 Corrective Action

Instructions (CGP Parts 5 and 7.2.7):

- Describe the procedures for taking corrective action in compliance with CGP Part 5.

Personnel Responsible for Corrective Actions
John Roche, Gilbane Sr. General Superintendent

TBD

Corrective Action Logs
See Appendix E for copy

6.3 Delegation of Authority

Instructions:

- Identify the individual(s) or positions within the company who have been delegated authority to sign inspection reports.
- Attach a copy of the signed delegation of authority (see example in Appendix J of this SWPPP Template.)
- For more on this topic, see Appendix G, Subsection 11 of EPA's CGP.

Duly Authorized Representative(s) or Position(s): TBD

Insert Company or Organization Name
Insert Name
Insert Position
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email

SECTION 7: TURBIDITY BENCHMARK MONITORING FOR DEWATERING DISCHARGES

Instructions (see CGP Part 3.3 and 7.2.8):

– If you are required to comply with the Part 3.3 turbidity benchmark monitoring requirements, describe the procedures you will follow to:
  - ✓ Collect and evaluate samples,
  - ✓ Report results to EPA and keep records of monitoring information, and
  - ✓ Take corrective action when necessary.

– Include the specific type of turbidity meter you will use for monitoring, as well as any manuals or manufacturer instructions on how to operate and calibrate the meter.

– Describe any coordinating arrangement you may have with any other permitted operators on the same site with respect to compliance with the turbidity monitoring requirements, including which parties are tasked with specific responsibilities.

– If EPA has approved of an alternate turbidity benchmark pursuant to Part 3.3.2.b, include any data and other documentation you relied on to request use of the specific alternative benchmark.

The current approach with regards to dewatering stormwater collected within open excavations and/or trenches includes pumping to an on-site infiltration basin for re-infiltration or to a frac tank and/or bag filter for settlement/filtering before discharging back onto the site to a level spreader. No direct discharge to a buffer zone or wetland will be permitted.

SECTION 8: CERTIFICATION AND NOTIFICATION

Instructions (CGP Appendix G, Part G.11.2):

- The following certification statement must be signed and dated by a person who meets the requirements of Appendix G, Part G.11.2.
- This certification must be re-signed in the event of a SWPPP Modification.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____ Title: _____

Signature: _____ Date: _____

SWPPP APPENDICES

Attach the following documentation to the SWPPP:

Appendix A – Site Maps

Appendix B – Copy of 2022 CGP

Appendix C – NOI and EPA Authorization Email

Appendix D – Site Inspection Form and Dewatering Inspection Form (if applicable)

Appendix E – Corrective Action Log

Appendix F – SWPPP Amendment Log

Appendix G – Subcontractor Certifications/Agreements

Appendix H – Grading and Stabilization Activities Log

Appendix I – Training Documentation

Appendix J – Delegation of Authority

Appendix K – Endangered Species Documentation

Appendix L – Historic Preservation Documentation

Appendix M – Rainfall Gauge Recording

Appendix N – Turbidity Meter Manual and Manufacturer's Instructions

Appendix A – Site Maps

DEMOLITION LEGEND:

- BUILDING TO BE REMOVED
- BITUMINOUS CONCRETE TO BE REMOVED/PULVERIZED
- TREE AREA TO BE CLEARED
- CEMENT CONCRETE TO BE REMOVED
- AREA OF CLEARING AND LOAM REMOVAL. COORDINATE WITH ARCHITECT IN THE FIELD
- CURB REMOVAL
- FENCE REMOVAL
- UTILITIES LINE TO BE REMOVED/ABANDONED
- LIMIT OF WORK
- EROSION CONTROL STRAW WATTLES WITH SILT FENCE (2 C.S.T.)
- UTILITIES STRUCTURE TO BE REMOVED
- UTILITIES STRUCTURE TO BE ABANDONED IN PLACE
- TREE TO BE REMOVED (INCLUDING STUMP)
- PROPOSED CATCHBASIN FILTER

Note: any active catch basin within the limits of construction must be protected with a catch basin filter regardless if shown on drawing

MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (NAD83)

MATCH LINE A — SHEET 4, SHEET 2

MATCH LINE — SHEET 1, SHEET 3

SHEET 2, SHEET 3, SHEET 4, SHEET 5

344 MAIN STREET
GROTON DUNSTABLE REGIONAL MIDDLE SCHOOL SOUTH
BRICK BUILDING

STRAW WATTLES WITH SILT FENCE (TYP.)

PROPOSED CONSTRUCTION ENTRANCE

BENCHMARK: X-CUT ON HYDRANT BOLT ELEVATION=333.49'

MATCH LINE C

MAIN STREET (AKA ROUTE 111 - S.H.L.O 690)

CHAMPNEY STREET

356 MAIN ST N/F JASON M. & KATHERINE CONDES CERT: 274475

THE INHABITANTS OF THE TOWN OF GROTON L.C.C. 4095B LOT AREA 182,176± S.F. 4.18± Ac.

3 CHAMPNEY ST N/F THE CARUSO FAMILY TRUST BK.67828, PG.277

13 CHAMPNEY ST N/F BRANDON C. LAMBERT BK.73335, PG.436

19 CHAMPNEY ST N/F DUANE CROMWELL BK.17035, PG.546

29 CHAMPNEY ST N/F NANCY P. STOOPS BK.69908, PG.155

37 CHAMPNEY ST N/F DOROTHY N. DAVIS REVOCABLE TRUST OF 2016 BK.67481, PG.369

#29 CHAMPNEY STREET

S68° 28' 28"W 314.28'

S27° 06' 32"E 2.58'

N53° 13' 32"W 232.00'

S64° 59' 12"W 165.00'

S25° 11' 19"E 210.00'

S69° 36' 45"W 15.11'

N27° 11' 19"W 200.00'

30 15 0 30 60

1 inch = 30 feet

10/22/2021 3:54:29 PM

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building sustainable communities

The Brewery
179 Boylston Street
Jamaica Plain, MA 02130
T 617-524-5558

STAMP

CONSULTANT
Samiotes Consultants Inc.
Civil Engineers + Land Surveyors
20 A Street
Framingham, MA 01701
T 508.877.6688
F 508.877.8349
www.samiotes.com

CLIENT
Groton-Dunstable Regional School District & Town of Groton
344 Main Street
Groton, MA 01450

NOT FOR CONSTRUCTION
DESIGN DEVELOPMENT ESTIMATE SET

KEY PLAN

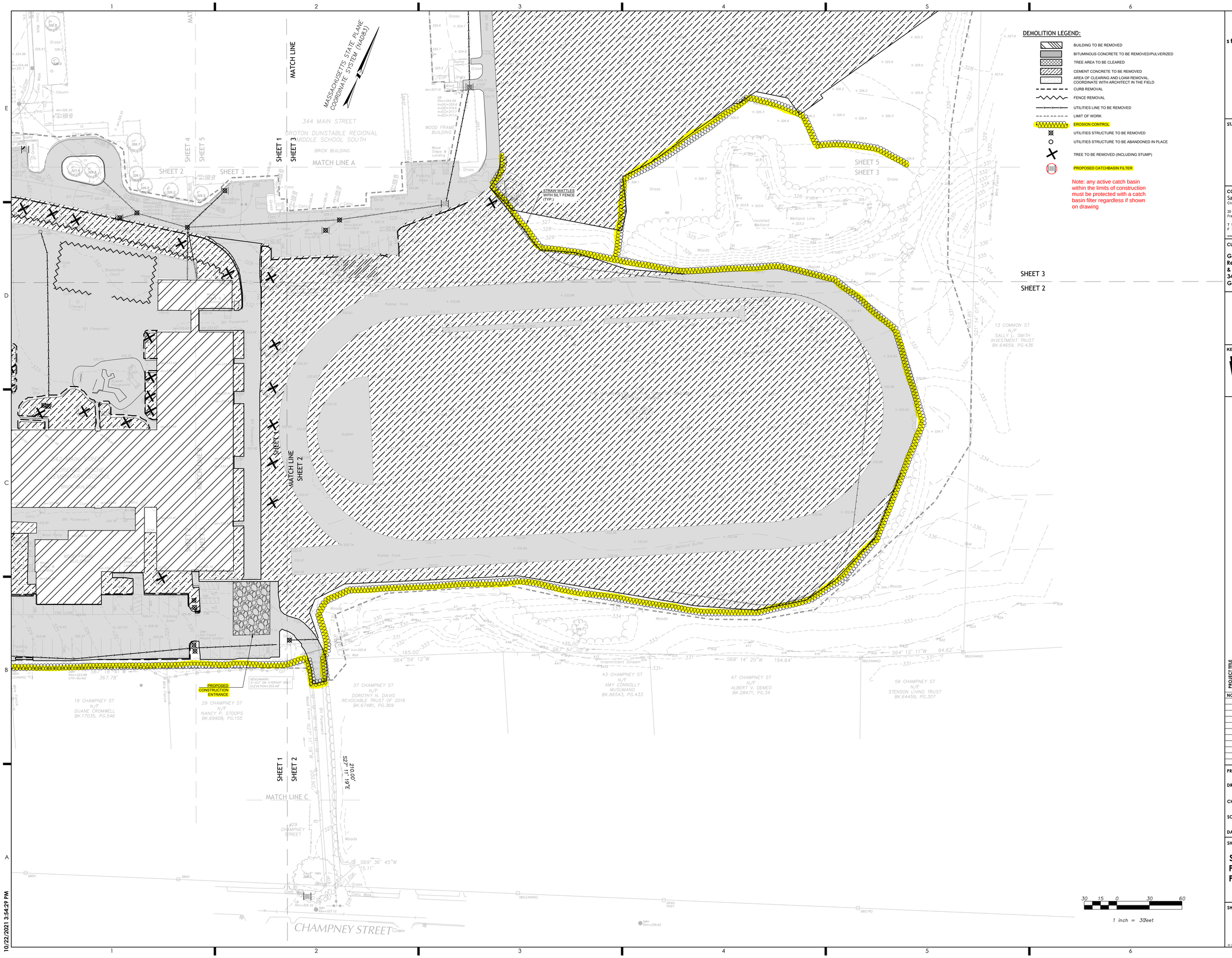
PROJECT TITLE
FLORENCE ROCHE ELEMENTARY SCHOOL
342 Main Street
Groton, MA 01450

NO.	DESCRIPTION	DATE

PROJECT NO	19088.00
DRAWN BY	WJP
CHECKED BY	SP
SCALE	1" = 30'-0"
DATE	12/22/2021

SHEET TITLE
SITE PREPARATION PLAN

SHEET NO
C101



DEMOLITION LEGEND:

- BUILDING TO BE REMOVED
- BITUMINOUS CONCRETE TO BE REMOVED/PULVERIZED
- TREE AREA TO BE CLEARED
- CEMENT CONCRETE TO BE REMOVED
- AREA OF CLEARING AND LOAM REMOVAL. COORDINATE WITH ARCHITECT IN THE FIELD
- CURB REMOVAL
- FENCE REMOVAL
- UTILITIES LINE TO BE REMOVED
- LIMIT OF WORK
- EROSION CONTROL
- UTILITIES STRUCTURE TO BE REMOVED
- UTILITIES STRUCTURE TO BE ABANDONED IN PLACE
- TREE TO BE REMOVED (INCLUDING STUMP)
- PROPOSED CATCHBASIN FILTER

Note: any active catch basin within the limits of construction must be protected with a catch basin filter regardless if shown on drawing

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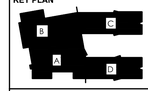
DESIGN DEVELOPMENT ESTIMATE SET

KEY PLAN



PROJECT TITLE
FLORENCE ROCHE ELEMENTARY SCHOOL
342 Main Street
Groton, MA 01450

NO.	DESCRIPTION	DATE

PROJECT NO	19088.00
DRAWN BY	WJP
CHECKED BY	SP
SCALE	1" = 30'-0"
DATE	12/22/2021

SHEET TITLE
SITE PREPARATION PLAN

SHEET NO
C102

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DEMOLITION LEGEND:

- BUILDING TO BE REMOVED
- BITUMINOUS CONCRETE TO BE REMOVED/PULVERIZED
- TREE AREA TO BE CLEARED
- CEMENT CONCRETE TO BE REMOVED
- AREA OF CLEARING AND LOAM REMOVAL. COORDINATE WITH ARCHITECT IN THE FIELD
- CURB REMOVAL
- FENCE REMOVAL
- UTILITIES LINE TO BE REMOVED
- LIMIT OF WORK
- EROSION CONTROL
- UTILITIES STRUCTURE TO BE REMOVED
- UTILITIES STRUCTURE TO BE ABANDONED IN PLACE
- TREE TO BE REMOVED (INCLUDING STUMP)
- PROPOSED CATCHBASIN FILTER

Note: any active catch basin within the limits of construction must be protected with a catch basin filter regardless if shown on drawing

REGRADE AND STABILIZE SLOPE WITH JUTE MESH

STRAW WATTLES WITH SILT FENCE (TYP.)

50' Wetland Buffer

100' Wetland Buffer

Bordering Vegetated Wetlands

Wetland Line

Isolated Wetland

Woods

Path

Bit Pavement

Rubber Track

Grass

Conc Walk

Conc Pad

Ramp

Steps

Wood Steps & Landing

Parking Area

Flagpole

Bench

Trash

Column

Conc Stairwell

Elec. Manhole

Drain Manhole

Sewer Manhole

Water Gate

Water Manhole

Gas Gate

Gas Manhole

Utility Pole

Light

Hydrant

Sign

Fence

Guard Rail

Wood Fence

Chain Link Fence

Stone Wall

Hedge

Tree

Shrub

BENCHMARK
X-CUT ON HYDRANT BOLT
ELEVATION=329.26'

N64° 48' 11"E 1039.99'(C) 1040.23'(R)

S67° 02' 52"W 392

MATCH LINE B

MATCH LINE

MATCH LINE A

SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5

344 MAIN STREET
GROTON DUNSTABLE REGIONAL MIDDLE SCHOOL SOUTH
BRICK BUILDING
WOOD FRAME BUILDING

MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (NAD83)

30 15 0 30 60
1 inch = 30feet

10/22/2021 3:54:29 PM

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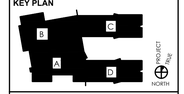
344 Main Street
Groton, MA 01450

NOT FOR CONSTRUCTION
DESIGN DEVELOPMENT ESTIMATE SET

KEY PLAN



PROJECT TITLE
FLORENCE ROCHE ELEMENTARY SCHOOL
342 Main Street
Groton, MA 01450

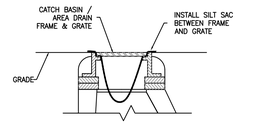
NO.	DESCRIPTION	DATE

PROJECT NO	19088.00
DRAWN BY	WJP
CHECKED BY	SP
SCALE	1" = 30'-0"
DATE	12/22/2021

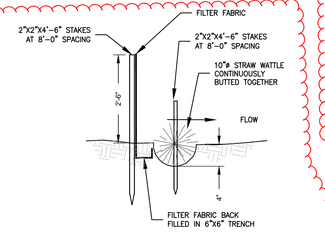
SHEET TITLE
SITE PREPARATION PLAN

SHEET NO
C103

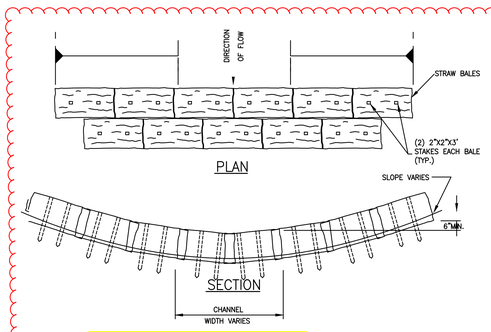
NOTE: ALL WORK SHALL COMPLY WITH THE TOWN OF GROTON STANDARD SPECIFICATIONS AND GENERAL CONSTRUCTION DETAILS.



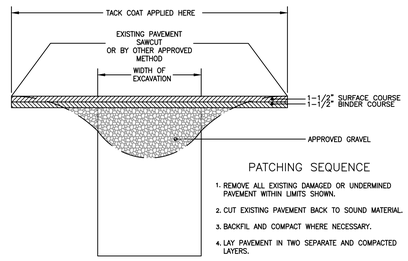
1 CATCH BASIN W/ SILT SAC
NTS



2 SILT FENCE WITH STRAW WATTLE
NTS



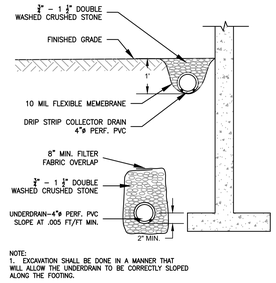
3 STRAW BALE CHECK DAM
NTS



PATCHING SEQUENCE

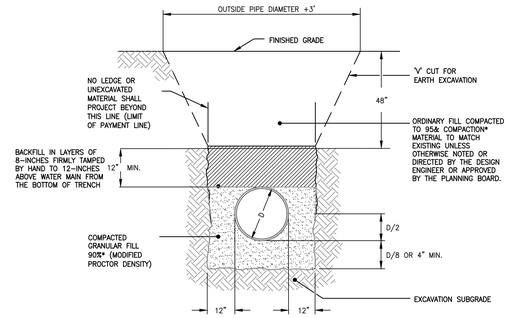
1. REMOVE ALL EXISTING DAMAGED OR UNDERMINED PAVEMENT WITHIN LIMITS SHOWN.
2. CUT EXISTING PAVEMENT BACK TO SOUND MATERIAL.
3. BACKFIL AND COMPACT WHERE NECESSARY.
4. LAY PAVEMENT IN TWO SEPARATE AND COMPACTED LAYERS.

4 TRENCH PATCHING DETAIL
NTS

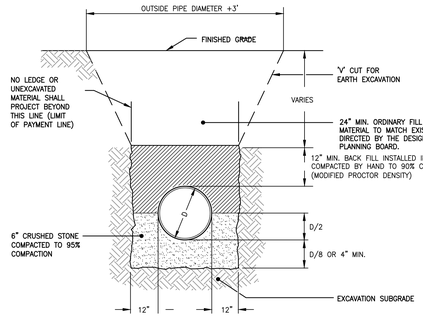


NOTE:
1. EXCAVATION SHALL BE DONE IN A MANNER THAT WILL ALLOW THE UNDERDRAIN TO BE CORRECTLY SLOPED ALONG THE FOOTING.
2. SEE GEOTECH PLANS.

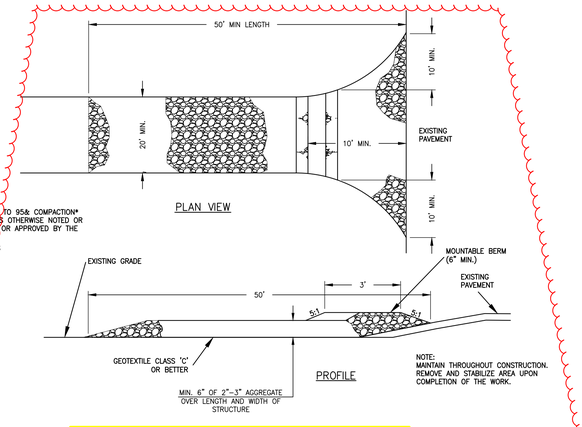
5 DRIP STRIP / FOUNDATION UNDERDRAIN
NTS



6 WATER MAIN TRENCH IN FIRM GROUND
NTS

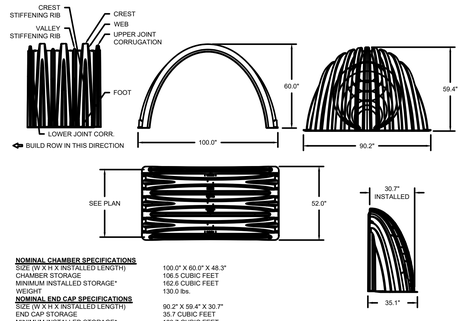


7 TRENCH SECTION - PVC/RCP GRAVITY PIPE
NTS



NOTE:
MAINTAIN THROUGHOUT CONSTRUCTION. REMOVE AND STABILIZE AREA UPON COMPLETION OF THE WORK.

8 STABILIZED CONSTRUCTION ENTRANCE
NTS



NOMINAL CHAMBER SPECIFICATIONS

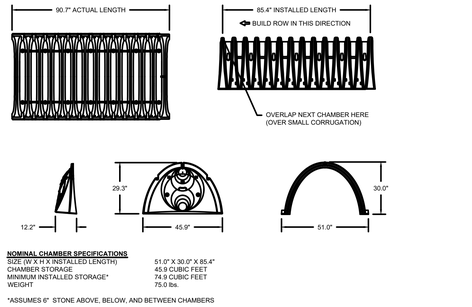
SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"
CHAMBER STORAGE	106.5 CUBIC FEET
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET
WEIGHT	130.0 lbs.

NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	90.2" X 59.4" X 30.7"
END CAP STORAGE	35.7 CUBIC FEET
MINIMUM INSTALLED STORAGE*	108.7 CUBIC FEET
WEIGHT	135.0 lbs.

*ASSUMES 12" STONE ABOVE, 9" STONE FOUNDATION AND BETWEEN CHAMBERS, 12" STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

9 INFILTRATION SYSTEM TYPE "A" CHAMBER
NTS

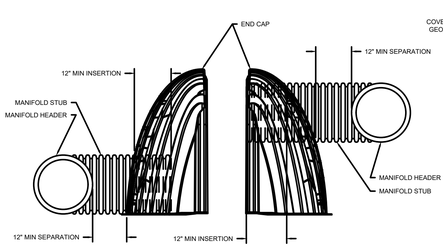


NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"
CHAMBER STORAGE	45.9 CUBIC FEET
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET
WEIGHT	75.0 lbs.

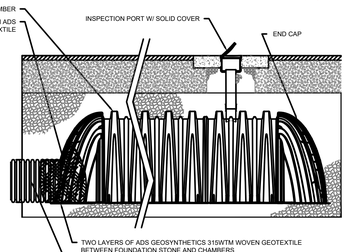
*ASSUMES 6" STONE ABOVE, BELOW, AND BETWEEN CHAMBERS

10 INFILTRATION SYSTEM TYPE "B" CHAMBER
NTS

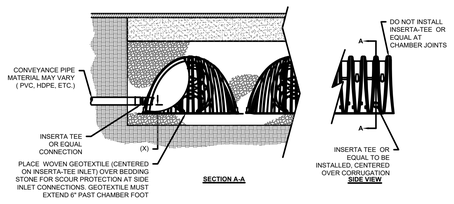


NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

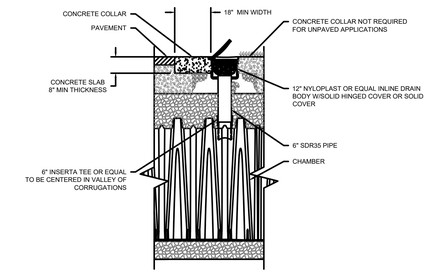
11 INFILTRATION SYSTEM END CAP INSERTION DETAIL
NTS



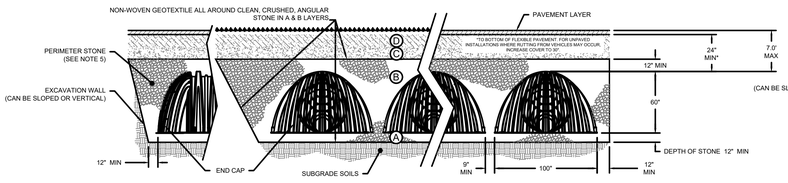
12 INFILTRATION SYSTEM ISOLATOR ROW DETAIL
NTS



13 INSERTA-TEE SIDE INLET DETAIL
NTS



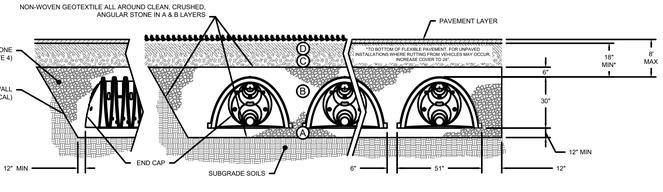
14 INFILTRATION SYTEM 6" INSPECTION PORT DETAIL
NTS



NOTES:

1. CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D'.
5. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.

15 INFILTRATION SYSTEM TYPE "A" CROSS SECTION DETAIL
NTS



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
4. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

16 INFILTRATION SYSTEM TYPE "B" CROSS SECTION DETAIL
NTS

ACCEPTABLE FILL MATERIALS: INFILTRATION CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE (B*LAYER) TO 24" ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[3] A-1, A-2-4, A-3 OR AASHTO M43[3] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[3] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[3] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9"(MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.

17 INFILTRATION SYSTEM TYPE "A" CROSS SECTION DETAIL
NTS

studio g ARCHITECTS
building sustainable communities
The Brewery
179 Boylston Street
Jamaica Plain, MA 02130
T 617-524-5558

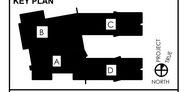
STAMP

CONSULTANT
Samiotes Consultants Inc.
Civil Engineers + Land Surveyors
20 A Street
Framingham, MA 01701
T 508.877.6688
F 508.877.8349
www.samiotes.com

CLIENT
Groton-Dunstable Regional School District & Town of Groton
344 Main Street
Groton, MA 01450

NOT FOR CONSTRUCTION
DESIGN DEVELOPMENT ESTIMATE SET

KEY PLAN



PROJECT TITLE
FLORENCE ROCHE ELEMENTARY SCHOOL
342 Main Street
Groton, MA 01450

NO.	DESCRIPTION	DATE

PROJECT NO	19088.00
DRAWN BY	WJP
CHECKED BY	SP
SCALE	1" = 30'-0"
DATE	12/22/2021

SHEET TITLE
CIVIL DETAIL SHEET

SHEET NO
C601

10/22/2021 3:54:29 PM

Appendix B – Copy of 2022 CGP

National Pollutant Discharge Elimination System (NPDES)
Construction General Permit (CGP) for Stormwater Discharges from Construction Activities

In compliance with the provisions of the Clean Water Act, 33 U.S.C. §1251 et. seq., (hereafter CWA), as amended by the Water Quality Act of 1987, P.L. 100-4, "operators" of construction activities (defined in Appendix A) that meet the requirements of Part 1.1 of this National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP), are authorized to discharge pollutants in accordance with the effluent limitations and conditions set forth herein. Permit coverage is required from the "commencement of construction activities" (see Appendix A) until one of the conditions for terminating CGP coverage has been met (see Part 8.2).

This permit becomes effective on 12:00 am, February 17, 2022.

This permit and the authorization to discharge expire at 11:59pm, February 16, 2027.

Signed and issued this 18 day of January 2022

DEBORAH SZARO
Digitally signed by DEBORAH SZARO
Date: 2022.01.18 08:31:14 -05'00'

Deborah Szaro,
Acting Regional Administrator, EPA Region 1.

Signed and issued this 18 day of January 2022

JAVIER LAUREANO
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Javier Laureano,
Director, Water Division, EPA Region 2.

Signed and issued this 18 day of January 2022

CARMEN GUERRERO PEREZ
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Carmen Guerrero-Perez,
Director, Caribbean Environmental Protection Division, EPA Region 2.

Signed and issued this 18 day of January 2022

CATHERINE LIBERTZ
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Catherine A. Libertz,
Director, Water Division, EPA Region 3.

Signed and issued this 18 day of January 2022

JEANEANNE GETTLE
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Jeaneanne Gettle,
Director, Water Division, EPA Region 4.

Signed and issued this 18 day of January 2022

Digitally signed by TERA FONG
Date: 2022.01.18 13:03:49 -06'00'

Tera Fong,
Director, Water Division, EPA Region 5.

Signed and issued this 18 day of January 2022

CHARLES MAGUIRE
Digitally signed by CHARLES MAGUIRE
DN: c=US, o=U.S. Government, ou=Environmental Protection Agency, cn=CHARLES MAGUIRE, 0.9.2342.19200300.100.1.1=68001003650036
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Charles W. Maguire,
Director, Water Division, EPA Region 6.

Signed and issued this 18 day of January 2022

JEFFERY ROBICHAUD
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Jeffery Robichaud,
Director, Water Division, EPA Region 7.

Signed and issued this 18 day of January 2022

DARCY OCONNOR
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Darcy O'Connor,
Director, Water Division, EPA Region 8.

Signed and issued this 18 day of January 2022

TOMAS TORRES
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Tomás Torres,
Director, Water Division, EPA Region 9.

Signed and issued this 18 day of January 2022

DANIEL OPALSKI
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Daniel D. Opalski,
Director, Water Division, EPA Region 10.

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1 HOW TO OBTAIN COVERAGE UNDER THE CONSTRUCTION GENERAL PERMIT (CGP)

To be covered under this permit, you must meet the eligibility conditions and follow the requirements for obtaining permit coverage in this Part.

1.1 ELIGIBILITY CONDITIONS

1.1.1 You are an "operator" of a construction site for which discharges will be covered under this permit. For the purposes of this permit and in the context of stormwater discharges associated with construction activity, an "operator" is any party associated with a construction project that meets either of the following two criteria:

a. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

b. The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions.

Where there are multiple operators associated with the same project, all operators must obtain permit coverage.[1] Subcontractors generally are not considered operators for the purposes of this permit.

1.1.2 Your site's construction activities:

a. Will disturb one or more acres of land, or will disturb less than one acre of land but are part of a common plan of development or sale (as defined in Appendix A) that will ultimately disturb one or more acres of land; or

b. Have been designated by EPA as needing permit coverage under 40 CFR § 122.26(a)(1)(v) or 40 CFR § 122.26(b)(15)(ii);

1.1.3 Your site is located in an area where EPA is the permitting authority and where coverage under this permit is available (see Appendix B);

1.1.4 Discharges from your site are not:

a. Already covered by a different NPDES permit for the same discharge; or

b. In the process of having coverage under a different NPDES permit for the same discharge denied, terminated, or revoked.[2, 3]

1.1.5 You can demonstrate you meet one of the criteria in the Endangered Species Protection section of the Notice of Intent (NOI) that you submit for coverage under this permit, per Part 1.4, with respect to the protection of Federally listed endangered or threatened species and Federally designated critical habitat under the Endangered Species Act

[1] If the operator of a "construction support activity" (see Part 1.2.1c) is different than the operator of the main site, that operator must also obtain permit coverage. See Part 7.1 for clarification on the sharing of permit-related functions between and among operators on the same site and for conditions that apply to developing a SWPPP for multiple operators associated with the same site.

[2] Parts 1.1.4a and 1.1.4b do not include sites currently covered under the 2017 CGP that are in the process of obtaining coverage under this permit, nor sites covered under this permit that are transferring coverage to a different operator.

[3] Notwithstanding a site being made ineligible for coverage under this permit because it falls under the description of Parts 1.1.4a or 1.1.4b, above, EPA may waive the applicable eligibility requirement after specific review if it determines that coverage under this permit is appropriate.

(ESA). If the EPA Regional Office grants you a waiver from electronic reporting per Part 1.4.2, you must complete the ESA worksheet in Appendix D to demonstrate you meet one of the criteria and submit it with your paper NOI (Appendix I).

1.1.6 You have completed the screening process in Appendix E relating to the protection of historic properties; and

1.1.7 You have complied with all requirements in Part 9 imposed by the applicable State, Indian Tribe, or Territory in which your construction activities and/or discharge will occur.

1.1.8 For "new sources" (as defined in Appendix A) only:

a. EPA has not, prior to authorization under this permit, determined that discharges from your site will not meet applicable water quality standards. Where such a determination is made prior to authorization, EPA may notify you that an individual permit application is necessary. However, EPA may authorize your coverage under this permit after you have included appropriate controls and implementation procedures designed to bring your discharge into compliance with this permit, specifically the requirement to meet water quality standards. In the absence of information demonstrating otherwise, EPA expects that compliance with the requirements of this permit, including the requirements applicable to such discharges in Part 3, will result in discharges that meet applicable water quality standards.

b. Discharges from your site to a Tier 2, Tier 2.5, or Tier 3 water[4] will not lower the water quality of the applicable water. In the absence of information demonstrating otherwise, EPA expects that compliance with the requirements of this permit, including the requirements applicable to such discharges in Part 3.2, will result in discharges that will not lower the water quality of such waters.

1.1.9 If you plan to add "cationic treatment chemicals" (as defined in Appendix A) to stormwater and/or authorized non-stormwater prior to discharge, you may not submit your NOI until you notify your applicable EPA Regional Office (see Appendix J) in advance and the EPA Regional Office authorizes coverage under this permit after you have included appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will result in discharges that meet applicable water quality standards.

[4] Note: Your site will be considered to discharge to a Tier 2, Tier 2.5, or Tier 3 water if the first receiving water to which you discharge is identified by a State, Tribe, or EPA as a Tier 2, Tier 2.5, or Tier 3 water. For discharges that enter a storm sewer system prior to discharge, the first receiving water to which you discharge is the waterbody that receives the stormwater discharge from the storm sewer system. The current list of Tier 2, Tier 2.5, and Tier 3 waters located in the areas eligible for coverage under this permit can be found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates. You can also use EPA's Discharge Mapping Tool (https://www.epa.gov/npdes/epas-stormwater-discharge-mapping-tools) to assist you in identifying whether any receiving waters to which you discharge are listed as impaired (and the pollutant for which it is impaired) and whether an approved total maximum daily load (TMDL) exists for that waterbody.

1.2 TYPES OF DISCHARGES AUTHORIZED[5]

1.2.1 The following stormwater discharges are authorized under this permit provided that appropriate stormwater controls are designed, installed, and maintained (see Parts 2 and 3):

- **a.** Stormwater discharges, including stormwater runoff, snowmelt runoff, and surface runoff and drainage, associated with construction activity under 40 CFR § 122.26(b)(14) or § 122.26(b)(15)(i);
- **b.** Stormwater discharges designated by EPA as needing a permit under 40 CFR §122.26(a)(1)(v) or § 122.26(b)(15)(ii);
- **c.** Stormwater discharges from on or off-site construction support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided that:
  - **i.** The support activity is directly related to the construction site required to have permit coverage for stormwater discharges;
  - **ii.** The support activity is not a commercial operation, nor does it serve multiple unrelated construction sites;
  - **iii.** The support activity does not continue to operate beyond the completion of the construction activity at the site it supports; and
  - **iv.** Stormwater controls are implemented in accordance with Part 2 and Part 3 for discharges from the support activity areas; and
- **d.** Stormwater discharges from earth-disturbing activities associated with the construction of staging areas and the construction of access roads conducted prior to active mining.

1.2.2 The following non-stormwater discharges associated with your construction activity are authorized under this permit provided that, with the exception of water used to control dust and to irrigate vegetation in stabilized areas, these discharges are not routed to areas of exposed soil on your site and you comply with any applicable requirements for these discharges in Parts 2 and 3:

- **a.** Discharges from emergency fire-fighting activities;
- **b.** Fire hydrant flushings;
- **c.** Landscape irrigation;
- **d.** Water used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes;
- **e.** Water used to control dust;
- **f.** Potable water including uncontaminated water line flushings;

[5] See "Discharge" as defined in Appendix A. Note: Any discharges not expressly authorized in this permit cannot become authorized or shielded from liability under CWA Section 402(k) by disclosure to EPA, State, or local authorities after issuance of this permit via any means, including the Notice of Intent (NOI) to be covered by the permit, the SWPPP, or during an inspection.

g. External building washdown, provided soaps, solvents, and detergents are not used, and external surfaces do not contain hazardous substances (as defined in Appendix A) (e.g., paint or caulk containing polychlorinated biphenyls (PCBs));

h. Pavement wash waters, provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. You are prohibited from directing pavement wash waters directly into any receiving water, storm drain inlet, or constructed or natural site drainage features, unless the feature is connected to a sediment basin, sediment trap, or similarly effective control;

i. Uncontaminated air conditioning or compressor condensate;

j. Uncontaminated, non-turbid discharges of ground water or spring water;

k. Foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water; and

l. Uncontaminated construction dewatering water[6] discharged in accordance with Part 2.4.

1.2.3 Also authorized under this permit are discharges of stormwater listed above in Part 1.2.1, or authorized non-stormwater discharges listed above in Part 1.2.2, commingled with a discharge authorized by a different NPDES permit and/or a discharge that does not require NPDES permit authorization.

1.3 PROHIBITED DISCHARGES[7]

The discharges listed in this Part are prohibited outright or authorized only under the identified conditions. To prevent the discharges in Parts 1.3.1 through 1.3.5, operators must comply with the applicable pollution prevention requirements in Part 2.3 or ensure the discharge is authorized by another NPDES permit consistent with Part 1.2.3 for commingled discharges.

1.3.1 Wastewater from washout of concrete, unless managed by an appropriate control as described in Part 2.3.4;

1.3.2 Wastewater from washout and/or cleanout of stucco, paint, form release oils, curing compounds, and other construction materials;

1.3.3 Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;

1.3.4 Soaps, solvents, or detergents used in vehicle and equipment washing or external building washdown; and

1.3.5 Toxic or hazardous substances from a spill or other release.

[6] EPA notes that operators may need to comply with additional procedures to verify that the dewatering discharge is uncontaminated. Operators should review Part 9 to determine if any of these requirements apply to their discharge and should ensure that they have complied with any State, Tribal, or local dewatering requirements that apply.

[7] EPA includes these prohibited non-stormwater discharges here as a reminder to the operator that the only non-stormwater discharges authorized by this permit are at Part 1.2.2. Any unauthorized non-stormwater discharges must be covered under an individual permit or alternative general permit.

1.4 SUBMITTING YOUR NOTICE OF INTENT (NOI)

All "operators" (as defined in Appendix A) associated with your construction site who meet the Part 1.1 eligibility conditions, and who seek coverage under this permit, must submit to EPA a complete and accurate NOI in accordance with the deadlines in Table 1 prior to commencement of construction activities (as defined in Appendix A).

Exception: If you are conducting construction activities in response to a public emergency (e.g., mud slides, earthquake, extreme flooding conditions, widespread disruption in essential public services), and the related work requires immediate authorization to avoid imminent endangerment to human health, public safety, or the environment, or to reestablish essential public services, you may discharge on the condition that a complete and accurate NOI is submitted within 30 calendar days after commencing construction activities (see Table 1) establishing that you are eligible for coverage under this permit. You must also provide documentation in your Stormwater Pollution Prevention Plan (SWPPP) to substantiate the occurrence of the public emergency pursuant to Part 7.2.3i.

1.4.1 Prerequisite for Submitting Your NOI

You must develop a SWPPP consistent with Part 7 before submitting your NOI for coverage under this permit.

1.4.2 How to Submit Your NOI

You must use EPA's NPDES eReporting Tool (NeT) to electronically prepare and submit your NOI for coverage under the 2022 CGP unless you received a waiver from your applicable EPA Regional Office.

To access NeT, go to https://cdx.epa.gov/cdx.

Waivers from electronic reporting may be granted based on one of the following conditions:

a. If your operational headquarters is physically located in a geographic area (i.e., ZIP code or census tract) that is identified as under-served for broadband Internet access in the most recent report from the Federal Communications Commission; or

b. If you have limitations regarding available computer access or computer capability.

If the EPA Regional Office grants you approval to use a paper NOI, and you elect to use it, you must complete the form in Appendix H.

1.4.3 Deadlines for Submitting Your NOI and Your Official Date of Permit Coverage

Table 1 provides the deadlines for submitting your NOI and the official start date of your permit coverage, which differ depending on when you commence construction activities.

Table 1 NOI Submittal Deadlines and Official Start Date for Permit Coverage.

Type of Operator	NOI Submittal Deadline[8]	Permit Authorization Date[9]
Operator of a new site (i.e., a site where construction activities commence on or after February 17, 2022)	At least 14 calendar days before commencing construction activities.	14 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization is delayed or denied.
Operator of an existing site (i.e., a site with 2017 CGP coverage where construction activities commenced prior to February 17, 2022)	No later than May 18, 2022.	14 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization is delayed or denied. Provided you submit your NOI no later than May 18, 2022, your authorization under the 2017 CGP is automatically continued until you have been granted coverage under this permit or an alternative NPDES permit, or coverage is otherwise terminated.
New operator of a permitted site (i.e., an operator that through transfer of ownership and/or operation replaces the operator of an already permitted construction site that is either a "new site" or an "existing site")	At least 14 calendar days before the date the transfer to the new operator will take place.	14 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization is delayed or denied.
Operator of an "emergency-related project" (i.e., a project initiated in response to a public emergency (e.g., mud slides, earthquake, extreme flooding conditions, disruption in essential public services), for which the related work requires immediate authorization to avoid imminent endangerment to human health or the environment, or to reestablish essential public services)	No later than 30 calendar days after commencing construction activities.	You are considered provisionally covered under the terms and conditions of this permit immediately, and fully covered 14 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization is delayed or denied.

[8] If you miss the deadline to submit your NOI, any and all discharges from your construction activities will continue to be unauthorized under the CWA until they are covered by this or a different NPDES permit. EPA may take enforcement action for any unpermitted discharges that occur between the commencement of construction activities and discharge authorization.

[9] Discharges are not authorized if your NOI is incomplete or inaccurate or if you are not eligible for permit coverage.

1.4.4 Modifying your NOI

If after submitting your NOI you need to correct or update any fields, you may do so by submitting a "Change NOI" form using NeT. Waivers from electronic reporting may be granted as specified in Part 1.4.2. If the EPA Regional Office has granted you approval to submit a paper NOI modification, you may indicate any NOI changes on the same NOI form in Appendix H.

When there is a change to the site's operator, the new operator must submit a new NOI, and the previous operator must submit a Notice of Termination (NOT) form as specified in Part 8.3.

The following modifications to an NOI form will result in a 14-day review process:

- Changes to the name of the operator;
- Changes to the project or site name;
- Changes to the estimated area to be disturbed;
- Changes to the name of the receiving water[10], or additions to the applicable receiving waters;
- Changes to eligibility information related to endangered species protection or historic preservation;
- Changes to information provided related to the use of chemical treatment at your site; and
- Changes to answers provided regarding the demolition of structures over 10,000 square feet of floor space built or renovated before January 1, 1980.

During the 14-day review process, you may continue to operate based on the information provided in your original NOI, but you must wait until the review period has ended before you may commence or continue activities on any portion of your site that would be affected by any of the above modifications, unless EPA notifies you that the authorization is delayed or denied.

1.4.5 Your Official End Date of Permit Coverage

Once covered under this permit, your coverage will last until the date that:

a. You terminate permit coverage consistent with Part 8; or

b. You receive permit coverage under a different NPDES permit or a reissued or replacement version of this permit after expiring on February 16, 2027; or

c. You fail to submit an NOI for coverage under a reissued or replacement version of this permit before the deadline for existing construction sites where construction activities continue after this permit has expired.

1.5 REQUIREMENT TO POST A NOTICE OF YOUR PERMIT COVERAGE

You must post a sign or other notice of your permit coverage at a safe, publicly accessible location in close proximity to the construction site. The notice must be located so it is visible from the public road that is nearest to the active part of the construction

[10] As defined in Appendix A, a "receiving water" is "a "Water of the United States" as defined in 40 CFR §122.2 into which the regulated stormwater discharges.

site, and it must use a font large enough to be readily viewed from a public right-of-way.[11] At a minimum, the notice must include:

a. The NPDES ID (i.e., permit tracking number assigned to your NOI and the EPA webpage where a copy of the NOI can be found (https://permitsearch.epa.gov/epermit-search/ui/search));

b. A contact name and phone number for obtaining additional construction site information;

c. The Uniform Resource Locator (URL) for the SWPPP (if available), or the following statement: "If you would like to obtain a copy of the Stormwater Pollution Prevention Plan (SWPPP) for this site, contact the EPA Regional Office at [*include the appropriate CGP Regional Office contact information found at* https://www.epa.gov/npdes/contact-us-stormwater#regional];" and

d. The following statement "If you observe indicators of stormwater pollutants in the discharge or in the receiving water, contact the EPA through the following website: https://www.epa.gov/enforcement/report-environmental-violations."

2 TECHNOLOGY-BASED EFFLUENT LIMITATIONS

You must comply with the following technology-based effluent limitations in this Part for all authorized discharges.[12]

2.1 GENERAL STORMWATER CONTROL DESIGN, INSTALLATION, AND MAINTENANCE REQUIREMENTS

You must design, install, and maintain stormwater controls required in Parts 2.2, 2.3, and 2.4 to minimize the discharge of pollutants in stormwater from construction activities.[13] To meet this requirement, you must:

2.1.1 Account for the following factors in designing your stormwater controls:

a. The expected amount, frequency, intensity, and duration of precipitation;[14]

b. The nature of stormwater runoff (i.e., flow) and run-on at the site, including factors such as expected flow from impervious surfaces, slopes, and site drainage features. You must design stormwater controls to control stormwater volume, velocity, and peak flow rates to minimize discharges of pollutants in stormwater and to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points; and

c. The soil type and range of soil particle sizes expected to be present on the site.

[11] If the active part of the construction site is not visible from a public road, then place the notice of permit coverage in a position that is visible from the nearest public road and as close as possible to the construction site.

[12] For each of the effluent limits in Part 2, as applicable to your site, you must include in your SWPPP (1) a description of the specific control(s) to be implemented to meet the effluent limit; (2) any applicable design specifications; (3) routine maintenance specifications; and (4) the projected schedule for installation/implementation. See Part 7.2.6.

[13] The permit does not recommend or endorse specific products or vendors.

[14] Stormwater controls must be designed using the most recent data available to account for recent precipitation patterns and trends.

If your site is exposed to or has previously experienced major storms, such as hurricanes, storm surge, extreme/heavy precipitation, and flood events, you should also include consideration of and contingencies for whether implementing structural improvements, enhanced/resilient stormwater controls, and other mitigation measures may help minimize impacts from stormwater discharges from such major storm events.

2.1.2 Design and install all stormwater controls in accordance with good engineering practices, including applicable design specifications.[15]

2.1.3 Complete installation of stormwater controls by the time each phase of construction activities has begun.

a. By the time construction activity in any given portion of the site begins, install and make operational any downgradient sediment controls (e.g., buffers, perimeter controls, exit point controls, storm drain inlet protection) that control discharges from the initial site clearing, grading, excavating, and other earth-disturbing activities.[16]

b. Following the installation of these initial controls, install and make operational all stormwater controls needed to control discharges prior to subsequent earth-disturbing activities.

2.1.4 Ensure all stormwater controls are maintained and remain in effective operating condition during permit coverage and are protected from activities that would reduce their effectiveness.

a. Comply with any specific maintenance requirements for the stormwater controls listed in this permit, as well as any recommended by the manufacturer.[17]

b. If at any time you find that a stormwater control needs routine maintenance (i.e., minor repairs or other upkeep performed to ensure the site's stormwater controls remain in effective operating condition, not including significant repairs or the need to install a new or replacement control), you must immediately initiate the needed work, and complete such work by the close of the next business day. If it is infeasible to complete the routine maintenance by the close of the next business day, you must document why this is the case and why the repair or other upkeep to be performed should still be considered routine maintenance in your inspection report under Part 4.7.1c and complete such work no later than seven (7) calendar days from the time of discovery of the condition requiring maintenance.

c. If you must repeatedly (i.e., three (3) or more times) make the same routine maintenance fixes to the same control at the same location, even if the fix can be completed by the close of the next business day, you must either:

i. Complete work to fix any subsequent repeat occurrences of this same problem under the corrective action procedures in Part 5, including keeping any records

[15] Design specifications may be found in manufacturer specifications and/or in applicable erosion and sediment control manuals or ordinances. Any departures from such specifications must reflect good engineering practices and must be explained in your SWPPP. You must also comply with any additional design and installation requirements specified for the effluent limits in Parts 2.2, 2.3, and 2.4.

[16] Note that the requirement to install stormwater controls prior to each phase of construction activities for the site does not apply to the earth disturbance associated with the actual installation of these controls. Operators should take all reasonable actions to minimize the discharges of pollutants during the installation of stormwater controls.

[17] Any departures from such maintenance recommendations made by the manufacturer must reflect good engineering practices and must be explained in your SWPPP.

of the condition and how it was corrected under Part 5.4; or

ii. Document in your inspection report under Part 4.7.1c why the specific reoccurrence of this same problem should still be addressed as a routine maintenance fix under this Part.[18]

d. If at any time you find that a stormwater control needs a significant repair or that a new or replacement control is needed, you must comply with the corrective action deadlines for completing such work in in Part 5.2.1c.

2.2 EROSION AND SEDIMENT CONTROL REQUIREMENTS

You must implement erosion and sediment controls in accordance with the following requirements to minimize the discharge of pollutants in stormwater from construction activities.

2.2.1 Provide and maintain natural buffers and/or equivalent erosion and sediment controls for discharges to any receiving waters that is located within 50 feet of the site's earth disturbances.

a. Compliance Alternatives. For any discharges to receiving waters located within 50 feet of your site's earth disturbances, you must comply with one of the following alternatives:

i. Provide and maintain a 50-foot undisturbed natural buffer; or

ii. Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or

iii. If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

See Appendix F, Part F.2 for additional conditions applicable to each compliance alternative.

b. Exceptions. See Appendix F, Part F.2 for exceptions to the compliance alternatives.

2.2.2 Direct stormwater to vegetated areas and maximize stormwater infiltration and filtering to reduce pollutant discharges, unless infiltration would be inadvisable due to the underlying geology (e.g., karst topography) and ground water contamination concerns, or infeasible due to site conditions.[19]

[18] Such documentation could include, for example, that minor repairs completed within the required timeframe are all that is necessary to ensure that the stormwater control continues to operate as designed and installed and that the stormwater control remains appropriate for the flow reaching it.

[19] Operators should consider whether factors such as specific contaminant concerns from the construction site, the underlying soils or geology, hydrology, depth to the ground water table, or proximity to source water or wellhead protection area(s) make the site unsuitable for infiltrating construction stormwater. Site conditions that may be of particular concern include proximity to: a current or future drinking water aquifer; a drinking water well or spring (including private/household wells); highly conductive geology such as karst; known pollutant hot spots, such as hazardous waste sites, landfills, gas stations, brownfields; an on-site sewage system or underground storage tank; or soils that do not allow for infiltration. Operators may find it helpful to consult EPA's Drinking Water Mapping Application to Protect Source Waters (DWMAPS). DWMAPS is an online mapping tool that can be used to locate drinking water providers, potential sources of contamination, polluted waterways, and information on protection initiatives in the site area.

2.2.3 Install sediment controls along any perimeter areas of the site that are downslope from any exposed soil or other disturbed areas.[20]

a. The perimeter control must be installed upgradient of any natural buffers established under Part 2.2.1, unless the control is being implemented pursuant to Part 2.2.1a.ii-iii;

b. To prevent stormwater from circumventing the edge of the perimeter control, install the perimeter control on the contour of the slope and extend both ends of the control up slope (e.g., at 45 degrees) forming a crescent rather than a straight line;

c. After installation, to ensure that perimeter controls continue to work effectively:

i. Remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control; and

ii. After a storm event, if there is evidence of stormwater circumventing or undercutting the perimeter control, extend controls and/or repair undercut areas to fix the problem.

d. **Exception**. For areas at "linear construction sites" (as defined in Appendix A) where perimeter controls are infeasible (e.g., due to a limited or restricted right-of-way), implement other practices as necessary to minimize pollutant discharges to perimeter areas of the site.

2.2.4 Minimize sediment track-out.

a. Restrict vehicle use to properly designated exit points;

b. Use appropriate stabilization techniques[21] at all points that exit onto paved roads;

i. **Exception**: Stabilization is not required for exit points at linear utility construction sites that are used only episodically and for very short durations over the life of the project, provided other exit point controls[22] are implemented to minimize sediment track-out;

c. Implement additional track-out controls[23] as necessary to ensure that sediment removal occurs prior to vehicle exit; and

d. Where sediment has been tracked-out from your site onto paved roads, sidewalks, or other paved areas outside of your site, remove the deposited sediment by the end of the same business day in which the track-out occurs or by the end of the next business day if track-out occurs on a non-business day. Remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. You are prohibited from hosing or sweeping tracked-out

[20] Examples of perimeter controls include filter berms; different types of silt fence such as wire-backed silt fence, super silt fence, or multi-layer geotextile silt fence; compost filter socks; gravel barriers; and temporary diversion dikes.

[21] Examples of appropriate stabilization techniques include the use of aggregate stone with an underlying geotextile or non-woven filter fabric, and turf mats.

[22] Examples of other exit point controls include preventing the use of exit points during wet periods; minimizing exit point use by keeping vehicles on site to the extent possible; limiting exit point size to the width needed for vehicle and equipment usage; using scarifying and compaction techniques on the soil; and avoiding establishing exit points in environmentally sensitive areas (e.g., *karst areas; steep slopes)*.

[23] Examples of additional track-out controls include the use of wheel washing, rumble strips, and rattle plates.

sediment into any constructed or natural site drainage feature, storm drain inlet, or receiving water.[24]

2.2.5 Manage stockpiles or land clearing debris piles composed, in whole or in part, of sediment and/or soil:[25]

a. Locate the piles outside of any natural buffers established under Part 2.2.1 and away from any constructed or natural site drainage features, storm drain inlets, and areas where stormwater flow is concentrated;

b. Install a sediment barrier along all downgradient perimeter areas of stockpiled soil or land clearing debris piles;[26]

c. For piles that will be unused for 14 or more days, provide cover[27] or appropriate temporary stabilization (consistent with Part 2.2.14);

d. You are prohibited from hosing down or sweeping soil or sediment accumulated on pavement or other impervious surfaces into any constructed or natural site drainage feature, storm drain inlet, or receiving water.

2.2.6 Minimize dust. On areas of exposed soil, minimize dust through the appropriate application of water or other dust suppression techniques to control the generation of pollutants that could be discharged in stormwater from the site.

2.2.7 Minimize steep slope disturbances. Minimize the disturbance of "steep slopes" (as defined in Appendix A).[28]

2.2.8 Preserve native topsoil, unless infeasible.[29]

2.2.9 Minimize soil compaction.[30] In areas of your site where final vegetative stabilization will occur or where infiltration practices will be installed:

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[24] Fine grains that remain visible (e.g., staining) on the surfaces of off-site streets, other paved areas, and sidewalks after you have implemented sediment removal practices are not a violation of Part 2.2.4.

[25] The requirements in Part 2.2.5 do not apply to the storage of rock, such as rip rap, landscape rock, pipe bedding gravel, and boulders. Refer to Part 2.3.3a for the requirements that apply to these types of materials.

[26] Examples of sediment barriers include berms, dikes, fiber rolls, silt fences, sandbags, gravel bags, or straw bale.

[27] Examples of cover include tarps, blown straw and hydroseeding.

[28] Where disturbance to steep slopes cannot be avoided, operators should consider implementing controls suitable for steep slope disturbances that are effective at minimizing erosion and sediment discharge (e.g., preservation of existing vegetation, hydraulic mulch, geotextiles and mats, compost blankets, earth dikes or drainage swales, terraces, velocity dissipation devices). To identify slopes and soil types that are of comparatively higher risk for sediment discharge in areas of the country where the CGP is in effect, operators can use the tables in Appendix F (see Tables F-2 thru F-6).

[29] Stockpiling topsoil at off-site locations, or transferring topsoil to other locations, is an example of a practice that is consistent with the requirements in Part 2.2.8. Preserving native topsoil is not required where the intended function of a specific area of the site dictates that the topsoil be disturbed or removed. For example, some sites may be designed to be highly impervious after construction, and therefore little or no vegetation is intended to remain, or may not have space to stockpile native topsoil on site for later use, in which case it may not be feasible to preserve topsoil.

[30] Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted.

a. Restrict vehicle and equipment use in these locations to avoid soil compaction; and

b. Before seeding or planting areas of exposed soil that have been compacted, use techniques that rehabilitate and condition the soils as necessary to support vegetative growth.

2.2.10 Protect storm drain inlets.

a. Install inlet protection measures that remove sediment from discharges prior to entry into any storm drain inlet that carries stormwater from your site to a receiving water, provided you have authority to access the storm drain inlet.[31] Inlet protection measures are not required for storm drain inlets that are conveyed to a sediment basin, sediment trap, or similarly effective control; and

b. Clean, or remove and replace, the inlet protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, remove the deposited sediment by the end of the same business day in which it is found or by the end of the following business day if removal by the same business day is not feasible.

2.2.11 Control stormwater discharges, including both peak flowrates and total stormwater volume, to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points.[32]

2.2.12 If you install a sediment basin or similar impoundment:

a. Situate the basin or impoundment outside of any receiving water. and any natural buffers established under Part 2.2.1;

b. Design the basin or impoundment to avoid collecting water from wetlands;

c. Design the basin or impoundment to provide storage for either:

i. The calculated volume of runoff from a 2-year, 24-hour storm;[33] or

ii. 3,600 cubic feet per acre drained.

d. Utilize outlet structures that withdraw water from the surface of the sediment basin or similar impoundment, unless infeasible;[34]

e. Use erosion controls and velocity dissipation devices to prevent erosion at inlets and outlets; and

[31] Inlet protection measures can be removed in the event of flood conditions or to prevent erosion.

[32] Examples of stormwater controls that can be used to comply with this requirement include the use of erosion controls and/or velocity dissipation devices (e.g., check dams, sediment traps), within and along the length of a constructed site drainage feature and at the outfall to slow down stormwater.

[33] Operators may refer to https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates for guidance on determining the volume of precipitation associated with their site's local 2-year, 24-hour storm event.

[34] The circumstances in which it is infeasible to design outlet structures in this manner are rare. Exceptions may include areas with extended cold weather, where using surface outlets may not be feasible during certain time periods (although they must be used during other periods). If you determine that it is infeasible to meet this requirement, you must provide documentation in your SWPPP to support your determination, including the specific conditions or time periods when this exception will apply.

f. Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition.

2.2.13 If using treatment chemicals (e.g., *polymers, flocculants, coagulants*):

a. Use conventional erosion and sediment controls before and after the application of treatment chemicals. Chemicals may only be applied where treated stormwater is directed to a sediment control *(e.g., sediment basin, perimeter control)* before discharge.

b. Select appropriate treatment chemicals*.* Chemicals must be appropriately suited to the types of soils likely to be exposed during construction and present in the discharges being treated *(i.e., the expected turbidity, pH, and flow rate of stormwater flowing into the chemical treatment system or area)*.

c. Minimize discharge risk from stored chemicals. Store all treatment chemicals in leak-proof containers that are kept under storm-resistant cover and surrounded by secondary containment structures *(e.g., spill berms, dikes, spill containment pallets),* or provide equivalent measures designed and maintained to minimize the potential discharge of treatment chemicals in stormwater or by any other means *(e.g., storing chemicals in a covered area, having a spill kit available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill)*.

d. Comply with State/local requirements. Comply with applicable State and local requirements regarding the use of treatment chemicals.

e. Use chemicals in accordance with good engineering practices and specifications of the chemical provider/supplier. Use treatment chemicals and chemical treatment systems in accordance with good engineering practices, and with dosing specifications and sediment removal design specifications provided by the provider/supplier of the applicable chemicals, or document in your SWPPP specific departures from these specifications and how they reflect good engineering practice.

f. Ensure proper training. Ensure all persons who handle and use treatment chemicals at the construction site are provided with appropriate, product-specific training prior to beginning application of treatment chemicals. Among other things, the training must cover proper dosing requirements.

g. Perform additional measures specified by the EPA Regional Office for the authorized use of cationic chemicals. If you have been authorized to use cationic chemicals at your site pursuant to Part 1.1.9, you must perform all additional measures as conditioned by your authorization to ensure the use of such chemicals will not result in discharges that do not meet water quality standards.

2.2.14 Stabilize exposed portions of the site. Implement and maintain stabilization measures (*e.g., seeding protected by erosion controls until vegetation is established,*[35] *sodding, mulching, erosion control blankets, hydromulch, gravel*) that minimize erosion from any areas of exposed soil on the site in accordance with Part.

[35] If you will be evaluating the use of some type of erosion control netting to the site as part of your site stabilization, EPA encourages you to consider employing products that have been shown to minimize

a. Stabilization Deadlines:[36]

Table 2 Deadlines for Initiating and Completing Site Stabilization.

Total Amount of Land Disturbance Occurring At Any One Time[37]	**Deadline**
i. Five acres or less (≤5.0) **Note: this includes sites disturbing more than five acres (>5.0) total over the course of a project, but that limit disturbance at any one time (i.e., *phase the disturbance*) to five acres or less (≤5.0)**	• Initiate the installation of stabilization measures immediately[38] in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days;[39] and • Complete the installation of stabilization measures as soon as practicable, but no later than 14 calendar days

impacts on wildlife. For instance, the U.S. Fish & Wildlife Service provides recommendations on the type of netting practices that are considered "wildlife friendly," including those that use natural fiber or 100 percent biodegradable materials and that use a loose weave with a non-welded, movable jointed netting, as well as those products that are not wildlife friendly including square plastic netting that are degradable (e.g., photodegradable, UV-degradable, oxo-degradable), netting made from polypropylene, nylon, polyethylene, or polyester. Other recommendations include removing the netting product when it is no longer needed. See https://www.fws.gov/midwest/eastlansing/library/pdf/WildlifeFriendlyErosionControlProducts_revised.pdf for further information. There also may be State, Tribal, or local requirements about using wildlife friendly erosion control products.

[36] EPA may determine, based on an inspection carried out under Part 4.8 and corrective actions required under Part 5.3, that the level of sediment discharge on the site makes it necessary to require a faster schedule for completing stabilization. For instance, if sediment discharges from an area of exposed soil that is required to be stabilized are compromising the performance of existing stormwater controls, EPA may require stabilization to correct this problem.

[37] Limiting disturbances to five (5) acres or less at any one time means that at no time during the project do the cumulative earth disturbances exceed five (5) acres. The following examples would qualify as limiting disturbances at any one time to five (5) acres or less:

1. The total area of disturbance for a project is five (5) acres or less.
2. The total area of disturbance for a project will exceed five (5) acres, but the operator ensures that no more than five (5) acres will be disturbed at any one time through implementation of stabilization measures. In this way, site stabilization can be used to "free up" land that can be disturbed without exceeding the five (5)-acre cap to qualify for the 14-day stabilization deadline. For instance, if an operator completes stabilization of two (2) acres of land on a five (5)-acre disturbance, then two (2) additional acres could be disturbed while still qualifying for the longer 14-day stabilization deadline.

[38] The following are examples of activities that would constitute the immediate initiation of stabilization:

1. Prepping the soil for vegetative or non-vegetative stabilization as long as seeding, planting, and/or installation of non-vegetative stabilization products takes place as soon as practicable, but no later than one (1) calendar day of completing soil preparation;
2. Applying mulch or other non-vegetative product to the exposed area;
3. Seeding or planting the exposed area;
4. Starting any of the activities in # 1 – 3 on a portion of the entire area that will be stabilized; and
5. Finalizing arrangements to have stabilization product fully installed in compliance with the deadlines for completing stabilization.

[39] The requirement to initiate stabilization immediately is triggered as soon as you know that construction work on a portion of the site is temporarily ceased and will not resume for 14 or more days, or as soon as you know that construction work is permanently ceased. In the context of this provision, "immediately" means as soon as practicable, but no later than the end of the next business day, following the day when the construction activities have temporarily or permanently ceased.

Total Amount of Land Disturbance Occurring At Any One Time[37]	Deadline
	after stabilization has been initiated.[40]
ii. More than five acres (>5.0)	• Initiate the installation of stabilization measures immediately[41] in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days;[42] and • Complete the installation of stabilization measures as soon as practicable, but no later than seven (7) calendar days after stabilization has been initiated.[43]

b. Exceptions:

i. Arid, semi-arid, and drought-stricken areas (as defined in Appendix A)**.** If it is the seasonally dry period (as defined in Appendix A)[44] or a period in which drought is occurring, and vegetative stabilization measures are being used:

(a) Immediately initiate and, within 14 calendar days of temporary or permanent cessation of work in any portion of your site, complete the installation of temporary non-vegetative stabilization measures to the extent necessary to prevent erosion;

(b) As soon as practicable, given conditions or circumstances on the site, complete all activities necessary to seed or plant the area to be stabilized; and

(c) If construction is occurring during the seasonally dry period, indicate in your SWPPP the beginning and ending dates of the seasonally dry period and your site conditions. Also include the schedule you will follow for initiating and completing vegetative stabilization.

ii. Unforeseen circumstances. Operators that are affected by unforeseen circumstances[45] that delay the initiation and/or completion of vegetative stabilization:

[40] If vegetative stabilization measures are being implemented, stabilization is considered "installed" when all activities necessary to seed or plant the area are completed, including the application of any non-vegetative protective cover (e.g., mulch, erosion control blanket), if applicable. If non-vegetative stabilization measures are being implemented, stabilization is considered "installed" when all such measures are implemented or applied.

[41] See footnote 38.

[42] See footnote 39.

[43] See footnote 40.

[44] The term "seasonally dry period" as defined in Appendix A refers to a month in which the long-term average total precipitation is less than or equal to 0.5 inches. Refer to EPA's Seasonally Dry Period Locator Tool at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates and supporting maps for assistance in determining whether a site is operating during a seasonally dry period for the area.

[45] Examples include problems with the supply of seed stock or with the availability of specialized equipment and unsuitability of soil conditions due to excessive precipitation and/or flooding.

(a) Immediately initiate and, within 14 calendar days, complete the installation of temporary non-vegetative stabilization measures to prevent erosion;

(b) Complete all soil conditioning, seeding, watering or irrigation installation, mulching, and other required activities related to the planting and initial establishment of vegetation as soon as conditions or circumstances allow it on your site; and

(c) Document in the SWPPP the circumstances that prevent you from meeting the deadlines in Part 2.2.14a and the schedule you will follow for initiating and completing stabilization.

iii. Discharges to a sediment- or nutrient-impaired water or to a water that is identified by your State, Tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes. Complete stabilization as soon as practicable, but no later than seven (7) calendar days after stabilization has been initiated.

c. Final Stabilization Criteria (for any areas not covered by permanent structures)**:**

i. Establish uniform, perennial vegetation *(*i.e.*, evenly distributed, without large bare areas)* to provide 70 percent or more of the vegetative cover native to local undisturbed areas; and/or

ii. Implement permanent non-vegetative stabilization measures[46] to provide effective cover of any areas of exposed soil.

iii. Exceptions:

(a) **Arid, semi-arid, and drought-stricken areas** (as defined in Appendix A). Final stabilization is met if the area has been seeded or planted to establish vegetation that provides 70 percent or more of the vegetative cover native to local undisturbed areas within three (3) years and, to the extent necessary to prevent erosion on the seeded or planted area, non-vegetative erosion controls have been applied to provide cover for at least three years without active maintenance.

(b) **Disturbed areas on agricultural land that are restored to their preconstruction agricultural use.** The Part 2.2.14c final stabilization criteria do not apply.

(c) **Areas that need to remain disturbed.** In limited circumstances, stabilization may not be required if the intended function of a specific area of the site necessitates that it remain disturbed, and only the minimum area needed remains disturbed *(*e.g.*, dirt access roads, utility pole pads, areas being used for storage of vehicles, equipment, materials)*.

2.3 POLLUTION PREVENTION REQUIREMENTS[47]

You must implement pollution prevention controls in accordance with the following requirements to minimize the discharge of pollutants in stormwater and to prevent the discharge of pollutants from spilled or leaked materials from construction activities.

[46] Examples of permanent non-vegetative stabilization measures include riprap, gravel, gabions, and geotextiles.

[47] Under this permit, you are not required to minimize exposure for any products or materials where the exposure to precipitation and to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

2.3.1 For equipment and vehicle fueling and maintenance:

a. Provide an effective means of eliminating the discharge of spilled or leaked chemicals, including fuels and oils, from these activities;[48]

b. If applicable, comply with the Spill Prevention Control and Countermeasures (SPCC) requirements in 40 CFR part 112 and Section 311 of the CWA;

c. Ensure adequate supplies are available at all times to handle spills, leaks, and disposal of used liquids;

d. Use drip pans and absorbents under or around leaky vehicles;

e. Dispose of or recycle oil and oily wastes in accordance with other Federal, State, Tribal, or local requirements; and

f. Clean up spills or contaminated surfaces immediately, using dry clean up measures (do not clean contaminated surfaces by hosing the area down), and eliminate the source of the spill to prevent a discharge or a continuation of an ongoing discharge.

2.3.2 For equipment and vehicle washing:

a. Provide an effective means of minimizing the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of wash waters;[49]

b. Ensure there is no discharge of soaps, solvents, or detergents in equipment and vehicle wash water; and

c. For storage of soaps, detergents, or solvents, provide either (1) cover *(*e.g., *plastic sheeting, temporary roofs)* to minimize the exposure of these detergents to precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas.

2.3.3 For storage, handling, and disposal of building products, materials, and wastes:[50]

a. *For building materials and building products*,[51] provide either (1) cover (e.g., *plastic sheeting, temporary roofs*) to minimize the exposure of these products to

[48] Examples of effective means include:

- Locating activities away from receiving waters, storm drain inlets, and constructed or natural site drainage feature so that stormwater coming into contact with these activities cannot reach waters of the U.S.;
- Providing secondary containment (e.g., *spill berms, dikes, spill containment pallets*) and cover where appropriate; and
- Having a spill kit available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill.

[49] Examples of effective means include locating activities away from receiving waters and storm drain inlets or constructed or natural site drainage features and directing wash waters to a sediment basin or sediment trap, using filtration devices, such as filter bags or sand filters, or using other similarly effective controls.

[50] Compliance with the requirements of this permit does not relieve compliance requirements with respect to Federal, State, or local laws and regulations governing the storage, handling, and disposal of solid, hazardous, or toxic wastes and materials.

[51] Examples of building materials and building products typically present at construction sites include asphalt sealants, copper flashing, roofing materials, adhesives, concrete admixtures, and gravel and mulch stockpiles.

precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas.

Exception: Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

b. *For pesticides, herbicides, insecticides, fertilizers, and landscape materials:*

i. In storage areas, provide either (1) cover (e.g., *plastic sheeting, temporary roofs*) to minimize the exposure of these chemicals to precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas; and

ii. Comply with all application and disposal requirements included on the registered pesticide, herbicide, insecticide, and fertilizer label (see also Part 2.3.5).

c. *For diesel fuel, oil, hydraulic fluids, other petroleum products, and other chemicals:* The following requirements apply to the storage and handling of chemicals on your site. If you are already implementing controls as part of an SPCC or other spill prevention plan that meet or exceed the requirements of this Part, you may continue to do so and be considered in compliance with these provisions provided you reference the applicable parts of the SPCC or other plans in your SWPPP as required in Part 7.2.6b.viii.

i. If any chemical container has a storage capacity of less than 55 gallons:

(a) The containers must be water-tight, and must be kept closed, sealed, and secured when not being actively used;

(b) If stored outside, use a spill containment pallet or similar device to capture small leaks or spills; and

(c) Have a spill kit available on site that is in good working condition (i.e., not damaged, expired, or used up) and ensure personnel are available to respond immediately in the event of a leak or spill.

ii. If any chemical container has a storage capacity of 55 gallons or more:

(a) The containers must be water-tight, and must be kept closed, sealed, and secured when not being actively used;

(b) Store containers a minimum of 50 feet from receiving waters, constructed or natural site drainage features, and storm drain inlets. If infeasible due to site constraints, store containers as far away from these features as the site permits. If site constraints prevent you from storing containers 50 feet away from receiving waters or the other features identified, you must document in your SWPPP the specific reasons why the 50-foot setback is infeasible, and how you will store containers as far away as the site permits;

(c) Provide either (1) cover (e.g., temporary roofs) to minimize the exposure of these containers to precipitation and to stormwater, or (2) secondary containment (e.g., curbing, spill berms, dikes, spill containment pallets, double-wall, above-ground storage tank); and

(d) Have a spill kit available on site that is in good working condition (i.e., not

damaged, expired, or used up) and ensure personnel are available to respond immediately in the event of a leak or spill. Additional secondary containment measures are listed at 40 CFR § 112.7(c)(1).

iii. Clean up spills immediately, using dry clean-up methods where possible, and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge.

d. *For hazardous or toxic wastes:*[52]

i. Separate hazardous or toxic waste from construction and domestic waste;

ii. Store waste in sealed containers, constructed of suitable materials to prevent leakage and corrosion, and labeled in accordance with applicable Resource Conservation and Recovery Act (RCRA) requirements and all other applicable Federal, State, Tribal, or local requirements;

iii. Store all outside containers within appropriately-sized secondary containment (e.g., *spill berms, dikes, spill containment pallets*) to prevent spills from being discharged, or provide a similarly effective means designed to prevent the discharge of pollutants from these areas *(*e.g., *storing chemicals in a covered area, having a spill kit available on site);*

iv. Dispose of hazardous or toxic waste in accordance with the manufacturer's recommended method of disposal and in compliance with Federal, State, Tribal, and local requirements;

v. Clean up spills immediately, using dry clean-up methods, and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge; and

vi. Follow all other Federal, State, Tribal, and local requirements regarding hazardous or toxic waste.

e. *For construction and domestic wastes:*[53]

i. Provide waste containers *(*e.g., *dumpster, trash receptacle)* of sufficient size and number to contain construction and domestic wastes;

(a) For waste containers with lids, keep waste container lids closed when not in use, and close lids at the end of the business day and during storm events. For waste containers without lids, provide either (1) cover *(*e.g., *a tarp, plastic sheeting, temporary roof)* to minimize exposure of wastes to precipitation, or (2) a similarly effective means designed to minimize the discharge of pollutants *(*e.g., *secondary containment)*;

(b) On business days, clean up and dispose of waste in designated waste

[52] Examples of hazardous or toxic waste that may be present at construction sites include paints, caulks, sealants, fluorescent light ballasts, solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids.

[53] Examples of construction and domestic wastes include packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, demolition debris; and other trash or discarded materials.

containers; and

(c) Clean up immediately if containers overflow, and if there is litter elsewhere on the site from escaped trash.

ii. Waste containers are not required for the waste remnant or unused portions of construction materials or final products that are covered by the exception in Part 2.2.3a provided that:

(a) These wastes are stored separately from other construction or domestic wastes addressed by Part 2.3.3e.i (i.e., wastes not covered by the exception in Part 2.3.3a). If the wastes are mixed, they must be stored in waste containers as required in Part 2.3.3e.i; and

(b) These wastes are stored in designated areas of the site, the wastes are described in the SWPPP (see Part 7.2.6b.ix), and identified in the site plan (see Part 7.2.4i).

f. *For sanitary waste*, position portable toilets so they are secure and will not be tipped or knocked over, and are located away from receiving waters, storm drain inlets, and constructed or natural site drainage features.

2.3.4 For washing applicators and containers used for stucco, paint, concrete, form release oils, curing compounds, or other materials:

a. Direct wash water into a leak-proof container or leak-proof and lined pit designed so no overflows can occur due to inadequate sizing or precipitation;

b. Handle washout or cleanout wastes as follows:

i. For liquid wastes:

(a) Do not dump liquid wastes or allow them to enter into constructed or natural site drainage features, storm inlets, or receiving waters;

(b) Do not allow liquid wastes to be disposed of through infiltration or to otherwise be disposed of on the ground;

(c) Comply with applicable State, Tribal, or local requirements for disposal

ii. Remove and dispose of hardened concrete waste consistent with your handling of other construction wastes in Part 2.3.3e; and

c. Locate any washout or cleanout activities as far away as possible from receiving waters, constructed or natural site drainage features, and storm drain inlets, and, to the extent feasible, designate areas to be used for these activities and conduct such activities only in these areas.

2.3.5 For the application of fertilizers:

a. Apply at a rate and in amounts consistent with manufacturer's specifications, or document in the SWPPP departures from the manufacturer specifications where appropriate in accordance with Part 7.2.6b.x;

b. Apply at the appropriate time of year for your location, and preferably timed to coincide as closely as possible to the period of maximum vegetation uptake and growth;

c. Avoid applying before heavy rains that could cause excess nutrients to be discharged;

d. Never apply to frozen ground;

e. Never apply to constructed or natural site drainage features; and

f. Follow all other Federal, State, Tribal, and local requirements regarding fertilizer application.

2.3.6 Emergency Spill Notification Requirements

Discharges of toxic or hazardous substances from a spill or other release are prohibited, consistent with Part 1.3.5. Where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR part 110, 40 CFR part 117, or 40 CFR part 302 occurs during a 24-hour period, you must notify the National Response Center (NRC) at (800) 424-8802 or, in the Washington, DC metropolitan area, call (202) 267-2675 in accordance with the requirements of 40 CFR part 110, 40 CFR part 117, and 40 CFR part 302 as soon as you have knowledge of the release. You must also, within seven (7) calendar days of knowledge of the release, provide a description of the release, the circumstances leading to the release, and the date of the release. State, Tribal, or local requirements may necessitate additional reporting of spills or discharges to local emergency response, public health, or drinking water supply agencies.

2.4 CONSTRUCTION DEWATERING REQUIREMENTS

Comply with the following requirements to minimize the discharge of pollutants from dewatering[54] operations.

2.4.1 Route dewatering water through a sediment control (e.g., sediment trap or basin, pumped water filter bag) designed to prevent discharges with visual turbidity; [55]

2.4.2 Do not discharge visible floating solids or foam;

2.4.3 The discharge must not cause the formation of a visible sheen on the water surface, or visible oily deposits on the bottom or shoreline of the receiving water. Use an oil-water separator or suitable filtration device (such as a cartridge filter) designed to remove oil, grease, or other products if dewatering water is found to or expected to contain these materials;

2.4.4 To the extent feasible, use well-vegetated (e.g., grassy or wooded), upland areas of the site to infiltrate dewatering water before discharge.[56] You are prohibited from using receiving waters as part of the treatment area;

2.4.5 To prevent dewatering-related erosion and related sediment discharges:

a. Use stable, erosion-resistant surfaces (e.g., well-vegetated grassy areas, clean filter stone, geotextile underlayment) to discharge from dewatering controls;

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[54] "Dewatering" is defined in Appendix A as "the act of draining accumulated stormwater and/or ground water from building foundations, vaults, and trenches, or other similar points of accumulation."

[55] For the purposes of this permit, visual turbidity is present where there is a sediment plume in the discharge or the discharge appears cloudy, or opaque, or has a visible contrast that can be identified by an observer.

[56] See footnote 19.

b. Do not place dewatering controls, such as pumped water filter bags, on steep slopes (as defined in Appendix A); and

c. At all points where dewatering water is discharged, comply with the velocity dissipation requirements of Part 2.2.11.

2.4.6 For backwash water, either haul it away for disposal or return it to the beginning of the treatment process;

2.4.7 Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications; and

2.4.8 Comply with dewatering-specific inspection requirements in Part 4.

3 WATER QUALITY-BASED EFFLUENT LIMITATIONS

3.1 GENERAL EFFLUENT LIMITATION TO MEET APPLICABLE WATER QUALITY STANDARDS

Discharges must be controlled as necessary to meet applicable water quality standards. Discharges must also comply with any additional State or Tribal requirements that are in Part 9.

In the absence of information demonstrating otherwise, EPA expects that compliance with the conditions in this permit will result in stormwater discharges being controlled as necessary to meet applicable water quality standards. If at any time you become aware, or EPA determines, that discharges are not being controlled as necessary to meet applicable water quality standards, you must take corrective action as required in Parts 5.1 and 5.2, and document the corrective actions as required in Part 5.4.

EPA may insist that you install additional controls (to meet the narrative water quality-based effluent limit above) on a site-specific basis, or require you to obtain coverage under an individual permit, if information in your NOI or from other sources indicates that your discharges are not controlled as necessary to meet applicable water quality standards. This includes situations where additional controls are necessary to comply with a wasteload allocation in an EPA-established or approved TMDL.

If during your coverage under a previous permit, you were required to install and maintain stormwater controls specifically to meet the assumptions and requirements of an EPA-approved or established TMDL (for any parameter) or to otherwise control your discharge to meet water quality standards, you must continue to implement such controls as part of your coverage under this permit.

3.2 WATER QUALITY-BASED CONDITIONS FOR SITES DISCHARGING TO CERTAIN IMPAIRED AND HIGH QUALITY RECEIVING WATERS

For any portion of the site that discharges to a sediment or nutrient-impaired water or to a water that is identified by your State, Tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes,[57] you must comply with the inspection frequency specified in Part 4.3 and you must comply with the stabilization deadline specified in Part 2.2.14b.iii.[58]

[57] Refer to Appendix A for definitions of "impaired water" and "Tier 2," "Tier 2.5," and "Tier 3" waters. For assistance in determining whether your site discharges to impaired waters, EPA has developed a tool that is available at https://www.epa.gov/npdes/epas-stormwater-discharge-mapping-tools. For assistance in determining whether your site discharges to a Tier 2, 2.5, or 3 water, refer to the list of such waters at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates.

[58] If you qualify for any of the reduced inspection frequencies in Part 4.4, you may conduct inspections in

If you discharge to a water that is impaired for a parameter other than a sediment-related parameter or nutrients, EPA will inform you if any additional controls are necessary for your discharge to be controlled as necessary to meet water quality standards. These controls might include those necessary for your discharge to be consistent with the assumptions of any available wasteload allocation in any applicable TMDL. In addition, EPA may require you to apply for and obtain coverage under an individual NPDES permit.

In addition, on a case-by-case basis, EPA may notify operators of new sites or operators of existing sites with increased discharges that additional analyses, stormwater controls, and/or other measures are necessary to comply with the applicable antidegradation requirements, or notify you that an individual permit application is necessary.

If you discharge to a water that is impaired for polychlorinated biphenyls (PCBs) and are engaging in demolition of any structure with at least 10,000 square feet of floor space built or renovated before January 1, 1980, you must:

a. Implement controls[59] to minimize the exposure of PCB-containing building materials, including paint, caulk, and pre-1980 fluorescent lighting fixtures, to precipitation and to stormwater; and

b. Ensure that disposal of such materials is performed in compliance with applicable State, Federal, and local laws.

3.3 TURBIDITY BENCHMARK MONITORING FOR SITES DISCHARGING DEWATERING WATER TO PROTECT THE WATER QUALITY OF SENSITIVE WATERS

For sites discharging dewatering water to "sensitive waters" (i.e., receiving waters listed as impaired for sediment or a sediment-related parameter (as defined in Appendix A), or receiving waters designated as a Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes) you are required to comply with the benchmark monitoring requirements in this Part and document the procedures you will use at your site in your SWPPP pursuant to Part 7.2.8. A summary of these requirements is included in Table 1.

EPA notes that the benchmark threshold is not an effluent limitation, rather it is an indicator that the dewatering controls may not be working to protect water quality, which the operator must investigate and correct as appropriate. A benchmark exceedance is not a permit violation. However, if a benchmark exceedance triggers corrective action in Part 5.1.5a, failure to conduct any required action is a permit violation.

Where there are multiple operators associated with the same site, the operators may coordinate with one another to carry out the monitoring requirements of this Part in order to avoid duplicating efforts. Such coordinating arrangements must be described in the SWPPP consistent with Part 7.2.8. Regardless of how the operators divide the

accordance with Part 4.4 for any portion of your site that discharges to a sensitive water.

[59] Examples of controls to minimize exposure of PCBs to precipitation and stormwater include separating work areas from non-work areas and selecting appropriate personal protective equipment and tools, constructing a containment area so that all dust or debris generated by the work remains within the protected area, and using tools that minimize dust and heat (<212°F). For additional information, refer to Part 2.3.3 of the CGP Fact Sheet.

responsibilities for monitoring and reporting, each operator remains responsible for compliance with these requirements.[60]

3.3.1 Turbidity monitoring requirements[61]

a. **Sampling frequency.** You must collect at least one turbidity sample from your dewatering discharge each day a discharge occurs.

b. **Sampling location.** Samples must be taken at all points where dewatering water is discharged. Samples must be taken after the dewatering water has been treated by installed treatment devices pursuant to Parts 2.4.1 and 2.4.3 and prior to its discharge off site into a receiving water, constructed or natural site drainage feature, or storm drain inlet.

c. **Representative samples.** Samples taken must be representative of the dewatering discharge for any given day as required in Appendix G (standard permit conditions), Part G.10.2.

d. **Test methods.** Samples must be measured using a turbidity meter that reports results in nephelometric turbidity units (NTUs) and conforms with a Part 136-approved method (e.g., methods 180.1 and 2130). You are required to use the meter, and conduct a calibration verification prior to each day's use, consistent with the manufacturer's instructions.

3.3.2 Turbidity benchmark

a. The benchmark threshold for turbidity for this permit is 50 NTUs (referred to elsewhere in this permit as the "standard 50 NTU benchmark") unless EPA has authorized the use of an alternate benchmark in accordance with Part 3.3.2b.

b. **Request for alternate benchmark threshold.**

i. At any time prior to or during your coverage under this permit, you may request that EPA approve a benchmark for your site that is higher than 50 NTUs if you have information demonstrating the higher number is the same as your receiving water's water quality standard for turbidity. Unless EPA approves an alternate benchmark, you will be required to use the standard 50 NTU benchmark. To request approval of an alternate benchmark, you must submit the following information to your applicable EPA Regional Office (see Appendix K):
(a) The current turbidity water quality standard that applies to your receiving

[60] For instance, if Operator A relies on Operator B to meet the Part 3.3.1 turbidity monitoring requirements, the Part 3.3.4 reporting and recordkeeping requirements, and the Part 5.2.2 corrective action provisions when applicable, Operator A does not have to duplicate these same functions if Operator B is implementing them for both operators to be in compliance with the permit. However, Operator A remains responsible for complying with these permit requirements if Operator B fails to take actions that were necessary for Operator A to comply with the permit. See also footnote 83. EPA notes that both Operator A and B are required to submit turbidity monitoring reports as required under Part 3.3.4, however, Operator A's report does not need to include the data collected by Operator B as long as Operator B submits the required data and Operator A's report indicates that it is relying on Operator B to report the data. See Part 3.3.4a.

[61] Operators may find it useful to consult EPA's *Monitoring and Inspection Guide for Construction Dewatering*, available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates, which provides guidelines on how to correctly monitor for turbidity, determine if the weekly average exceeds the benchmark, and, if so, how to proceed with corrective action.

water and the source/citation.[62]

(b) If the applicable turbidity water quality standard requires information on natural or background turbidity levels (e.g., "no more than 10 NTU above natural turbidity levels") to determine the specific standard for the receiving water, include available data that can be used to establish the natural turbidity levels of your receiving water (including literature studies or Federal, State, Tribal, or local government data). Data must be representative of the natural turbidity levels of your specific receiving water. Identify the source(s) of all data provided, including if the data are from samples you collected of the receiving water.

ii. EPA will inform you of its decision on whether to approve the requested alternate benchmark within 30 days. EPA may approve your request, request additional time (e.g., if additional information is needed to substantiate the data you provided), or deny your request. Unless and until EPA approves your request to use an alternate benchmark, you are required to use the standard benchmark of 50 NTUs and take any required corrective actions if an exceedance occurs.

3.3.3 Comparison of turbidity samples to benchmark. Compare the weekly average[63] of your turbidity monitoring results to the standard 50 NTU benchmark, or alternate benchmark if approved by EPA.

a. If the weekly average of your turbidity monitoring results exceeds the standard benchmark (or your approved alternate benchmark), you are required to conduct follow-up corrective action in accordance with Part 5.2.2 and document any corrective action taken in your corrective action log in accordance with Part 5.4.

b. For averaging purposes, a "monitoring week" starts with a Monday and ends on Sunday. Once a new monitoring week starts, you will need to calculate a new average for that week of turbidity monitoring results.[64] A weekly average may consist of one or more turbidity monitoring results.

c. Although you are not required to collect and analyze more than one turbidity sample per day from your dewatering discharge, if you do collect and analyze more than one sample on any given day, you must include any additional results in the

[62] For instance, if your site is located in Washington, DC, and you are discharging to a Class B water, for which the water quality standard is that turbidity may not increase above ambient levels by more than 20 percent, you would reference "Water Quality Standards for the District of Columbia, Chapter 11, Section 1104.8."

[63] A "weekly average" is defined as the sum of all of the turbidity samples taken during a "monitoring week" divided by the number of samples measured during that week. Average values should be calculated to the nearest whole number.

[64] For example, if turbidity samples from your dewatering discharge in week 1 result in values of 30 NTU on Tuesday, 40 NTU on Wednesday, and 45 NTU on Thursday, your weekly average turbidity value would be 38.33 NTU ((30+40+45) ÷ 3 = 38 NTU). If in week 2, your turbidity samples resulted in values of 45 NTU on Monday, 30 NTU on Tuesday, 25 NTU on Wednesday, and 15 NTU on Thursday, you would calculate a new average for that week, which would yield an average turbidity value of 28.75 NTU ((45+30+25+15) ÷ 4 = 29 NTU). By comparison, if your samples on consecutive days from Friday to Monday were 60 NTU, 45 NTU, 40 NTU, and 43 NTU, respectively, and there are no other dewatering discharges for the remainder of the week, you would calculate one weekly average for the Friday to Sunday to be 48 NTU ((60+45+40) ÷ 3 = 48 NTU), and a separate weekly average for the one Monday to be 43 NTU (43 ÷ 1 = 43 NTU).

calculation of your weekly average (i.e., add all individual results for that monitoring week and divide by the total number of samples).[65]

d. If you are conducting turbidity monitoring for more than one dewatering discharge point, you must calculate a weekly average turbidity value for each discharge point and compare each to the turbidity benchmark.

3.3.4 Reporting and recordkeeping.

a. You must submit reports of your weekly average turbidity data to EPA no later than 30 days following the end of each monitoring quarter. If there are monitoring weeks in which there was no dewatering discharge, or if there is a monitoring quarter with no dewatering discharge, indicate this in your turbidity monitoring report. If another operator associated with your same site is conducting turbidity monitoring on your behalf pursuant to Part 3.3, indicate this in your turbidity monitoring report.

b. For the purposes of this permit, the following monitoring quarters and reporting deadlines apply:

Table 3. Monitoring Quarters and Deadlines for Reporting Turbidity Benchmark Monitoring Data.

Monitoring Quarter #	**Months**	**Reporting Deadline** (no later than 30 days after end of the monitoring quarter)
1	January 1 – March 31	April 30
2	April 1 – June 30	July 30
3	July 1 – September 30	October 30
4	October 1 – December 31	January 30

c. You must use EPA's NPDES eReporting Tool (NeT) to electronically submit your quarterly turbidity data, unless, consistent with Part 1.4.2, you received a waiver from your applicable EPA Regional Office. If the EPA Regional Office grants you approval to use a paper turbidity monitoring report form, and you elect to use it, you must complete the form in Appendix K. If EPA approves of your request to use an alternate turbidity benchmark pursuant to Part 3.3.2b, EPA will substitute the alternate benchmark in your NeT account.

d. For each day in which you are required to monitor, you must record the monitoring information required by Appendix G, Parts G.10.2 and G.10.3 and retain all such information for a period of at least three years from the date this permit expires or from the date your authorization is terminated.

[65] For example, if during a monitoring week you take two turbidity samples on Tuesday with a value of 30 NTU and 35 NTU, three samples on Wednesday with a value of 40 NTU, 45 NTU, and 48 NTU, and one sample on Thursday with a value of 45 NTU, your weekly average turbidity value for this week would be 41 NTU ((30+35+40+45+48+45) ÷ 6 = 41 NTU).

Table 4. Summary of Turbidity Benchmark Monitoring Requirements.

Applicability	Sampling Requirement	Turbidity Benchmark	Corrective Action	Reporting
Sites discharging dewatering water to a sediment-impaired water or to a water designated as a Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes.	Collect at least one turbidity sample per day, from each discharge point, on any day there is a dewatering discharge. Use turbidity sampling procedures specified in Part 3.3.1.	Compare the weekly average of your turbidity monitoring results to the 50 NTU benchmark (or alternate benchmark if approved by EPA).	If the weekly average of turbidity monitoring results exceeds the 50 NTU turbidity benchmark (or alternate benchmark if approved by EPA), you are required to take follow-up corrective action in accordance with Part 5.2.2.	Report all weekly average turbidity monitoring results on a quarterly basis via NeT-CGP (unless use of the paper monitoring form in Appendix K is approved by EPA) no later than 30 days following the end of each monitoring quarter.

4 INSPECTION REQUIREMENTS

4.1 PERSON(S) RESPONSIBLE FOR CONDUCTING SITE AND DEWATERING INSPECTIONS

The person(s) inspecting your site may be a person on your staff or a third party you hire to conduct such inspections. You are responsible for ensuring that any person conducting inspections pursuant to this Part is a "qualified person." A qualified person is someone who has completed the training required by Part 6.3.

4.2 FREQUENCY OF INSPECTIONS.[66]

At a minimum, you must conduct a site inspection in accordance with one of the two schedules listed below, unless you are subject to the Part 4.3 site inspection frequency for discharges to sediment or nutrient-impaired or high quality waters, or qualify for a Part 4.4 reduction in the inspection frequency:

4.2.1 At least once every seven (7) calendar days; *or*

4.2.2 Once every 14 calendar days *and* within 24 hours[67] of the occurrence of:

- **a.** A storm event that produces 0.25 inches or more of rain within a 24-hour period.
  - **i.** If a storm event produces 0.25 inches or more of rain within a 24-hour period (including when there are multiple, smaller storms that alone produce less than 0.25 inches but together produce 0.25 inches or more in 24 hours), you are required to conduct one inspection within 24 hours of when 0.25 inches of rain or more has fallen.

[66] Inspections are only required during the site's normal working hours.

[67] For the purposes of the inspection requirements in this Part, conducting an inspection "within 24 hours" means that once either of the two conditions in Parts 4.2.2a or 4.2.2b are met you have 24 hours from that time to conduct an inspection. For clarification, the 24 hours is counted as a continuous passage of time, and not counted by business hours (e.g., 3 business days of 8 hours each). When the 24-hour inspection time frame occurs entirely outside of normal working hours, you must conduct an inspection by no later than the end of the next business day.

ii. If a storm event produces 0.25 inches or more of rain within a 24-hour period on the first day of a storm and continues to produce 0.25 inches or more of rain on subsequent days, you must conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the last day of the storm that produces 0.25 inches or more of rain (i.e., only two inspections would be required for such a storm event).[68]

b. A discharge caused by snowmelt from a storm event that produces 3.25 inches[69] or more of snow within a 24-hour period. You are required to conduct one inspection once the discharge of snowmelt from a 3.25-inch or more snow accumulation occurs. Additional snowmelt inspections are only required if following the discharge from the first snowmelt, there is a discharge from a separate storm event that produces 3.25 inches or more of snow.

4.2.3 To determine whether a storm event meets either of the thresholds in Parts 4.2.2a or 4.2.2b:

a. For rain, you must either keep a properly maintained rain gauge on your site, or obtain the storm event information from a weather station that is representative of your location. For any 24-hour period during which there is 0.25 inches or more of rainfall, you must record the total rainfall measured for that day in accordance with Part 4.7.1d.

b. For snow, you must either take measurements of snowfall at your site,[70] or rely on similar information from a local weather forecasting provider that is representative of your location.

4.3 INCREASE IN INSPECTION FREQUENCY FOR CERTAIN SITES.

The increased inspection frequencies established in this Part take the place of the Part 4.2 inspection frequencies for the portion of the site affected.

4.3.1 For any portion of the site that discharges to a sediment or nutrient-impaired water or to a water that is identified by your State, Tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes (see Part 3.2), you must conduct an once every seven (7) calendar days *and* within 24 hours of the occurrence of a storm event that produces 0.25 inches or more of rain within a 24-hour period, or within 24 hours of a snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

[68] For example, if 0.30 inches of rain falls on Day 1, 0.25 inches of rain falls on Day 2, and 0.10 inches of rain fall on Day 3, you would be required to conduct a first inspection within 24 hours of the Day 1 rainfall and a second inspection within 24 hours of the Day 2 rainfall, but a third inspection would not be required within 24 hours of the Day 3 rainfall.

[69] This is the amount of snow that is equivalent to 0.25 inches of rain, based on information from the National Oceanic and Atmospheric Administration (NOAA) indicating that 13 inches of snow is, on average, equivalent to 1 inch of rain. See https://www.nssl.noaa.gov/education/svrwx101/winter/faq/.

[70] For snowfall measurements, EPA suggests use of NOAA's National Weather Service guidelines at https://www.weather.gov/jkl/snow_measurement. These guidelines recommend use of a "snowboard" (a piece of wood about 16 inches by 16 inches) that is placed in an unobstructed part of the site on a hard surface.

Refer to Parts 4.2.3a and 4.2.3b for the requirements to determine if a storm event produces enough rain or snow to trigger the inspection requirement.

4.3.2 For sites discharging dewatering water, you must conduct an inspection in accordance with Part 4.6.3 during the discharge once per day on which the discharge occurs. The Part 4.2 inspection frequency still applies to all other portions of the site, unless the site is affected by either the increased frequency in Part 4.3.1 or the reduced frequency in Part 4.4.

4.4 REDUCTIONS IN INSPECTION FREQUENCY

4.4.1 Stabilized areas.

a. You may reduce the frequency of inspections to twice per month for the first month, no more than 14 calendar days apart, then once per month until permit coverage is terminated consistent with Part 8 in any area of your site where the stabilization steps in Part 2.2.14a have been completed. If construction activity resumes in this portion of the site at a later date, the inspection frequency immediately increases to that required in Parts 4.2 and 4.3, as applicable. You must document the beginning and ending dates of this period in your SWPPP.

b. Exception. For "linear construction sites" (as defined in Appendix A) where disturbed portions have undergone final stabilization at the same time active construction continues on others, you may reduce the frequency of inspections to twice per month for the first month, no more than 14 calendar days apart, in any area of your site where the stabilization steps in Part 2.2.14a have been completed. After the first month, inspect once more within 24 hours of the occurrence of a storm event that produces 0.25 inches of rain or more within a 24-hour period, or within 24 hours of a snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period. If there are no issues or evidence of stabilization problems, you may suspend further inspections. If "wash-out" of stabilization materials and/or sediment is observed, following re-stabilization, inspections must resume at the inspection frequency required in Part 4.4.1a. Inspections must continue until final stabilization is visually confirmed following a storm event that produces 0.25 inches of rain or more within a 24-hour period.

4.4.2 Arid, semi-arid, or drought-stricken areas (as defined in Appendix A). If it is the seasonally dry period[71] or a period in which drought is occurring, you may reduce the frequency of inspections to once per month and within 24 hours of the occurrence of a storm event that produces 0.25 inches of rain or more within a 24-hour period, or within 24 hours of a snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period. You must document that you are using this reduced schedule and the beginning and ending dates of the seasonally dry period in your SWPPP. Follow the procedures in Part 4.2.3a and 4.2.3b, accordingly, to determine if a storm event occurs that produces 0.25 inches or more of rain or 3.25 inches or more of snow within a 24-hour period. For any 24-hour period during which there is 0.25 inches or more of rainfall, or 3.25 inches or more of snow, you must record the total rainfall or snow measured for that day in accordance with Part 4.7.1d.

[71] See footnote 44.

4.4.3 Frozen conditions:

a. If you are suspending construction activities due to frozen conditions, you may temporarily suspend inspections on your site until thawing conditions (as defined in Appendix A) begin to occur if:

i. Discharges are unlikely due to continuous frozen conditions that are likely to continue at your site for at least three (3) months based on historic seasonal averages.[72] If unexpected weather conditions (such as above freezing temperatures or rain events) make discharges likely, you must immediately resume your regular inspection frequency as described in Parts 4.2 and 4.3, as applicable;

ii. Land disturbances have been suspended; and

iii. All disturbed areas of the site have been stabilized in accordance with Part 2.2.14a.

b. If you are still conducting construction activities during frozen conditions, you may reduce your inspection frequency to once per month if:

i. Discharges are unlikely due to continuous frozen conditions that are likely to continue at your site for at least three (3) months based on historic seasonal averages. If unexpected weather conditions (such as above freezing temperatures or rain events) make discharges likely, you must immediately resume your regular inspection frequency as described in Parts 4.2 and 4.3, as applicable; and

ii. Except for areas in which you are actively conducting construction activities, disturbed areas of the site have been stabilized in accordance with Part 2.2.14a.

You must document the beginning and ending dates of this period in your SWPPP.

4.5 AREAS THAT MUST BE INSPECTED

During your site inspection, you must at a minimum inspect the following areas of your site:

4.5.1 All areas that have been cleared, graded, or excavated and that have not yet completed stabilization consistent with Part 2.2.14a;

4.5.2 All stormwater controls, including pollution prevention controls, installed at the site to comply with this permit;[73]

4.5.3 Material, waste, borrow, and equipment storage and maintenance areas that are covered by this permit;

4.5.4 All areas where stormwater typically flows within the site, including constructed or natural site drainage features designed to divert, convey, and/or treat stormwater;

4.5.5 All areas where construction dewatering is taking place, including controls to treat the dewatering discharge and any channelized flow of water to and from those controls;

[72] Use data sets that include the most recent data available to account for recent precipitation patterns and trends.

[73] This includes the requirement to inspect for sediment that has been tracked out from the site onto paved roads, sidewalks, or other paved areas consistent with Part 2.2.4.

4.5.6 All points of discharge from the site; and

4.5.7 All locations where stabilization measures have been implemented.

You are not required to inspect areas that, at the time of the inspection, are considered unsafe to your inspection personnel.

4.6 REQUIREMENTS FOR INSPECTIONS

4.6.1 During each site inspection, you must at a minimum:

- **a.** Check whether all stormwater controls *(*i.e.*, erosion and sediment controls and pollution prevention controls)* are properly installed, appear to be operational, and are working as intended to minimize pollutant discharges.
- **b.** Check for the presence of conditions that could lead to spills, leaks, or other accumulations of pollutants on the site.
- **c.** Identify any locations where new or modified stormwater controls are necessary to meet the requirements of Parts 2 and/or 3.
- **d.** Check for signs of visible erosion and sedimentation *(*i.e.*, sediment deposits)* that have occurred and are attributable to your discharge at points of discharge and, if applicable, on the banks of any receiving waters flowing within or immediately adjacent to the site;
- **e.** Check for signs of sediment deposition that are visible from your site and attributable to your discharge (e.g., sand bars with no vegetation growing on top in receiving waters or in other constructed or natural site drainage features, or the buildup of sediment deposits on nearby streets, curbs, or open conveyance channels).
- **f.** Identify any incidents of noncompliance observed.

4.6.2 If a discharge is occurring during your inspection:

- **a.** Identify all discharge points at the site; and
- **b.** Observe and document the visual quality of the discharge, and take note of the characteristics of the stormwater discharge, including color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants. Check also for signs of these same pollutant characteristics that are visible from your site and attributable to your discharge in receiving waters or in other constructed or natural site drainage features.

4.6.3 For dewatering inspections conducted pursuant to Parts 4.3.2, record the following in a report within 24 hours of completing the inspection:

- **a.** The inspection date;
- **b.** Names and titles of personnel making the inspection;
- **c.** Approximate times that the dewatering discharge began and ended on the day of inspection;[74]
- **d.** Estimates of the rate (in gallons per day) of discharge on the day of inspection;

[74] If the dewatering discharge is a continuous discharge that continues after normal business hours, indicate that the discharge is continuous.

e. Whether or not any of the following indications of pollutant discharge were observed at the point of discharge to any receiving waters flowing through or immediately adjacent to the site and/or to constructed or natural site drainage features or storm drain inlets:[75]

i. a sediment plume, suspended solids, unusual color, presence of odor, decreased clarity, or presence of foam; and/or

ii. a visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water; and

f. Photographs of (1) the dewatering water prior to treatment by a dewatering control(s) and the final discharge after treatment; (2) the dewatering control(s); and (3) the point of discharge to any receiving waters flowing through or immediately adjacent to the site and/or to constructed or natural site drainage features, storm drain inlets, and other conveyances to receiving waters.

You must also comply with the Part 4.7.2, 4.7.3, and 4.7.4 requirements for signing the reports, keeping them available on site, and retaining copies.

4.6.4 Based on the results of your inspection:

a. Complete any necessary maintenance repairs or replacements under Part 2.1.4 or under Part 5, whichever applies; and

b. Modify your SWPPP site map in accordance with Part 7.4.1 to reflect changes to your stormwater controls that are no longer accurately reflected on the current site map.

4.7 INSPECTION REPORT

4.7.1 You must complete an inspection report within 24 hours of completing any site inspection. Each inspection report (except for dewatering inspection reports, which are covered in Part 4.6.3) must include the following:

a. The inspection date;

b. Names and titles of personnel making the inspection;

c. A summary of your inspection findings, covering at a minimum the observations you made in accordance with Part 4.6, including any problems found during your inspection that make it necessary to perform routine maintenance pursuant to Part 2.1.4b or corrective action pursuant to Part 5. Include also any documentation as to why the corrective action procedures under Part 5 are unnecessary to fix a problem that repeatedly occurs as described in Part 2.1.4c;

d. If you are inspecting your site at the frequency specified in Part 4.2.2, Part 4.3, or Part 4.4.1b, and you conducted an inspection because of a storm event that produced rainfall measuring 0.25 inches or more within a 24-hour period, you must include the applicable rain gauge or weather station readings that triggered the inspection. Similarly, if you conducted an inspection because of a snowmelt discharge from a storm event that produced 3.25 inches or more of snow within a 24-hour period, you must include any measurements taken of snowfall at your site, or weather station information you relied on; and

[75] If the operator observes any of these indicators of pollutant discharge, corrective action is required consistent with Parts 5.1.5b and 5.2.2.

e. If you determined that it is unsafe to inspect a portion of your site, you must describe the reason you found it to be unsafe and specify the locations to which this condition applies.

4.7.2 Each inspection report must be signed by the operator's signatory in accordance with Appendix G, Part G.11 of this permit.

4.7.3 You must keep a copy of all inspection reports at the site or at an easily accessible location, so that it can be made immediately available at the time of an on-site inspection or upon request by EPA.[76]

4.7.4 You must retain all inspection reports completed for this Part for at least three (3) years from the date that your permit coverage expires or is terminated.

4.8 INSPECTIONS BY EPA

You must allow EPA, or an authorized representative of EPA, to conduct the following activities at reasonable times. To the extent that you are utilizing shared controls, that are not on site, to comply with this permit, you must make arrangements for EPA to have access at all reasonable times to those areas where the shared controls are located.

4.8.1 Enter onto all areas of the site, including any construction support activity areas covered by this permit, any off-site areas where shared controls are utilized to comply with this permit, discharge locations, adjoining waterbodies, and locations where records are kept under the conditions of this permit;

4.8.2 Access and copy any records that must be kept under the conditions of this permit;

4.8.3 Inspect your construction site, including any construction support activity areas covered by this permit (see Part 1.2.1c), any stormwater controls installed and maintained at the site, and any off-site shared controls utilized to comply with this permit; and

4.8.4 Sample or monitor for the purpose of ensuring compliance.

5 CORRECTIVE ACTIONS

5.1 CONDITIONS TRIGGERING CORRECTIVE ACTION.

You must take corrective action to address any of the following conditions identified at your site:

5.1.1 A stormwater control needs a significant repair or a new or replacement control is needed, or, in accordance with Part 2.1.4c, you find it necessary to repeatedly (i.e., three (3) or more times) conduct the same routine maintenance fix to the same control at the same location (unless you document in your inspection report under Part 4.7.1c that the specific reoccurrence of this same problem should still be addressed as a routine maintenance fix under Part 2.1.4); or

5.1.2 A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly; or

[76] Inspection reports may be prepared, signed, and kept electronically, rather than in paper form, if the records are: (a) in a format that can be read in a similar manner as a paper record; (b) legally dependable with no less evidentiary value than their paper equivalent; and (c) immediately accessible to the inspector during an inspection to the same extent as a paper copy stored at the site would be, if the records were stored in paper form. For additional guidance on the proper practices to follow for the electronic retention of inspection report records, refer to the Fact Sheet discussion related to Part 4.7.3.

5.1.3 Your discharges are not meeting applicable water quality standards;

5.1.4 A prohibited discharge has occurred (see Part 1.3); or

5.1.5 During discharge from site dewatering activities:

a. The weekly average of your turbidity monitoring results exceeds the 50 NTU benchmark (or alternate benchmark if approved by EPA pursuant to Part 3.3.2b); or

b. You observe or you are informed by EPA, State, or local authorities of the presence of the conditions specified in Part 4.6.3e.

5.2 CORRECTIVE ACTION DEADLINES

5.2.1 If responding to any of the Part 5.1.1, 5.1.2, 5.1.3, or 5.1.4 triggering conditions, you must:

a. Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events; and

b. When the problem does not require a new or replacement control or significant repair, the corrective action must be completed by the close of the next business day; or

c. When the problem requires a new or replacement control or significant repair, install the new or modified control and make it operational, or complete the repair, by no later than seven (7) calendar days from the time of discovery. If it is infeasible to complete the installation or repair within seven (7) calendar days, you must document in your records why it is infeasible to complete the installation or repair within the 7-day timeframe and document your schedule for installing the stormwater control(s) and making it operational as soon as feasible after the 7-day timeframe. Where these actions result in changes to any of the stormwater controls or procedures documented in your SWPPP, you must modify your SWPPP accordingly within seven (7) calendar days of completing this work.

5.2.2 If responding to either of the Part 5.1.5 triggering conditions related to site dewatering activities, you must:

a. Immediately take all reasonable steps to minimize or prevent the discharge of pollutants until you can implement a solution, including shutting off the dewatering discharge as soon as possible depending on the severity of the condition[77] taking safety considerations into account;

b. Determine whether the dewatering controls are operating effectively and whether they are causing the conditions; and

c. Make any necessary adjustments, repairs, or replacements to the dewatering controls to lower the turbidity levels below the benchmark or remove the visible plume or sheen.

[77] For instance, if the weekly average of your turbidity monitoring results or a single sample is extremely high (e.g., a single turbidity sample results in 355 NTUs or higher), you should take action to safely shut off the discharge so that you can evaluate the cause of the high turbidity. Note: A single turbidity sample of 355 NTUs or higher means that the weekly average turbidity value will exceed 50 NTU regardless of the turbidity values the other days during the week.

When you have completed these steps and made any changes deemed necessary, you may resume discharging from your dewatering activities.

5.3 CORRECTIVE ACTION REQUIRED BY EPA

You must comply with any corrective actions required by EPA as a result of permit violations found during an inspection carried out under Part 4.8.

5.4 CORRECTIVE ACTION LOG

5.4.1 For each corrective action taken in accordance with this Part, you must record the following in a corrective action log:

- **a.** Within 24 hours of identifying the corrective action condition, document the specific condition and the date and time it was identified.
- **b.** Within 24 hours of completing the corrective action (in accordance with the deadlines in Part 5.2), document the actions taken to address the condition, including whether any SWPPP modifications are required.

5.4.2 Each entry into the corrective action log, consisting of the information required by both Parts 5.4.1a and 5.4.1b, must be signed by the operator's signatory in accordance with Appendix G, Part G.11.2 of this permit.

5.4.3 You must keep a copy of the corrective action log at the site or at an easily accessible location, so that it can be made immediately available at the time of an on-site inspection or upon request by EPA.[78]

5.4.4 You must retain the corrective action log for at least three (3) years from the date that your permit coverage expires or is terminated.

6 STORMWATER TEAM FORMATION/STAFF TRAINING REQUIREMENTS

6.1 STORMWATER TEAM

Each operator, or group of multiple operators, must assemble a "stormwater team" that will be responsible for carrying out activities necessary to comply with this permit. The stormwater team must include the following people:

- **a.** Personnel who are responsible for the design, installation, maintenance, and/or repair of stormwater controls (including pollution prevention controls);
- **b.** Personnel responsible for the application and storage of treatment chemicals (if applicable);
- **c.** Personnel who are responsible for conducting inspections as required in Part 4.1; and
- **d.** Personnel who are responsible for taking corrective actions as required in Part 5.

Members of the stormwater team must be identified in the SWPPP pursuant to Part 7.2.2.

[78] The corrective action log may be prepared, signed, and kept electronically, rather than in paper form, if the records are: (a) in a format that can be read in a similar manner as a paper record; (b) legally dependable with no less evidentiary value than their paper equivalent; and (c) immediately accessible to the inspector during an inspection to the same extent as a paper copy stored at the site would be, if the records were stored in paper form. For additional guidance on the proper practices to follow for the electronic retention of corrective action log records, refer to the Fact Sheet discussion related to Part 4.7.3.

6.2 GENERAL TRAINING REQUIREMENTS FOR STORMWATER TEAM MEMBERS

Prior to the commencement of construction activities, you must ensure that all persons[79] assigned to the stormwater team understand the requirements of this permit and their specific responsibilities with respect to those requirements, including the following related to the scope of their job duties:

a. The permit requirements and deadlines associated with installation, maintenance, and removal of stormwater controls, as well as site stabilization;

b. The location of all stormwater controls on the site required by this permit and how they are to be maintained;

c. The proper procedures to follow with respect to the permit's pollution prevention requirements; and

d. When and how to conduct inspections, record applicable findings, and take corrective actions. Specific training requirements for persons conducting site inspections are included in Part 6.3.

You are responsible for ensuring that all activities on the site comply with the requirements of this permit. You are not required to provide or document formal training for subcontractors or other outside service providers (unless the subcontractors or outside service providers are responsible for conducting the inspections required in Part 4, in which case you must provide such documentation consistent with Part 7.2.2), but you must ensure that such personnel understand any requirements of this permit that may be affected by the work they are subcontracted to perform.

6.3 TRAINING REQUIREMENTS FOR PERSONS CONDUCTING INSPECTIONS

For projects that receive coverage under this permit on or after February 17, 2023, to be considered a qualified person under Part 4.1 for conducting inspections under Part 4, you must, at a minimum, either:

a. Have completed the EPA construction inspection course developed for this permit and have passed the exam; or

b. Hold a current valid construction inspection certification or license from a program that, at a minimum, covers the following:[80]

- **i.** Principles and practices of erosion and sediment control and pollution prevention practices at construction sites;
- **ii.** Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites; and
- **iii.** Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4.

[79] If the person requiring training is a new employee who starts after you commence construction activities, you must ensure that this person has the proper understanding as required above prior to assuming particular responsibilities related to compliance with this permit. For emergency-related projects, the requirement to train personnel prior to commencement of construction activities does not apply, however, such personnel must have the required training prior to NOI submission.

[80] If one of the following topics (e.g., installation and maintenance of pollution prevention practices) is not covered by the non-EPA training program, you may consider supplementing the training with the analogous module of the EPA course (e.g., Module 4) that covers the missing topic.

For projects that receive coverage under this permit prior to February 17, 2023, any personnel conducting site inspections pursuant to Part 4 on your site must, at a minimum, be a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality, and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.[81]

6.4 STORMWATER TEAM'S ACCESS TO PERMIT DOCUMENTS

Each member of the stormwater team must have easy access to an electronic or paper copy of applicable portions of this permit, the most updated copy of your SWPPP, and other relevant documents or information that must be kept with the SWPPP.

7 STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

7.1 GENERAL REQUIREMENTS

All operators associated with a construction site under this permit must develop a SWPPP consistent with the requirements in Part 7 prior to their submittal of the NOI.[82, 83, 84] The SWPPP must be kept up-to-date throughout coverage under this permit.

If a SWPPP was prepared under a previous version of this permit, the operator must review and update the SWPPP to ensure that this permit's requirements are addressed prior to submitting an NOI for coverage under this permit.

7.2 SWPPP CONTENTS

At a minimum, the SWPPP must include the information specified in this Part and as specified in other parts of this permit.

7.2.1 All Site Operators. Include a list of all other operators who will be engaged in construction activities at the site, and the areas of the site over which each operator has control.

[81] If you receive coverage for a project prior to February 17, 2023, and construction activities for the same project will continue after February 17, 2023, the personnel conducting inspections do not need to take the additional training specified in Parts 6.3a and 6.3b for inspections conducted on the project site. If the same operator obtains coverage for a different project on or after February 17, 2023, personnel conducting inspections would be required to meet the requirements for a qualified person by completing the training in either Part 6.3a or Part 6.3b.

[82] The SWPPP does not establish the effluent limits and/or other permit terms and conditions that apply to your site's discharges; these limits, terms, and conditions are established in this permit.

[83] Where there are multiple operators associated with the same site, they may develop a group SWPPP instead of multiple individual SWPPPs. Regardless of whether there is a group SWPPP or multiple individual SWPPPs, each operator is responsible for compliance with the permit's terms and conditions. In other words, if Operator A relies on Operator B to satisfy its permit obligations, Operator A does not have to duplicate those permit-related functions if Operator B is implementing them such that both operators are in compliance with the permit. However, Operator A remains responsible for permit compliance if Operator B fails to take actions necessary for Operator A to comply with the permit. In addition, all operators must ensure, either directly or through coordination with other operators, that their activities do not cause a violation or compromise any other operators' controls and/or any shared controls. See also footnote 60.

[84] There are a number of commercially available products to assist operators in developing the SWPPP, as well as companies that can be hired to help develop a site-specific SWPPP. The permit does not state which are recommended, nor does EPA endorse any specific products or vendors. Where operators choose to rely on these products or services, the choice of which ones to use to comply with the requirements of this Part is a decision for the operator alone.

7.2.2 Stormwater Team. Identify the personnel (by name and position) that you have made part of the stormwater team pursuant to Part 6.1, as well as their individual responsibilities, including which members are responsible for conducting inspections.

Include verification that each member of the stormwater team has received the training required by Part 6.2. Include documentation that members of the stormwater team responsible for conducting inspections pursuant to Part 4 have received the training required by Part 6.3. If personnel on your team elect to complete the EPA inspector training program pursuant to Part 6.3a, you must include copies of the certificate showing that the relevant personnel have completed the training and passed the exam. If personnel on your team elect to complete a non-EPA inspector training program pursuant to Part 6.3b, you must include documentation showing that these persons have successfully completed the program and their certification or license is still current. You must also confirm that the non-EPA inspector training program satisfies the minimum elements for such programs in Part 6.3b.

7.2.3 Nature of Construction Activities. Include the following:

- **a.** A description of the nature of your construction activities, including the age or dates of past renovations for structures that are undergoing demolition;
- **b.** The size of the property (in acres or length in miles if a linear construction site);
- **c.** The total area expected to be disturbed by the construction activities (to the nearest quarter acre or nearest quarter mile if a linear construction site);
- **d.** A description of any on-site and off-site construction support activity areas covered by this permit (see Part 1.2.1c);
- **e.** The maximum area expected to be disturbed at any one time, including on-site and off-site construction support activity areas;
- **f.** A description and projected schedule for the following:[85]
  - **i.** Commencement of construction activities in each portion of the site, including clearing and grubbing, mass grading, demolition activities, site preparation (i.e., excavating, cutting and filling), final grading, and creation of soil and vegetation stockpiles requiring stabilization;
  - **ii.** Temporary or permanent cessation of construction activities in each portion of the site;
  - **iii.** Temporary or final stabilization of exposed areas for each portion of the site; and
  - **iv.** Removal of temporary stormwater controls and construction equipment or vehicles, and the cessation of construction-related pollutant-generating activities.

[85] If plans change due to unforeseen circumstances or for other reasons, the requirement to describe the sequence and estimated dates of construction activities is not meant to "lock in" the operator to meeting these dates. When departures from initial projections are necessary, this should be documented in the SWPPP itself, or in associated records, as appropriate.

g. A list and description of all pollutant-generating activities[86] on the site. For each pollutant-generating activity, include an inventory of pollutants or pollutant constituents (e.g., *sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels*) associated with that activity, which could be discharged in stormwater from your construction site. You must take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed or removed during construction;

h. Business days and hours for the project;

i. If you are conducting construction activities in response to a public emergency (see Part 1.4), a description of the cause of the public emergency *(*e.g., *mud slides, earthquake, extreme flooding conditions, widespread disruption in essential public services)*, information substantiating its occurrence *(*e.g., *State disaster declaration or similar State or local declaration)*, and a description of the construction necessary to reestablish affected public services.

7.2.4 Site Map. Include a legible map, or series of maps, showing the following features of the site:

a. Boundaries of the property;

b. Locations where construction activities will occur, including:

i. Locations where earth-disturbing activities will occur (note any phasing), including any demolition activities;

ii. Approximate slopes before and after major grading activities (note any steep slopes (as defined in Appendix A));

iii. Locations where sediment, soil, or other construction materials will be stockpiled;

iv. Any receiving water crossings;

v. Designated points where vehicles will exit onto paved roads;

vi. Locations of structures and other impervious surfaces upon completion of construction; and

vii. Locations of on-site and off-site construction support activity areas covered by this permit (see Part 1.2.1c).

c. Locations of any receiving waters within the site and all receiving waters within one mile downstream of the site's discharge point(s). Also identify if any of these receiving waters are listed as impaired or are identified as a Tier 2, Tier 2.5, or Tier 3 water;

d. Any areas of Federally listed critical habitat within the action area of the site as defined in Appendix A;

e. Type and extent of pre-construction cover on the site (e.g., vegetative cover, forest, pasture, pavement, structures);

f. Drainage patterns of stormwater and authorized non-stormwater before and after major grading activities;

[86] Examples of pollutant-generating activities include paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering activities.

g. Stormwater and authorized non-stormwater discharge locations, including:

i. Locations where stormwater and/or authorized non-stormwater will be discharged to storm drain inlets, including a notation of whether the inlet conveys stormwater to a sediment basin, sediment trap, or similarly effective control;[87]

ii. Locations where stormwater or authorized non-stormwater will be discharged directly to receiving waters (i.e., not via a storm drain inlet); and

iii. Locations where turbidity benchmark monitoring will take place to comply with Part 3.3, if applicable to your site.

h. Locations of all potential pollutant-generating activities identified in Part 7.2.3g;

i. Designated areas where construction wastes that are covered by the exception in Part 2.3.3e.ii because they are not pollutant-generating will be stored;

j. Locations of stormwater controls, including natural buffer areas and any shared controls utilized to comply with this permit; and

k. Locations where polymers, flocculants, or other treatment chemicals will be used and stored.

7.2.5 Non-Stormwater Discharges. Identify all authorized non-stormwater discharges in Part 1.2.2 that will or may occur.

7.2.6 Description of Stormwater Controls.

a. For each of the Part 2.2 erosion and sediment control requirements, Part 2.3 pollution prevention requirements, and Part 2.4 construction dewatering requirements, as applicable to your site, you must include the following:

i. A description of the specific control(s) to be implemented to meet these requirements;

ii. The design specifications for controls described in Part 7.2.6a.i (including references to any manufacturer specifications and/or erosion and sediment control manuals/ordinances relied upon);[88]

iii. Routine stormwater control maintenance specifications; and

iv. The projected schedule for stormwater control installation/implementation.

b. You must also include any of the following additional information as applicable.

i. Natural buffers and/or equivalent sediment controls (see Part 2.2.1 and Appendix F). You must include the following:

(a) The compliance alternative to be implemented;

(b) If complying with alternative 2, the width of natural buffer retained;

[87] The requirement to show storm drain inlets in the immediate vicinity of the site on your site map only applies to those inlets that are easily identifiable from your site or from a publicly accessible area immediately adjacent to your site.

[88] Design specifications may be found in manufacturer specifications and/or in applicable erosion and sediment control manuals or ordinances. Any departures from such specifications must reflect good engineering practice and must be explained in the SWPPP.

(c) If complying with alternative 2 or 3, the erosion and sediment control(s) you will use to achieve an equivalent sediment reduction, and any information you relied upon to demonstrate the equivalency;

(d) If complying with alternative 3, a description of why it is infeasible for you to provide and maintain an undisturbed natural buffer of any size;

(e) For "linear construction sites" where it is infeasible to implement compliance alternative 1, 2, or 3, a rationale for this determination, and a description of any buffer width retained and/or supplemental erosion and sediment controls installed; and

(f) A description of any disturbances that are exempt under Part 2.2.1 that occur within 50 feet of a receiving water.

ii. Perimeter controls for a "linear construction site" (see Part 2.2.3d). For areas where perimeter controls are not feasible, include documentation to support this determination and a description of the other practices that will be implemented to minimize discharges of pollutants in stormwater associated with construction activities.

Note: Routine maintenance specifications for perimeter controls documented in the SWPPP must include the Part 2.2.3c.i requirement that sediment be removed before it has accumulated to one-half of the above-ground height of any perimeter control.

iii. Sediment track-out controls (see Parts 2.2.4b and 2.2.4c). Document the specific stabilization techniques and/or controls that will be implemented to remove sediment prior to vehicle exit.

iv. Inlet protection measures (see Part 2.2.10a). Where inlet protection measures are not required because the storm drain inlets to which your site discharges are conveyed to a sediment basin, sediment trap, or similarly effective control, include a short description of the control that receives the stormwater flow from the site.

v. Sediment basins (see Part 2.2.12). In circumstances where it is infeasible to utilize outlet structures that withdraw water from the surface, include documentation to support this determination, including the specific conditions or time periods when this exception will apply.

vi. Treatment chemicals (see Part 2.2.13), you must include the following:

(a) A listing of the soil types that are expected to be exposed during construction in areas of the project that will drain to chemical treatment systems. Also include a listing of soil types expected to be found in fill material to be used in these same areas, to the extent you have this information prior to construction;

(b) A listing of all treatment chemicals to be used at the site and why the selection of these chemicals is suited to the soil characteristics of your site;

(c) If the applicable EPA Regional Office authorized you to use cationic treatment chemicals for sediment control, include the specific controls and implementation procedures designed to ensure that your use of cationic

treatment chemicals will not lead to a discharge that does not meet water quality standards;

(d) The dosage of all treatment chemicals to be used at the site or the methodology to be used to determine dosage;

(e) Information from any applicable Safety Data Sheet (SDS);

(f) Schematic drawings of any chemically enhanced stormwater controls or chemical treatment systems to be used for application of the treatment chemicals;

(g) A description of how chemicals will be stored consistent with Part 2.2.13c;

(h) References to applicable State or local requirements affecting the use of treatment chemicals, and copies of applicable manufacturer's specifications regarding the use of your specific treatment chemicals and/or chemical treatment systems; and

(i) A description of the training that personnel who handle and apply chemicals have received prior to permit coverage, or will receive prior to use of the treatment chemicals at your site.

vii. Stabilization measures (see Part 2.2.14). You must include the following:

(a) The specific vegetative and/or non-vegetative practices that will be used;

(b) The stabilization deadline that will be met in accordance with Part 2.2.14;

(c) If complying with the deadlines for sites in arid, semi-arid, or drought-stricken areas, the beginning and ending dates of the seasonally dry period (as defined in Appendix A)[89] and the schedule you will follow for initiating and completing vegetative stabilization; and

(d) If complying with deadlines for sites affected by unforeseen circumstances that delay the initiation and/or completion of vegetative stabilization, document the circumstances and the schedule for initiating and completing stabilization.

viii. Spill prevention and response procedures (see Parts 1.3.5, 2.3.3c, 2.3.3d, and 2.3.6). You must include the following:

(a) Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or position of the employee(s) responsible for detection and response of spills or leaks; and

(b) Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 2.3.6 and established under either 40 CFR part 110, 40 CFR part 117, or 40 CFR part 302, occurs

[89] See footnote 44.

during a 24-hour period. Contact information must be in locations that are readily accessible and available to all employees.

You may also reference the existence of SPCC plans developed for the construction activity under Section 311 of the CWA, or spill control programs otherwise required by an NPDES permit for the construction activity, provided that you keep a copy of that other plan on site.[90]

ix. Waste management procedures (see Part 2.3.3). Describe the procedures you will follow for handling, storing, and disposing of all wastes generated at your site consistent with all applicable Federal, State, Tribal, and local requirements, including clearing and demolition debris, sediment removed from the site, construction and domestic waste, hazardous or toxic waste, and sanitary waste. You must also include the following additional information:

(a) If site constraints prevent you from storing chemical containers 50 feet away from receiving waters or the other site drainage features as required in Part 2.3.3c.ii(b), document in your SWPPP the specific reasons why the 50-foot setback is not feasible, and how you will store containers as far away as the site permits; and

(b) If there are construction wastes that are subject to the exception in Part 2.3.3e.ii, describe the specific wastes that will be stored on your site.

x. Application of fertilizers (see Part 2.3.5). Document any departures from the manufacturer specifications where appropriate.

7.2.7 Procedures for Inspection, Maintenance, and Corrective Action. Describe the procedures you will follow for maintaining your stormwater controls, conducting site inspections, and, where necessary, taking corrective actions, in accordance with Part 2.1.4, Part 4, and Part 5 of this permit, accordingly. Also include:

a. The inspection schedule you will follow, which is based on whether your site is subject to Part 4.2 or Part 4.3, or whether your site qualifies for any of the reduced inspection frequencies in Part 4.4;

b. If you will be conducting inspections in accordance with the inspection schedule in Part 4.2.2, Part 4.3, or Part 4.4.1b, the location of the rain gauge or the address of the weather station you will be using to obtain rainfall data;

c. If you will be reducing your inspection frequency in accordance with Part 4.4.1b, the beginning and ending dates of the seasonally defined arid period for your area or the valid period of drought;

d. If you will be reducing your inspection frequency in accordance with Part 4.4.3, the beginning and ending dates of frozen conditions on your site; and

e. Any maintenance or inspection checklists or other forms that will be used.

7.2.8 Procedures for Turbidity Benchmark Monitoring from Dewatering Discharges (if applicable). If you are required to comply with the Part 3.3 turbidity benchmark

[90] Even if you already have an SPCC or other spill prevention plan in existence, your plans will only be considered adequate if they meet all of the requirements of this Part, either as part of your existing plan or supplemented as part of the SWPPP.

monitoring requirements, describe the procedures you will follow to collect and evaluate samples, report results to EPA and keep records of monitoring information, and take corrective action when necessary. Include the specific type of turbidity meter you will use for monitoring, as well as any manuals or manufacturer instructions on how to operate and calibrate the meter. Describe any coordinating arrangement you may have with any other permitted operators on the same site with respect to compliance with the turbidity monitoring requirements, including which parties are tasked with specific responsibilities. If EPA has approved of an alternate turbidity benchmark pursuant to Part 3.3.2b, include any data and other documentation you relied on to request use of the specific alternative benchmark.

7.2.9 Compliance with Other Requirements.

a. Threatened and Endangered Species Protection. Include documentation required in the Endangered Species Protection section of the NOI in NeT, or the ESA worksheet in Appendix D, supporting your eligibility with regard to the protection of threatened and endangered species and designated critical habitat.

b. Historic Properties. Include documentation required in Appendix E supporting your eligibility with regard to the protection of historic properties.

c. Safe Drinking Water Act Underground Injection Control (UIC) Requirements for Certain Subsurface Stormwater Controls. If you are using any of the following stormwater controls at your site, document any contact you have had with the applicable State agency[91] or EPA Regional Office responsible for implementing the requirements for underground injection wells in the Safe Drinking Water Act and EPA's implementing regulations at 40 CFR § 144 -147. Such controls would generally be considered Class V UIC wells:

i. Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system);

ii. Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow; and

iii. Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system).

7.2.10 SWPPP Certification. Your signatory must sign and date your SWPPP in accordance with Appendix G, Part G.11.

7.2.11 Post-Authorization Additions to the SWPPP. Once you are authorized for coverage under this permit, you must include the following documents as part of your SWPPP:

a. A copy of your NOI submitted to EPA along with any correspondence exchanged between you and EPA related to coverage under this permit;

b. A copy of the acknowledgment letter you receive from NeT assigning your NPDES ID (i.e.*, permit tracking number*);

[91] For State UIC program contacts, refer to the following EPA website: https://www.epa.gov/uic.

c. A copy of this permit (an electronic copy easily available to the stormwater team is also acceptable).

7.3 ON-SITE AVAILABILITY OF YOUR SWPPP

You must keep a current copy of your SWPPP at the site or at an easily accessible location so that it can be made available at the time of an on-site inspection or upon request by EPA; a State, Tribal, or local agency approving stormwater management plans; the operator of a storm sewer system receiving discharges from the site; or representatives of the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS).[92]

EPA may provide access to portions of your SWPPP to a member of the public upon request. Confidential Business Information (CBI) will be withheld from the public, but may not be withheld from EPA, USFWS, or NMFS.[93]

If an on-site location is unavailable to keep the SWPPP when no personnel are present, notice of the plan's location must be posted near the main entrance of your construction site.

7.4 SWPPP MODIFICATIONS

7.4.1 You must modify your SWPPP, including the site map(s), within seven (7) days of any of the following conditions:

a. Whenever new operators become active in construction activities on your site, or you make changes to your construction plans, stormwater controls, or other activities at your site that are no longer accurately reflected in your SWPPP. This includes changes made in response to corrective actions triggered under Part 5. You do not need to modify your SWPPP if the estimated dates in Part 7.2.3f change during the course of construction;

b. To reflect areas on your site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;

c. If inspections or investigations by EPA or its authorized representatives determine that SWPPP modifications are necessary for compliance with this permit;

d. Where EPA determines it is necessary to install and/or implement additional controls at your site in order to meet the requirements of this permit, the following must be included in your SWPPP:

i. A copy of any correspondence describing such measures and requirements; and

[92] The SWPPP may be prepared, signed, and kept electronically, rather than in paper form, if the records are: (a) in a format that can be read in a similar manner as a paper record; (b) legally dependable with no less evidentiary value than their paper equivalent; and (c) immediately accessible to the inspector during an inspection to the same extent as a paper copy stored at the site would be, if the records were stored in paper form. For additional guidance on the proper practices to follow for the electronic retention of the SWPPP, refer to the Fact Sheet discussion related to Part 4.7.3.

[93] Information covered by a claim of confidentiality will be disclosed by EPA only to the extent of, and by means of, the procedures set forth in 40 CFR part 2, Subpart B. In general, submitted information protected by a business confidentiality claim may be disclosed to other employees, officers, or authorized representatives of the United States concerned with implementing the CWA. The authorized representatives, including employees of other executive branch agencies, may review CBI during the course of reviewing draft regulations.

ii. A description of the controls that will be used to meet such requirements.

e. To reflect any revisions to applicable Federal, State, Tribal, or local requirements that affect the stormwater controls implemented at the site; and

f. If applicable, if a change in chemical treatment systems or chemically enhanced stormwater control is made, including use of a different treatment chemical, different dosage rate, or different area of application.

7.4.2 You must maintain records showing the dates of all SWPPP modifications. The records must include the name of the person authorizing each change (see Part 7.2.9 above) and a brief summary of all changes.

7.4.3 All modifications made to the SWPPP consistent with Part 7.4 must be authorized by a person identified in Appendix G, Part G.11.b.

7.4.4 Upon determining that a modification to your SWPPP is required, if there are multiple operators covered under this permit, you must immediately notify any operators who may be impacted by the change to the SWPPP.

8 HOW TO TERMINATE COVERAGE

Until you terminate coverage under this permit, you must comply with all conditions and effluent limitations in the permit. To terminate permit coverage, you must submit to EPA a complete and accurate Notice of Termination (NOT), which certifies that you have met the requirements for terminating in Part 8.

8.1 MINIMUM INFORMATION REQUIRED IN NOT

8.1.1 NPDES ID (i.e*., permit tracking number)* provided by EPA when you received coverage under this permit;

8.1.2 Basis for submission of the NOT (see Part 8.2);

8.1.3 Operator contact information;

8.1.4 Name of site and address (or a description of location if no street address is available); and

8.1.5 NOT certification.

8.2 CONDITIONS FOR TERMINATING CGP COVERAGE

You may terminate CGP coverage only if one or more of the conditions in Parts 8.2.1, 8.2.2, or 8.2.3 has occurred. Until your termination is effective consistent with Part 8.5, you must continue to comply with the conditions of this permit.

8.2.1 You have completed all construction activities at your site and, if applicable, construction support activities covered by this permit (see Part 1.2.1c), and you have met all of the following requirements:

a. For any areas that (1) were disturbed during construction, (2) are not covered by permanent structures, and (3) over which you had control during the construction activities, you have met the requirements for final vegetative or non-vegetative stabilization in Part 2.2.14c.

To document that you have met these stabilization requirements, you must take either ground or aerial photographs that show your site's compliance with the Part 2.2.14 stabilization requirements and submit them with your NOT. If any portion of your

site is covered by one of the exceptions in Part 2.2.14c.iii, indicate which exception applies and include a supplementary explanation with your photographs that provides the necessary context for why this portion of the site is in compliance with the final stabilization criteria even though it appears to be unstabilized. You are not required to take photographs of every distinct part of your site that is being stabilized, however, the conditions of the site portrayed in any photographs that are submitted must be substantially similar[94] to those of the areas that are not photographed. You must also comply with the following related to these photographs:

i. Take photographs both before and after the site has met the final stabilization criteria in Part 2.2.14c;

ii. All photographs must be clear and in focus, and in the original format and resolution; and

iii. Include the date each photograph was taken, and a brief description of the area of the site captured by the photograph (e.g., photo shows application of seed and erosion control mats to remaining exposed surfaces on northeast corner of site).

b. You have removed and properly disposed of all construction materials, waste and waste handling devices, and have removed all equipment and vehicles that were used during construction, unless intended for long-term use following your termination of permit coverage;

c. You have removed all stormwater controls that were installed and maintained during construction, except those that are intended for long-term use following your termination of permit coverage or those that are biodegradable (as defined in Appendix A); and

d. You have removed all potential pollutants and pollutant-generating activities associated with construction, unless needed for long-term use following your termination of permit coverage; or

8.2.2 You have transferred control of all areas of the site for which you are responsible under this permit to another operator, and that operator has submitted an NOI and obtained coverage under this permit; or

8.2.3 Coverage under an individual or alternative general NPDES permit has been obtained.

8.3 HOW TO SUBMIT YOUR NOT

You must use EPA's NPDES eReporting Tool (NeT) to electronically prepare and submit an NOT for the 2022 CGP.

To access NeT, go to https://cdx.epa.gov/cdx.

Waivers from electronic reporting may be granted as specified in Part 1.4.2. If the EPA Regional Office grants you approval to use a paper NOT, and you elect to use it, you must complete the form in Appendix I.

[94] Stabilization conditions that are substantially similar would include areas that are using the same type of stabilization measures and that have similar slopes, soils, and topography, and have achieved the same level of stabilization.

8.4 DEADLINE FOR SUBMITTING THE NOT

You must submit an NOT within 30 calendar days after any one of the conditions in Part 8.2 occurs.

8.5 EFFECTIVE DATE OF TERMINATION OF COVERAGE

Your authorization to discharge under this permit terminates at midnight of the calendar day that a complete NOT is submitted to EPA.

9 PERMIT CONDITIONS APPLICABLE TO SPECIFIC STATES, INDIAN COUNTRY LANDS, OR TERRITORIES

The provisions in this Part provide additions to the applicable conditions of this permit to reflect specific additional conditions required as part of the State or Tribal CWA Section 401 certification process, or the Coastal Zone Management Act (CZMA) certification process, or as otherwise established by the permitting authority. The specific additional revisions and requirements only apply to activities in those specific States, Indian country, and areas in certain States with Federal Facilities or areas subject to construction projects by Federal Operators. States, Indian country, and other areas not included in this Part do not have any additions to the applicable conditions of this permit.

9.1 EPA REGION 1

9.1.1 NHR100000 State of New Hampshire

a. Should the permit coverage for an individual applicant be insufficient to achieve water quality standards, the New Hampshire Department of Environmental Services (NHDES) may prepare additional 401 certification conditions for that applicant. Any additional 401 certification conditions will follow all required NHDES public participation requirements.

b. If you disturb 100,000 square feet or more of contiguous area, you must also comply with RSA 485-A:17 and Env-Wq 1500, and, unless exempt, apply for an Alteration of Terrain (AoT) permit from NHDES. This requirement also applies to a lower disturbance threshold of 50,000 square feet or more when construction occurs within the protected shoreline under the Shoreland Water Quality Protection Act (see RSA 483-B and Env-Wq 1400). A permit application must also be filed if your project disturbs an area of greater than 2,500 square feet, is within 50 feet of any surface water, and has a flow path of 50 feet or longer disturbing a grade of 25 percent or greater. Project sites with disturbances smaller than those discussed above, that have the potential to adversely affect state surface waters, are subject to the conditions of an AoT General Permit by Rule (Env-Wq 1503.03).

c. You must determine that any excavation dewatering discharges are not contaminated before they will be authorized as an allowable non-stormwater discharge under this permit (see Part 1.2.2 of the Construction General Permit or CGP). In the absence of information demonstrating otherwise, the water is considered uncontaminated if there is no groundwater contamination within 1,000 feet of the groundwater dewatering location. Information on groundwater contamination can be generated over the Internet via the NHDES web site http:// des.nh.gov/ by using the One Stop Data Mapper. For a toxic substance included in the New Hampshire surface water quality standards, see Env-Wq 1703.21 (see https://www.des.nh.gov/sites/g/fi1es/ehbemt 341/files/documents/2020-01/Env-Wg

1700.pdf). If it is determined that the groundwater to be dewatered is near a remediation or other waste site, you must apply for the Remediation General Permit (see https://www3.epa.gov/region1/npdes/rgp.html)

d. As a minimum, you must treat any uncontaminated excavation "dewatering" discharges and "stormwater" discharges, as those terms are defined in Appendix A of the CGP, as necessary, to remove suspended solids and turbidity so that the surface waters receiving the construction discharges[95] meet New Hampshire surface water quality standards for turbidity (Env-Wq 1703.11 and Env-Wq 1703.03(c)(1)c), benthic deposits (Env-Wq 1703.03(c)(1)a), and Env-Wq 1703.08) and foam, debris, scum or other visible substances (i.e., plumes or visual turbidity)[96] (Env-Wq 1703.03(c)(1)b).

i. For all Construction Activities covered under this CGP, the following shall apply to ensure compliance with the aforementioned regulations for turbidity, benthic deposits and visible substances:

Unless otherwise specified, site inspection requirements shall comply with Part 4 of the CGP. As a minimum site inspection frequency shall be in accordance with Part 4.2.2 of the CGP (and Part 4.3.2 of the CGP for sites discharging dewatering water). Site inspection frequency may be reduced in accordance with Part 4.4 of the CGP (Reductions in Inspection Frequency). Monitoring of the receiving water for visible turbidity and benthic sediment deposits shall be conducted each site inspection and results reported in the Inspection Report required in Part 4.7 of the CGP. Should visible turbidity or benthic sediment deposits attributable or partly attributable to your construction activities be present in the receiving water, the "Corrective Actions" specified in Part 5 shall be immediately implemented to correct the water quality standard violations. In addition, daily monitoring (including photographs) of the receiving water shall be conducted until there is no visible turbidity or benthic deposits. Inspection Reports required in Part 4.7 of the CGP shall include, but not be limited to, the distance downstream and the percent of the river width[97] where visible turbidity was observed, and the period of time that the visible turbidity persisted. A copy of the Inspection Report(s) shall be made available to NHDES within 24 hours of receiving a written request from NHDES.

ii. For Construction Activities, disturbing 5 acres or more of land at any one time (excluding areas that have been completely stabilized in accordance with the final stabilization criteria specified in Part 2.2.14.c of the CGP), the following shall

[95] Construction Discharges include uncontaminated "dewatering" and "stormwater" discharges as those terms are defined in Appendix A of the CGP. Controlled construction discharges are construction discharges where the rate of flow can be regulated such as from a construction settling basin or NHDES approved flocculation system.

[96] For the definition of visual turbidity, see the definition for "Non-Turbid" in Appendix A of the CGP, which states the following:" "Non-Turbid" - a discharge that is free from visual turbidity. For the purposes of this permit, visual turbidity refers to a sediment plume or other cloudiness in the water caused by sediment that can be identified by an observer." *[EPA interprets the text of this footnote as intending to reference the Appendix A definitions of "visual turbidity" and "non-turbid" in the final permit.]*

[97] The distance downstream and the percent of river width where visible turbidity (i.e., plume) is observed is required to determine the extent of the river affected and to determine if there was a "zone of passage" (i.e., a portion of the receiving water where there was no visible turbidity where mobile organisms could pass without being adversely impacted). The percent of river width affected is equal 100 multiplied by the width of the plume (in feet) divided by the width of the receiving water (in feet).

apply to ensure compliance with the aforementioned regulations for turbidity, benthic deposits and visible substances.

Item 9.1.1.d.i) above shall apply to all construction discharges and the minimum site inspection frequency shall comply with Part 4.3.1 of the CGP (and Part 4.3.2 of the CGP for sites discharging dewatering water). Site inspection frequency may be reduced in accordance with Part 4.4 of the CGP (Reductions in Inspection Frequency).

With regards to controlled construction discharges, if there is no visible turbidity (i.e., plumes) or benthic deposits, and, in the absence of information demonstrating otherwise, turbidity measurements of less than or equal to 50 nephelometric turbidity units (NTU) in the controlled construction discharges at the outlet prior to mixing with the receiving surface waters, shall be presumed to meet New Hampshire surface water quality standards for the parameters listed above. As a minimum, the controlled construction discharges must be sampled at each site inspection.

If any controlled construction discharge exceeds 50 NTU, or if visible turbidity or benthic sediment deposits attributable or partly attributable to any construction discharge are observed in the receiving water, then the "Corrective Actions" specified in Part 5 of the CGP shall be immediately implemented.

In addition, should such violation occur, and, in order to determine compliance with surface water quality standards for turbidity (Env-Wq 1703.11 and Env-Wq 1703.03(c)(1)c), benthic deposits (Env-Wq 1703.03(c)(1)a), and Env-Wq 1703.08) and foam, debris, scum or other visible substances (Env-Wq 1703.03(c)(1)b)), turbidity monitoring shall be immediately implemented as specified below:

Turbidity samples of the receiving water shall be immediately taken in the receiving water upstream and beyond the influence of the construction activity, and, unless a mixing zone[98] is approved by NHDES, no more than 75 feet downstream of each controlled construction discharge that exceeded 50 NTU and no more than 75 feet downstream of each construction discharge that caused visible turbidity.

Downstream samples shall be taken at locations in the receiving water that are most likely influenced by the discharge (e.g., if visible turbidity (i.e., a plume) is present, the sample shall be taken in the plume). Samples shall be collected a minimum of 2 times per day during the daylight hours at times when construction activities are most likely to cause turbidity in the receiving water and shall continue until the turbidity water quality standards are met in the receiving water (i.e., the difference between the upstream and downstream turbidity level is no greater than 10 NTU).

[98] Permittees may request a distance greater than 75 feet downstream of a construction discharge for determining compliance with turbidity standards in Class B surface waters, by submitting a mixing zone request to NHDES that complies with Env-Wq 1707.02. If a mixing zone is approved, NHDES is required to include conditions to ensure that the criteria on which the approval is based are met (Env-Wq 1707.03).

If water quality standards are not met during daylight hours on any day, sampling shall resume the next day and continue no fewer than 2 times per day until water quality standards are met. The date, time, location and results of turbidity measurements, as well as a summary identifying the cause of the violations, corrective actions that were implemented, the period of time that the receiving water exceeded turbidity standards and the distance downstream and the percent of the river width where visible turbidity was observed, and the period of time that the visible turbidity persisted, shall be recorded and included in the Inspection Report required in Part 4.7 of the CGP. Turbidity measurements shall be conducted via a field meter in accordance with the requirements for turbidity specified in Table 1B in 40 CFR 136.3 (see 40 CFR §136.3 Identification of test procedures - Code of Federal Regulations ecfr.io). Field meters shall be calibrated every day sampling is conducted and prior to the first sample.

e. Construction site owners and operators are encouraged to consider opportunities for post- construction groundwater recharge using infiltration best management practices (BMPs) during site design and preparation of the SWPPP in order to assure compliance with Env-Wq 1703.03 and Env-Wq 1703.11. If your construction site is in a town that is required to obtain coverage under the NPDES General Permit for discharges from Municipal Separate Storm Sewer Systems (MS4) you may be required to use such practices. The SWPPP must include a description of any on-site infiltration that will be installed as a post-construction stormwater management measure or reasons for not employing such measures such as 1) The facility is located in a wellhead protection area as defined in RSA 485- C:2; or 2) The facility is located in an area where groundwater has been reclassified to GAA, GA1 or GA2 pursuant to RSA 485-C and Env-DW 901; or 3) Any areas that would be exempt from the groundwater recharge requirements contained in Env-Wq 1507.04, including all land uses or activities considered to be a "High-load Area" (see Env-Wq 1502.30). For design considerations for infiltration measures see Env-Wq 1508.06. Note that there may be additional local requirements that fall under the NH MS4 permittee's Authorization to Discharge Permit for those regulated areas.

f. Appendix F of the CGP contains information regarding Tier 2, or high quality waters in the various states. ***[EPA notes that this information has now been moved to https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates]*** Although there is no official list of tier 2 waters for New Hampshire, it can be assumed that all New Hampshire surface waters are tier 2 for turbidity unless 1) the surface water that you are proposing to discharge into is listed as impaired for turbidity in the states listing of impaired waters (see https://nhdes-surface-water-quality-assessment-site-nhdes.hub.arcgis.com/) or 2) sampling upstream of the proposed discharge location shows turbidity values greater than 10 NTU (Env-Wq 1703.11). A single grab sample collected during dry weather (no precipitation within 48 hours) is acceptable.

g. To ensure compliance with RSA 485-C, RSA 485-A, RSA 485-A:13, I(a), Env-Wq 1700 and Env-Wq 302, the following information may be requested by NHDES. This information must be kept on site unless you receive a written request from NHDES that it be sent to the address shown below in 9.1.1.h.

i. A list of all non-stormwater discharges that occur at the facility, including their source locations and the control measures being used (see Part 1.2.2 of the CGP).

ii. Records of sampling and analysis required for construction dewatering and stormwater discharges (see 9.1.1.d above).

h. All required or requested documents must be sent to: NH Department of Environmental Services, Watershed Management Bureau, P.O. Box 95 Concord, NH 03302-0095.

9.1.2 MAR100000 Commonwealth of Massachusetts (except Indian country)

a. All discharges covered by the Construction General Permit shall comply with the provisions pursuant to 314 CMR 3.00, 314 CMR 4.00, 314 CMR 9.00, including applicable construction stormwater standards and 310 CMR 10.00.

b. Pursuant to 314 CMR 3.11 (2)(a)6., and in accordance with MassDEP's obligation under 314 CMR 4.05(5)(e) to maintain surface waters free from pollutants in concentrations or combinations that are toxic to humans, aquatic life, or wildlife, permittees are prohibited from discharging dewatering water under the CGP from sites that are designated as Superfund/CERCLA or RCRA, and must make accommodations to dispose of the dewatering discharges appropriately, such as coverage under the Remediation General Permit (RGP).

c. Pursuant to 314 CMR 3.11 (2)(a), and in accordance with MassDEP's obligation to protect Outstanding Resource Waters under 314 CMR 4.04(3), applicants seeking coverage under the 2022 CGP that propose to carry out construction activities near Outstanding Resource Waters as identified in 314 CMR 4.06, shall submit to MassDEP for review:

i. a copy of the Stormwater Pollution Prevention Plan (SWPPP),

ii. a copy of the EPA NOI, and

iii. MassDEP's Stormwater BMP Checklist.

For purposes of this review, the permittee shall submit these documents to MassDEP at the same time they are submitted to EPA. Instructions on how to submit these documents to MassDEP and where to find the MassDEP Stormwater BMP Checklist and obtain authorization to discharge can be found here: https://www.mass.gov/how-to/wm-15-npdes-general-permit-notice-of- intent.

d. Pursuant to 314 CMR 3.11 (2)(a)6., and in accordance with MassDEP's obligation under 314 CMR 4.05(5)(e) to maintain surface waters free from pollutants in concentrations or combinations that are toxic to humans, aquatic life, or wildlife, applicants that propose to dewater under the 2022 CGP and plan to discharge to certain waters as described below, shall determine that any dewatering discharges are not contaminated by testing the proposed discharge as described below as part of the application for WM15 authorization. Unless otherwise specified, testing described in this section should be conducted using the methods in 40 CFR 136.

i. Applicants for sites that plan to discharge to Outstanding Resource Waters as identified in 314 CMR 4.06 shall test one sample of the proposed dewatering discharge water for pH, E. Coli (for discharges to freshwater), fecal coliform (for

discharges to salt water), Enterococci (for discharges to salt water), total suspended solids, oil and grease, total nitrogen, total phosphorus, and all parameters with numeric criteria listed in the Massachusetts Surface Water Quality Standards at 314 CMR 4.05(e). Results shall be reported to MassDEP as part of the WM15 application. To determine if the dewatering discharge could be covered under the 2022 CGP, the effluent at zero dilution must meet numeric water quality criteria. If the effluent does not meet numeric water quality criteria, the applicant shall contact EPA Region 1 to discuss coverage under the Remediation General Permit.

ii. Applicants for sites that propose to discharge to Public Water Supplies (314 CMR 4.06(1)(d)1) shall also test one sample of the proposed dewatering discharge water for per- and polyfluoroalkyl substances (PFAS), as outlined in the table below. Results shall be reported to MassDEP as part of the WM15 application. If any PFAS compounds are detected, the applicant shall apply for coverage under the NPDES Remediation General Permit for Massachusetts if required.

PFAS Testing Parameters for Discharges to Public Drinking Water Supplies[99]	
Perfluorohexanesulfonic acid (PFHxS), grab	Report ng/L
Perfluoroheptanoic acid (PFHpA), grab	Report ng/L
Perfluorononanoic acid (PFNA), grab	Report ng/L
Perfluorooctanesulfonic acid (PFOS), grab	Report ng/L
Perfluorooctanoic acid (PFOA), grab	Report ng/L
Perfluorodecanoic acid (PFDA), grab	Report ng/L

iii. Applicants for sites that propose to discharge to an impaired water as identified in the most recent final Massachusetts Integrated List of Waters,shall test one sample of the proposed dewatering discharge water for the parameter(s) for which the waterbody is impaired. To determine if the dewatering discharge could be covered under the 2022 CGP, the effluent at zero dilution must meet numeric water quality criteria. If the effluent does not meet numeric water quality criteria, the applicant shall contact EPA Region 1 to discuss coverage under the Remediation GeneralPermit and shall apply for RGP coverage if required.

iv. For dewatering discharges to all other waters, if any pollutants are knownor believed present in the proposed dewatering discharge water, the applicant shall apply for coverage under the NPDES Remediation General Permit for Massachusetts if required. For the purposes of this condition, a pollutant is "known present" if measured above the analytical detection limit using a sufficiently sensitive test method in an environmental sample, and "believed present" if a pollutant has not been measured in an environmental sample but will be added or generated prior to discharge, such as through a treatment process. Consequently, a pollutant is "known absent" if measured as non-detect relative to the analytical detection limit using a sufficiently sensitive test method in an environmental sample, and "believed absent" if a pollutant has not been measured in an environmentalsample but will not be added or generated prior to discharge and is not a parameter that applies to the applicable activity category for a site. If any pollutants are known or believed present in the

[99] PFAS testing shall follow established EPA methods 537 or 537.1 for drinking water until EPA Method 3512 for non-potable water becomes available.

proposed dewatering discharge water, the applicant shall test one sample of the proposed dewatering discharge water for the pollutants known or believed to be present. To determine if the dewatering discharge could be covered under the 2022 CGP, the effluent at zero dilution must meet numeric water quality criteria. If the effluent does not meet numeric water quality criteria, the applicant shall contact EPA Region 1 to discuss coverage under the Remediation General Permit.

e. Pursuant to 314 CMR 3.11 (2)(a), and in accordance with MassDEP's obligation to protect Outstanding Resource Waters under 314 CMR 4.04(3), applicants that propose to dewater under the 2022 CGP and discharge to Outstanding Resource Waters as identified in 314 CMR 4.06, shall submit the SWPPP and associated documents to MassDEP to review. MassDEP shall complete review within 30 daysof receipt.

f. Pursuant to 314 CMR 3.11 (2)(a)6., and in accordance with MassDEP's obligation under 314 CMR 4.05 to maintain surface waters free from color and turbidity in concentrations or combinations that are aesthetically objectionable or would impair any use assigned to the waterbody, permittees that have been authorized to dewater under the 2022 CGP and that discharge to Outstanding Resource Waters as identified in 314 CMR 4.06 shall carry out daily benchmark monitoring for turbidity[100] for the duration of dewatering. Permittees shall compare the weekly average of the turbidity monitoring results with the established benchmark turbidity value of 25 Nephelometric Turbidity Units (NTU). If a permittee's weekly average turbidity results exceed the benchmark, the operator shall conduct follow-up corrective action to determine the source of the problem and to make any necessary repairs or upgrades to the dewatering controls to lower the turbidity levels. The permittee shall document any corrective action taken in its corrective action log. Furthermore, permittees at these sites shall carry out inspections at higher frequency, specifically, daily inspections of the dewatering discharge treatment for the duration of the discharge. The permittee shall inspect the site for sediment plume or whether a hydrocarbon sheen is visible at the point of discharge, estimate the flow rate at the point of discharge, and inspect the site downstream to assess whether sedimentation is attributable to the dewatering discharges.

g. Pursuant to 314 CMR 3.11 (2)(a)6., and in accordance with MassDEP's obligation under 314 CMR 4.05 to maintain surface waters free from color and turbidity in concentrations or combinations that are aesthetically objectionable or would impair any use assigned to the waterbody, permittees shall store materials outside the Base Flood Elevation[101] when feasible to prevent displacing runoff and erosion.

h. Pursuant to 314 CMR 3.11 (2)(a), and in accordance with MassDEP's obligation to maintain surface waters free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses under 314 CMR 4.05(5)(c), all applicants who apply for coverage under the 2022 CGP shall follow guidelines on fertilizer application, including use of fertilizer containing no phosphorus, in accordance with 330 CMR 31.00 Plant Nutrient Application Requirements for

[100] Applicants shall follow EPA Method 180.1 to monitor for turbidity

[101] Base Flood Elevation (BFE) is the elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year. The BFE is shown on the Flood Insurance Rate Map (FIRM) for zones AE, AH, A1–A30, AR, AR/A, AR/AE, AR/A1– A30, AR/AH, AR/AO, V1–V30 and VE. (Source: https://www.fema.gov/node/404233).

Agricultural Land and Non-Agricultural Turf and Lawns. Further, fertilizer shall never be applied to a site when a rain event greater than 0.5 inches is forecast in the next 48 hours.

i. Pursuant to 314 CMR 3.11 (2)(a), all applicants who apply for coverage under the 2022 CGP and elect to carry out site inspections every 14 days shall also inspect sites within 24 hours of 0.25 inches of precipitation events or greater over 24 hours,or within 24 hours of a discharge that occurred due to snowmelt from 3.25 inches or greater of snow accumulation.[102] During the high flow periods in spring (i.e., months of April to June), inspection frequency shall be increased to once per week for all sites.

  i. To determine whether 3.25 inches or greater of snow accumulation has occurred at a site, snowfall measurements can be taken at the site,[103] or theoperator can rely on similar information from a local weather forecast.

j. Implementing structural improvements, enhanced/resilient pollution prevention measures, and other mitigation measures can help to minimize impacts from stormwater discharges from major storm events such as hurricanes, storm surge, extreme/heavy precipitation,[104] and flood events. Pursuant to 314 CMR 3.11 (2)(a), if such stormwater control measures are already in place due to existing requirements mandated by other state, local or federal agencies, the SWPPP shall include a brief description of the controls and a reference to the existing requirement(s). If the site may be exposed to or has previously experienced suchmajor storm events[105], additional stormwater control measures that may be considered, and implemented as necessary, include, but are not limited to:

  i. Reinforce materials storage structures to withstand flooding and additional exertion of force;

  ii. Prevent floating of semi-stationary structures by elevating to the Base Flood Elevation (BFE) level or securing with non-corrosive device;

  iii. When a delivery of exposed materials is expected, and a storm is anticipated within 48 hours, delay delivery until after the storm or storematerials as appropriate (refer to emergency procedures);

[102] This is the amount of snow that is equivalent to 0.25 inches of rain, based on information from the National Oceanic and Atmospheric Administration (NOAA) indicating that 13 inches of snow is, on average, equivalent to 1 inch of rain. See https://www.nssl.noaa.gov/education/svrwx101/winter/faq/.

[103] NOAA's National Weather Service has guidelines on snowfall measurements at https://www.weather.gov/jkl/snow_measurement. These guidelines recommend use of a "snowboard" (a piece of wood about 16 inches by 16 inches) that is placed in an unobstructed part of the site on a hard surface.

[104] Heavy precipitation refers to instances during which the amount of rain or snow experienced in a location substantially exceeds what is normal. What constitutes a period of heavy precipitation varies according to location and season. Heavy precipitation does not necessarily mean the total amount of precipitation at a location has increased— just that precipitation is occurring in more intense or more frequent events.

[105] To determine if your facility is susceptible to an increased frequency of major storm events that could impact the discharge of pollutants in stormwater, you may reference FEMA, NOAA, or USGS flood map products at https://www.usgs.gov/faqs/where-can-i-find-flood-maps?qt-news_science_products=0#qtnews_science_products.

iv. Temporarily store materials and waste above the Base Flood Elevation ***[EPA notes that it has deleted a footnote reference to the term "Base Flood Elevation" since the same footnote is already included in Part 9.1.2.g, above.]*** level;

v. Temporarily reduce or eliminate outdoor storage;

vi. Temporarily relocate any mobile vehicles and equipment to higher ground;

vii. Develop scenario-based emergency procedures for major storms that are complementary to regular stormwater pollution prevention planning andidentify emergency contacts for staff and contractors; and

viii. Conduct staff training for implementing your emergency procedures atregular intervals.

k. Pursuant to 314 CMR 3.11 (2)(a)6., and in accordance with MassDEP's obligation under 314 CMR 4.05(5)(e) to maintain surface waters free from pollutants in concentrations or combinations that are toxic to humans, aquatic life, or wildlife, permittees who seek coverage under the 2022 CGP and anticipate to carry out dust control shall limit their dust control methodology to using water only and specifically avoid using other techniques, such as solutions containing calcium chloride.

l. If MassDEP requests a copy of the Stormwater Pollution Prevention Plan (SWPPP) for any construction site at any time, the permittee shall submit the SWPPP to MassDEP within 14 days of such a request. MassDEP may conduct an inspection of any site covered by this permit to ensure compliance with state lawrequirements, including state water quality standards.

9.1.3 MTR10F000 Areas in the State of Vermont located at a federal facility

a. Earth disturbance at any one time is limited to five acres.

b. All areas of earth disturbance must have temporary or final stabilization within 14 days of the initial disturbance. After this time, disturbed areas must be temporarily or permanently stabilized in advance of any runoff producing event. A runoff producing event is an event that produces runoff from the construction site. Temporary stabilization is not required if precipitation is not forecast and work is to continue in the next 24-hours or if the work is occurring in a self-contained excavation (i.e. no outlet) with a depth of two feet or greater (e.g. house foundation excavation, utility trenches). Areas of a construction site that drain to sediment basins are not considered eligible for this exemption, and the exemption applies only to the excavated area itself.

c. Site inspections on active construction sites shall be conducted daily during the period from October 15 through April 15.

d. The use of chemical treatments (e.g. polymers, flocculants, and coagulants) for the settling and/or removal of sediment from stormwater runoff associated with construction and construction-related activities requires prior written approval and an approved site and project-specific plan, from the Vermont Agency of Natural Resources. In addition, the use of cationic polymers is prohibited unless approved by the Vermont Agency of Natural Resources under a site and project-specific plan.

e. Any applicant under EPA's CGP shall allow authorized Vermont Agency of Natural Resources representatives, at reasonable times and upon presentation of credentials, to enter upon the project site for purposes of inspecting the project and determining

compliance with this Certification.

f. The Vermont Agency of Natural Resources may reopen and alter or amend the conditions of this Certification over the life of the EPA 2022 Construction General Permit when such action is necessary to assure compliance with the VWQS.

9.2 EPA REGION 2

9.2.1 NYR10I000 Indian country within the State of New York

a. Saint Regis Mohawk Tribe

i. Any Responsible-Person/Decision-Maker required under the CGP to submit a Notice of Intent (NOI) to EPA for coverage under the CGP, must concurrently submit an electronic copy of the NOI to the SRMT Environmental Division, Water Resource Program Manager. Additionally, an electronic copy of the Notice of Termination (NOT) must be provided within three business days after electronic confirmation is received from EPA that the NOT has been accepted. The NOI and NOT must be electronically provided to the following addresses:

Mr. Tieman W. Smith
Water Resources Program Manager Saint Regis Mohawk Tribe
449 Frogtown Road
Akwesasne, NY 13655 Tiernan.Smith@srmt-nsn.gov 518.358.2272 ext. 5073

ii. Any Responsible-Person/Decision-Maker that is required as part of the CGP to prepare a Discharge Management Plan (OMP) or Storm Water Management Plan (SWMP) and/or Storm Water Pollution Prevention Plan (SWPPP) must submit an electronic copy of the DMP, SWMP and/or SWPPP to the SRMT Environment Division, Water Resources Program Manager IO business days prior to the start of construction of any work to be conducted under the CGP. The applicable documents must be provided to the electronic address listed above.

iii. Any Responsible-Person/Decision-Maker that is required under the CGP to submit an annual report to EPA must submit an electronic copy of the annual report concurrently to the SRMT Water Resource Program. Additionally, any correspondences between the applicant and EPA related to analytical data, written reports, corrective action, enforcement, monitoring, or an adverse incident must likewise be routed to the SRMT Water Resources Program at the above electronic address.

iv. An "Authorization to Proceed Letter" with site-specific mitigation requirements may be sent out to the permittee when a review of the NOI and OMP, SWMP and /or SWPPP on a case-by-case basis, is completed by the SRMT Environment Division, Water Resource Program. This approval will allow the application to proceed if all mitigation requirements are met.

b. Seneca Nation

i. Under Part 1.1.5 of the CGP, the Seneca Nation requests that an applicant must demonstrate that they meet the eligibility criteria listed in Appendix D (certify in your Notice of Intent (NOI) that you meet one of the eligibility criteria [Criterion A-F]) as well as species and critical habitats that are listed under the Seneca Nation's "Fishing and Conservation Laws" and the "Seneca Nation of Indians Comprehensive Conservation Law".

ii. The Tribal Historic Preservation Office (THPO) was established in 2000 after the Seneca Nation received a recognition letter from the National Park Service (NPS); therefore under Part 1.1.6 of the CGP (Appendix E) and prior to submitting a Notice of Intent (NOI) operators must complete the Nation's TPHO, Project Review Form (https://sni.org/media/246603/sni-thpo-project-review-form.pdf) and submit the completed form with associated information to the Tribal Historic Preservation Officer at 90 Ohi:yo' Way, Salamanca, NY 14779. Federal agencies engaging in construction activities must provide for construction review by a certified construction reviewer in accordance with 7 Del. C. §§4010 & 4013 and 7 DE Admin. Code 5101, subsection 6.1.6.

iii. Under Part 1.2 of the CGP, discharges must also follow the Section 13 of the Guide for Construction (Seneca Nation of Indians Source Water Code) and respectively, Council Resolution, dated April 13, 2013 (CN: R-04-13-13-11) to ensure that the health, safety and welfare of the citizens of the Seneca Nation, and all other within the Lands and Territories of the Seneca Nation of Indians, and to facilitate the adequate provisions of water through the elimination or prevention of ground water contamination in the vicinity of wells that supply drinking water for the Nation. The area is known as the Source Water Protection Area (SWPA) and specified activities are regulated within this SWPA, as cited in Section 13 of the Guide for Construction and Section VI, of CN: R-04-13-13-11.

iv. Under Part 1.4, any operator who seeks coverage of the CGP, and is required to submit a notice of intent NOI and Notice of Termination (NOT) (as necessary) to the EPA for coverage, under Part 1.4.2 must also submit a copy of the NOI to the Seneca Nation's Environmental Protection Department (EPD) within three business days of submittal to the EPA, (address shown below). Respectively, a copy of the NOT (as described under Part 8.3 of the CGP), which certifies that you have met the requirements of Part 8, must be provided within three business days after electronic confirmation is received from the EPA that the NOT has been accepted. In addition to a NOI and NOT, the Seneca Nation (Environmental Protection Department [EPD]) would require an Environmental Impact Assessment (EA) (Long Form), as shown in Section 2 of the Seneca Nation of Indians Laws, Ordinances & Policies (Guide for Construction), to be completed and submitted to the EPD prior to any project to determine whether the impacts from a project would create significant and detrimental effects to the Nation's lands, water (violate WQS), and environment. The NOI, NOT, and EA must be submitted electronically to epd@sni.org and provided to the following address:

Seneca Nation
Environmental Protection Department (EPD) Attn: Director of EPD
12837 Route 438
Irving, NY 14081

v. Under Part 3.0 of the CGP, discharges must be controlled as necessary to meet applicable WQS. The Seneca Nation is working actively towards finalizing and implementing the; therefore, the EPD would require an applicant to submit or grant access to the permit to obtain information on the impact of effluents on receiving waters, including the capability of receiving waters to support future designated uses and achieve the WQS of the Nation; and to advise prospective dischargers of discharge requirements, and coordinate with the appropriate

permitting agencies. As stated in the Decision Document, under Section 303(c) of the CWA, 33 U.S.C. § 1313(c), states develop, review, and revise (as appropriate) water quality standards for surface waters of the United States. At a minimum, such standards are to include designated water uses, water quality criteria to protect such uses, and an antidegradation policy. 40 C.F.R. § 131.6. In addition, under Section 401 of the CWA states may grant, condition, or deny "certification" for federally permitted or licensed activities that may result in a discharge to the waters of the United States 33 U.S.C. § 1341.

vi. Under Part 7.2.8(a)(b)(c) and for Part 9 of the CGP, the following Sections of the Seneca Nation's Guide for Construction shall be considered, in conjunction with the CGP:

(a) Section 1. Executive Order - To Establish a Policy for Governing Access to Nation Territories and Facilities by Officials of Foreign Government, dated March 31, 2011

(b) Section 3. Natural Resources Committee, Sand and Gravel Law (CN: R-06-24-05-08)

(c) Section 4. Fishing and Conservation Laws - Part 1.1.5 of the CGP

(d) Section 5. Seneca Nation of Indians Comprehensive Conservation Law, adopted January 14, 2012

(e) Section 9. Food is Our Medicine (FIOM) Program/Native Planting Policy (CN: R-03- 08-14-14)

(f) Section 10. Forestry Management Plan (CN: R-08-14-10-23)

(g) Section 11. Timber Ordinance #411-092, dated May 8, 1982

(h) Section 14. Flood Damage Prevention Local Law, dated September 27, 1988

(i) Section 16. Utilities Ordinance No. 87-100

(j) Authorizing Emergency Action and Contingency Plan to Restrain Pollution of Nations Waters, (Council Resolution: R-03-01-18-10), dated March 10, 2018 Seneca Nation of Indians Permit Application for Construction within Waterways Permit, Form NR98-01.00

9.3 EPA REGION 3

9.3.1 DCR100000 District of Columbia

a. Discharges authorized by this permit shall comply with the District of Columbia Water Pollution Control Act of 1984, as amended (DC Official Code § 8-103.01 and § 8-103.06, et seq.) to ensure that District of Columbia waters, waters in adjacent and downstream states, and the beneficial uses of these waters will not be harmed or degraded by the discharges.

b. Discharges authorized by this permit must comply with §§ 1104.1 and 1104.8 of Chapter 11 and the provisions of Chapter 19 of Title 21of District of Columbia Municipal Regulations in order to attain and maintain designated uses of the District of Columbia waters.

c. The permittee shall comply with the District of Columbia Stormwater Management and Soil Erosion and Sediment Control regulations in Chapter 5 of Title 21 of the District of Columbia Municipal Regulations.

d. The permittee shall comply with the District of Columbia Flood Management Control regulations in Chapter 31 of Title 20 of the District of Columbia Municipal Regulations.

e. The permittee shall submit a copy of the Stormwater Pollution Prevention Plan (SWPPP) to the Regulatory Review Division, Department of Energy & Environment, Government of the District of Columbia, 1200 First Street, NE, 5th Floor, Washington, DC 20002, during the review and approval of the permittee's DOEE Erosion and Sediment Control Plan in accordance with the provisions of Chapter 542 of Title 21 of the District of Columbia Municipal Regulations.

f. Upon request, the permittee shall submit all inspection and monitoring reports as required by this permit and 40 CFR § 122.41 to the Associate Director, Inspection and Enforcement Division, Department of Energy & Environment, Government of the District of Columbia, 1200 First Street, NE, 5th Floor, Washington, DC 20002; telephone (202) 535-2226, or by email at Joshua.Rodriguez@dc.gov.

g. In the event the permittee intends to discharge dewatering water, groundwater, or groundwater comingled with stormwater from a known contaminated site, the permittee shall contact the Regulatory Review Division, Department of Energy & Environment, Government of the District of Columbia, 1200 First Street, NE, 5th Floor, Washington, DC 20002; telephone (202) 535-2600, or by email at MS4DischargeAuthorization@dc.gov to request authorization to discharge dewatering water, groundwater, or groundwater comingled with stormwater to the District's Municipal Separate Storm Sewer System (MS4) or to a surface water body pursuant to §§ 8-103.02, 8-103.06, and 8-103.07 of the District of Columbia Water Pollution Control Act of 1984, as amended.

9.3.2 DER10F000 Areas in the State of Delaware located at a federal facility (as defined in Appendix A)

a. Federal agencies must submit a sediment and stormwater management plan (SSMP) and receive Department approval prior to undertaking any land clearing, soil movement or construction activity unless conducting an exempt activity.

b. Federal construction activities are required to have a third-party Certified Construction Reviewer (CCR) perform weekly reviews to ensure the adequacy of construction activities pursuant to the approved SSMP and regulations.

Implementation of approved SSMPs requires the daily oversight of construction activity by certified responsible personnel.

c. Implementation of approved SSMPs requires the daily oversight of construction activity by certified responsible personnel.

d. A current copy of the SSMP must be maintained at the construction site.

e. Unless authorized by the Department, not more than 20 acres may be disturbed at any one time.

9.4 EPA REGION 4

No additional conditions

9.5 EPA REGION 5

9.5.1 MIR10I000 Indian country within the State of Minnesota

a. Fond du Lac Reservation

i. New dischargers wishing to discharge to an Outstanding Reservation Resource Water (ORRW)[106] must obtain an individual permit from EPA for storm water discharges from large and small construction activities.

ii. A copy of the Storm Water Pollution Prevention Plan (SWPPP) must be submitted to the Office of Water Protection at least fifteen (15) days in advance of sending the Notice of Intent to EPA. The SWPPP can be submitted electronically to richardgitar@FDLREZ.com or by hardcopy sent to:

Fond du Lac Reservation
Office of Water Protection
1720 Big Lake Road
Cloquet, MN 55720

iii. Copies of the Notice of Intent (NOI) and the Notice of Termination (NOT) must be sent to the Fond du Lac Office of Water Protection at the same time they are submitted to EPA. [The condition helps the Office of Water Protection keep track of when a project is about to start and when it has ended. FDL Water Quality Certification Ordinance, Section 204 (a) (2)).

iv. If the project will entail a discharge to any watercourse or open water body, the turbidity limit shall NOT exceed 10% of natural background within the receiving water(s) as determined by Office of Water Protection staff. For such discharges, turbidity sampling must take place within 24 hours of a ½-inch or greater rainfall event. The results of the sampling must be reported to the Office of Water Protection within 7 days of the sample collection. All sample reporting must include the date and time, location (GPS: UTM/Zone 15), and NTU. CGP applicants are encouraged to work with the Office of Water Protection in determining the most appropriate location(s) for sampling. [This condition helps both the Office of Water Protection and the project proponent in knowing whether or not their erosion control efforts are effective. FDL Water Quality Certification, Section 204 (b) (1)).

v. Receiving waters with open water must be sampled for turbidity prior to any authorized discharge as determined by Office of Water Protection staff. This requirement only applies to receiving waters which no ambient turbidity data exists. [This condition allows the Office of Water Protection to obtain a baseline turbidity sample in which to compare to other samples. FDL Water Quality Certification Ordinance, Section 204 (b) (2)].

vi. All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in the Water Quality Standards of the Fond du Lac Reservation, Ordinance #12/98, as amended. This includes, but is not limited to, the prevention of any discharge that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of water of the Fond du Lac

[106] Although additional waters may be designated in the future, currently Perch Lake, Rice Portage Lake, Miller Lake, Deadfish Lake, and Jaskari Lake are designated as ORRWs.

Reservation for any of the uses designated in the Water Quality Standards of the Fond du Lac Reservation. These uses include wildlife, aquatic life, warm water fisheries, cold water fisheries, subsistence fishing (netting), primary contact recreation, secondary contact recreation, cultural, wild rice areas, aesthetic waters, agriculture, navigation, commercial and wetlands. It also includes the designated uses of wetlands including, but not limited to, baseflow discharge, cultural opportunities, flood flow attenuation, groundwater recharge, indigenous floral and fauna) diversity and abundance, nutrient cycling, organic carbon export/cycling, protection of downstream water quality, recreation, resilience against climactic effects, sediment/shoreline stabilization, surface water storage, wild rice, and water dependent wildlife. [In addition to listing the designated uses of waters of the Fond du Lac Reservation, this condition also limits the project proponent to discharges that will not violate our Water Quality Standards. FDL Water Quality Certification Ordinance, Section 204 (a) (7)).

vii. Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the Fond du Lac Reservation. All spills must be reported to the appropriate emergency management Agency (National Response Center AND the State Duty Officer), and measures shall be taken immediately to prevent the pollution of waters of the Fond du Lac Reservation, including groundwater. The Fond du Lac Office of Water Protection must also be notified immediately of any spill regardless of size. [This condition helps protect water quality and also reminds project proponents of their responsibility in reporting spill events. FDL Water Quality Certification Ordinance, Section 204 (b) (3)).

viii. All seed mixes, whether used for temporary stabilization or permanent seeding, shall NOT contain any annual ryegrass (Lolium species). Wild rye (Elymus species) or Oats (Avena species) may be used as a replacement in seed mixes. [This condition prevents the use of annual ryegrass on the Reservation. Annual ryegrass is allelopathic, which means it produces biochemical in its roots that inhibit the growth of native plants. If used in seed mixes, annual ryegrass could contribute to erosion, especially on slopes. However, the condition also specifies substitute grasses that germinate almost as fast as annual ryegrass for use as a cover crop to help prevent erosion. FDL Water Quality Certification Ordinance, Section 204 (t) (1)).

ix. To prevent the introduction of invasive species, ALL contractors and subcontractors MUST disclose information stating prior equipment location(s) and ALL known invasive species potentially being transported from said location(s). All equipment MUST undergo a high pressure wash (including any equipment mats) BEFORE ENTERING the Fond du Lac Reservation. Personal equipment such as work boots, gloves, vest, etc. MUST be clean of debris, dirt and plant and animal material BEFORE ENTERING the Fond du Lac Reservation. Equipment being transported from known infested areas MUST undergo a high pressure wash as soon as possible after leaving the infested site and again BEFORE ENTERING the Fond du Lac Reservation, to avoid transport of invasive species into areas surrounding the Reservation. Written certification of equipment cleaning MUST be provided to the Fond du Lac Office of Water Protection. Upon arrival, ALL contractor and subcontractor equipment will be inspected by appointed Fond du Lac staff. If equipment is deemed unsatisfactory, the equipment MUST

undergo a high pressure washing until the equipment is cleared by the inspector, until such time, minimal travel will be allowed through the Reservation. The contractor shall be held responsible for the control of any invasive species introduced as a result of their project. [This condition requires the project proponent to prevent the inadvertent introduction of invasive species by taking an active role in cleaning all vehicles, equipment, and equipment mats before entering the Reservation. This condition has been placed in certifications since 2012, due to the introduction of Wild Parsnip in 2011 from a pipeline contractor. It is much easier to prevent the introduction of an invasive species than it is to eradicate it once it has been introduced. Many invasive plant species form monocultures, preventing native plants from growing. This situation often leads to cases of erosion, which in turn effects water quality. FOL Water Quality Certification Ordinance, Section 204 (g) (1)].

x. A copy of this certification MUST be kept by the contractor on-site at all times and be available for viewing by all personnel, including inspectors. [This condition ensures that the information contained in the certification, especially the conditions, is readily available onsite for reference. FOL Water Quality Certification Ordinance, Section 204 (a) (9)].

b. The Grand Portage Band of Lake Superior Chippewa

i. The CGP authorization is for construction activities that may occur within the exterior boundaries of the Grand Portage Reservation in accordance to the Grand Portage Land Use Ordinance. The CGP regulates stormwater discharges associated with construction sites of one acre or more in size. Only those activities specifically authorized by the CGP are authorized by this certification (the "Certification").

ii. All construction stormwater discharges authorized by the CGP must comply with the Water Quality Standards and Water Resources Ordinance, as well as Applicable Federal Standards (as defined in the Water Resources Ordinance).

iii. All appropriate steps must be taken to ensure that petroleum products or other chemical pollutants are prevented from entering the Waters of the Reservation. All spills must be reported to the appropriate emergency-management agency, and measures must be taken to prevent the pollution of the Waters of the Reservation, including groundwater.

iv. The 2022 CGP requires inspections and monitoring reports of the construction site stormwater discharges by a qualified person. Monitoring and inspection reports must comply with the minimum requirements contained in the 2022 CGP. The monitoring plan must be prepared and incorporated into the Storm Water Pollution Prevention Plan (the "SWPP"). A copy of the SWPP must be submitted to the Board at least 30 days in advance of sending the requisite Notice of Intent to EPA. The SWPP should be sent to:

Grand Portage Environmental Resources Board

P.O. Box 428

Grand Portage, MN 55605

Copies of the Notice of Intent and Notice of Termination required under the General Permit must be submitted to the Board at the address above at the same time they are submitted to the EPA.

v. If requested by the Grand Portage Environmental Department, the permittee must provide additional information necessary for a case-by-case eligibility determination to assure compliance with the Water Quality Standards and any Applicable Federal Standards. The burden is on the applicant to demonstrate compliance with the Water Quality Standards, the Water Resources Ordinance, and Applicable Federal Standards whether or not the application is ultimately eligible for the CGP.

vi. CGP discharges must not cause nuisance conditions as defined in Grand Portage Water Quality Standards.

vii. The Board retains full authority to ensure compliance with and to enforce the provisions of the Water Resource Ordinance and Water Quality Standards, Applicable Federal Standards, and these Certification conditions. Nothing herein affects the scope or applicability of other controlling tribal or federal requirements, including but not limited to impacts to cultural, historical, or archeological features or sites, or properties that may be eligible for listing on the National Register of Historic Places under the National Historic Preservation Act, 54 U.S.C. §§ 300101 et seq.

viii. Appeals related to Board actions taken in accordance with any of the preceding conditions may be heard by the Grand Portage Tribal Court.

c. Leech Lake Band of Ojibwe

i. The water quality standards that apply to the construction site are the standards at the time the operator submits its Notice of Intent (NOI) to EPA and the LLBO WRP (see conditions # 2 and # 3).

ii. A copy of the Stormwater Pollution Prevention Plan (SWPPP) must be submitted to the LLBO WRP at least 30 days in advance of sending the NOI for the project to EPA. See attached LLBO 401 Water Quality Certification Ordinance. Section 304(a)(1). The SWPPP should be submitted electronically to Jeff.Harper@llojibwe.net and by hardcopy sent to:

Leech Lake Band of Ojibwe
ATTN: Water Resources Program - 401 Cert
Division of Resource Management
190 Sailstar Drive NW
Cass Lake, Minnesota 56633

iii. Copies of the NOI and the Notice of Termination (NOT) must be submitted to the LLBO WRP at the same time they are submitted to EPA. See attached LLBO 401 Water Quality Certification Ordinance, Section 304(a)(2). The NOI and NOT should be submitted electronically to Jeff.Harper@llojibwe.net and sent by hardcopy to the address cited in condition # 2.

iv. Any and all other conditions listed in Section 304 of the attached LLBO 401 Water Quality Certification Ordinance shall be observed unless the LLBO WRP deems that certain conditions therein are not applicable to the project in need of a permit under this certification.

v. A copy of this certification MUST be kept by the contractor on-site at all times and be available for viewing by all personnel, including inspectors.

vi. Upon consideration of the NOI, if the LLBO WRP finds that the discharge will not be controlled as necessary to meet applicable water quality standards, the LLBO WRP may insist, consistent with Part 3.1 of the CGP, that additional controls are installed to meet applicable water quality standards, or recommend to EPA that the operator obtain coverage under an individual permit.

9.5.2 WIR10I000 Indian country within the State of Wisconsin

a. Bad River Band of Lake Superior Tribe of Chippewa Indians

i. Only those activities specifically authorized by the CGP are authorized by this Certification. This Certification does not authorize impacts to cultural properties, orhistorical sites, or properties that may be eligible for listing as such.

ii. All projects which are eligible for coverage under the CGP and are located within the exterior boundaries of the Bad River Reservation shall be implemented in such a manner that is consistent with the Tribe's Water Quality Standards (WQS). The Tribe's WQS can be viewed at: http://www.badriver-nsn.gov/wp-content/uploads/2020/01/NRD_WaterQualityStandards_2011.pdf

iii. Operators are not eligible to obtain authorization under the CGP for all new discharges to an Outstanding Tribal Resource Water (OTRW or Tier 3 water). OTRWs, or Tier 3 waters, include the following: Kakagon Slough and the lower wetland reaches of its tributaries that support wild rice, Kakagon River, Bad River Slough, Honest John Lake, Bog Lake, a portion of Bad River, from where it enters the Reservation through the confluence with the White River, and Potato River. OTRWs can be viewed at: https://www.arcgis.com/apps/View/index.html?appid=6f44c371217e4ee8b5f1c2c705c 7c7c5

iv. An operator proposing to discharge to an Outstanding Resource Water (ORW or Tier 2.5 water) under the CGP must comply with the antidegradation provisions of the Tribe's WQS. ORWs, or Tier 2.5 waters, include the following: a portion of Bad River, from downstream the confluence with the White River to Lake Superior, White River, Marengo River, Graveyard Creek, Bear Trap Creek, Wood Creek, Brunsweiler River, Tyler Forks, Bell Creek, and Vaughn Creek. ORWs can be viewed at: https://www.arcgis.com/apps/View/index.html?appid=6f44c371217e4ee8b5f1c2c705c 7c7c5. The antidegradation demonstration materials described in provision E.4.iii., and included on the antidegradation demonstration template found at: https://www.badriver-nsn.gov/natural-resources/projectreviews/, must be submitted to the following address:

Bad River Tribe's Natural Resources Department
Attn: Water Regulatory Specialist
P.O. Box 39 Odanah, WI 54861
WaterReg@badriver-nsn.gov

v. An operator proposing to discharge to an Exceptional Resource Water (ERW or Tier 2 water) under the CGP must comply with the antidegradation provisions of the Tribe's WQS. ERWs, or Tier 2 waters, include the following: any surface water within the exterior boundaries of the Reservation that is not specifically classified as an Outstanding Resource Water (Tier 2.5 water) or an Outstanding Tribal Resource Water (Tier 3 water). ERWs can be viewed at:

https://www.arcgis.com/apps/View/index.html?appid=6f44c371217e4ee8b5f1c2c705c 7c7c5. The antidegradation demonstration materials described in provision E.4.ii., and included on the antidegradation demonstration template found at: https://www.badriver-nsn.gov/natural-resources/projectreviews/, must be submitted to the following address:

Bad River Tribe's Natural Resources Department
Attn: Water Regulatory Specialist
P.O. Box 39 Odanah, WI 54861
WaterReg@badriver-nsn.gov

vi. Projects utilizing cationic treatment chemicals within the Bad River Reservation boundaries are not eligible for coverage under the CGP.

vii. A discharge to a surface water within the Bad River Reservation boundaries shall not cause or contribute to an exceedance of the turbidity criterion included in the Tribe's WQS, which states: Turbidity shall not exceed 5 NTU over natural background turbidity when the background turbidity is 50 NTU or less, or turbidity shall not increase more than 10% when the background turbidity is more than 50 NTU.

viii. All projects which are eligible for coverage under the CGP within the exterior boundaries of the Bad River Reservation must comply with the Bad River Reservation Wetland and Watercourse Protection Ordinance, or Chapter 323 of the Bad River Tribal Ordinances, including the erosion and sedimentation control, natural buffer, and stabilization requirements. Questions regarding Chapter 323 and requests for permit applications can be directed to the Wetlands Specialist in the Tribe's Natural Resources Department at (715) 682-7123 or wetlands@badriver-nsn.gov.

ix. An operator of a project, which is eligible for coverage under the CGP, that would result in an allowable discharge under the CGP occurring within the exterior boundaries of the Bad River Reservation must notify the Tribe prior to the commencing earth-disturbing activities. The operator must submit a copy of the Notice of Intent (NOI) to the following addresses at the same time it is submitted to the U.S. EPA:

Bad River Tribe's Natural Resources Department
Attn: Water Regulatory Specialist
P.O. Box 39 Odanah, WI 54861
WaterReg@badriver-nsn.gov

Bad River Tribe's Natural Resources Department
Attn: Tribal Historic Preservation Officer (THPO)
P.O. Box 39 Odanah, WI 54861
THPO@badriver-nsn.gov

The operator must also submit a copy of the Notice of Termination (NOT) to the above addresses at the same time it is submitted to the U.S. EPA. Photographs showing the current site conditions must be included as part of the NOT to document the stabilization requirements have been met.

x. The THPO must be provided 30 days to comment on the project.

xi. The operator must obtain THPO concurrence in writing. This written concurrence will outline measures to be taken to prevent or mitigate effects to historic properties. For more information regarding the specifics of the cultural resources process, see 36 CFR Part 800. A best practice for an operator is to consult with the THPO during the planning stages of an undertaking.

xii. An operator of a project, which is eligible for coverage under the CGP, that would result in an allowable discharge under the CGP occurring within the exterior boundaries of the Bad River Reservation must submit a copy of the Stormwater Pollution Prevention Plan (SWPPP) to the following address at the same time as submitting the NOI:

Bad River Tribe's Natural Resources Department
Attn: Water Regulatory Specialist
P.O. Box 39 Odanah, WI 54861
WaterReg@badriver-nsn.gov

xiii. Any corrective action reports that are required under the CGP must be submitted to the following address within one (1) working day of the report completion:

Bad River Tribe's Natural Resources Department
P.O. Box 39 Odanah, WI 54861
WaterReg@badriver-nsn.gov

xiv. An operator of a project, which is eligible for coverage under the CGP, that would result in an allowable discharge under the CGP occurring within the exterior boundaries of the Bad River Reservation must submit a copies of the inspection reports (including photographs) to the following address within 24 hours of completing any site inspection required:

Bad River Tribe's Natural Resources Department Attn: Water Regulatory Specialist
P.O. Box 39 Odanah, WI 54861
WaterReg@badriver-nsn.gov

xv. An operator shall be responsible for meeting any additional permit requirements imposed by the U.S. EPA necessary to comply with the Tribe's antidegradation policies if the discharge point is located upstream of waters designated by the Tribe.

9.6 EPA REGION 6

9.6.1 NMR100000 State of New Mexico, except Indian country

a. In Outstanding National Resource Waters (ONRWs) in New Mexico, no degradation is permitted except in limited, specifically defined instances. Therefore, Operators are not eligible to obtain authorization under this general permit for stormwater discharges to waters classified as ONRWs listed in Paragraph D of 20.6.4.9 New Mexico Administrative Code (NMAC), also referred to as "Tier 3 waters" as defined in Appendix A of this permit. Exception: When construction activities are in response to a public emergency (e.g., wildfire, extreme flooding, etc.) and the related work requires immediate authorization to avoid a threat to public health or safety.

i. Operators who conduct construction activities in response to a public emergency to mitigate an immediate threat to public health or safety shall

adhere to the requirements in 20.6.4.8(A)(3)(c) NMAC, including notifying the New Mexico Environment Department (NMED) within seven days of initiation of the emergency action and providing NMED with a summary of the action taken within 30 days of initiation of the emergency action.

ii. For all other scenarios, Operators with proposed discharges to ONRWs in New Mexico shall obtain coverage from EPA under an NPDES Individual Permit and will comply with the additional standards and regulations related to discharges to ONRWs in 20.6.4.8(A) NMAC. Additional information is available from:

New Mexico Environment Department Surface Water Quality Bureau
P.O. Box 5469
Santa Fe, NM 87502-5469 Telephone: 505-827-0187
https://www.env.nm.gov/surface-water-quality/wqs/
https://gis.web.env.nm.gov/oem/?map=swqb

b. If construction dewatering activities are anticipated at a construction site and non-stormwater discharges of groundwater, subsurface water, spring water, and/or other dewatering water are anticipated, the Operators/Permittees must complete the following steps:

1. Review the state's Ground Water Quality Bureau Mapper (https://gis.web.env.nm.gov/GWQB/) and Petroleum Storage Tank Bureau Mapper (https://gis.web.env.nm.gov/GWQB/).

   Check if the following sources are located within the noted distance from the anticipated construction dewatering activity. At a minimum, a list of the following potential sources of contaminants and pollutants at the noted distance is to be kept in the SWPPP.

Source of Potential Contamination or Pollutants*	Constituents likely to be required for testing*
Within 0.5 mile of an open Leaking Underground Storage Tank (LUST) site	BTEX (Benzene, Toluene, Ethylbenzene, and Xylene) plus additional parameters depending on site conditions**
Within 0.5 mile of an open Voluntary Remediation site	All applicable parameters or pollutants listed in 20.6.4.13, 20.6.4.52, 20.6.4.54, 20.6.4.97 thru 20.6.4.99, 20.6.4.101 through 20.6.4.899, and 20.6.4.900 NMAC (or an alternate list approved by the NMED-SWQB)*
Within 0.5 mile of an open RCRA Corrective Action Site	
Within 0.5 mile of an open Abatement Site	
Within 0.5 mile of an open Brownfield Site	
Within 1.0 mile or more of a Superfund site or National Priorities List (NPL) site with associated groundwater contamination.	
Construction activity contaminants and/or natural water pollutants	Additional parameters depending on site activities and conditions (Contact NMED- SWQB for an alternate list)*

*For further assistance determining whether dewatering may encounter contaminated sources, please contact the NMED Ground Water Quality Bureau at 505-827-2965 or NMED Surface Water Quality Bureau (SWQB) at 505-827-0187.

** EPA approved sufficiently sensitive methods must be used. For known PCB sources and analysis, EPA Method 1668C must be used (see https://www.epa.gov/cwa-methods).

2. If dewatering activities are anticipated, information on the flow rate and potential to encounter contaminated groundwater, subsurface water, spring water, or dewatering water must be provideddirectly to NMED at the following address:

   NMED Surface Water Quality Bureau

   Program Manager, Point Source Regulation
   SectionPO Box 5469, Santa Fe, NM 87502

   Please call the SWQB to obtain the appropriate email address (505-827-0187).

3. In addition, the Operator/Permittee must characterize the quality of the groundwater and subsurface water, spring water, or dewatering water being considered for discharge according to the table above and including dissolved hardness and pH. Considering the contaminant sources listed in the table above, water quality data may already be available. For further assistance, contactthe

NMED Surface Water Quality Bureau (505-827-0187), Ground Water Quality Bureau (505-827- 2965), Petroleum Storage Tank Bureau (505-476-4397), or Hazardous Waste Bureau (505-476- 6000).

i. The Operator/Permittee must submit recent analytical test results (i.e., within the past 5 years) according to the table above, and including dissolved hardness and pH, to the EPA Region 6 Stormwater Permit Contact and the NMED Surface Water Quality Bureau (see contact information in #2 above). If the test data exceed applicable water quality standards, then the groundwater, subsurface water, spring water, or dewatering water cannot be discharged into surface waters under this general permit. Operators/Permittees may submit an NPDES Individual Permit application to treat and discharge to waters of the U.S. or find alternative disposal measures. No discharges to surface waters are allowed until authorized.

ii. If the discharge has the potential to affect groundwater (e.g., land application), the Operator/Permittee must submit an NOI to the NMED Ground Water Quality Bureau (see 20.6.2.1201 NMAC – Notice of Intent to Discharge).

4. The Operator/Permittee must document any findings and all correspondence with NMED and EPA in the SWPPP.

c. Operators who intend to obtain authorization under this permit for new and existing storm water dischargesfrom construction sites must satisfy the following condition:

i. The SWPPP must include site-specific interim and permanent stabilization, managerial, and structural solids, erosion and sediment control best management practices (BMPs) and/or other controls that are designed to prevent to the maximum extent practicable an increase in the sediment yield and flow velocity from pre-construction, pre-development conditions to assure thatapplicable standards in 20.6.4 NMAC, including the antidegradation policy, and TMDL waste load allocations (WLAs) are met. This requirement applies to discharges both during construction and after construction operations have been completed. The SWPPP must identify and document the rationale for selecting these BMPs and/or other controls. The SWPPP must also describe design specifications, construction specifications, maintenance schedules (including a long-term maintenance plan), criteria for inspections, and expected performance and longevity of these BMPs.For sites greater than 5 acres in size, BMP selection must be made based on the use of appropriatesoil loss prediction models (i.e. SEDCAD, RUSLE, SEDIMOT, MULTISED, etc.) OR equivalent generallyaccepted (by professional erosion control specialists) soil loss prediction tools.

ii. For all sites, the Operator(s) must demonstrate, and include documentation in the SWPPP, that implementation of the site-specific practices will ensure that the applicable standards and TMDL WLAs are met, and will result in sediment yields and flow velocities that, to the maximum extent practicable, will not be greater than the sediment yield levels and flow velocities from preconstruction, pre-development conditions.

iii. All SWPPPs must be prepared in accordance with good engineering practices by qualified (e.g., CPESC certified, engineers with appropriate training) erosion control specialists familiar with the use of soil loss prediction models and design of erosion and sediment control systems based on these models (or equivalent soil

loss prediction tools). Qualifications of the preparer (e.g., professional certifications, description of appropriate training) must be documented in the SWPPP.The Operator(s) must design, implement, and maintain BMPs in the manner specified in the SWPPP.

NMED supports the use of EPA's small residential lot template if a site qualifies to use it as explained inthe permit, as long as it is consistent with the above requirements. NMED's requirement does not preclude small residential sites from using the template, but it may require an additional short paragraphto justify the selection of specific BMPs for the site.

d. Operators must notify NMED when discharges of toxic or hazardous substances or oil from a spill or other release occurs - see Emergency Spill Notification Requirements, Part 2.3.6 of the permit. For emergencies, Operators can call 505-827-9329 at any time. For non-emergencies, Operators can call 866-428-6535 (voice mail 24-hours per day) or 505-476-6000 during business hours from 8am-5pm, Monday through Friday. Operators can also call the NMED Surface Water Quality Bureau directly at 505-827-0187.

e. Operators of small construction activities (i.e., 1-5 acres) are not eligible to qualify for a waiver in lieu of needing to obtain coverage under this general permit based on Item C.3 of Appendix C (Equivalent Analysis Waiver) in the State of New Mexico.

9.6.2 NMR10I000 Indian country within the State of New Mexico, except Navajo Reservation Lands that are covered under Arizona permit AZR10000I and Ute Mountain Reservation Lands that are covered under Colorado permit COR10000I.

a. Nambe Pueblo

i. The operator must provide a copy of the Notice of Intent (NOI) and Notice of Termination (NOT) to the Nambe Pueblo Governor's Office at the same time it is provided to the US Environmental Protection Agency. The NOI and NOT should be provided to the following address:

Office of the Governor Nambe Pueblo

!SA NPI02 WEST

Nambe Pueblo, New Mexico 87506

ii. The operator must provide a copy of the Storm Water Pollution Prevention Plan (SWPPP) to Nambe Pueblo at the same time it is submitted to the EPA, either by email to governor@nambepueblo.org or mailed to the above address.

iii. The operator must provide copies of inspection reports, a copy of the corrective action log, and modifications made to the SWPPP as a result of inspection findings, upon request by the Nambe Pueblo Department of Environmental and Natural Resources or Nam be Governor.

b. Ohkay Owingeh Tribe

i. All operators obtaining permit coverage under the EPA CGP, must submit a copy of the certified (signed) Notice of Intent (NOI) to the Ohkay Owingeh Office of Environmental Affairs, a copy of NOI modifications and the Notice of Termination (NOT), must be provided within three business days after EPA provides electronic confirmation that the submission has been received. The NOI and NOT must be provided to the following address:

Naomi L. Archuleta - Environmental Programs Manager Ohkay Owingeh Office of Environmental Affairs
P.O. Box 717
Ohkay Owingeh, NM 87566
naomi.archuleta@ohkay.org

Noah Kaniatobe - Environmental Specialist Ohkay Owingeh, Office of Environmental Affairs
P.O. Box 717
Ohkay Owingeh, NM 87566
noah.kaniatohe@ohkay.org

ii. All operators obtaining permit coverage under the EPA CGP, must submit an electronic copy of the Storm Water Pollution Prevention Plan (SWPPP) to Ohkay Owingeh Office of Environmental Affairsat the same time that the NOI is submitted to the tribe (see contact information listed above).

iii. Following each incident where the operator takes a corrective action the operator must provide thecorrective action log to the Ohkay Owingeh Office of Environmental Affairs.

iv. The operator must notify Ohkay Owingeh Office of Environmental Affairs within 24 hours, in the event of an emergency spill in addition to the notification requirements at Part 2.3.6 of the CGP. Please contact: Ohkay Owingeh Tribal Police Department at 505.852.2757.

Please contact:
Ohkay Owingeh
Tribal Police Department
505.852.2757

c. Pueblo of Isleta

i. All operators obtaining permit coverage under the EPA CGP must submit a copy of the certified Notice ofIntent (NOI) to the Pueblo of Isleta at the same time it is submitted to EPA for projects occurring within the exterior boundaries of the Pueblo of Isleta. Additionally, a copy of NOI modifications and the Notice of Termination (NOT), must be provided within three business days after EPA provides electronic confirmation that the submission has been received. The Notices must be provided to the following address:

Water Quality Control OfficerPueblo of Isleta
Environment DepartmentPO Box 1270
Isleta NM 87022
505-869-7565
WQCO@isletapueblo.com

ii. The operator must notify the Pueblo of Isleta's Dispatch at 505-869-3030 as soon as possible and thePueblo of Isleta Water Quality Control Officer within 10 hours, in the event of a spill of hazardous ortoxic substances or if health or the

environment become endangered in addition to the notification requirements at Part 2.3.6 and at I.12.6.1 of the CGP.

iii. All operators obtaining permit coverage under the EPA CGP must submit an electronic copy of the Stormwater Pollution Prevention Plan (SWPPP) to the Pueblo of Isleta Water Quality Control Officer atthe above address, 30 days prior to submitting the certified NOI to EPA. If the electronic file is too largeto send through e-mail, a zip file or flash drive may be submitted.

iv. All operators obtaining permit coverage under the EPA CGP must give 2 days advance notice to the Pueblo of Isleta Water Quality Control Officer of any planned changes in the permitted activity whichmay result in noncompliance with permit requirements.

v. All operators obtaining permit coverage under the EPA CGP must post a sign or other notice of permit coverage at a safe, publicly accessible location in close proximity to the construction site. The notice mustbe located so that it is visible from the public road or tribal road that is nearest to the active part of the construction site. The sign must be maintained on-site from the time construction activities begin until final stabilization is met.

vi. Erosion and sediment controls shall be designed to retain sediment on-site and project-generatedwaste materials that have the potential to discharge pollutants shall not be placed on open soil oron a surface that is not stabilized. Volumes of sediment over five (5) cubic yards must be removed from the active construction site; additionally, if sediment is placed for disposal withinthe exterior boundaries of the Pueblo of Isleta, disposal must be within a tribally approved sediment disposal site.

d. Pueblo of Laguna

i. All operators obtaining permit coverage under the EPA CGP must submit an electronic copy of the certified (signed) Notice of Intent (NOI) to the Pueblo of Laguna's Environmental & Natural Resources Department (ENRD) within three business days of submittal to the EPA. Additionally, a copy of NOI modifications and the Notice of Termination (NOT), must be provided within three business days after the EPA provides electronic confirmation that the submission has been received. The NOI and NOT must be electronically submitted to info.environmental@pol-nsn.gov.

ii. All operators obtaining permit coverage under the EPA CGP must submit an electronic copy of the Stormwater Pollution Prevention Plan (SWPPP) to the Pueblo of Laguna's ENRD 14 days prior to the submittal of the NOI (see contact information listed above).

iii. The operator must provide copies of corrective actions logs and modifications made to the SWPPP as a result of inspection findings to the Pueblo of Laguna ENRD (see contact information above).

iv. In addition to the notification requirements of Part 2.3.6 of the CPG ***[EPA interprets this intending to refer to the CGP]***, the operator must notify the Pueblo of Laguna ENRD at 505-552-7512 in the event of an emergency spill as soon as possible.

e. Pueblo of Sandia. The following conditions apply only to discharges on the Pueblo of Sandia Reservation:

i. All operators obtaining permit coverage under the EPA CGP, must submit a copy of the certified (signed) Notice of Intent (NOI) to the Pueblo of Sandia Environment Department concurrently with submittal to the EPA. Additionally, a copy of NOI modifications and the Notice of Termination (NOT), must be provided concurrently with submittal to the EPA. The NOI and NOT must be provided electronically to the following addresses:

Electronic Addresses:

Amy Rosebrough (Water Quality Manager): rosebrough@sanidapueblo.nsn.us
Greg Kaufman (Environment Director):gkaufman@sandiapueblo.nsn.us

ii. All operators obtaining permit coverage under the EPA CGP, must submit an electronic copy of the Stormwater Pollution Prevention Plan (SWPPP) to the Pueblo of Sandia Environment. Department at least 14 days prior to submittal of the NOI to the Pueblo (see contact information listed above).

iii. If requested by the Pueblo of Sandia Environment Department, the permittee must provide additional information necessary on a case-by-case basis to assure compliance with the Pueblo of Sandia Water Quality Standards and/or applicable Federal Standards.

iv. An "Authorization to Proceed Letter" with site specific mitigation requirements may be sent out to the permittee when a review of the NOI and SWPPP, on a case-by-case basis, is completed by the Pueblo of Sandia Environment Department. This approval will allow the application to proceed if all mitigation requirements are met.

v. The Pueblo of Sandia will not allow Small Construction Waivers (Appendix C) to be granted for any small construction activities.

vi. The operator must provide copies of inspection reports, a copy of the corrective action log, and modifications made to the SWPPP as a result of inspection findings to the Pueblo of Sandia Environment Department upon request. An inspection report and corrective action log must be submitted to the Pueblo within 3 days of any inspection that results in corrective action (see contact information listed above).

vii. The operator must notify the Pueblo of Sandia within 24 hours in the event of an emergency spill, in addition to the notification requirements at Part 2.3.6 of the COP (see contact information listed above).

viii. Before submitting a Notice of Termination (NOT) to the EPA, permittees must clearly demonstrate to the Pueblo of Sandia Environment Department through a site visit or documentation that requirements for site stabilization have been met and any temporary erosion control structures have been removed. A short letter stating that the NOT is acceptable and all requirements have been met will be sent to the permittee to add to the permittee's NOT submission to the EPA.

f. Pueblo of Santa Ana. The following conditions apply only to discharges on the Pueblo of Santa Ana Reservation:

i. All operators obtaining permit coverage under the EPA CGP, must submit a copy of the certified (signed) Notice of Intent (NOI) to the Pueblo's Department of Natural Resources within three business days of submittal to EPA. Additionally, a copy of NOI modifications and the Notice of Termination (NOT), must be

provided within three business days after EPA provides electronic confirmation that the submission has been received. The NOI and NOT must be provided to the following address:

Regular U.S. Delivery Mail:
Pueblo of Santa Ana
Department of Natural Resources Water Resources Division
Attn: Andrew Sweetman 02 Dove Rd
Santa Ana Pueblo, NM 87004

Electronically:
Andrew Sweetman
Water Resources Division Manager Andrew.Sweetman@santaana-nsn.gov
Tammy Montoya Hydrologist
Tammy.Montoya@santaana-nsn.gov

ii. All operators obtaining permit coverage under the EPA CGP, must submit an electronic copyof the Stormwater Pollution Prevention Plan (SWPPP) to the to the Pueblo's Department of Natural Resources at the same time that the NOI is submitted to the tribe (see contact information listed above).

iii. The operator must provide copies of inspection reports, a copy of the corrective action log, and modifications made to the SWPPP as a result of inspection findings, upon request by the Pueblo's Department of Natural Resources.

iv. The operator must notify the Pueblo's Department of Natural Resources within 24 hours in the event of an emergency spill, in addition to the notification requirements at Part 2.3.6 of the CGP.

g. Pueblo of Taos

i. All operators obtaining permit coverage under the EPA CGP, must submit a copy of the certified (signed) Notice of Intent (NOi) to the Taos Pueblo Environmental Office and Taos Pueblo Governor's Office within three business days of submittal to EPA. Additionally, a copy of NOi modifications and the Notice of Termination (NOT), must be provided within three business days after EPA provides electronic confirmation that the submission has been received. The NOi and NOTmust be provided to the following addresses:

Honorable Governor of Taos Pueblo PO Box 1846
Taos, New Mexico 87571

Taos Pueblo Environmental Office PO Box 1846
Taos, New Mexico 87571

ii. All operators obtaining permit coverage under the EPA CGP, must submit an electronic copy of theStormwater Pollution Prevention Plan (SWPPP) to the Taos Pueblo Environmental Office when the NOI is submitted to the tribe. Electronic copy of SWPPP downloaded on flash drive may be sent to the above address for the Taos Pueblo Environmental Office.

iii. The operator must provide a copy of the corrective action log following each corrective action undertaken and modifications made to the SWPPP as a result of

a corrective action to the Taos Pueblo Environmental Office at address listed above.

h. Pueblo of Tesuque.

i. All operators obtaining permit coverage under the EPA CGP, must submit a copy of the certified (signed) Notice of Intent (NOI) to the Pueblo of Tesuque Department of Environment and Natural Resources (DENR) and the Pueblo's Governor within three business days of submittal to EPA. Additionally, a copy of any NOi modifications and the Notice of Termination (NOT), must be provided within three business days after EPA provides electronic confirmation that the submission has been received. The NOI and NOT must be provided to the following address:

Governor Mark Mitchell Pueblo of Tesuque
20 TP 828
Santa Fe, NM 87506 governor@puebloftesuque.org

Sage Mountain.flower Pueblo of Tesuque
Department of Environment and Natural Resources Director
20 TP 828

ii. All operators obtaining permit coverage under the EPA CGP, must submit an electronic copyof the Stormwater Pollution Prevention Plan (SWPPP) to Pueblo of Tesuque DENR and the Pueblo's Governor at the same time that the NO! is submitted to the EPA (see contact information listed above).

iii. The operator must provide a copy of the corrective action log, and any modifications made tothe SWPPP as a result of inspection findings, or upon request by the Pueblo of Tesuque DENR.

iv. The operator must notify the Pueblo of Tesuque DENR within 24 hours in the event of an emergency spill, in addition to the notification requirements at Part 2.3.6 of the CGP (seecontact information listed above).

i. Santa Clara Indian Pueblo.

i. All operators obtaining permit coverage under the EPA CGP, must submit a copy of the certified (signed) Notice of Intent (NOI) to the Santa Clara Pueblo Office of Environmental Affairs at the same time the NOI is submitted to the U.S. EPA. Additionally, a copy of the NOI modifications and the Notice of Termination (NOT), must be provided at the same time after electronic confirmation is received from EPA that the NOT has been accepted. The NOI and NOT shall be provided to the following address in electronic format:

Dino Chavarria,
Santa Clara Pueblo
Office of Environmental Affairs
dinoc@santaclarapueblo.org

ii. All operators obtaining permit coverage under the EPA CGP, must submit an electronic copy of the Stormwater Pollution Prevention Plan to the Santa Clara Pueblo Office of Environmental Affairs at the same time the NOI is submitted to the U.S. EPA (see contact information listed above).

iii. The operator must notify the Santa Clara Pueblo Office of Environmental Affairs at the address above within 24 hours, in the event of an emergency spill, in addition to the notification requirements at Part 2.3.6 of the CGP

9.6.3 OKR10I000 Indian country within the State of Oklahoma, except areas of Indian country covered by an extension of state program authority pursuant to Section 10211 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA).

a. Pawnee Nation. The following conditions apply only to discharges within Pawnee Indian country:

i. Copies of the Notice of Intent (NOI) and Notice of Termination (NOT) must be provided to the Pawnee Nation at the same time it is submitted to the Environmental Protection Agency to the following address:

Pawnee Nation Department of Environmental Conservation and Safety
P.O. Box 470
Pawnee, OK 74058
Or email to dnrs@pawneenation.org

ii. An electronic copy of the Storm Water Pollution Prevention Plan (SWPPP) must be submitted to the Pawnee Nation Department of Environmental Conservation and Safety at the same time the NOI is submitted.

iii. The operator must provide access to the site for inspections and for copies of inspection reports, copy of the corrective action log and modifications, made to the SWPPP because of inspection findings, upon request by the Pawnee Nation DECS.

iv. The Pawnee Nation Department of Environmental Conservation and Safety must be notified at 918.762.3655 immediately upon discovery of any noncompliance with any provision of the permit conditions.

9.6.4 OKR10F000 Discharges in the State of Oklahoma that are not under the authority of the Oklahoma Department of Environmental Quality, or the Oklahoma Department of Agriculture and Forestry including activities associated with oil and gas exploration, drilling, operations, and pipelines (includes SIC Groups 13 and 46, and SIC codes 492 and 5171), and point source discharges associated with agricultural production, services, and silviculture (includes SIC Groups 01, 02, 07, 08, 09).

a. For activities located within the watershed of any Oklahoma Scenic River, including the Illinois River, Flint Creek, Barren Fork Creek, Upper Mountain Fork, Little Lee Creek, and Lee Creek or any water or watershed designated "ORW" in Oklahoma's Water Quality Standards, this permit may only be used to authorize discharges from temporary construction activities. Certification is denied for any on-going activities such as sand and gravel mining or any other mineral mining.

b. For activities located within the watershed of any Oklahoma Scenic River, including the Illinois River, Flint Creek, Barren Fork Creek, Upper Mountain Fork, Little Lee Creek, and Lee Creek or any water or watershed designated "ORW" in Oklahoma's Water Quality Standards, certification is denied for any discharges originating from support activities, including, but not limited to, concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, or borrow areas.

c. Dewatering discharges into sediment or nutrient-impaired waters, and waters identified as Tier 2, Tier 2.5, or Tier 3 (OAC 785:46-13) shall be controlled to meet water quality standards for turbidity in those waters as follows:

i. Cool Water Aquatic Community/Trout Fisheries: 10 NTUs (OAC 785: 45-5-12(f)(7)(A)(i)

ii. Lakes: 25 NTUs (OAC 785: 45-5-12(f)(7)(A)(ii)

iii. In waters where background turbidity exceeds these values, turbidity from dewatering discharges should be restricted to not exceed ambient levels (OAC 785: 45-5-12(f)(7)(B)

9.7 EPA REGION 7

No additional conditions.

9.8 EPA REGION 8

9.8.1 MTR10I000 Indian country within the State of Montana

a. Blackfeet Nation.

i. The Applicant and applicants for projects authorized under the NWPs should obtain all other permits, licenses, and certifications that may be required by federal, state, or tribal authority. Primary relevant tribal permit will be ALPO (Ordinance 117). Others may apply. It is the applicant's responsibility to know the tribal and local ordinances and complete all necessary permissions before they can commence work.

ii. If a project is unable to meet the enclosed conditions, or if certification is denied for an applicable NWP, the Applicant may request an individual certification from Blackfeet. An individual certification request must follow the requirements outlined in 40 CFR 121.5 of EPA's CWA § 401 Certification Rule, effective September 11, 2020.

iii. Copies of this certification should be kept on the job site and readily available for reference.

iv. If the project is constructed and/or operated in a manner not consistent with the applicable NWP, general conditions, or regional conditions, the permittee may be in violation of this certification.

v. Blackfeet and EPA representatives may inspect the authorized activity and any mitigation areas to determine compliance with the terms and conditions of the NWP.

vi. This NWP Reissuance does not reduce Tribal authority under any other rule.

vii. The project, including any stream relocations and restoration, must be built as shown and as otherwise described in the application, the construction plans, cross sections, mitigation plans and other supporting documents submitted to this office. Impacts to aquatic systems and restoration efforts will be monitored by an appropriate aquatic resource professional to ensure that disturbed areas are restored to at least their original condition.

viii. All existing water uses will be fully maintained during and after the completion of the project. (If applicable)

ix. Where practicable, perform all in-channel and wetland work during periods of low flow or drawn—down or when dry

x. Equipment staging areas must be located out of all delineated wetlands

xi. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during and immediately after construction, and all exposed soil and other fills, as well as any work below the ordinary high-water mark or in a wetland, must be permanently stabilized as soon as possible

xii. Materials such as piling, culverts, sandbags, fabric, mats, timbers used for temporary facilities in wetlands or below the high- water mark of Waters of the US must be free from oil, gas, excess dirt, loose paint and other pollutants.

xiii. Equipment staging areas in wetlands or in stream or river channels must be placed on mats, or other measures must be taken to minimize soil disturbance and compaction.

xiv. Clearing of riparian or wetland vegetation for the sole purpose of constructing work bridges, detours, staging areas or other temporary facilities must be limited to the absolute minimum necessary. When temporary impacts to native riparian or wetland vegetation are unavoidable, it must be mowed or cut above ground with the topsoil and root mass left intact.

xv. Remove all temporary fills and structures in the entirety when they are no longer needed. Restore affected areas to the appropriate original and planned contours where possible. Re-vegetate disturbed areas with appropriate native species when native species are impacted.

xvi. Construction methods and best management practices (BMPs) must minimize aquatic resource impacts to the maximum extent possible. Any BMPs described in the Joint Application must be followed. BMPs should include installation and maintenance of sediment control measures; separation, storage and reuse of any topsoil; and recovery of all disturbed areas where possible. All best management practices must in place prior to the onset of construction or as soon as practicable during the construction process.

xvii. Best available technology and/or best management practices must be utilized to protect existing water uses and maintain turbidity and sedimentation at the lowest practical level.

xviii. Applicant/contractor should manage disturbed streambank topsoil in a manner that optimizes plant establishment for the site.

xix. When operating equipment or otherwise undertaking construction in wetlands and water bodies the following conditions apply:

(a) Work should be done in dry conditions if possible.

(b) All equipment is to be inspected for oil, gas, diesel, anti-freeze, hydraulic fluid or other petroleum leaks. All such leaks will be properly repaired and equipment cleaned prior to being allowed on the project site. Leaks that occur after the equipment is moved to the project site will be fixed the same day or the next day or removed from the project area. The equipment is not allowed to continue operation once a leak is discovered.

(c) All equipment is to be inspected and cleaned before and after use to minimize the spread or introduction of invasive or undesirable species.

(d) Construction equipment shall not operate below the existing water surface except as follows:

- Impacts from construction should be minimized through the use of best management practices submitted in the permit application.
- Essential work below the waterline shall be done in a manner to minimize impacts to aquatic system and water quality.

(e) Containment booms and/or absorbent material must be available onsite. Any spills of petroleum products must be reported to the Army Corps, Blackfeet Nation BEO Office and the US EPA within 24 hours.

xx. Upland, riparian and in-stream vegetation should be protected except where its removal is necessary for completion of work. Revegetation should be completed as soon as possible. Applicant/contractor should revegetate disturbed soil in a manner that optimizes plant establishment for the site. Revegetation must include topsoil replacement, planting, seeding, fertilization, liming and weed-free mulching as necessary. Applicant must use native plant material and soils where appropriate and feasible. This certification does not allow for the introduction of non-native flora and fauna. All disturbed surface areas must be restored to pre-construction contours and elevation.

xxi. Spoils piles should not be placed or stored within the delineated wetlands or streams unless protected by a temporary structure designed to divert and handle high flows that can be anticipated during permit activity. Spoils piles should be placed on landscaping fabric or some other material to separate spoils material and allow retrieval of spoils material with minimal impact.

xxii. Impacts to wetlands shall not exceed 4.92 acres.

xxiii. Any unexpected and additional impacts to waters of the US should be reported to the

xxiv. Army Corps, Blackfeet Environmental Office Water Quality Coordinator and the US EPA.

xxv. All instream and stream channel reconstruction work must be completed before the stream is diverted into the new channel.

xxvi. Any temporary crossings, bridge supports, cofferdams, or other structures that are necessary during permit activity should be designed to handle high flows that can be anticipated during permit activity. All temporary structures should be completely removed from the water body at the conclusion of the permitted activity and the area restored to a natural function and appearance.

xxvii. The certification does not authorize any unconfined discharge of liquid cement into the waters of the United States. Grouting riprap must occur under dry conditions with no exposure of wet concrete to the water body.

xxviii. BMPs shall include application of certified weed-free straw or hay across all disturbed wetland areas that are temporarily impacted; installation and maintenance of sediment control measures during construction and if necessary, after construction is completed; use of heavy mud mats if necessary; separation,

storage and reuse of all streambank topsoil and wetland topsoil, as appropriate; and recovery of all disturbed wetland and streambank areas where possible. All conditions set by the Blackfeet Tribe and US Army Corps must be followed.

xxix. All applicants, including federal agencies, must notify EPA and the Blackfeet Environmental Office of the use of all NWPs for which certification has been granted prior to commencing work on the project. Notifications must include:

(a) project location (lat. Long., exact point on map);

(b) NWP that will be used and the specific activity that will be authorized under the NWP;

(c) amount of permanent and temporary fills;

(d) a short summary of the proposed activity, and all other federal, state, tribal or local permits or licenses required for the project;

(e) complete contact information of both the applicant and contractor (name, name of the company or property if applicable, telephone, mobile, and email); and,

(f) Summary of best management practices that will be used.

(g) A summary of communications with the affected Tribe's water quality staff regarding the project, including any concerns or issues.

(h) Notify Blackfeet and EPA at least 7 days before the completion of construction and operations begin.

xxx. Point source discharges may not occur: (1) in fens, bogs or other peatlands; (2) within 100 feet of the point of discharge of a known natural spring source; or (3) hanging gardens.

xxxi. Except as specified in the application, no debris, silt, sand, cement, concrete, oil or petroleum, organic material, or other construction related materials or wastes shall be allowed to enter into or be stored where it may enter into waters of the U.S.

xxxii. Silt fences, straw wattles, and other techniques shall be employed as appropriate to protect waters of the U.S. from sedimentation and other pollutants.

xxxiii. Water used in dust suppression shall not contain contaminants that could violate water quality standards.

xxxiv. Erosion control matting that is either biodegradable blankets or loose-weave mesh must be used to the maximum extent practicable.

xxxv. All equipment used in waters of the U.S. must be inspected for fluid leaks and invasive species prior to use on a project. All fluid leaks shall be repaired and cleaned prior to use or when discovered, or if the fluid leak can't be repaired, the equipment shall not be used on site. Equipment used in waters with the possibility of aquatic nuisance species infestation must be thoroughly cleaned and effectively decontaminated before they are used on the project.

xxxvi. Vegetation should be protected except where its removal is necessary for completion of the work. Locations disturbed by construction activities should be revegetated with appropriate native vegetation in a manner that optimizes plant establishment for the specific site.

xxxvii. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary. Where practical, stockpile weed- seed-free topsoil and replace it on disturbed areas. All revegetation materials, including plants and plant seed shall be on site or scheduled for delivery prior to or upon completion of the earth moving activities.

xxxviii. Activities may not result in any unconfined discharge of liquid cement into waters of the U.S. Grouting riprap must occur under dry conditions with no exposure of wet concrete to the waterbody.

xxxix. Activities that may result in a point source discharge shall occur during seasonal low flow or no flow periods to the extent practicable.

xl. The placement of material (discharge) for the construction of new dams is not certified, except for stream restoration projects.

xli. Any decision-maker that is required under 7.0 of the CGP to prepare a Stormwater Pollution Prevention Plan (SWPPP), must submit an electronic copy of the SWPPP to the Blackfeet Environmental Office at least 30 days before construction starts for review and approval. Any modifications to the SWPPP should be submitted to the Blackfeet Environmental Office.

xlii. Any Decision-maker required under Part 1.4 of the CGP to submit a Notice of Intent (NOI) to EPA for coverage under the CGP, must submit a copy of the NOI to the Blackfeet Environmental Office within three business days of submittal to EPA. Additionally, a copy of the Notice of Termination (NOT) must be provided within three business days after electronic confirmation is received from EPA that the NOT has been accepted. The NOI and NOT must be provided to the following address Gerald Wagner, Blackfeet Environmental Office Director.

62 Hospital Drive, Browning, MT 59417

beo.director@gmail.com

b. Fort Peck Tribes.

i. Any Decision-maker required under Part 1.4 of the CGP to submit a Notice of Intent (NOI) to EPA for coverage under the CGP, must submit a copy of the NOI to the Fort Peck Tribes Office of Environmental Protection within three business days of submittal to EPA. Additionally, a copy of the Notice of Termination (NOT) must be provided within three business days after electronic confirmation is received from EPA that the NOT has been accepted. The NOI and NOT must be provided to the following address:

Martina Wilson, Office of Environmental Protection Director

501 Medicine Bear Rd Poplar, MT 59255

martinawilson@fortpecktribes.net

ii. Any Decision-maker that is required under Part 7.0 of the CGP to prepare a Stormwater Pollution Prevention Plan (SWPPP), must submit an electronic copy of the SWPPP to the Fort Peck Tribes Office of Environmental Protection at least 30 days before construction starts for review and approval. Any modifications to the

SWPPP should be submitted to the Fort Peck Tribes Office of Environmental Protection.

iii. Any Decision-maker that is required under Part 8.0 of the CGP to submit a weekly, bi-weekly, and/or annual report to EPA, must submit an electronic copy of the annual report to the Fort Peck Tribes Office of Environmental Protection within three business days after submittal to EPA.

9.9 EPA REGION 9

9.9.1 CAR10I000 Indian country within the State of California

a. Morongo Band of Mission Indians

i. A copy of the Stormwater Pollution Prevention Plan (SWPPP) must be submitted (either mailed or electronically) to the MEPD no less than thirty (30) days before commencing construction activities:

Morongo Band of Mission Indians
Environmental Protection Department
12700 Pumarra Road
Banning, CA 92220
Email: epd@morongo-nsn.gov

ii. Copies of the Notice of Intent (NOI) and the Notice of Termination (NOT) must be sent to the MEPD at the same time they are submitted to EPA.

iii. Operators of an "emergency-related project" must submit notice to the MEPD within twenty- four (24) hours after commencing construction activities.

iv. Spills, leaks, or unpermitted discharges must be reported to the MEPD within twenty-four (24) hours of the incident, in addition to the reporting requirements of the CGP.

v. Projects utilizing cationic treatment chemicals (as defined in Appendix A of the CGP) within the Morongo Reservation are not eligible for coverage under this certification of the CGP.

vi. Facilities covered under the CGP will be subject to compliance inspections by MEPD staff, including compliance with final site stabilization criteria prior to submitting an NOI ***[EPA assumes this intended to refer to an NOT]***.

9.9.2 GUR100000 Island of Guam

a. For purposes of this Order, the term "Project Proponent" shall mean U.S. Environmental Protection Agency, and its agents, assignees, and contractors.

b. For purposes of this Order, the permit "Operator" shall mean any party associated with a construction project that meets either of the following two criteria:

i. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications (e.g. in most cases this is the owner of the site); or

ii. The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the permit; in most cases this is the general contractor of the project).

Subcontractors generally are not considered operators for the purposes of this permit.

c. The Project Proponent shall enforce the proposed 2022 CGP and ensure that the Operator complies with the conditions of the permit at all times.[107] (40 CFR §121.11(c))

d. All submittals required by this Order shall be sent to the Guam Environmental Protection Agency Attn: 401 Federal Permit Manager, Non-Point Source Program, EMAS Division, 3304 Mariner Avenue, Bldg. 17-3304, Barrigada, Guam 96913, AND via email to jesse.cruz@epa.guam.gov. The submittals shall be identified with WQC Order #2021- 04 and include the COP Permit Number, certifying representative's name, title, mailing address and phone number. (§51060)(4) 2017 GWQS)

e. A copy of the Operator's signed Stormwater Pollution Prevention Plan (SWPPP) and signed Notice of Intent (NOI) and Notice of Termination (NOT) submitted to EPA for review and approval, shall concurrently be submitted to Guam EPA, consistent with condition A4. Coordination with Guam EPA is encouraged when the receiving water(s) for the proposed discharge is/are being identified. (§10105.B.5.d.) GSESCR; (§51060)(4) 2017 GWQS)

f. The Operator must comply with the conditions and requirements set forth in 22 GAR 10, Guam Soil Erosion and Sediment Control Regulations (GSESCR).

g. Before submitting the NOT to EPA, Operators shall comply with GSESC regulations at §10105.B10. (Stabilization of Affected Areas) and §10107.B. {Final Inspection and Approval)

h. All operators/owners shall comply with the general design criteria for best management practices (BMPs) acceptable for meeting the Construction and Post-construction stormwater criteria in the 2006 CNMI and Guam Stormwater Management Manual. (E.O. 2012-02)

i. Operating reports and monitoring and analytical data (e.g. Discharge Monitoring Reports (DMRs), follow-up monitoring reports, Exceedance Reports for Numerical Effluent Limits, etc.) submitted to EPA shall be concurrently submitted to Guam EPA, consistent with condition A4. §51060)(4) 2017 GWQS

j. The Operators who install a sediment basin or similar impoundment shall maintain the storage capacity of five thousand cubic feet {5,000 cu. ft.) per acre of project area tributary to the basin. (§10105.B.5.i.) GSESCR

k. (1) This Order does not authorize EPA to qualify Rainfall Erosivity Waivers to stormwater discharges associated with small construction activities (i.e. 1-5 acres). Operators are required to apply for an NOI for those projects eligible for coverage under the proposed 2022 CGP. An Erosion and Sediment Control Plan is required for every site that would be covered by the proposed 2022 CGP. (22 GAR §10104) The average annual rainfall for Guam and the CNMI exceeds I00 inches per year in many locations. These climatic conditions combined with the region's unique limestone, volcanic geologic formations, sensitive water resources and significant land

[107] By incorporating this condition into the permit, EPA acknowledges receipt of Guam's certification conditions.

development forces make stormwater discharges a very significant environmental and economic issue. (2006 CNMJ/Guam Stormwater Management Manual) E.O. 2012-02

(2) This Order does not authorize EPA to approve a Sediment TMDL Waiver for the Ugum River. Operators of construction activities eligible for a TMDL Waiver in lieu of coverage under the proposed 2022 CGP, shall submit a complete and accurate waiver certification as described in C.2., Appendix C - (Small Construction Waivers) to Guam EPA per condition A4., prior to notifying EPA of its intention to obtain a waiver. §51060)(4) 2017 GWQS

l. The Project Proponent shall submit to Guam EPA a signed Statement of Understanding of Water Quality Certification Conditions.[108] (see Attachment A for an example) per condition A4. §51060)(4) 2017 GWQS

m. The Operator shall comply with applicable provisions of the Guam Pesticides Act of2007 (10 GCA Chapter 50) and implementing regulations at Title 22 GAR Chapter 15 for any use and application of pesticides.

n. Point source discharge(s) to waterbodies under the jurisdiction of Guam EPA must be consistent with the antidegradation policy in 22 GAR §510l(b).

o. The operator shall carry out construction activities in such a manner that will not violate Guam Water Quality Standards (GWQS). Proposed 2022 CGP discharges are prohibited as follows:

- **i.** In Marine Waters, Category M-1 Excellent 22 GAR Chapter 5 §5102(b)(I); and
- **ii.** In Surface Waters, Category S-1 High 22 GAR Chapter 5 §5102(c)(I)

p. In addition to complying with construction dewatering requirements in Part 2.4 and site inspection requirements for all areas where construction dewatering is taking place in Part 4 of the proposed 2022 CGP, Operators shall comply with all dewatering conditions and requirements set forth in 22 GAR 7, Water Resources Development and Operating Regulations, to include securing Guam EPA permits prior to any dewatering activities.

q. The Operator shall develop and implement a Spill Prevention and Containment Plan.

r. The Operator shall have adequate and appropriate spill response materials on hand to respond to emergency release of oil, petroleum or any other material into waters of the territory.

s. Any unpermitted discharge into territorial waters or onto land with a potential for entry into territorial waters, is prohibited. If this occurs, the Operator shall immediately take the following actions:

- **i.** Cease operations at the location of the violation or spill.
- **ii.** Assess the cause of the water quality problem and take appropriate measures to correct the problem and/or prevent further environmental damage.
- **iii.** Notify Guam EPA of the failure to comply. All petroleum spills shall be reported immediately to:

[108] By incorporating this condition into the permit, EPA acknowledges receipt of Guam's certification conditions.

(a) Guam's Emergency 911 system

(b) Guam EPA's 24-Hour Spill Response Team at (671) 888-6488 or during working hours (671) 300-4751

(c) US Coast Guard Sector Guam (671) 355-4824

(d) National Response Center 1-800-424-8802

iv. Submit a detailed written report to Guam EPA within five days of noncompliance that describes the nature of the event corrective action taken and/or planned, steps to be taken to prevent a recurrence, results of any samples taken, and any other pertinent information.

t. Compliance with this condition does not relieve the Operator from responsibility to maintain continuous compliance with the terms and conditions of this Order or the resulting liability from failure to comply.

u. Submittal or reporting of any of this information does not provide relief from any subsequent enforcement actions for unpermitted discharges to waters of the United States.

v. This Order is valid for five (5) Years from Date of Certification, unless otherwise approved by the Guam EPA Administrator.

w. The Operator shall be required to adhere to the current Guam Coral Spawning Moratorium dates for both hard and soft corals where in-water activities and/or construction activity in close proximity with marine waters may impair water quality. These dates can be obtained from the Guam Department of Agriculture, Division of Aquatic and Wildlife Resources, or the NOAA NMFS Pacific Islands Regional Office Habitat Conservation Division.

x. The Operator shall provide notice to Guam EPA consistent with Condition A4:

(a) Immediately upon discovery of noncompliance with the provisions of this Order.

y. A Notice of Violation/Work Stop Order will be issued if certification conditions are not adhered to or when significant or sustained water quality degradation occurs. Work or discharge shall be suspended or halted until the Operator addresses environmental problems/concerns to Guam EPA's satisfaction. Guam EPA may also levy penalties and fines (10 GCA §47111). Invalidity or enforceability of one or more provisions of this certification shall not affect any other provision of this certification.

9.10 EPA REGION 10

9.10.1 IDR10I000 Indian country within the State of Idaho, except Duck Valley Reservation lands (see Region 9)

a. Shoshone-Bannock Tribes

i. Copies of the following information must be sent to the SBT-WRD:

(a) Notice of Intents (NOI)

The Notice of Intent shall be forwarded to the SBT-WRD within thirty (30) days of receipt of submitting NOI to the USEPA.

Shoshone-Bannock Tribes Water Resources Department
PO Box 306 Pima Drive
Fort Hall, ID 83203 Phone: (208) 239-4582
Fax: (208) 239-4592
Or Email ctanaka@sbtribes.com

b. If requested by the SBT-WRD, the permittee must submit a copy of the SWPPP to SBT-WRD within fourteen (14) days of the request.

9.10.2 ORR10I000 Indian country within the State of Oregon, except Fort McDermitt Reservation lands (see Region 9)

a. Confederated Tribes of Coos, Lower Umpqua, and Siuslaw

i. No activities allowed under the CGP shall result in the degradation of any Tribal waters or affect resident aquatic communities or resident or migratory wildlife species at any life stage.

ii. The operator shall be responsible for achieving compliance with CTCLUSI Water Quality Standards and all other tribal codes, regulations, and laws as they exist at the time that the permit is submitted.

iii. The operator shall submit a copy of the Notice of Intent (NOI) to be covered by the general permit to the CTCLUSI Water Quality Program before, or at the same time as, it is submitted to EPA.

iv. The operator shall be responsible for submitting all Stormwater Pollution Prevention Plans (SWPPP) required under this general permit to the CTCLUSI Water Quality Program for review and determination that the SWPPP is sufficient to meet Tribal Water Quality Standards, prior to the beginning of any discharge activities taking place.

v. The operator shall be responsible for reporting an exceedance to Tribal Water Quality Standards to the CTCLUSI Water Quality Program at the same time it is reported to EPA.

vi. The THPO will be provided 30 days to comment on the APE as defined in the permit application.

vii. If the project is an undertaking, a cultural resource assessment must occur. All fieldwork must be permitted by the THPO (as appropriate), conducted by qualified personnel (as outlined by the Secretary of Interior's Standards and Guidelines; http://www.nps.gov/history/local-law/arch_stnds_O.htm) and documented according to Oregon Reporting Standards (Reporting_Guidelines.pdf) (oregon.gov). The resulting report must be submitted to the THPO and the THPO must concur with the finding of effect and recommendations before any ground disturbing work can occur. The THPO requires 30 days to review all reports.

viii. The operator must obtain THPO concurrence in writing. If historic properties are present, this written concurrence will outline measures to be taken to prevent or mitigate adverse effects to historic properties.

b. Confederated Tribes of the Umatilla Indian Reservation

i. The operator shall be responsible for achieving compliance with the

Confederated Tribes of the Umatilla Indian Reservation's (CTUIR) Water Quality Standards.

ii. The operator shall submit a copy of the Notice of Intent (NOI) to be covered by the general permit to the CTUIR Water Resources Program at the address below, at the same time it is submitted to EPA.

iii. The operator shall be responsible for submitting all Stormwater Pollution Prevention Plans (SWPPP) required under this general permit to the CTUIR Water Resources Program for review and determination that the SWPPP is sufficient to meet Tribal Water Quality Standards, prior to the beginning of any discharge activities taking place.

iv. The operator shall be responsible for reporting an exceedance to Tribal Water QualityStandards to the CTUIR Water Resources Program at the same time it is reported to EPA.

Confederated Tribes of the Umatilla Indian Reservation
Water Resources Program
46411 Timíne Way
Pendleton, OR 97801
(541) 429-7200

v. The THPO will be provided 30 days to comment on the APE as defined in the permit application.

vi. If the project is an undertaking, a cultural resource assessment must occur. All fieldwork must be permitted by the Tribal Historic Preservation Office (as appropriate), conducted by qualified personnel (as outlined by the Secretary of Interior's Standards and Guidelines; http://www.nps.gov/history/local-law/arch_stnds_0.htm) and documented according to Oregon Reporting Standards (Reporting_Guidelines.pdf (oregon.gov). The resulting report must be submitted to the THPO and the THPO must concur with the finding of effect and recommendations before any ground disturbing work can occur. The THPO requires 30 days to review all reports.

vii. The operator must obtain THPO concurrence in writing. If historic properties are present, this written concurrence will outline measures to be taken to prevent or mitigate adverse effects to historic properties.

9.10.3 WAR10F000 Areas in the State of Washington, except those located on Indian country, subject to construction activity by a Federal Operator

a. For purposes of this Order, the term "Project Proponent" shall mean those that are seeking coverage under this permit, and its agents, assignees and contractors.

b. The Federal Agency shall mean the US Environmental Protection Agency. The Federal Agency shall enforce the permit and ensure that the Project Proponent complies with the conditions of the permits at all times.

c. Failure of any person or entity to comply with this Certification may result in the issuance of civil penalties or other actions, whether administrative or judicial, to enforce the terms of this Certification.

d. The Certification conditions within this Order must be incorporated into EPA's final NPDES permit. Per 40 CFR 121.10(a), all certification conditions herein that satisfy the

requirements of 40 CFR 121.7(d) must be incorporated into the permit. Per 40 CFR 121.10(b), the permit must clearly identify all certification conditions.

e. This Certification does not authorize exceedances of water quality standards established in chapter 173-201A WAC.

f. Discharges from construction activity must not cause or contribute to violations of the Water Quality Standards for Surface Water of the State of Washington (chapter 173-201A WAC), Ground Water Quality Standards (chapter 173- 200 WAC), Sediment Management Standards (chapter 173-204 WAC), and standards in the EPA's Revision of certain Federal water quality criteria applicable to Washington (40 CFR 131.45). Discharges that do not comply with these standards are prohibited.

g. Prior to discharge of stormwater and non-stormwater to waters of the State, the Permittee must apply all known, available, and reasonable methods of prevention, control, and treatment (AKART). This includes the preparation and implementation of an adequate Stormwater Pollution Prevention Plan (SWPPP), with all appropriate Best Management Practices (BMPs) installed and maintained in accordance with the SWPPP and the terms and conditions of the permit.

i. BMPs must be consistent with:

(a) The Stormwater Management Manual for Western Washington (most current approved edition at the time this permit was issued), for sites west of the crest of the Cascade Mountains; or

(b) The Stormwater Management Manual for Eastern Washington (most current approved edition at the time this permit was issued), for sites east of the crest of the Cascade Mountains; or

(c) Revisions to either manual, or other stormwater management guidance documents or manuals which provide equivalent level of pollution prevention, that are approved by Ecology and incorporated into this permit in accordance with the permit modification requirements of WAC 173-226-230. (For purposes of this section, the stormwater manuals listed in Appendix 10 of the Phase I Municipal Stormwater Permit are approved by Ecology); or

(d) Documentation in the SWPPP that the BMPs selected provided an equivalent level of pollution prevention, compared to the applicable stormwater management manuals, including:

- The technical basis for the selection of all stormwater BMPs (scientific, technical studies, and/or modeling) that support the performance claims for the BMPs being selected.
- An assessment of how the selected BMP will satisfy AKART requirements and the applicable federal technology-based treatment requirements under 40 CFR part 125.3.

The Stormwater Management Manuals for Eastern and Western Washington can be found at: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Stormwater-manuals.

ii. An adequate SWPPP must include a narrative and drawings. All BMPs must be clearly referenced in the narrative and marked on the drawings. The SWPPP

narrative must include documentation to explain and justify the pollution prevention decisions made for the project. Documentation must include:

(a) Information about existing site conditions (topography, drainage, soils, vegetation, etc.).

(b) Potential erosion problem areas.

(c) The 13 elements of a SWPPP, including BMPs used to address each element. Unless site conditions render the element unnecessary and the exemption is clearly justified in the SWPPP, the 13 elements are as follows:

- Preserve Vegetation/Mark Clearing Limits
- Establish Construction Access
- Control Flow Rates
- Install Sediment Controls
- Stabilize Soils
- Protect Slopes
- Protect Drain Inlets
- Stabilize Channels and Outlets
- Control Pollutants
- Control Dewatering
- Maintain BMPs
- Manage the Project
- Protect Low Impact Development (LID) BMPs

h. Discharges of stormwater and authorized non-stormwater must be monitored for turbidity (or transparency) and, in the event of significant concrete work or engineered soils, pH must also be monitored. As applicable based on project specifics, monitoring, benchmarks, and reporting requirements contained in Condition S.4. (pp.10-16) of the Washington State Construction Stormwater General Permit, effective January 1, 2021, shall apply.

i. Discharges to segments of waterbodies listed as impaired by the State of Washington under Section 303(d) of the Clean Water Act for turbidity, fine sediment, phosphorus, or pH must comply with the following numeric effluent limits:

Parameter identified in 303(d) listing	Parameter Sampled	Unit	Analytical Method	Numeric Effluent Limit
• Turbidity • Fine Sediment • Phosphorus	Turbidity	NTU	SM2130	25 NTUs at the point where the stormwater is discharged from the site.
High pH	pH	su	pH meter	In the range of 6.5 – 8.5

All references and requirements associated with Section 303(d) of the Clean Water Act mean the most current EPA-approved listing of impaired waters that exists on the

effective date of the permit, or the date when the operator's complete permit application is received by EPA, whichever is later.

The EPA approved WQ Assessment can be found at: https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d

j. Discharges to a waterbody that is subject to a Total Maximum Daily Load (TMDL) for turbidity, fine sediment, high pH, or phosphorus must be consistent with the TMDL.

- **i.** Where an applicable TMDL sets specific waste load allocations or requirements for discharges covered by this permit, discharges shall be consistent with any specific waste load allocations or requirements established by the applicable TMDL.
- **ii.** Where an applicable TMDL has established a general waste load allocation for construction stormwater discharges, but no specific requirements have been identified, compliance with this permit will be assumed to be consistent with the approved TMDL.
- **iii.** Where an applicable TMDL has not specified a waste load allocation for construction stormwater discharges, but has not excluded these discharges, compliance with this permit will be assumed to be consistent with the approved TMDL.
- **iv.** Where an applicable TMDL specifically precludes or prohibits discharges from construction activity, the operator is not eligible for coverage under this permit.

Applicable TMDL means a TMDL for turbidity, fine sediment, high pH, or phosphorus which has been completed and approved by EPA as of the effective date of the permit, or prior to the date of the operator's complete application for permit coverage is received by EPA, whichever is later.

k. Discharges to waters of the state from the following activities are prohibited:

- **i.** Concrete wastewater.
- **ii.** Wastewater from washout and clean-up of stucco, paint, form release oils, curing compounds and other construction materials.
- **iii.** Process wastewater as defined by 40 Code of Federal Regulations (CFR) 122.2.
- **iv.** Slurry materials and waste from shaft drilling, including process wastewater from shaft drilling for construction of building, road, and bridge foundations unless managed to prevent discharge to surface water.
- **v.** Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance.
- **vi.** Soaps or solvents used in vehicle and equipment washing.
- **vii.** Wheel wash wastewater, unless managed to prevent discharge to surface water.
- **viii.** Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, unless managed according to appropriate controls described within the permit.

l. This Certification is valid until the expiration date including any administrative extension or termination date of the NPDES 2022 Construction General Permit. (40 CFR § 122.46)

m. The Federal Agency shall enforce and the Project Proponent must comply with all the reporting and notification conditions of the NPDES 2022 Construction General Permit in order to comply with this Order and the certification conditions herein (40 CFR § 121.11).

n. You have a right to appeal this Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do all of the following within 30 days of the date of receipt of this Order:

- File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Order on Ecology in paper form - by mail or in person (see addresses below). E-mail is not accepted.

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 1111 Israel RD SW STE 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

CONTACT INFORMATION

Please direct all questions about this Order to:

Noel Tamboer
Department of Ecology
P.O. Box 47600
Olympia, WA 98503-7600

(360) 701-6171
noel.tamboer@ecy.wa.gov

9.10.4 WAR10I000 Indian country within the State of Washington

a. Lummi Nation

i. This certification does not exempt and is provisional upon compliance with other applicable statutes and codes administered by federal and Lummi tribal agencies. Pursuant to Lummi Code of Laws (LCL) 17.05.020(a), the operator must also obtaina land use permit from the Lummi Planning Department as provided in Title 15 of theLummi Code of Laws and regulations adopted thereunder.

ii. Pursuant to LCL 17.05.020(a), each operator shall develop and submit a Storm WaterPollution Prevention Plan to the Lummi Water Resources Division for review and approval by the Water Resources Manager prior to beginning any discharge activities.

iii. Pursuant to LCL Title 17, each operator shall be responsible for achieving compliance with the Water Quality Standards for Surface Waters of the Lummi

iv. Indian Reservation (Lummi Administrative Regulations [LAR] 17 LAR 07.010 through 17 LAR 07.210 together with supplements and amendments thereto).

v. Each operator shall submit a signed copy of the Notice of Intent (NOI) to the Lummi Water Resources Division at the same time it is submitted electronically to the Environmental Protection Agency (EPA) and shall provide the Lummi Water Resources Division the acknowledgement of receipt of the NOI from the EPA and the associated NPDES tracking number provided by the EPA within 7 calendar days of receipt from the EPA.

vi. Each operator shall submit a signed copy of the Notice of Termination (NOT) to the Lummi Water Resources Division at the same time it is submitted electronically to the EPA and shall provide the Lummi Water Resources Division the EPA acknowledgement of receipt of the NOT.

vii. Storm Water Pollution Prevention Plans, Notice of Intent, Notice of Termination and associated correspondence with the EPA shall be submitted to:

Lummi Natural Resources Department
ATTN: Water Resources Manager 2665 Kwina Road
Bellingham, WA 98226-9298

b. Port Gamble S'Klallam Tribe

i. No discharge from the project site shall cause exceedances of Port Gamble S'KlallamSurface Water Quality Standards narrative or numeric criteria in Tribal waters. This includes activities outside of Tribal lands that occur upstream of Tribal waters.

(a) If any exceedance of these water quality standards occurred, the Natural Resources Department shall be notified immediately.

- The Department shall additionally be provided a complete draft of the proposed corrective action within a reasonable timeframe and its approval will be required before any corrective action may be taken.

ii. Operators performing activities under the CGP that may affect Tribal waters will requirea permit and shall submit their plans to the Port Gamble S'Klallam Natural Resources Department for review.

- The Department has the right to require conditions outside of this Water QualityCertification prior to permit approval.

iii. No activities allowed under the CGP shall result in the degradation of any Tribal watersor change in designated uses.

iv. No activities allowed under the CGP shall affect resident aquatic communities or resident/migratory wildlife species at any life stage.

- Biological assessment methods used to determine the effect of an activity allowedunder the CGP shall be approved by the PGST Natural Resources Department.

v. No activities allowed under the CGP shall be conducted within wetland and stream bufferzones, nor shall said activities affect in any way wetland or stream buffers, as defined by *PGST Law and Order Code 24.08.01(c)*.

vi. Concentrations for substances listed within the table in *Water Quality Standards for Surface Waters* sec. 7(7) shall not be exceeded by activities allowed under the CGP.

c. Spokane Tribe of Indians

i. Pursuant to Tribal Law and Order Code (TLOC) Chapter 30 each operator shall be responsible for achieving compliance with the Surface Water Quality Standards of the Spokane Tribe. The operator shall notify the Spokane Tribe, Water Control Board (WCB) of any spills of hazardous material and;

ii. Each operator shall submit a signed hard copy of the Notice of Intent (NOI) to the WCB at the same time it is submitted to EPA.

iii. The permittee shall allow the Tribal Water Control Board or its designee to inspect and sample at the construction site as needed.

iv. Each operator shall submit a signed copy of the Notice of Termination (NOT) to the WCB at the same time it is submitted to EPA

The correspondence address for the Spokane Tribe Water Control Board is:

Water Control Board c/o Brian Crossley PO Box480
Wellpinit WA 99040
(509)626-4409
crossley@spokanetribe.com

d. Swinomish Tribe

i. Owners and operators seeking coverage under this permit must submit a copy of the Notice of Intent (NOI) to the DEP at the same time the NOI is submitted to EPA.

ii. Owners and operators must also submit to the DEP changes in NOI and/or Notices of Termination at the same time they are submitted to EPA.

iii. Owners and operators seeking coverage under this permit must also submit a Stormwater Pollution Prevention Plan to the DEP for review and approval by DEP prior to beginning any discharge activities.

e. Tulalip Tribes

i. Submission of NOI: Copies of the Notice of Intent (NOI),) Certification shall be submitted to the Tribe's Natural Resources Department to notify the Tribes of the

pending project and in order for the Tribes to review the projects potential impacts to endangered or threatened species.

ii. Submission of SWPPP: A copy of the Stormwater Pollution Plans (SWPPPs) shall be submitted to the Tribe's Natural Resources Department along with the NOI during the 30 day waiting period.

iii. Submission of Monitoring Data and Reports: The results of any monitoring required by this permit and reports must be sent to the Tribe's Natural Resources Depa1tment,

iv. The Tulalip Tribes are federally recognized successors in the interest to the Snohomish, Snoqualmie, Skykomish, and other allied tribes and bands signatory to the Treaty of Point Elliott.

v. including a description of the corrective actions required and undertaken to meet effluent limits or benchmarks (as applicable).

vi. Authorization to Inspect: The Tribe's Natural Resources Department may conduct an inspection of any facility covered by this permit to ensure compliance with tribal water quality standards. The Department may enforce its certification conditions.

vii. Submission of Inspection Reports: Inspection reports must be sent to the Tribe's Natural Resources Department, including a description of the corrective actions required and undertaken to meet effluent limits or benchmarks (as applicable).

viii. Permits on-site: A copy of the pe1mit shall be kept on the job site and readily available for reference by the construction supervisor, construction managers and foreman, and Tribal inspectors.

ix. Project Management: The applicant shall ensure that project managers, construction managers and foreman, and other responsible parties have read and understand conditions of the permit, this certification, and other relevant documents, to avoid violations or noncompliance with this certification.

x. Emergency Spill Notification Requirements: In the event of a spill or the contractor shall immediately take action to stop the violation and correct the problem, and immediately repo1t spill to the Tulalip Tribes Police Department (425) 508-1565. Compliance with this condition does not relieve the applicant from responsibility to maintain continuous compliance with the tem1S and conditions of this certification or the resulting liability from failure to comply.

xi. Discharges to CERCLA Sites: This permit does not autho1ize direct stormwater discharges to certain sites undergoing remedial cleanup actions pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) unless first approved by the appropriate EPA Regional office. In the case of the Tulalip Landfill site (WAD980639256), the Tulalip Tribes also requests notification by the facility and consultation with EPA prior to discharge. Contaminants at this site may include but are not limited to: dioxins, furans, arsenic, copper, lead, zinc, 4- methyl-phenol, Hex-CB, HPAHs, PCBs, PCE, cadmium, mercury, and LPAHs.

xii. Discharge-related Activities that have Potential to Cause an Adverse Effect on Historic Properties: Installation of stormwater controls that involve subsurface disturbances may potentially have an adverse impact on historic properties.

xiii. Procedures detailed in the permit shall be completed. Richard Young, of the Tulalip Tribe's Cultural Resources Department shall be contacted prior to initiating discharge- related activities that may have an impact on historic properties. His contact information is (360) 716-2652, ryoung@tulaliptribes-nsn.gov.

xiv. Invalidation: This certification will cease to be valid if the project is constructed and/or operated in a manner not consistent with the project description contained in

xv. the permit. This certification will also cease to be valid and the applicant must reapply with an updated application if info1mation contained in the permit is voided by subsequent submittals.

xvi. Modification: Nothing in this certification waives the Tulalip Tribes of Washington's authority to issue modifications to this ce1iification if additional impacts due to operational changes are identified, or if additional conditions are necessary to protect water quality or further protect the Tribal Communities interest.

xvii. incorporation by reference: TI1is certification does not exempt the applicant from compliance with other statues and codes administered by the Tribes, county, state and federal agencies.

xviii. Compliance with Tribe's I996 Water Quality Standards: Each permittee shall be responsible for controlling discharges and achieving compliance with the T1ibe's Water Quality Standards.

xix. Compliant with Tulalip Tribes Tidelands Management Policy: Permittee shall be responsible for achieving compliance with applicable sections of the Tulalip Tribe's Tidelands Management Policy. (Tulalip Tribal Code Title 8 Chapter 8.30).

xx. Compliant with Tulalip Tribes Environmental Infractions: Permittee shall be responsible for achieving compliance with applicable sections of the Tulalip Tribe's Environmental Infractions. (Tulalip Tribal Code Title 8 Chapter 8.20).

xxi. Where to Submit information and for further Coordination: All requested documents should be sent to the: Tulalip Tribes Natural Resources Environmental Department c/o Kurt Nelson and Valerie Streeter, 6704 Marine Drive, Tulalip, Washington 98271. For further 40 I Certification coordination with the Tulalip Tribes Natural Resources Department, please contact Mr. Kurt Nelson (360) 716-4617 knelson@tu1aliptribes- nsn.gov. 6406 Marine Dr., Tulalip WA 98271.

f. Makah Tribe

i. The permittee shall be responsible for meeting any additional permit requirements imposed by EPA necessary to comply with the Makah Tribe's Water Quality Standards if the discharge point is located within the Makah's U&A treaty reserved areas.

ii. Each permittee shall submit a copy of the Notice of Intent (NOI) to be covered by the general permit to Makah Fisheries Management, Water Quality Department at the address listed below at the same time it is submitted to the EPA.

Makah Water Quality
Makah Fisheries Management (MFM)
ray.colby@makah.com

PO Box 115
Neah bay, WA 98357

iii. All supporting documentation and certifications in the NOI related to coverage under the general permit for Endangered Species Act purposes shall be submitted to the Tribe's Habitat programs for their review.

iv. If EPA requires coverage under an individual or alternative permit, the permittee shall submit a copy of the permit to Assistant Fisheries Director, ray.colby@makah.com.

v. The permittee shall submit all Stormwater Pollution Prevention plan (SWPP) to MFM for review and approval prior to beginning any activities resulting in a discharge to Makah tribal waters.

vi. The permittee shall notify Ray Colby, ray.colby@makah.com (360) 645-3150 prior to conducting inspections at construction sites generating stormwater discharges to tribal waters.

vii. The operator shall treat dewatering discharges with controls necessary to minimize discharges of pollutants to surface waters, or ground waters, and from stormwater runoff onsite from excavations, trenches, foundations, or storage areas. To the extent feasible, at all points where dewatering is discharged, comply with the velocity dissipation using check dams, sediment traps, and grouted outlets.

g. Puyallup Tribe of Indians

i. The permittee shall be responsible for meeting any additional permit requirements imposed by EPA necessary to comply with the Puyallup Tribe's antidegradation procedures.

ii. Each permittee shall submit a copy of the Notice of Intent (NOI) to be covered by the general permit to Char Naylor, Tribal Water Quality Manager at the following e-mail address: (char.naylor@puyalluptribe-nsn.gov) at the same time it is submitted to EPA.

iii. All supporting documentation and certifications in the NOI related to coverage under the general permit for Endangered Species Act purposes shall be submitted to Char Naylor, Tribal Water Quality Manager/Assistant Fisheries Director (char.naylor@puyalluptribe-nsn.gov) for review.

iv. If EPA requires coverage under an individual or alternative permit, the permittee shall submit a copy of the permit to Char Naylor at the email address listed above.

v. The permittee shall submit all stormwater pollution prevention plans to Char Naylor for review and approval prior to beginning any activities resulting in a discharge to Puyallup tribal waters.

vi. The permittee shall contact Brandon Reynon (Brandon.reynon@puyalluptribe-nsn-gov), Tribe's Historic Preservation Officer or Jennifer Keating (Jennifer.keating@puyalluptribe-nsn.gov), Tribe's Assistant Historic Preservation Officer regarding historic properties and cultural resources.

vii. To minimize the discharge of pollutants to groundwater or surface waters from stormwater that is removed from excavations, trenches, foundations, vaults, or

other storage areas, treat dewatering discharges with controls necessary to minimize discharges of pollutants. Examples of appropriate controls include sediment basins or sediment traps, sediment socks, dewatering tanks, tube settlers, weir tanks, and filtration systems (e.g., bag or sand filters) that are designed to remove sediment.

To the extent feasible, utilize vegetated, upland areas of the site to infiltrate dewatering water before discharge. At all points where dewatering water is discharged, utilize velocity dissipation controls. Examples of velocity dissipation devices include check dams, sediment traps, riprap, and grouted riprap at outlets.

viii. The permittee shall provide and maintain natural buffers to the maximum extent possible (and/or equivalent erosion and sediment controls) when tribal waters are located within 100 feet of the boundaries. If infeasible to provide and maintain an undisturbed 100 foot natural buffer, erosion and sediment controls to achieve the sediment load reduction equivalent to a 100-foot undisturbed natural buffer shall be required.

Appendix C – Copy of NOI and EPA Authorization Email

Appendix D – Copy of Site and Dewatering Inspection Forms

Project Name: _____
NPDES ID Number: _____

Section A – General Information (If necessary, complete additional inspection reports for each separate inspection location.)	
Inspector Information	
Inspector Name:	**Title:**
Company Name:	**Email:**
Address:	**Phone Number:**
Inspection Details	
Inspection Date:	**Inspection Location:**
Inspection Start Time:	**Inspection End Time:**
Current Phase of Construction:	**Weather Conditions During Inspection:**

Did you determine that any portion of your site was unsafe for inspection per CGP Part 4.5? ☐ Yes ☐ No

If "Yes," provide the following information:

Location of unsafe conditions:

The conditions that prevented you inspecting this location:

Indicate the required inspection frequency: (Check all that apply. You may be subject to different inspection frequencies in different areas of the site.)

Standard Frequency (CGP Part 4.2):

☐ At least once every 7 calendar days; **OR**

☐ Once every 14 calendar days *and* within 24 hours of the occurrence of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
- A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period

Increased Frequency (CGP Part 4.3.1) (If site discharges to sediment or nutrient-impaired waters or to waters designated as Tier 2, Tier 2.5, or Tier 3):

☐ Once every 7 calendar days *and* within 24 hours of the occurrence of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
- A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period

Reduced Frequency (CGP Part 4.4):

☐ For stabilized areas: Twice during first month, no more than 14 calendar days apart; then once per month after first month until permit coverage is terminated

☐ For stabilized areas on "linear construction sites": Twice during first month, no more than 14 calendar days apart; then once more within 24 hours of the occurrence of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
- A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period

☐ For arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought: Once per month and within 24 hours of the occurrence of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
- A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period

☐ For frozen conditions where construction activities are being conducted: Once per month

Was this inspection triggered by a storm event producing 0.25 inches or more of rain within a 24-hour period? ☐ Yes ☐ No

If "Yes," how did you determine whether the storm produced 0.25 inches or more of rain?

☐ On-site rain gauge
☐ Weather station representative of site.
Weather station location:

Total rainfall amount that triggered the inspection (inches):

Was this inspection triggered by a snowmelt discharge from a storm event producing 3.25 inches or more of snow within a 24-hour period? ☐ Yes ☐ No

If "Yes," how did you determine whether the storm produced 3.25 inches or more of snow?

☐ On-site rain gauge
☐ Weather station representative of site.
Weather station location:

Total snowfall amount that triggered the inspection (inches):

Section B – Condition and Effectiveness of Erosion and Sediment (E&S) Controls (CGP Part 2.2) (Insert additional rows if needed)					
Type and Location of E&S Control	**Conditions Requiring Routine Maintenance?[1]**	**If "Yes," How Many Times (Including This Occurrence) Has This Condition Been Identified?**	**Conditions Requiring Corrective Action?[2, 3]**	**Date on Which Condition First Observed (If Applicable)?**	**Description of Conditions Observed**
1.	☐ Yes ☐ No		☐ Yes ☐ No		
2.	☐ Yes ☐ No		☐ Yes ☐ No		
3.	☐ Yes ☐ No		☐ Yes ☐ No		
4.	☐ Yes ☐ No		☐ Yes ☐ No		
5.	☐ Yes ☐ No		☐ Yes ☐ No		
If the same routine maintenance was found to be necessary three or more times for the same control at the same location (including this occurrence), follow the corrective action requirements and record the required information in your corrective action log, or describe here why you believe the specific condition should still be addressed as routine maintenance:					

[1] Routine maintenance includes minor repairs or other upkeep performed to ensure that the site's stormwater controls remain in effective operating condition, not including significant repairs or the need to install a new or replacement control. Routine maintenance is also required for specific conditions: (1) for perimeter controls, whenever sediment has accumulated to half or more the above-ground height of the control (CGP Part 2.2.3.c.i); (2) where sediment has been tracked-out from the site onto paved roads, sidewalks, or other paved areas (CGP Part 2.2.4.d); (3) for inlet protection measures, when sediment accumulates, the filter becomes clogged, and/or performance is compromised (CGP Part 2.2.10.b); and (4) for sediment basins, as necessary to maintain at least half of the design capacity of the basin (CGP Part 2.2.12.f)

[2] Corrective actions are triggered only for specific conditions (CGP Part 5.1):

1. A stormwater control needs a significant repair or a new or replacement control is needed, or, in accordance with Part 2.1.4.c, you find it necessary to repeatedly (i.e., three (3) or more times) conduct the same routine maintenance fix to the same control at the same location (unless you document in your inspection report under Part 4.7.1.c that the specific reoccurrence of this same problem should still be addressed as a routine maintenance fix under 2.1.4); or
2. A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly; or
3. Your discharges are not meeting applicable water quality standards; or
4. A prohibited discharge has occurred (see CGP Part 1.3); or
5. During the discharge from site dewatering activities:
   a. The weekly average of your turbidity monitoring results exceeds the 50 NTU benchmark (or alternate benchmark if approved by EPA pursuant to Part 3.3.2.b); or
   b. You observe or you are informed by EPA, State, or local authorities of the presence of the conditions specified in Part 4.6.3.e.

[3] If a condition on your site requires a corrective action, you must also fill out a corrective action log found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates. See CGP Part 5.4 for more information.

Section C – Condition and Effectiveness of Pollution Prevention (P2) Practices and Controls (CGP Part 2.3) (Insert additional rows if needed)					
Type and Location of P2 Practices and Controls	**Conditions Requiring Routine Maintenance?[1]**	**If "Yes," How Many Times (Including This Occurrence) Has This Condition Been Identified?**	**Conditions Requiring Corrective Action?[2, 3]**	**Date on Which Condition First Observed (If Applicable)?**	**Description of Conditions Observed**
1.	☐ Yes ☐ No		☐ Yes ☐ No		
2.	☐ Yes ☐ No		☐ Yes ☐ No		
3.	☐ Yes ☐ No		☐ Yes ☐ No		
4.	☐ Yes ☐ No		☐ Yes ☐ No		
5.	☐ Yes ☐ No		☐ Yes ☐ No		
If the same routine maintenance was found to be necessary three or more times for the same control at the same location (including this occurrence), follow the corrective action requirements and record the required information in your corrective action log, or describe here why you believe the specific condition should still be addressed as routine maintenance:					

Section D – Stabilization of Exposed Soil (CGP Part 2.2.14) (Insert additional rows if needed)					
Specific Location That Has Been or Will Be Stabilized	**Stabilization Method and Applicable Deadline**	**Stabilization Initiated?**	**Final Stabilization Criteria Met?**	**Final Stabilization Photos Taken?**	**Notes**
1.		☐ Yes ☐ No If "Yes," date initiated:	☐ Yes ☐ No If "Yes," date criteria met:	☐ Yes ☐ No	
2.		☐ Yes ☐ No If "Yes," date initiated:	☐ Yes ☐ No If "Yes," date criteria met:	☐ Yes ☐ No	
3.		☐ Yes ☐ No If "Yes," date initiated:	☐ Yes ☐ No If "Yes," date criteria met:	☐ Yes ☐ No	
4.		☐ Yes ☐ No If "Yes," date initiated:	☐ Yes ☐ No If "Yes," date criteria met:	☐ Yes ☐ No	
5.		☐ Yes ☐ No If "Yes," date initiated:	☐ Yes ☐ No If "Yes," date criteria met:	☐ Yes ☐ No	

Section E – Description of Discharges (CGP Part 4.6.2)

(Insert additional rows if needed)

Was a discharge (not including dewatering) occurring from any part of your site at the time of the inspection?[4] ☐ Yes ☐ No

If "Yes," for each point of discharge, document the following:

- The visual quality of the discharge.
- The characteristics of the discharge, including color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants.
- Signs of the above pollutant characteristics that are visible from your site and attributable to your discharge in receiving waters or in other constructed or natural site drainage features.

Discharge Location	Observations
1.	
2.	
3.	
4.	
5.	

[4] If a dewatering discharge was occurring, you must conduct a dewatering inspection pursuant to CGP Part 4.3.2 and complete a separate dewatering inspection report.

Section F – Signature and Certification (CGP Part 4.7.2)	
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."	
MANDATORY: Signature of Operator or "Duly Authorized Representative:"	
Signature:	**Date:**
Printed Name:	**Affiliation:**
OPTIONAL: Signature of Contractor or Subcontractor	
Signature:	**Date:**
Printed Name:	**Affiliation:**

General Tips for Using This Template

This Site Inspection Report Template is provided to assist you in preparing site inspection reports for EPA's 2022 Construction General Permit (CGP). If you are covered under the 2022 CGP, you can use this template to create a site inspection report form that is customized to the specific circumstances of your site and that complies with the minimum reporting requirements of Part 4.7 of the permit. Note that the use of this form is optional; you may use your own site inspection report form provided it includes the minimum information required in Part 4.7 of the CGP.

This template does not address the CGP's inspection reporting requirements related to dewatering activities. A separate inspection template has been developed specifically for dewatering activities and is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates.

Keep in mind that this document is a template and not an "off-the-shelf" inspection report that is ready to use without some modification. You must first customize this form to include the specifics of your project in order for it to be useable for your inspection reports. Once you have entered all of your site-specific information into the blank fields, you may use this form to complete inspection reports.

The following tips for using this template will help you ensure that the minimum permit requirements are met:

- **Review the inspection requirements.** Before you start developing your inspection report form, read the CGP's Part 4 inspection requirements. This will ensure that you have a working understanding of the permit's underlying inspection requirements.
- **Complete all required blank fields.** Fill out all blank fields. Only by filling out all fields will the template be compliant with the requirements of the permit. (Note: Where you do not need the number of rows provided in the template form for your inspection, you may delete these or cross them off as you see fit. Or, if you need more space to document your findings, you may insert additional rows in the electronic version of this form or use the bottom of the page in the field version of this form.)
- **Use your site map to document inspection findings.** In several places in the template, you are directed to specify the location of certain features of your site, including where stormwater controls are installed and where you will be stabilizing exposed soil. You are also asked to fill in location information for unsafe conditions and the locations of any discharges occurring during your inspections. Where you are asked for location information, EPA encourages you to reference the point on your SWPPP site map that corresponds to the requested location on the inspection form. Using the site map as a tool in this way will help you conduct efficient inspections, will assist you in evaluating problems found, and will ensure proper documentation.
- **Complete the inspection report within 24 hours of completing a site inspection.** You must complete an inspection report in accordance with Part 4.7.1 of the CGP.
- **Include the inspection form with your SWPPP.** Once your form is complete, make sure to include a copy of the inspection form in your SWPPP in accordance with Part 7.2.7.e of the CGP.
- **Retain copies of all inspection reports with your records.** You must also retain in your records copies of all inspection reports in accordance with the requirements in Part 4.7.3 of the CGP. These reports must be retained for at least 3 years from the date your permit coverage expires or is terminated in accordance with the requirements in Part 4.7.4 of the CGP.

Instructions for Section A

Inspector Name

Enter the name of the person that conducted the inspection. Include the person's contact information (title, affiliated company name, address, email, and phone number).

Inspection Date and Time

Enter the date you performed the inspection and the time you started and ended the inspection.

Weather Conditions During Inspection

Enter the weather conditions occurring during the inspection, e.g., sunny, overcast, light rain, heavy rain, snowing, icy, windy.

Current Phase of Construction
If this project is being completed in more than one phase, indicate which phase it is currently in.

Inspection Location
If your project has multiple locations where you conduct separate inspections, specify the location where this inspection is being conducted. If only one inspection is conducted for your entire project, enter "Entire Site." If necessary, complete additional inspection report forms for each separate inspection location.

Unsafe Conditions for Inspection (CGP Part 4.5.7)
Inspections are not required where a portion of the site or the entire site is subject to unsafe conditions. These conditions should not regularly occur and should not be consistently present on a site. Generally, unsafe conditions are those that render the site (or a portion of it) inaccessible or that would pose a significant probability of injury to applicable personnel. Examples could include severe storm or flood conditions, high winds, and downed electrical wires.

If your site, or a portion of it, is affected by unsafe conditions during the time of your inspection, provide a description of the conditions that prevented you from conducting the inspection and what parts of the site were affected. If the entire site was considered unsafe, specify the location as "Entire Site."

Inspection Frequency
Check all the inspection frequencies that apply to your project. Note that you may be subject to different inspection frequencies in different areas of your site.

Inspection Triggered by a Storm Event
If you were required to conduct this inspection because of a storm event that produced 0.25 inches or more of rain within a 24-hour period, indicate whether you relied on an on-site rain gauge or a nearby weather station (and where the weather station is located). Also, specify the total amount of rainfall for this specific storm event.

If you were required to conduct this inspection because of a snowmelt discharge from a storm event that produced 3.25 inches or more of snow within a 24-hour period, then indicate whether you relied on an on-site measurement or a nearby weather station (and where the weather station is located). Also, specify the total amount of snowfall for this specific storm event.

Instructions for Section B

Type and Location of Erosion and Sediment (E&S) Controls
Provide a list of all erosion and sediment (E&S) controls that your SWPPP indicates will be installed and implemented at your site. This list must include at a minimum all E&S controls required by CGP Part 2.2. Include also any natural buffers established under CGP Part 2.2.1. Buffer requirements apply if your project's earth-disturbing activities will occur within 50 feet of a discharge to receiving water. You may group your E&S controls on your form if you have several of the same type of controls (e.g., you may group "Inlet Protection Measures," "Perimeter Controls," and "Stockpile Controls" together on one line), but if there are any problems with a specific control, you must separately identify the location of the control, whether routine maintenance or corrective action is necessary, and in the notes section you must describe the specifics about the problem you observed.

Conditions Requiring Routine Maintenance?
Answer "Yes" if the E&S control requires routine maintenance as defined in footnote 1 of this template. Note that in many cases, "Yes" answers are expected and indicate a project with an active operation and maintenance program. You should also answer "Yes" if work to fix the problem is still ongoing from the previous inspection, though necessary work must be initiated immediately and completed by the end of the next business day or within seven calendar days if documented in accordance with CGP Part 2.1.4.b.

If "Yes," How Many Times (Including this Occurrence) Has this Condition Been Identified?
Indicate how many times the routine maintenance has been required for the same control at the same location.

Conditions Requiring Corrective Action?
Answer "Yes" if you found any of the conditions listed in footnote 2 in this template to be present during your inspection (CGP Part 5.1). If you answer "Yes," you must take corrective action and complete a corrective action log, found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates. You should also answer "Yes" if work to fix the problem from a previous inspection is still ongoing, though the operator must comply with the corrective action deadlines in CGP Part 5.2.

Date on Which Condition First Observed (If Applicable)?
Provide the date on which the condition that triggered the need for routine maintenance or corrective action was first identified. If the condition was just discovered during this inspection, enter the inspection date. If the condition is a carryover from a previous inspection, enter the original date of the condition's discovery.

Description of Conditions Observed
For each E&S control and the area immediately surrounding it, describe whether the control is properly installed and whether it appears to be working to minimize sediment discharge. Indicate also whether a new or modified control is necessary to comply with the permit. Describe any problem condition(s) you observed such as the following:

1. Failure to install or to properly install a required E&S control
2. Damage or destruction to an E&S control caused by vehicles, equipment, or personnel, a storm event, or other event
3. Mud or sediment deposits found downslope from E&S controls, including in receiving waters, or on nearby streets, curbs, or open conveyance channels
4. Sediment tracked out onto paved areas by vehicles leaving construction site
5. Noticeable erosion or sedimentation at discharge outlets or at adjacent streambanks or channels
6. Erosion of the site's sloped areas (e.g., formation of rills or gullies)
7. E&S control is no longer working due to lack of maintenance
8. Other incidents of noncompliance

Describe also why you think the problem condition(s) occurred as well as actions (e.g., routine maintenance or corrective action) you will take or have taken to fix the problem.

For buffer areas, make note of whether they are marked off as required, whether there are signs of construction disturbance within the buffer, which is prohibited under the CGP, and whether there are visible signs of erosion resulting from discharges through the area.

If routine maintenance or corrective action is required, briefly note the reason. If routine maintenance or corrective action has been completed, make a note of the date it was completed and what was done. *If corrective action is required, note that you will need to complete a separate corrective action log describing the condition and your work to fix the problem*.

Routine Maintenance Need Has Been Found to be Necessary Three (3) or More Times for the Same Control at the Same Location (Including this Occurrence)
If routine maintenance has been required three (3) or more times for the same control at the same location, the permit requires (CGP Part 2.1.4.c) you to fix the problem using the corrective action procedures in CGP Part 5 or to document why you believe the reoccurring problem can be addressed as a routine maintenance fix. If you believe the problem can continue to be fixed as routine maintenance, describe why you believe the specific condition should still be addressed as routine maintenance.

Instructions for Section C

Type and Location of Pollution Prevention (P2) Practices and Controls
Provide a list of all pollution prevention (P2) practices and controls that are implemented at your site. This list must include all P2 practices and controls required by CGP Part 2.3 and those that are described in your SWPPP.

Conditions Requiring Routine Maintenance?
Answer "Yes" if the P2 practice or control requires routine maintenance as defined in footnote 1of this template. Note that in many cases, "Yes" answers are expected and indicate a project with an active operation and maintenance program. You should also answer "Yes" if work to fix the problem is still ongoing

from the previous inspection, though necessary work must be initiated immediately and completed by the end of the next business day or within seven calendar days if documented in accordance with CGP Part 2.1.4.b.

If "Yes," How Many Times (Including this Occurrence) Has this Condition Been Identified?
Indicate how many times the routine maintenance has been required for the same practice or control at the same location.

Conditions Requiring Corrective Action?
Answer "Yes" if you found any of the conditions listed in footnote 2 in this template to be present during your inspection (CGP Part 5.1). If you answer "Yes," you must take corrective action and complete a corrective action log, found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates. You should also answer "Yes" if work to fix the problem from a previous inspection is still ongoing, though the operator must comply with the corrective action deadlines in CGP Part 5.2.

Date on Which Condition First Observed (If Applicable)?
Provide the date on which the condition that triggered the need for maintenance or corrective action was first identified. If the condition was just discovered during this inspection, enter the inspection date. If the condition is a carryover from a previous inspection, enter the original date of the condition's discovery.

Description of Conditions Observed
For each P2 control and the area immediately surrounding it, describe whether the control is properly installed, and whether it appears to be working to minimize or eliminate pollutant discharges. Indicate also whether a new or modified control is necessary to comply with the permit. Describe any problem condition(s) you observed such as the following:

1. Failure to install or to properly install a required P2 control
2. Damage or destruction to a P2 control caused by vehicles, equipment, or personnel, or a storm event
3. Evidence of a spill, leak, or other type of pollutant discharge, or failure to have properly cleaned up a previous spill, leak, or other type of pollutant discharge
4. Spill response supplies are absent, insufficient, or not where they are supposed to be located
5. Improper storage, handling, or disposal of chemicals, building materials or products, fuels, or wastes
6. P2 control is no longer working due to lack of maintenance
7. Other incidents of noncompliance

Describe also why you think the problem condition(s) occurred as well as actions (e.g., routine maintenance or corrective action) you will take or have taken to fix the problem.

If routine maintenance or corrective action is required, briefly note the reason. If routine maintenance or corrective action has been completed, make a note of the date it was completed and what was done. *If corrective action is required, note that you will need to complete a separate corrective action log describing the condition and your work to fix the problem*.

Routine Maintenance Need Was Found to be Necessary Three (3) or More Times for the Same Control at the Same Location (Including this Occurrence)
If routine maintenance has been required three (3) or more times for the same control at the same location, the permit requires (CGP Part 2.1.4.c) you to fix the problem using the corrective action procedures in CGP Part 5 or to document why you believe the reoccurring problem can be addressed as a routine maintenance fix. If you believe the problem can continue to be fixed as routine maintenance, describe why you believe the specific condition should still be addressed as routine maintenance.

Instructions for Section D

Specific Location That Has Been or Will Be Stabilized
List all areas where soil stabilization is required to begin because construction work in that area has permanently stopped or temporarily stopped (i.e., work will stop for 14 or more days), and all areas where stabilization has been implemented (CGP Part 2.2.14).

Stabilization Method and Applicable Deadline
For each area, specify the method of stabilization (e.g., hydroseed, sod, planted vegetation, erosion control blanket, mulch, rock).

Specify also which of the following stabilization deadlines apply to this location:

1. 5 acres or less of land disturbance occurring at any one time at site: Complete no later than 14 calendar days after stabilization initiated.
2. More than 5 acres of land disturbance occurring at any one time at site: Complete no later than 7 calendar days after stabilization initiated.
3. Arid, semi-arid, and drought-stricken areas: See CGP Part 2.2.14.b.i.
4. Unforeseen circumstances: See CGP Part 2.2.14.b.ii.
5. Discharges to a sediment- or nutrient-impaired water or to a water identified as Tier 2, 2.5, or 3 for antidegradation purposes: Complete no later than 7 days after stabilization initiated.

Stabilization Initiated?
For each area, indicate whether stabilization has been initiated. If "Yes," then enter the date stabilization was initiated.

Final Stabilization Criteria Met?
For each area, indicate whether the final stabilization criteria in CGP Part 2.2.14.c have been met. If "Yes," then enter the date final stabilization criteria were met.

Final Stabilization Photos Taken?
Answer "Yes" if you have taken photos before and after meeting the stabilization criteria as required in CGP Part 8.2.1.a.

Notes
For each area where stabilization has been initiated, describe the progress that has been made and what additional actions are necessary to complete stabilization. Note the effectiveness of stabilization in preventing erosion. If stabilization has been initiated but not completed, make a note of the date it is to be completed. If stabilization has been completed, make a note of the date it was completed. If stabilization has not yet been initiated, make a note of the date it is to be initiated and the date it is to be completed.

Instructions for Section E

You are only required to complete this section if a discharge is occurring at the time of the inspection (CGP Part 4.6.2).

Was a discharge (not including dewatering) occurring from any part of your site at the time of the inspection?
During your inspection, examine all points of discharge from your site, and determine whether a discharge is occurring. If a dewatering discharge was occurring, you must conduct a dewatering inspection pursuant to CGP Part 4.3.2. If there is a discharge, answer "Yes" and complete the questions below regarding the specific discharge. If there is not a discharge, answer "No" and skip to the next page.

Discharge Location (Repeat as necessary if there are multiple points of discharge.)
Specify the location on your site where the discharge is occurring. The location may be an outlet from a stormwater control or constructed stormwater channel, a discharge into a storm sewer inlet, or a specific point on the site. Be as specific as possible; it is recommended that you refer to a precise point on your site map.

Observations
Document the visual quality of the discharge and take note of the characteristics of the stormwater discharge, including color; odor; floating, settled, or suspended solids; foam; oily sheen; and other indicators of stormwater pollutants. Also, document signs of these same pollutant characteristics that are visible from your site and attributable to your discharge in receiving waters or in other constructed or natural site drainage features.

Instructions for Section F

Each inspection report must be signed and certified to be considered complete (CGP Part 4.7.2).

Operator or "Duly Authorized Representative" – MANDATORY (CGP Appendix G Part G.11.2 and CGP Appendix H Section X)

At a minimum, the site inspection report must be signed by either (1) the person who signed the NOI, or (2) a duly authorized representative of that person. The following requirements apply:

If the signatory will be the person who signed the NOI for permit coverage, as a reminder, that person must be one of the following types of individuals:

- *For a corporation*: By a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- *For a partnership or sole proprietorship*: By a general partner or the proprietor, respectively.
- *For a municipality, State, Federal, or other public agency*: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a Federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

If the signatory will be a duly authorized representative, the following requirements must be met:

- The authorization is made in writing by the person who signed the NOI (see above);
- The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

Sign, date and print your name and affiliation.

Contractor or Subcontractor - OPTIONAL

Where you rely on a contractor or subcontractor to complete the site inspection report, you should consider requiring the individual(s) to sign and certify each report. Note that this does not relieve you, the permitted operator, of the requirement to sign and certify the site inspection report as well. If applicable, sign, date, and print your name and affiliation.

Note

While EPA has made every effort to ensure the accuracy of all instructions contained in this template, it is the permit, not this template, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between this template and any corresponding provision of the CGP, you must abide by the requirements in the permit. EPA welcomes comments on this Site Inspection Report Template at any time and will consider those comments in any future revision. You may contact EPA for CGP-related inquiries at cgp@epa.gov

2022 Construction General Permit Dewatering Inspection Report

Project Name: _____

NPDES ID Number: _____

Section A – Dewatering Discharges (CGP Part 4.6.3) Complete this section within 24 hours of completing the inspection. (If necessary, complete additional inspection reports for each separate inspection location.)	
Inspector Information	
Inspector Name:	**Title:**
Company Name:	**Email:**
Address:	**Phone Number:**
Inspection Details	
Inspection Date:	**Inspection Location:**
Discharge Start Time:	**Discharge End Time:**
Rate of Discharge (gallons per day):	**Corrective Action Required?**[1] ☐ Yes ☐ No
Describe Indicators of Pollutant Discharge at Point of Dewatering Discharge:[1]	
Attach Photographs of: 1. Dewatering water prior to treatment by a dewatering control(s) and the final discharge after treatment; and 2. Dewatering control(s); and 3. Point of discharge to any receiving waters flowing through or immediately adjacent to the site and/or to constructed or natural site drainage features, storm drain inlets, and other conveyances to receiving waters.	

[1] If you observe any of the following indicators of pollutant discharge, you are required to take corrective action under Part 5.1.5.b:

- a sediment plume, suspended solids, unusual color, presence of odor, decreased clarity, or presence of foam; or
- a visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water.

Project Name: _____

NPDES ID Number: _____

Section B – Signature and Certification (CGP Part 4.7.2)	
"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."	
MANDATORY: Signature of Operator or "Duly Authorized Representative:"	
Signature:	**Date:**
Printed Name:	**Affiliation:**
OPTIONAL: Signature of Contractor or Subcontractor	
Signature:	**Date:**
Printed Name:	**Affiliation:**

General Tips for Using This Template

This Dewatering Inspection Report Template is provided to assist you in preparing dewatering inspection reports for EPA's 2022 Construction General Permit (CGP). If you are covered under the 2022 CGP, you can use this template to create a dewatering inspection report form that complies with the minimum reporting requirements of Part 4.6.3 of the permit. Note that the use of this form is optional; you may use your own inspection report form provided it includes the minimum information required in Part 4.6.3 of the CGP.

This template is for dewatering inspections only. A separate site inspection report template that does not include dewatering inspections and complies with the minimum reporting requirements of Part 4.7 of the permit is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates.

If you are covered under a State CGP, this template may be helpful in developing a report that can be used for that permit; however, it will need to be modified to meet the specific requirements of that permit. If your permitting authority requires you to use a specific inspection report form, you should not use this form.

The following tips for using this template will help you ensure that the minimum permit requirements are met:

- **Review the inspection requirements.** Before you start developing your inspection report form, read the CGP's Part 4 inspection requirements. This will ensure that you have a working understanding of the permit's underlying inspection requirements.
- **Complete all required blank fields.** Fill out all blank fields. Only by filling out all fields will the template be compliant with the requirements of the permit. (Note: Where you do not need the number of rows provided in the template form for your inspection, you may delete these as you see fit. Or, if you need more space to document your findings, you may insert additional rows in the electronic version of this form or use the bottom of the page in the field version of this form.)
- **Use your site map to document inspection findings.** In several places in the template, you are directed to specify the location of certain features of your site, including where stormwater controls are installed and where you will be stabilizing exposed soil. You are also asked to fill in location information for unsafe conditions and the locations of any discharges occurring during your inspections. Where you are asked for location information, EPA encourages you to reference the point on your SWPPP site map that corresponds to the requested location on the inspection form. Using the site map as a tool in this way will help you conduct efficient inspections, will assist you in evaluating problems found, and will ensure proper documentation.
- **Include the inspection form with your SWPPP.** Once your form is complete, make sure to include a copy of the inspection form in your SWPPP in accordance with Part 7.2.7.e of the CGP.
- **Retain copies of all inspection reports with your records.** You must also retain copies of all inspection reports in your records in accordance with the requirements in Part 4.7.3 of the CGP. These reports must be retained for at least 3 years from the date your permit coverage expires or is terminated in accordance with the requirements in Part 4.7.4 of the CGP.

Instructions for Section A

Inspector Name

Enter the name of the person that conducted the inspection. Include the person's contact information (title, affiliated company name, address, email, and phone number).

Inspection Date

Enter the date you performed the inspection.

Inspection Location

If your project has multiple locations where you conduct separate dewatering inspections, specify the location where this inspection is being conducted. Otherwise, you can enter "dewatering operation."

Discharge Start and End Times

Enter the approximate time the dewatering discharge started and ended on the day of the inspection.

Rate of Discharge
Enter the rate of discharge in gallons per day on the day of inspection.

To estimate the approximate discharge rate on the day of dewatering inspection, one approach is to use the manufacturer's design pump rating for the pump model in use. For example, a pump rated at 164 gpm (gallons per minute) by the manufacturer can be assumed to be discharging at 164 gpm in most cases. To convert to gallons per day, multiply the rate in gpm by the ratio of minutes in one-day (1,440 minutes per day), resulting in a discharge rate of 236,160 gallons per day.

In cases where the dewatering discharge is being pumped over long distances or a substantial distance uphill, which will result in a reduced pump rate relative to manufacturer's specification, the operator may improve the accuracy of the estimate by estimating the time required to fill a container of a known volume. For example, if it takes 60 seconds to fill an empty 55-gallon barrel, the estimated discharge rate is 55 gpm, or 79,200 gallons per day.

Indicators of Pollutant Discharge
For the point of discharge, describe any observed sediment plume, suspended solids, unusual color, presence of odor, decreased clarity, or presence of foam; and/or a visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water.

Corrective Action Required?
Answer "Yes" if during your inspection you found any of the conditions listed above in the instructions for the Indicators of Pollutant Discharge section. If you answer "Yes," you must take corrective action and complete a corrective action log, found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates. Answer "No" if you did not observe any of the listed pollutant indicators.

Photographs
As required in CGP Part 8.2.1.a, attach photos of: (1) dewatering water prior to treatment by a dewatering control(s) and the final discharge after treatment; (2) the dewatering control(s); and (3) the point of discharge to any receiving waters flowing through or immediately adjacent to the site and/or to constructed or natural site drainage features, storm drain inlets, and other conveyances to receiving waters.

Instructions for Section B

Each inspection report must be signed and certified to be considered complete (CGP Part 4.7.2).

Operator or "Duly Authorized Representative" – MANDATORY (CGP Appendix G Part G.11.2 and CGP Appendix H Section X)
At a minimum, the dewatering inspection report must be signed by either (1) the person who signed the NOI, or (2) a duly authorized representative of that person. The following requirements apply:

If the signatory will be the person who signed the NOI for permit coverage, as a reminder, that person must be one of the following types of individuals:

- *For a corporation*: By a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- *For a partnership or sole proprietorship*: By a general partner or the proprietor, respectively.

- *For a municipality, State, Federal, or other public agency*: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a Federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

If the signatory will be a duly authorized representative, the following requirements must be met:

- The authorization is made in writing by the person who signed the NOI (see above);
- The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

Sign, date and print your name and affiliation.

Contractor or Subcontractor - OPTIONAL

Where you rely on a contractor or subcontractor to complete the dewatering inspection report, you should consider requiring the individual(s) to sign and certify each report. Note that this does not relieve you, the permitted operator, of the requirement to sign and certify the dewatering inspection report as well. If applicable, sign, date, and print your name and affiliation.

Note

While EPA has made every effort to ensure the accuracy of all instructions contained in this template, it is the permit, not this template, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between this template and any corresponding provision of the CGP, you must abide by the requirements in the permit. EPA welcomes comments on this Dewatering Inspection Report Template at any time and will consider those comments in any future revision. You may contact EPA for CGP-related inquiries at cgp@epa.gov

Appendix E – Copy of Corrective Action Log

2022 CGP Corrective Action Log
Project Name: _____
NPDES ID Number: _____

Section A – Individual Completing this Log	
Name:	**Title:**
Company Name:	**Email:**
Address:	**Phone Number:**
Section B – Details of the Problem (CGP Part 5.4.1.a) Complete this section within 24 hours of discovering the condition that triggered corrective action.	
Date problem was first identified:	**Time problem was first identified**:
What site conditions triggered this corrective action? *(Check the box that applies. See instructions for a description of each triggering condition (1 thru 6).)* ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5a ☐ 5b ☐ 6	
Specific location where problem identified:	
Provide a description of the specific condition that triggered the need for corrective action and the cause (if identifiable):	
Section C – Corrective Action Completion (CGP Part 5.4.1.b) Complete this section within 24 hours after completing the corrective action.	
For site condition # 1, 2, 3, 4, or 6 (those not related to a dewatering discharge) confirm that you met the following deadlines (CGP Part 5.2.1):	
☐ Immediately took all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events. **AND**	
☐ Completed corrective action by the close of the next business day, unless a new or replacement control, or significant repair, was required. **OR**	
☐ Completed corrective action within seven (7) calendar days from the time of discovery because a new or replacement control, or significant repair, was necessary to complete the installation of the new or modified control or complete the repair. **OR**	
☐ It was infeasible to complete the installation or repair within 7 calendar days from the time of discovery. Provide the following additional information: Explain why 7 calendar days was infeasible to complete the installation or repair:	

Provide your schedule for installing the stormwater control and making it operational as soon as feasible after the 7 calendar days:

For site condition # 5a, 5b, or 6 (those related to a dewatering discharge), confirm that you met the following deadlines:

- ☐ Immediately took all reasonable steps to minimize or prevent the discharge of pollutants until a solution could be implemented, including shutting off the dewatering discharge as soon as possible depending on the severity of the condition taking safety considerations into account.
- ☐ Determined whether the dewatering controls were operating effectively and whether they were causing the conditions.
- ☐ Made any necessary adjustments, repairs, or replacements to the dewatering controls to lower the turbidity levels below the benchmark or remove the visible plume or sheen.

Describe any modification(s) made as part of corrective action: (Insert additional rows below if applicable)	**Date of completion:**	**SWPPP update necessary?**	**If yes, date SWPPP was updated:**
1.		☐ Yes ☐ No	
2.		☐ Yes ☐ No	

Section D - Signature and Certification (CGP Part 5.4.2)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

MANDATORY: Signature of Operator or "Duly Authorized Representative:"	
Signature:	**Date:**
Printed Name:	**Affiliation:**
OPTIONAL: Signature of Contractor or Subcontractor	
Signature:	**Date:**
Printed Name:	**Affiliation:**

General Instructions

This Corrective Action Log Template is provided to assist you creating a corrective action log that complies with the minimum reporting requirements of Part 5.4 of the EPA's Construction General Permit (CGP). For each triggering condition on your site, you will need to fill out a separate corrective action log.

The entire form must be completed to be compliant with the requirements of the permit. (Note: In Section C, if you do not need the number of rows provided in the corrective action log, you may delete these or cross them off. Alternatively, if you need more space to describe any modifications, you may insert additional rows in the electronic version of this form or use the bottom of the page in the field version of this form.)

If you are covered under a State CGP, this template may be helpful in developing a log that can be used for that permit; however, you will likely need to modify this form to meet the specific requirements of any State-issued permit. If your permitting authority requires you to use a specific corrective action log, you should not use this template.

Instructions for Section A

Individual completing this form Enter the name of the person completing this log. Include the person's contact information (title, affiliated company name, address, email, and phone number).

Instructions for Section B

You must complete Section B within 24 hours of discovering the condition that triggered corrective action. (CGP Part 5.4)

When was the problem first discovered?
Specify the date and time when the triggering condition was first discovered.

What site conditions triggered this corrective action? (CGP Parts 5.1 and 5.3)
Check the box corresponding to the numbered triggering condition below that applies to your site.

1. A stormwater control needs a significant repair or a new or replacement control is needed, or, in accordance with Part Error! Reference source not found., you find it necessary to repeatedly (i.e., 3 or more times) conduct the same routine maintenance fix to the same control at the same location (unless you document in your inspection report under Part Error! Reference source not found. that the specific reoccurrence of this same problem should still be addressed as a routine maintenance fix under Part Error! Reference source not found.);
2. A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly;
3. Your discharges are not meeting applicable water quality standards;
4. A prohibited discharge has occurred (see Part 1.3);
5. During discharge from site dewatering activities:
   a. The weekly average of your turbidity monitoring results exceeds the 50 NTU benchmark (or alternate benchmark if approved by EPA pursuant to Part **Error! Reference source not found.**); or
   b. You observe or you are informed by EPA, State, or local authorities of the presence of any of the following at the point of discharge to a receiving water flowing through or immediately adjacent to your site and/or to constructed or natural site drainage features or storm drain inlets:
      - sediment plume
      - suspended solids
      - unusual color
      - presence of odor
      - decreased clarity
      - presence of foam
      - visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water
6. EPA requires corrective action as a result of permit violations found during an inspection carried out under Part 4.8.

Provide a description of the problem (CGP Part 5.4.1.a)
Provide a summary description of the condition you found that triggered corrective action, the cause of the problem (if identifiable), and the specific location where it was found. Be as specific as possible about the location; it is recommended that you refer to a precise point on your site map.

Instructions for Section C

You must complete Section C within 24 hours after completing the correction action. (CGP Part 5.4)

Deadlines for completing corrective action for condition # 1, 2, 3, 4, or 6 (if not relating to a dewatering discharge) (CGP Part 5.2.1)
Check the box to confirm that you met the deadlines that apply to each triggering condition. You are always required to check the first box (i.e., Immediately took all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events.). Only one of the next three boxes should be checked depending on the situation that applies to this corrective action.

Check the second box if the corrective action for this particular triggering condition does not require a new or replacement control, or a significant repair. These actions must be completed by the close of the next business day from the time of discovery of the condition.

Check the third box if the corrective action for this particular triggering condition requires a new or replacement control, or a significant repair. These actions must be completed by no later than seven calendar days from the time of discover of the condition.

Check the fourth box if the corrective action for this particular triggering condition requires a new or replacement control, or a significant repair, and if it is infeasible to complete the work within seven calendar days. Additionally, you will need to fill out the table below the checkbox that requires:

1. An explanation as to why it was infeasible to complete the installation or repair within seven calendar days of discovering the condition.
2. Provide the schedule you will adhere to for installing the stormwater control and making it operational as soon as feasible after the seventh day following discovery.

Note: Per Part 5.2.1.c, where these actions result in changes to any of the stormwater controls or procedures documented in your SWPPP, you must modify your SWPPP accordingly within seven calendar days of completing this work.

Deadlines for completing corrective action for condition # 5a, 5b, or 6 related to a dewatering discharge (CGP Part 5.2.2)
These deadlines apply to conditions relating to construction dewatering activities. Check the box to confirm that you met the deadlines that apply to each triggering condition. You are required to check all of the boxes in this section to indicate your compliance with the corrective action deadlines.

List of modification(s) to correct problem
Provide a list of modifications you completed to correct the problem.

Date of completion
Enter the date you completed the modification. The work must be completed by the deadline you indicated above.

SWPPP update necessary?
Check "Yes" or "No" to indicate if a SWPPP update is necessary consistent with Part 7.4.1.a in order to reflect changes implemented at your site. If "Yes," then enter the date you updated your SWPPP. The SWPPP updates must be made within seven calendar days of completing a corrective action. (CGP Part 5.2.1.c)

Instructions for Section D

Each corrective action log entry must be signed and certified following completion of Section D to be considered complete. (CGP Part 5.4.2)

Operator or "Duly Authorized Representative" – MANDATORY (CGP Appendix G Part G.11.2 and CGP Appendix H Section X)

At a minimum, the corrective action log must be signed by either (1) the person who signed the NOI, or (2) a duly authorized representative of that person. The following requirements apply:

If the signatory will be the person who signed the NOI for permit coverage, as a reminder, that person must be one of the following types of individuals:

- *For a corporation*: By a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- *For a partnership or sole proprietorship*: By a general partner or the proprietor, respectively.
- *For a municipality, State, Federal, or other public agency*: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a Federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

If the signatory will be a duly authorized representative, the following requirements must be met:

- The authorization is made in writing by the person who signed the NOI (see above);
- The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

Sign, date and print your name and affiliation.

Contractor or Subcontractor - OPTIONAL

Where you rely on a contractor or subcontractor to complete this log and the associated corrective action, you should consider requiring the individual(s) to sign and certify each log entry. Note that this does not relieve you, the permitted operator, of the requirement to sign and certify the log as well. If applicable, sign, date, and print your name and affiliation.

Recordkeeping

Logs must be retained for at least 3 years from the date your permit coverage expires or is terminated. (CGP Part 5.4.4)

Keep copies of your signed corrective action log entries at the site or at an easily accessible location so that it can be made immediately available at the time of an on-site inspection or upon request by EPA. (CGP Part 5.4.3) Include a copy of the corrective action log in your SWPPP. (CGP Part 7.2.7.e)

Note

While EPA has made every effort to ensure the accuracy of all instructions contained in this template, it is the permit, not this template, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between this template and any corresponding provision of the CGP, you must abide by the requirements in the permit. EPA welcomes comments on this Corrective Action Log Template at any time and will consider those comments in any future revision. You may contact EPA for CGP-related inquiries at cgp@epa.gov

Appendix F –SWPPP Amendment Log

Instructions (see CGP Part 7.4):

- Create a log here of changes and updates to the SWPPP. You may use the table below to track these modifications.
- SWPPP modifications are required pursuant to CGP Part 7.4.1 in the following circumstances:
  - ✓ Whenever new operators become active in construction activities on your site, or you make changes to your construction plans, stormwater controls, or other activities at your site that are no longer accurately reflected in your SWPPP (this includes changes made in response to corrective actions triggered under CGP Part 5);
  - ✓ To reflect areas on your site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;
  - ✓ If inspections or investigations determine that SWPPP modifications are necessary for compliance with this permit;
  - ✓ Where EPA determines it is necessary to install and/or implement additional controls at your site in order to meet requirements of the permit;
  - ✓ To reflect any revisions to applicable Federal, State, Tribal, or local requirements that affect the stormwater control measures implemented at the site; and
  - ✓ If applicable, if a change in chemical treatment systems or chemically-enhanced stormwater control is made, including use of a different treatment chemical, different dosage rate, or different area of application.

No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]

Appendix G –Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: _____

Project Title: _____

Operator(s): _____

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: _____

Address: _____

Telephone Number: _____

Type of construction service to be provided: _____

_____

_____

Signature: _____

Title: _____

Date: _____

Appendix H –Grading and Stabilization Activities Log

Date Grading Activity Initiated	**Description of Grading Activity**	**Description of Stabilization Measure and Location**	**Date Grading Activity Ceased** (Indicate Temporary or Permanent)	**Date When Stabilization Measures Initiated**
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	

Appendix I –Training Documentation

Refer to Section 1.2 for additional details.

Clarification regarding training requirements. Excerpt taken from EPA FAQs

What are the training requirements for inspectors?

For projects that receive permit coverage prior to February 17, 2023, operators may continue to comply with the training requirements as they were worded in the 2017 CGP:

For projects that receive permit coverage on or after February 17, 2023, CGP Part 6.3 specifies that anyone carrying out inspections must either (1) complete the EPA construction inspection course developed for this permit and pass the exam, or (2) hold a current valid certification or license from a non-EPA training program that covers essentially the same principles.

The requirements specify that the non-EPA training program must cover, at a minimum, the following:

- Principles and practices of erosion and sediment control and pollution prevention practices at construction sites
- Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites
- Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4.

Once the EPA 2022 Stormwater training class is available members of the Stormwater management team will comply with the noted training requirements.

Appendix J – Delegation of Authority Form

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the EPA's Construction General Permit (CGP), at the _____ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, State, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix G of EPA's CGP, and that the designee above meets the definition of a "duly authorized representative" as set forth in Appendix G.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____

Appendix K – Endangered Species Documentation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To: February 14, 2022
Project code: 2022-0007195
Project Name: Florence Roche Elementary School

Subject: Consistency letter for the 'Florence Roche Elementary School' project indicating that any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).

Dear mark winslow:

The U.S. Fish and Wildlife Service (Service) received on February 14, 2022 your effects determination for the 'Florence Roche Elementary School' (the Action) using the northern long-eared bat (*Myotis septentrionalis*) key within the Information for Planning and Consultation (IPaC) system. You indicated that no Federal agencies are involved in funding or authorizing this Action. This IPaC key assists users in determining whether a non-Federal action may cause "take"[1] of the northern long-eared bat that is prohibited under the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based upon your IPaC submission, any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the Action is not likely to result in unauthorized take of the northern long-eared bat.

Please report to our office any changes to the information about the Action that you entered into IPaC, the results of any bat surveys conducted in the Action area, and any dead, injured, or sick northern long-eared bats that are found during Action implementation.

If your Action proceeds as described and no additional information about the Action's effects on species protected under the ESA becomes available, no further coordination with the Service is required with respect to the northern long-eared bat.

The IPaC-assisted determination for the northern long-eared bat **does not** apply to the following ESA-protected species that also may occur in your Action area:

- Monarch Butterfly *Danaus plexippus* Candidate

You may coordinate with our Office to determine whether the Action may cause prohibited take of the animal species listed above.

---

[1]Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct [ESA Section 3(19)].

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Florence Roche Elementary School

2. Description

The following description was provided for the project 'Florence Roche Elementary School':

> Construction of a replacement Elementary School and athletic field s followed by demolition of existing Elementary school

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.61644135,-71.57632414847596,14z

Determination Key Result

This non-Federal Action may affect the northern long-eared bat; however, any take of this species that may occur incidental to this Action is not prohibited under the final 4(d) rule at 50 CFR §17.40(o).

Determination Key Description: Northern Long-eared Bat 4(d) Rule
This key was last updated in IPaC on **May 15, 2017**. Keys are subject to periodic revision.

This key is intended for actions that may affect the threatened northern long-eared bat.

The purpose of the key for non-Federal actions is to assist determinations as to whether proposed actions are excepted from take prohibitions under the northern long-eared bat 4(d) rule.

If a non-Federal action may cause prohibited take of northern long-eared bats or other ESA-listed animal species, we recommend that you coordinate with the Service.

Determination Key Result

Based upon your IPaC submission, any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).

Qualification Interview

1. Is the action authorized, funded, or being carried out by a Federal agency?

   No

2. Will your activity purposefully **Take** northern long-eared bats?

   No

3. [Semantic] Is the project action area located wholly outside the White-nose Syndrome Zone?

   Automatically answered
   No

4. Have you contacted the appropriate agency to determine if your project is near a known hibernaculum or maternity roost tree?

   Location information for northern long-eared bat hibernacula is generally kept in state Natural Heritage Inventory databases – the availability of this data varies state-by-state. Many states provide online access to their data, either directly by providing maps or by providing the opportunity to make a data request. In some cases, to protect those resources, access to the information may be limited. A web page with links to state Natural Heritage Inventory databases and other sources of information on the locations of northern long-eared bat roost trees and hibernacula is available at www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html.

   Yes

5. Will the action affect a cave or mine where northern long-eared bats are known to hibernate (i.e., hibernaculum) or could it alter the entrance or the environment (physical or other alteration) of a hibernaculum?

   No

6. Will the action involve Tree Removal?

   No

Project Questionnaire

If the project includes forest conversion, report the appropriate acreages below. Otherwise, type '0' in questions 1-3.

1. Estimated total acres of forest conversion:

0

2. If known, estimated acres of forest conversion from April 1 to October 31

0

3. If known, estimated acres of forest conversion from June 1 to July 31

0

If the project includes timber harvest, report the appropriate acreages below. Otherwise, type '0' in questions 4-6.

4. Estimated total acres of timber harvest

0

5. If known, estimated acres of timber harvest from April 1 to October 31

0

6. If known, estimated acres of timber harvest from June 1 to July 31

0

If the project includes prescribed fire, report the appropriate acreages below. Otherwise, type '0' in questions 7-9.

7. Estimated total acres of prescribed fire

0

8. If known, estimated acres of prescribed fire from April 1 to October 31

0

9. If known, estimated acres of prescribed fire from June 1 to July 31

0

If the project includes new wind turbines, report the megawatts of wind capacity below. Otherwise, type '0' in question 10.

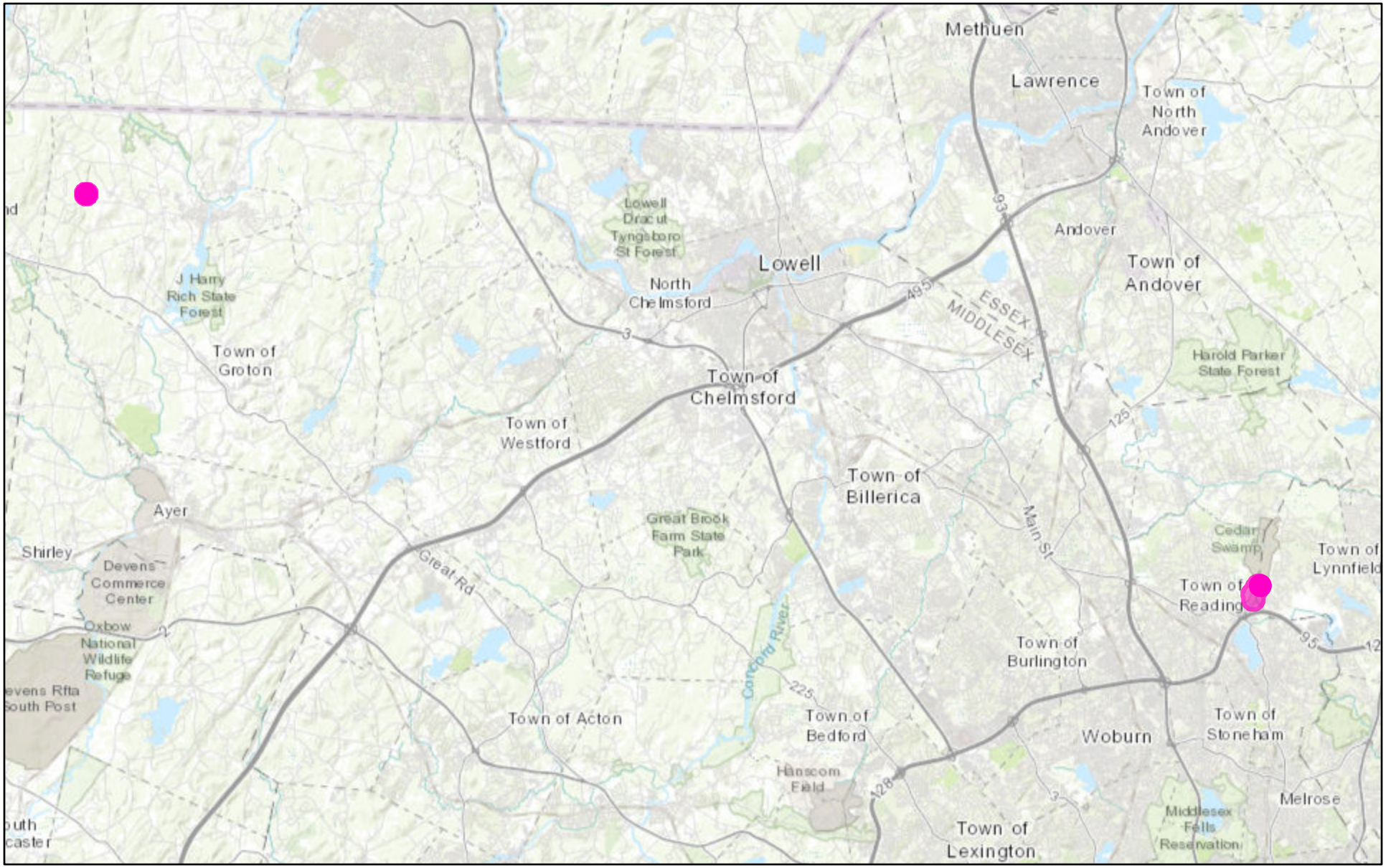
10. What is the estimated wind capacity (in megawatts) of the new turbine(s)?

0

IPaC User Contact Information

Name: mark winslow
Address: 7 Jackson Walkway
City: Providence
State: RI
Zip: 02903
Email mwinslow@gilbaneco.com
Phone: 4014565800

Groton



February 14, 2022

Statewide_NLEB_Symbology

- Hibernaculum
- MA Northern Long-eared Bat Winter Hibernacula (with ¼ mile buffer)

1:288,895

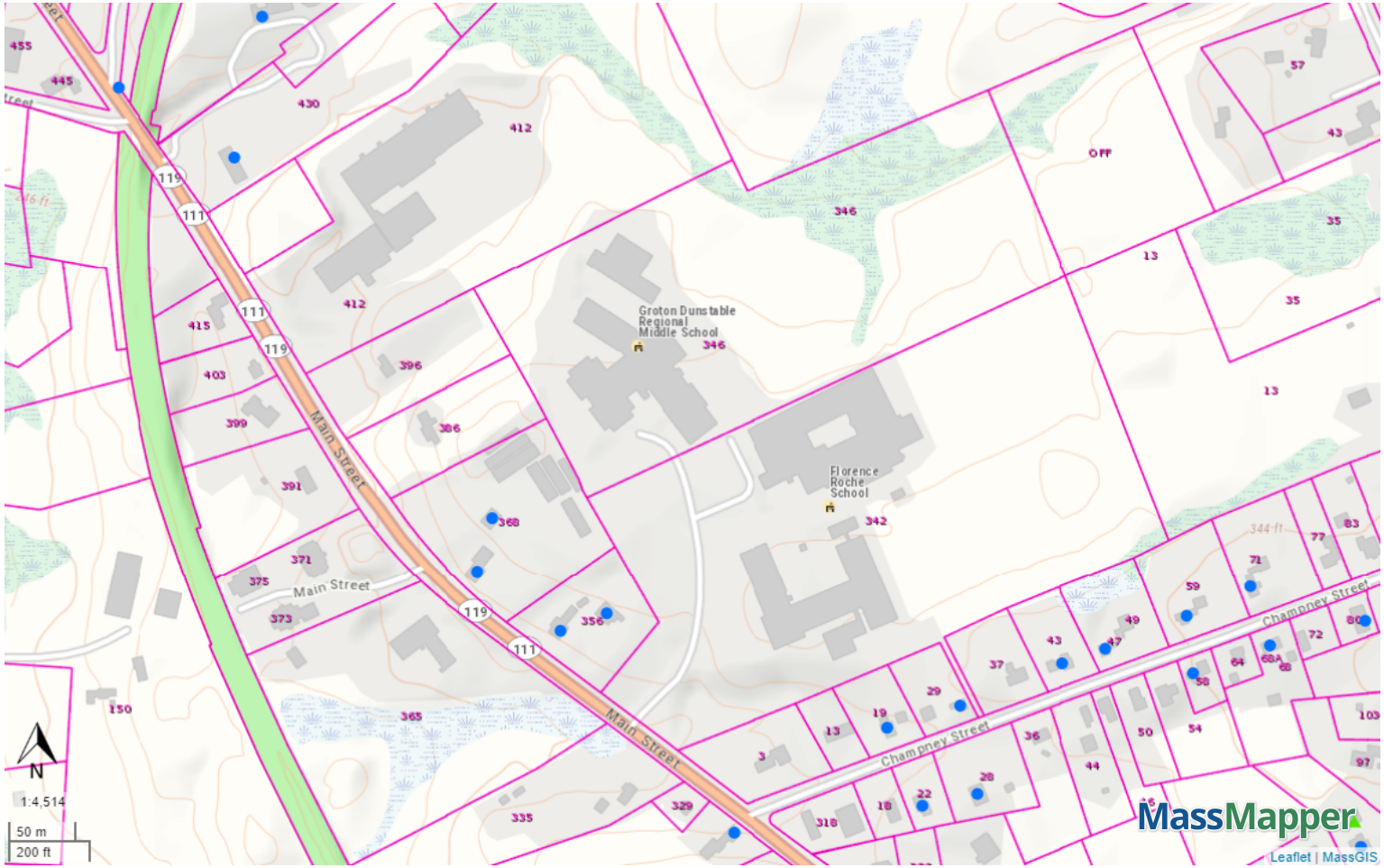
0 1.75 3.5 7 mi

0 2.75 5.5 11 km

Appendix L – Historic Properties Documentation

A formal Project Notification Form was submitted to the Massachusetts Historical Commission on 3/18/2022. No response has been received as of the issuance of this draft. An unofficial search of the Massachusetts Historical database revealed no Historic Properties currently or previously associated with the project site.

MassHistoric Commission Inventory



MassHistoric Commission Inventory (Points)

- National Register of Historic Places
- Preservation Restriction
- Massachusetts Historic Landmark
- Local Historic District
- NRHP and LHD
- Inventoried Property

Property Tax Parcels

Appendix M – Rainfall Gauge Recording

Use the table below to record the rainfall gauge readings at the beginning and end of each work day. An example table follows.

Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
1			1			1		
2			2			2		
3			3			3		
4			4			4		
5			5			5		
6			6			6		
7			7			7		
8			8			8		
9			9			9		
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31			31			31		

Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
1			1			1		
2			2			2		
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4			4			4		
5			5			5		
6			6			6		
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30			30			30		
31			31			31		

Month/Year			Month/Year			Month/Year		
Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
1			1			1		
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3			3			3		
4			4			4		
5			5			5		
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31			31			31		

Month/Year			Month/Year			Month/Year		
Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
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Appendix N – Turbidity Monitoring Sampling Documentation

TBD. No dewatering discharges are anticipated requiring the need for turbidity monitoring

APPENDIX 8:
STORMWATER MANAGEMENT REPORT

TOWN OF GROTON
Earth Removal-Stormwater Advisory Committee
173 Main Street
Groton, Massachusetts 01450
Telephone (978) 448-1105
FAX: (978) 448-1113

CHAPTER 198
FULL STORMWATER MANAGEMENT
PERMIT # 2022-02

Applicant:	Town of Groton/Groton Dunstable Regional School District Town Hall, 173 Main Street Groton, MA 01450
Landowner:	Groton Dunstable Regional School District 342 Main Street Groton, MA 01450
Property location:	342 Main Street
Assessors' Map and Parcel:	110-42, 110-43, 110-34
Application submitted:	January 4, 2022
Public Hearing:	January 18, 2022 February 15, 2022
Date permit issued:	February 15, 2022
Activity level:	Full Stormwater Management Permit
Expiration date:	February 15, 2025

Reference plans & documents:

- "Stormwater Management Permit Review, Florence Roche Elementary School," prepared by Samiotes Consultants, Inc., dated January 4, 2022, with revisions through February 15, 2022
- "Florence Roche School, Stormwater Report," prepared by Samiotes Consultants, Inc., dated January 4, 2022, with revisions through February 4, 2022
- Nitsch Engineering Peer Review Reports dated January 18, 2022 and February 11, 2022 (attached herewith)

Public Hearing:
In accordance with the provisions of the Code of the Town of Groton, Chapter 198, the Earth Removal Stormwater Advisory Committee held a virtual public hearing via Zoom to consider the application submitted by the Town of Groton/Groton Dunstable Regional School District (GDRSD) for approval of a Full Stormwater Management Permit for construction of the new Florence Roche elementary school as shown on the plan entitled, "Stormwater Management Permit Review, Florence Roche Elementary School," prepared by Samiotes Consultants, Inc., dated January 4, 2022. The project is located at 342 Main Street, Assessors' Parcel 110-42 on the easterly side of Main Street.

Finding of Significance
The Earth Removal Stormwater Advisory Committee determined that the proposed project is significant to the interests stated in Chapter 198, Section 1 Purposes, including:

It has been determined that proper management of construction sites and post-development stormwater runoff will prevent damage to public and private property and infrastructure, safeguard the public health, safety, environment and general welfare, protect water and aquatic resources, promote groundwater recharge to protect surface and groundwater drinking supplies, and encourage the appropriate use of the land throughout the Town.

Waivers:
The Committee voted unanimously to grant the following waiver of the Stormwater Regulations:

- Section 352-11.C(10) to allow six (6) water quality units, as shown on the revised plan, to provide the minimum requirement of 80% TSS removal of non-roof runoff prior to discharging to any underground recharge systems. Nitsch Engineering had no objections to this waiver.

Special conditions:
At its regular meeting on February 15, 2022, the Earth Removal-Stormwater Advisory Committee voted unanimously to grant the permit with the following conditions:

1. Construction shall be done in accordance with the above-referenced plans and construction sequencing.

2. All construction entrances shall be stabilized for a minimum distance of 50 ft as shown on the "Construction Entrance" detail from the "Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas." The crushed stone shall be replenished as needed to prevent tracking sediment on the public way.

3. The applicant shall take all reasonable measures to ensure that vegetation, brush, slash, and earth materials, etc. remain in vehicles leaving the site and are not deposited or blown on to the public way or abutting properties.

4. All work shall be done in compliance with the "Massachusetts Department of Environmental Protection - Stormwater Management, Volume One: Stormwater Policy Handbook, and Volume Two: Stormwater Technical Handbook," dated February 2008.

5. It is the applicant's responsibility to prevent the products of erosion and sedimentation from reaching Main Street or Champney Street and causing a safety hazard on the public way. There shall be no net increase in runoff or erosion to the public ways, the municipal storm drain system, or abutting properties.

6. The limits of disturbance shown on the plan shall be well delineated in the field with erosion control barriers in the locations shown on the above-referenced plan. The limit of work not delineated by erosion control barriers shall be delineated with yellow flagging to prevent disturbance. These barriers and flagging shall be maintained throughout construction to prevent any disturbance to the vegetation or topography beyond the limits of disturbance.

7. All disturbed areas and stockpiles must be properly stabilized. A supply of erosion control materials shall be kept on site to stabilize disturbed areas.

8. During construction, no slope shall be any steeper than 2:1, including any open cellar holes, to prevent any potential public safety hazard. All excavations are to be done according to the latest version of the U.S. Department of Labor, Occupational Safety and Health Administration, 29 CFR 1926, Safety and Health Regulations for Construction, Subpart P – Excavations.

9. Catch basins shall be protected with erosion control barriers and siltation sacks during construction to prevent the basins from becoming clogged with sand and silt.

10. The applicant shall take effective measures to control dust and windblown erosion at all times. All topsoil shall be stockpiled on the site. Erosion control barriers shall be installed around the base of the stockpile. The stockpiles shall be seeded to prevent dust and wind-blown erosion.

11. The applicant shall comply with the Construction Sequencing Plan as detailed on the plan, the SWPPP, and the NPDES Construction General Permit. Copies of the SWPPP and NPDES Permit shall be submitted to the Committee for its files.

12. The applicant shall comply with "Appendix 8 - Operation and Maintenance Plan." The applicant shall keep a log of spring and fall maintenance activities. The Operation and Maintenance plan shall comply with Section 352-22.

13. After a project is issued a Certificate of Completion, the Responsible Party or Owner, as listed in the Long Term Operation and Maintenance Plan, shall submit annual BMP Inspection and Maintenance logs to the Committee and if applicable an updated Long Term Operation and Maintenance Plan on or before June 1st annually as required in Section 352-6D.

14. The applicant must submit any proposed change in the above referenced plans to the Earth Removal-Stormwater Advisory Committee for its review and approval before the change is implemented.

15. The removal of any excess earth material from the site requires a Certificate of Exemption from the Earth Removal By-law, Chapter 134 of the Code of the Town of Groton. Chapter 134, Section 10 Exemptions.

16. The applicant is responsible for obtaining any other permits (including but not limited to) those required by the Select Board, Board of Health, Conservation Commission, Building Commissioner, DPW Director, Planning Board and Zoning Board of Appeals.

17. It is the applicant's responsibility to ensure that the contents of this permit are made known to all contractors who perform work at this site.

18. It is the applicant's responsibility to contact Dig Safe prior to the commencement of any work at the site. The applicant is responsible for obtaining a trench permit, if required by G.L. c. 82A §1 and 520 CMR 7.00 et seq (as amended).

19. The applicant shall return the signed "Maintenance Agreement" and "Illicit Discharge Compliance Statement prior to the commencement of construction. The applicant will notify the Stormwater Inspector at least 48 hours prior to the commencement of construction. Erosion control measures shall be in place prior to the 48-hour notice to the Stormwater Inspector. Additionally, the applicant will provide the Earth Removal Stormwater Inspector with emergency contact information for all site contractors.

20. The applicant or the applicant's consultant shall submit, at least monthly when construction activity occurs on site and for as long thereafter as the ground remains unstabilized, a report to the Committee's review, certifying that, to the best of his or her knowledge and belief, based on a careful site inspection, all work is being performed in compliance with the plan and these conditions.

21. The applicant shall submit payment for any outstanding peer review costs as required in Chapter 352, Section 3 Filing Fees.

22. If the project is not completed within three (3) years from the date the permit is issued, it is the responsibility of the applicant to request an extension. The Committee may grant extensions for additional time provided that the applicant submits a written request for renewal no later than 30 days prior to expiration of the permit.

23. The applicant is required to obtain a Certificate of Completion as required in Section 352-5A Project Completion which states:

    "When the construction of a project is completed, the applicant shall request that the Committee conduct a final inspection. For full stormwater management permits, the applicant must submit a statement from a registered professional engineer certifying that the project was completed in accordance with the approved plans and construction conditions of the permit. The applicant shall also submit an on-the-ground surveyed as-built plan prepared by a professional land surveyor. The Committee shall determine whether the project complies with the approved plans, construction conditions of the permit, and Chapter 198, Stormwater Management. If completion is satisfactory, the Committee shall issue a Certificate of Completion. "

24. This permit runs with the land and applies to any successor in interest or successor in control.

EARTH REMOVAL STORMWATER ADVISORY COMMITTEE:

Eileen McHugh, Chairman

Robert T. Delaney

Robert Hanninen

Steven Savage

cc: Mark Haddad, Groton Town Manager; Groton Dunstable Regional School District, Samiotes Consultants, Inc.; Studio G Architects, LeftField, Huntress Associates, Inc.; Terraink Landscape Architects and Planning, Select Board, Board of Appeals, Board of Assessors, Board of Health, Building Commissioner, Conservation Commission, DPW Director, Planning Board, Police Chief, Fire Chief, Sewer Commission, Water Commission

Nitsch Engineering

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February 11, 2022

Earth Removal Stormwater Advisory Committee
c/o Ms. Michelle Collette
Stormwater Inspector/ADA Coordinator
Town of Groton
173 Main Street
Groton, MA 01450

RE: Nitsch Project #13346.23
Florence Roche Elementary School
342 Main Street
Groton, MA 01450
Stormwater Review

Dear Committee Members:

Nitsch Engineering has received and reviewed the following documents:

1. The Design Development Permit Set Plans (the Plans) entitled "Florence Roche Elementary School" (22 sheets), dated January 4, 2022, Revised February 4, 2022 and prepared by Samiotes Consultants Inc ; and
2. The Stormwater Report (474 sheets), dated February 4, 2022, and prepared by Samiotes Consultants Inc.

Nitsch Engineering has reviewed the revised Plans and Reports to determine conformance to the following:

1. "Earth Removal Stormwater Advisory Committee" Regulations, Chapter 352 from the Code of the Town of Groton, latest version; and

2. The Massachusetts Stormwater Management Standards.

This letter includes Nitsch Engineering's original comments in standard text, Samiotes' responses in *italics*, and our current comments in **bold.**

Comments from Nitsch Engineering Letter dated January 18, 2022

GROTON STORMWATER DESIGN CRITERIA AND THE MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS

1. Section 352-2.F.(1)(a) states that the site plan shall include the following information: a north arrow.

   A north arrow is not shown on Plan C503. The Plan should be revised to include a north arrow.

   Samiotes Response: Included with this response memo are revised plans. A north arrow is shown on Plan C503.

   Comment has been addressed. While a north arrow is not shown on the plan view of sheet C503, there is a north arrow on the title block of this sheet. Nitsch Engineering recommends the Applicant add a north arrow to the plan view of sheet C503 to be consistent with the other sheets in the drawing set.

2. Section 352-2.G.(8) states that the site plan shall include the following information: proposed limits of vegetation clearing.

   The proposed Plans should be revised to include the proposed tree line or proposed limit of vegetation clearing.

Samiotes Response: Included with this response memo are the site preparation plans, Sheet C101-C103, which show the proposed limit of vegetation clearing. Additionally, the proposed tree line is shown on the Vehicular Layout C201-C203 and Grading Plans C301-C303.

Comment has been addressed.

3. Section 352-11.C.(3) states that the compaction of soils in designed recharge areas must be minimized during and after construction.

   Nitsch Engineering recommends that the proposed Plans include a note or a callout to minimize compaction in recharge areas during construction.

   Samiotes Response: Included with this response memo are updated proposed plans (Construction Plan Sheets C501-C503), which note that compaction in recharge/infiltration systems shall be minimized during and after construction.

   Comment has been addressed.

4. Section 352-11.C.(10) states that underground recharge systems may only be used to recharge stormwater runoff directly from rooftops. They may not be used to recharge stormwater runoff from other surfaces due to sediments in the runoff that may cause clogging of the recharge system and difficulty to rehabilitate these systems once they have failed.

   Infiltration Systems #1, #2, and #3 are underground recharge systems that collect roadway runoff from the driveway and parking lots. The Applicant should revise the Plans to comply with this Section or request a waiver from the Earth Removal Stormwater Advisory Committee. Nitsch Engineering would take no exceptions to this waiver request provided that a minimum of 80% TSS removal is provided prior to discharge of non-roof runoff to any underground recharge systems.

   Samiotes Response: Six (6) water quality units are proposed in the revised plans to provide the minimum requirement of at least 80% TSS removal of non-roof runoff prior to discharging to any underground recharge systems. The project will also request a waiver for the Section 352-11.C.(10) requirement.

   Comment has been addressed. Nitsch Engineering has no objections to this waiver request since the Applicant is providing at least 80% TSS removal prior to discharging to all underground recharge systems.

5. Section 352-11.C.(14) states that a mounding analysis must be performed when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four feet and the recharge system is proposed to attenuate peak discharge from a ten-year or higher twenty-four-hour storm. The mounding analysis must demonstrate that the recharge volume is fully dewatered within 72 hours and that the groundwater mound that forms under the recharge system will not break out above the land or water surface of a wetland. The Hantush or other equivalent method may be used to conduct the mounding analysis.

   Two feet minimum separation is required between the bottom of infiltration systems and estimated seasonal high groundwater (ESUGW). Infiltration System #4 shows less than two feet of separation from the bottom of the system to ESHGW. All proposed infiltration systems should be provided with at least two feet separation from the bottom of the system to ESHGW. The design should be modified to meet this requirement. The Applicant should also provide a mounding analysis if the separation is between two and four feet.

Samiotes Response: Mounding calculations and groundwater mounding sketches (SKCE-006 – SKCE-009) for three (3) infiltration systems have been included with this response memo, which illustrate the amended design meeting the Bylaw Requirements. Infiltration System #4 is to be wrapped in an impervious barrier, thus will not be an infiltration BMP. The drawdown calculations can be found on page 9 of the attached Stormwater Management Narrative incorporated to the calculations for Standard #3.

Comment has been addressed.

6. Section 352-12.B. states that the pretreatment structures shall be sized to hold an annual sediment loading.

   The Applicant should provide calculations to confirm that pretreatment structures have been designed to provide a minimum of one year's worth of sediment storage volume.

   Samiotes Response: Revised plans and supporting calculations are included with this response memo that illustrate that the pretreatment structures are sized to hold an annual sediment loading.

   Comment has been addressed.

7. Section 352-13.G. states that the Applicant shall use the curve number (CN) values as provided in Table 2 to calculate stormwater runoff rates for pre-/post-construction ground surface conditions.

   The Applicant has used some CN values that are different from the values found in Table 2. The CN values used for grass cover assume a "good" condition while this Section requires CN values for lawns assume a "poor" condition for grass cover since the post-construction amount of grass cover cannot be predicted or guaranteed (refer to Note 2 under Table 2). The Applicant should provide supporting documentation for these CN values and request a waiver from this Section, or revise the hydrologic calculations to only utilize CN values from Table 2.

   Samiotes Response: Included with this response memo are the revised existing and proposed hydrology reports, which only utilize the CN values from Table 2 of Section 352-13.G. Tables A-E (POA #1-5 Peak Rates of Runoff), on page 7 of the attached Stormwater Management Narrative, show that there still is a reduction in stormwater runoff rates with the revised CN values.

   Comment has been addressed.

8. Section 352-15.A. states that the water quality volume shall be calculated as 1-inch times the total impervious area.

   The water quality volume was calculated as 0.5-inch times the total impervious area. The Applicant should update the water quality volume calculations to comply with this Section.

   Samiotes Response: The revised plans and Stormwater Narrative reflect the updated water quality volume calculations of 1-inch times the total impervious area and show that Standard #4 is met. Calculations can be seen on page 11 of the Stormwater Management Narrative.

   Comment has been addressed.

GENERAL COMMENTS

9. Dimensions for Infiltration System #4 on the plans do not match the dimensions on the HydroCAD report. The plans and the HydroCAD report should be updated so they are consistent.

Samiotes Response: Dimensions of Infiltration System #4 have been updated to match in the plans and in the HydroCAD report.

Comment has been addressed. However, the callout on Drawing C503 should be updated to reflect the number of proposed chambers.

10. Nitsch Engineering recommends the Applicant consider options to provide 80% TSS removal for Proposed Watershed 5 (WS-PR5 area) and/or provide a weighted average TSS removal calculation for the entire site to confirm the average TSS removal is at least 80%.

    Samiotes Response: The revised Stormwater Narrative provides a weighted average TSS removal calculation for the entire site that confirms the average TSS removal is 90.5.

    Comment has been addressed.

11. The Stormwater Report Checklist notes that the Stormwater Pollution Prevention Plan (SWPPP) will be submitted before land disturbance begins. Nitsch Engineering recommends this requirement be included as a condition of the stormwater management permit.

    Samiotes Response: It is acknowledged that the Stormwater Pollution Prevention Plan (SWPPP) will be submitted before land disturbance begins per Environmental Protection Agency (EPA) requirements.

    Comment has been addressed.

12. The Applicant should provide a stage-storage table for each infiltration system to confirm the proposed recharge volume.

    Samiotes Response: Included with this response memo is a revised HydroCAD report that provides a stage-storage table for each infiltration system.

    Comment has been addressed.

13. The Applicant should provide capture area adjustment calculations to confirm Standard 3 is being met since not all impervious areas are discharging to infiltration BMPs per their stormwater checklist.

    Samiotes Response: The recharge calculations in the Stormwater Narrative show that more than 8 times of the minimum required adjusted recharge areas are provided.

    Comment has been addressed.

14. The Applicant should provide water quality flow rate calculations for all water quality units to confirm Standard 4 is being met. Water quality flow rates should also be provided on the Plans so the properly sized units are submitted and installed by the Contractor.

    Samiotes Response: Included with this response memo is updated Plan Sheet C602 that illustrates a new table for the Water Quality Unit Detail #13, which summarizes the water quality flow rates for all six (6) pretreatment structures. The sizing calculations are also included with this memo.

    Comment has been addressed.

RECOMMENDATIONS

The Plans and supporting documents appear to conform to the Code. Provided that Comments #1 and #9 are addressed by the Applicant, Nitsch Engineering does not have any additional comments related to the stormwater review.

If the Earth Removal Stormwater Advisory Committee has any questions, please call.

Very truly yours,

Nitsch Engineering, Inc.

Basel Alhadidi
Project Designer

Approved by:

Jared E. Gentilucci, PE, CPESC, LEED AP BD+C
Deputy Director of Civil Engineering

BA/jeg

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FLORENCE ROCHE SCHOOL
342 MAIN STREET
Groton, MA 01450

STORMWATER REPORT

Submitted to:
Town of Groton Earth Removal Stormwater Advisory Committee

Applicant:
Mark Haddad – Town of Groton/GDRSD
342 Main Street
Groton, MA 01450

Architect:
Studio G Architects
179 Boylston Street
Jamaica Plain, MA 02130

Track Landscape Architect:
Huntress Associates, Inc.
17 Tewksbury St,
Andover, MA 01810

Landscape Architect:
Terraink Landscape Architecture and Planning
7 Central St,
Arlington, MA 02476

Civil Engineer / Land Surveyor:
Samiotes Consultants, Inc.
20 A Street
Framingham, MA 01701

04 February 2022

TOWN OF GROTON
Earth Removal Stormwater Advisory Committee
173 Main Street
Groton, Massachusetts 01450
Telephone (978) 448-1105
FAX: (978) 448-1113

CHAPTER 198
STORMWATER MANAGEMENT PERMIT APPLICATION

Applicant	Mark Haddad - Town of Groton/GDRSD	Landowner	Groton-Dunstable Regional School District
Address	Town Hall, 173 Main Street	Address	344 Main Street
	Groton, MA 01450		Groton, MA 01450
Telephone	978-448-1111	Telephone	978-448-5505
E-mail	mhaddad@grotonma.gov	E-mail	

Assessors' Map & Parcel # 110/ 42,43,34 Subdivision or site plan: _____

Property location: 342 Main Street, Groton, MA 01450

Application is for:

Full Stormwater Management Permit: ✓ Modification of Permit #: _____

Limited Stormwater Management Permit: _____ Extension of Permit #: _____

Submission requirements:

- Two copies of the plan (24" x 36") and supporting documentation
- Operation and Maintenance Plan (for Full Stormwater Management Permits only)
- Stormwater Management Report (for Full Stormwater Management Permits only)
- PDF of the plans, Operation & Maintenance Plan, and Stormwater Management Report for electronic distribution
- Abutters List - A list of abutters within 300 ft (verified by the Board of Assessors)
- Filing Fee:

Limited Stormwater Management Permit:	$100.00
Full Stormwater Management Permit: *(plus estimated amount for peer review as specified in Section 352-3C)*	$500.00

Applicant's signature

12-17-21
Date

Landowners signature

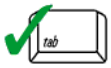
12-17-21
Date

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

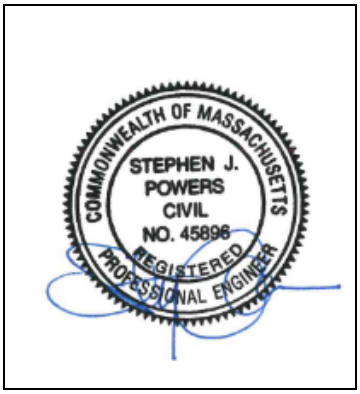
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Signature and Date

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 Field[1]

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

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

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

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

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

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

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

---

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

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

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☒ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

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

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☒ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

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

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

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

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

FLORENCE ROCHE ELEMENTARY SCHOOL
STORMWATER MANAGEMENT NARRATIVE
GROTON, MA

February 2022

Introduction

The proposed Florence Roche Elementary School, located at 342 Main Street in Groton, MA (Zoning District: P) is a project consisting of a proposed 109,855 gross square foot (GSF) 2-story new construction building located to the east of the existing Florence Roche Elementary School. Additionally, the project includes site improvements adjacent to the Elementary School, and a new 400m running track located northeast of the existing Middle School South building. The new Elementary School will have a total design enrollment of 645 students (Kindergarten through 4th grade) for the Town of Groton and the Groton-Dunstable Regional School District.

Project Description:
Stormwater management for the proposed Florence Roche Elementary School building and track is designed to mitigate the peak stormwater rate of runoff resulting from the full build-out of the project. The proposed project will consist of the demolition of the current elementary school (converting the area to mostly pervious open space) and track, in favor of the construction of a new elementary school building and relocated track.

The majority of the new parking would be located to the southwest of the new school building. The school's driveway will extend off the existing curb cut to Main Street, continue through the proposed parking lot, and loop in front of the southwest building entrance/drop-off zone. An emergency access road will be constructed from the proposed parking lot, looping around the new building, and connecting to the existing driveway south of the existing Groton Middle School. The emergency access road will also connect to the relocated track.

Soils:
Soils on the site consist of a mix of hydrological "A", "B", and "C" Soils. The soils resource report, and test pit results conducted on July 7, 2020 and November 1, 2021 are located in the Appendix of this report. The infiltration on the site was determined by using the more conservative value of a "B" soil from the MA Stormwater Handbook Rawl's Rates.

Existing Stormwater Management:
The existing project site consists of a mixture of impervious and pervious areas. The impervious areas consist of existing buildings, parking lots, access drives, walkways, basketball court, playground, and rubber track. The pervious areas include playing fields, grassed/ landscaped areas, woods, and wetlands. In the current conditions, the site has minimal stormwater management control and treatment. The on-site tributary stormwater is managed/ conveyed, without tying into a municipal system. A portion of the stormwater from the existing elementary school building sheets into "daisy-chained" catch basins and outlets directly to the wetlands north of the site. The stormwater from the existing Groton Middle School parking lot is routed to another series of catch basins and drain manholes heading north of the site, ultimately discharging to the wetlands. The stormwater within the existing Florence Roche School parking lot (southern side of the site) and existing driveway is captured via a catch basin and is routed untreated towards the wetlands west of the site. Stormwater outlet from these areas are conveyed to the wetlands, via rip-rap swales southwest of the site. The existing building roof runoff outlets directly into the on-site wetlands and the remainder of the site sheet flows untreated runoff towards multiple low points surrounding wetlands.

Methodology/ Procedure

Objective:
The objective of the stormwater management for the site is to mitigate any increase in peak storm runoff rates, while meeting/exceeding established stormwater quality thresholds, due to the construction of the proposed project. Outlined below are several best management practices (BMP's) that are proposed to be incorporated into the overall stormwater design.

Proposed Stormwater Control Systems:
The following are the proposed Best Management Practices (BMP's) stormwater control systems to be used on the site to mitigate an increase in peak stormwater runoff and improve water quality:

Subsurface Structures (Infiltration Chambers): Subsurface structures are underground systems that capture runoff, and gradually infiltrate it into the groundwater. There are a number of underground infiltration systems that can be installed to enhance groundwater recharge. Subsurface structures are constructed to temporarily store stormwater and promote infiltration into the underlying soils. They are feasible only where the soil is adequately permeable and the high groundwater table and/or elevation is sufficiently below the bottom of the system. They can be used to control the quantity as well as treat stormwater runoff, if properly designed and constructed. The structures serve as storage chambers for captured stormwater, while the soil matrix provides treatment.

Deep Sump Catch Basins: Deep sump catch basins (also known as oil and grease or hooded catch basins) act as underground retention systems designed to remove trash, debris, and coarse sediment from stormwater runoff. These structures also serve as temporary spill containment devices for floatables such as oil and grease that provides pretreatment. A 25% TSS removal is awarded to the deep sump catch basin when used as pre-treatment.

Water Quality Units (WQUs): Water Quality Units are a flow-through structure with a settling or separation unit designed to remove sediments and other pollutants. They typically use the power of swirling or flowing water to separate floatables and coarser sediments, are typically designed and manufactured by private businesses, and come in different sizes to accommodate several design storms and flow conditions. Since proprietary separators can be placed in almost any location on a site, they are particularly useful when either site constraints prevent the use of other stormwater techniques or as part of a larger treatment train. Generally they are placed below grade and contain inspection and access ports so that they may be periodically inspected and cleaned.

Proposed Stormwater Conveyance System:
The proposed stormwater management system consists of catch basins and area drains located throughout the sites impervious vehicular areas, as well as around the relocated track. The majority of the on-site runoff from impervious areas are routed via catch basins into subsurface structures (for temporary storage/treatment) prior to discharging towards the wetlands via overflow drain lines. The proposed building roof runoff is also partially captured via the subsurface infiltration systems.

Low Impact Development:
As part of the proposed work, it was important to incorporate as many on-site Low Impact Development (LID) methods to create a combination of hydrologically functional site design, with pollution prevention measures to compensate for the land development impacts on hydrology and water quality.

The following are the four (4) areas where LID is utilized to support stormwater control.

Low Impact Development Site Planning:

Site planning strategies and techniques is the first method in providing LID for a site "The goal of LID site planning is to allow for full development of the property while maintaining the essential site hydrologic functions. The hydrologic disturbances are mitigated with the use of an at-source control approach, in contrast to the end of pipe control approach."

The use of hydrologically functional landscapes that preserve and maintain essential hydrologic functions of the development site and local watersheds. Techniques in which this is incorporated into the Florence Roche School site are:

Reduce Limits of Clearing and Grading:
Comparing the existing conditions plan and the proposed plans, the majority of the disturbance to the site is within the footprint of the existing school building, parking lot, track, and baseball field. The majority of that area has already been developed/ disturbed.

Use Site Fingerprinting:
As part of the LID incorporation, reducing work in the high permeability soils, preserves sensitive areas. However, the highly permeable soils on site (A & B soils) are within previously disturbed areas. Therefore, stormwater infiltration systems within these areas are being maximized to encourage infiltration & recharge to groundwater to the maximum extent practicable.

Disconnecting as much impervious area as possible to increase opportunities for infiltration and reduce water runoff flow is another way to use site fingerprinting in LID design. The proposed site's parking lots are graded so that portions of the runoff sheets into the proposed subsurface structures and therefore, disconnects the water runoff from flowing continuously from the parking area(s) and downgradient to the entire access roads to the municipal systems.

Low Impact Development Hydrologic Analysis:
The LID approach preserves or restores the hydrologic functions of watersheds for the full range of storm events. It is therefore necessary to compare the pre- and post-development conditions.

The stormwater management for the Florence Roche School site is designed to mitigate any increase in peak stormwater runoff rates due to the construction of the proposed project. The proposed development will result in an increase of impervious area, therefore the proposed stormwater management system had to be designed to mitigate any increase in the rate of runoff and improve stormwater quality. Table A-E below show the overall peak rate of runoff is reduced for the proposed site.

Low Impact Development Integrated Management Practices:
LID IMP's are used to satisfy the storage volume requirements. In the narrative below section five: Stormwater Management Standards, recharge to groundwater calculations are provided.

Best Management Practices suited to Low-Impact Development that are proposed for the site are: water quality units, velocity reducing devices, underdrains and infiltration systems.

Another component of the LID design is developing monitoring protocols. This component has been provided within the Operations & Maintenance Plan.

Erosion and Sediment Control Considerations for Low Impact Development:
Erosion and sediment control and stormwater management are closely interrelated. The application of LID concepts and the associated emphasis on minimizing the areas disturbed, as well as breaking up drainage areas into small manageable sub catchment areas, promote harmony with the basic principles

of erosion and sediment control. Included within the submission is the Soil Erosion and Sediment Control plans, which illustrated erosion and sediment control considerations, as well as the planting plan.

Watershed Routing

Below is a summary of the various existing and proposed watersheds with a brief narrative describing the routing. The descriptions of the watersheds are depicted in sketches Ex-HYD and P-HYD located in the Appendix.

Existing Watersheds:

Ex-Watershed-1: This watershed consists of the majority of the western portion of the site; including half of the parking lot north of the existing school building, walkways west of the building, the entrance roundabout, a portion of the fire lane, cross walk, and surrounding landscaped areas. Stormwater runoff from this watershed is captured by a series of catch basins within the driveway /parking lot and routed to the wetlands south west of the site depicted as POA-1.

Ex-Watershed-2: This watershed consists of the parking lots north-east of the existing building, walkways, the access road running along the north face of the building, the playground in the northern school area, a basketball court in the northern school area, landscaped areas, and the northwest section of the existing rubber track. Stormwater runoff from this is routed through a series of catch basins and manholes to the bordering vegetated wetland areas north of the existing school building depicted as POA-2.

Ex-Watershed-3: This watershed consists of the northeastern section of the existing rubber track, landscape, and vegetated wetland areas. Stormwater runoff from the existing rubber track sheet flows to the bordering vegetated wetland areas northeast of the existing track depicted as POA-3.

Ex-Watershed-4: This watershed consists of the southern half of the existing rubber track, landscaped areas, woods, and vegetated wetlands. Stormwater runoff from the rubber track sheet flows to the bordering vegetated areas south of the existing track depicted as POA-4.

Ex-Watershed-5: This watershed consists of the access road off of Champney Street and surrounding wooded and landscaped areas. Stormwater runoff from this watershed sheets south into a catch basin within Champney Street.

Ex-Watershed-6: This watershed consists of the parking lot to the south of the existing building, a paved plaza south of the existing building, the lower portion of the school driveway, and surrounding landscaped areas. Stormwater runoff sheet flows into a catch basin in the southwestern corner of the southern parking lot and discharges into the wetlands to the south west, depicted as POA-1.

Ex-Watershed-7: This watershed is a small portion of the site that consists of landscaped and wooded areas located at the southwestern corner of the site. Stormwater runoff sheets into the vegetated wetlands depicted as POA-1.

Ex-Watershed-8: This watershed consists of a baseball field, landscaped area, woods, and a portion of the driveway for the adjacent middle school all located in the northeast section of the site. The stormwater runoff from this watershed sheets directly into the adjacent bordering vegetated wetlands

(flags C1.1-C1.4 and C1-C32) depicted as POA-2. Additional runoff sheet flows into a catch basin and drain manhole off of the northeastern face of the Groton Dunstable Regional Middle School South before discharging into the wetlands depicted as POA-2.

Proposed Watersheds:

PR-Watershed-1:This watershed consists of the driveway to the proposed Florence Roche Elementary School, as well as concrete walkways and surrounding landscaped areas. The stormwater runoff is routed to two catch basins and a water quality unit at the entrance of the driveway, which tie into an existing drain manhole in the access road off of Main Street before discharging into the wetlands south west of the site (flag series D1-D15 and DD1-DD7) depicted as POA-1.

PR-Watershed-1A: This watershed consists of landscaped areas west of the proposed building, the proposed basketball court, paved walkways, and the southern parking lot. Stormwater runoff from this watershed is routed via a large underdrain system as well as a series of catch basins and drain manholes into two infiltration systems underneath the proposed southern parking lot.. The infiltration systems outlet through an outlet control structure prior to connecting to the existing 12" drainage line that discharges into the wetlands south west of the site depicted as POA-1.

PR-Watershed-1B: This watershed consists of a portion of the plaza and walkway leading to the proposed building, surrounding landscaped areas, and a small portion of the northern driveway. Stormwater runoff from this watershed sheet flows into a catch basin in the driveway and is routed into the infiltration systems in the southern parking lot prior to discharging into the wetlands depicted as POA-1.

PR-Watershed-1C: This watershed consists of the student drop-off roundabout, ADA accessible parking, entrance plazas east, south and west of the building and surrounding landscaped areas. Stormwater runoff from this watershed is routed into the infiltration systems in the southern parking lot via a series of catch basins and drain manholes throughout the parking lot and driveway. The infiltration systems discharge into the wetlands depicted as POA-1.

PR-Watershed-1D: This watershed consists of the ADA accessible entrance plazas east of the building and surrounding landscaped areas. Stormwater runoff from this watershed is routed into the Sediment Forebay and Rain Garden where it will recharge into the ground or overflow into infiltration systems 1A and 1B in the southern parking lot via a series of drain manholes throughout the driveway. The infiltration systems discharge into the wetlands depicted as POA-1.

PR-Watershed-2: This watershed consists of the northern parking lot, the driveway off of Main Street's access road, concrete walkways, a fire access road and surrounding landscaped areas. Stormwater runoff from this portion of the access driveway is routed into Infiltration System #3 through a network of catch basins, and drain manholes prior to discharging to the wetlands depicted as POA-2.

PR-Watershed-3: This watershed consists of the wooded and landscaped areas between the proposed building and the athletic track. Stormwater runoff from this watershed sheets directly to the wetlands depicted as POA-3 (flags B1-B17).

PR-Watershed-4: This watershed consists of wooded and landscaped areas south of the proposed building. Stormwater runoff from this watershed sheets to the south directly into the wetland area associated with the intermittent stream (flags A1-A26 and AA1-AA12) depicted as POA-4.

PR-Watershed-5: This watershed consists of the access road off of Champney Street and surrounding wooded and landscaped areas. Stormwater runoff from this watershed sheets directly to Champney Street into a catch basin, depicted as POA-5.

PR-Waterhsed-6: This watershed consists of landscaped and wooded areas west of the southern parking lot and along the southern portion of the driveway. Stormwater runoff from this watershed sheets directly into the vegetated wetlands (flags D1-D5 and DD1-DD7) depicted as POA-1.

PR-Watershed-7: This watershed contains landscaped, and wooded areas located at the southwestern corner of the site. Stormwater runoff sheets directly into the bordering vegetated wetlands (flags D5-D17), depicted as POA-1.

PR-Watershed-8: This watershed consists of the proposed athletic track, walkways, a Battery Energy Storage System (BESS), and surrounding landscaped areas. Stormwater runoff from this watershed is routed via a series of several area drains and drain manhole junction boxes into Underground System #4 under the southern corner of the track before discharging into the wetlands depicted as POA-2.

PR-Watershed-9: This watershed consists of the landscaped areas to the north east of the proposed track and a portion of the existing access road north of the adjacent middle school all located at the north east side of the site. Stormwater runoff from the landscaped areas sheet flows directly into the wetlands depicted as POA-2. Stormwater runoff from the access road is captured by a series of catch basins and drain manholes before it is treated by a water quality unit and outlets into the wetlands depicted as POA-2.

Analysis:
The analysis was based on the pre- and post-development peak discharge rates at the point of analysis. The proposed construction of the Florence Roche Elementary School will result in an increase in impervious area, therefore the proposed stormwater management system will be designed to mitigate any increase in the rate of runoff and improve stormwater quality.

Results/ Summary

Results of Analysis:
Through the use of the HydroCAD Software, the curve numbers, times of concentrations, and peak discharge rates were determined for both the existing conditions and the proposed conditions. The results of the study shows that both the post-development peak rates of runoff are equal or less than the existing rates.

As shown in Table A through Table E, the post development peak rates of runoff from the site will be mitigated.

Table A – POA 1 South West Wetlands
Peak Rates of Runoff (cfs)

	2-year storm	10-year storm	25-year storm	100-year storm
Existing	9.08	13.72	16.93	22.63
Proposed	8.61	12.24	14.78	22.19

Table B – POA 2 Existing DMH North of Site Peak Rates of Runoff (cfs)				
	2-year storm	10-year storm	25-year storm	100-year storm
Existing	10.72	18.61	24.34	34.79
Proposed	9.59	14.70	17.94	23.47

Table C – POA 3 North East Wetlands Peak Rates of Runoff (cfs)				
	2-year storm	10-year storm	25-year storm	100-year storm
Existing	2.38	4.47	6.01	8.85
Proposed	1.20	2.16	2.86	4.14

Table D – POA 4 South East Wetlands Peak Rates of Runoff (cfs)				
	2-year storm	10-year storm	25-year storm	100-year storm
Existing	2.64	5.06	6.85	10.17
Proposed	0.91	2.00	2.85	4.46

Table E – POA 5 Champney Street Peak Rates of Runoff (cfs)				
	2-year storm	10-year storm	25-year storm	100-year storm
Existing	0.62	1.04	1.35	1.89
Proposed	0.57	0.96	1.24	1.74

Stormwater Management Standards

The Department of Environmental Protection has implemented the Stormwater Management Standards as of November 18, 1996 and updated them in April 2008. The standards met are described below and in the Stormwater Management Form as provided by DEP.

Standard #1: Untreated Stormwater

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

Therefore Standard #1 is met.

Standard #2: Post-development peak discharge rates

The proposed project will result in an increase in impervious area. The proposed stormwater management system has been designed so that there is no increase in post construction discharge rates from the site. See Tables A-Table E above.

Therefore Standard #2 is met.

Standard #3: Recharge to groundwater

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

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

The proposed development will result in an increase in impervious area in the "B" soil areas. Therefore, 0.35 inches of runoff will be required to be infiltrated for the new impervious areas.

Hydrologic Group Volume to Recharge (x Total Impervious Area)	
Hydrologic Group	Volume to Recharge x Total Impervious Area
A	0.60 inches of runoff
B	0.35 inches of runoff
C	0.25 inches of runoff
D	0.10 inches of runoff

Required Recharge Volumes:

<u>"B" Soils</u>

Infiltration Rate: 0.35 inches of runoff
Proposed Site New Impervious Area in "B" Soils: 75,408 sf
75,408 sf x 0.35 x (1/12) = 2,199 cf

Total required recharge volume (unadjusted): 2,199 cf

Impervious Coverage to Infiltration BMP's (total) = 208,481 sf
Total Impervious Coverage = 304,241 sf
Percentage passed through Infiltration BMP's = 208,481 sf / 304,241 sf = 68.5%

Ratio of total site area to site area draining to the recharge facilities = 304,241 sf / 208,481 sf = 1.45
Adjusted minimum required recharge volume = 1.45 * 2,199 cf = 3,210.22 cf

Proposed Recharge Volume:

Infiltration System #1A = 3,545 cf

Infiltration System #1B = 399 cf

Infiltration System #2 = 22,181 cf

Infiltration System #3 =344 cf

Rain Garden #1 =1,242 cf

Total provided recharge volume: 27,711 cf (over 8 times the minimum)

Drawdown Time:
INF-1A (maximum time 72 hours)= 3,545 cf / (1.02 in/hr x 2,119 sf / 12 in/ft) = 19.67 hours

INF-1B (maximum time 72 hours)= 399 cf / (1.02 in/hr x 1,996 sf / 12 in/ft) = 2.35 hours

INF-2 (maximum time 72 hours)= 22,181 cf / (1.02 in/hr x 5,967 sf / 12 in/ft) = 43.73 hours

INF-3 (maximum time 72 hours)= 334 cf / (1.02 in/hr x 588 sf / 12 in/ft) = 6.68 hours

Rain Garden #1 (maximum time 72 hours)= 1,242 cf / (1.02 in/hr x 1,303 sf / 12 in/ft) = 11.21 hours

Therefore Standard #3 is met.

Standard #4: TSS removal

The BMP's selected to remove TSS from impervious areas for this include: Area Drains, Catch Basins, Outlet Control Structures, Water Quality Units, and Infiltration Chambers.

PR-Watershed-1: Driveway
Initial TSS=1.00
Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
Water Quality Unit:(0.75)(1.00-0.80*)=0.15
Total TSS Removal= 85%

PR-Watershed-1A: Parking Lot
Initial TSS=1.00
Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
WQU: (0.75)(1.00-0.80)= 0.15 TSS
Infiltration System (Isolator row): (0.15)(1.00-0.80)= 0.03 TSS
Total TSS Removal= 97%

PR-Watershed-1B: Driveway
Initial TSS=1.00

Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
WQU: (0.75)(1.00-0.80)= 0.15 TSS
Infiltration System (Isolator row): (0.15)(1.00-0.80)= 0.03 TSS
Total TSS Removal= 97%

PR-Watershed-1C: Parking Lot / Driveway
Initial TSS=1.00
Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
WQU: (0.75)(1.00-0.80)= 0.15 TSS
Infiltration System (Isolator row): (0.15)(1.00-0.80)= 0.03 TSS
Total TSS Removal= 97%

PR-Watershed-1D: Plaza walkway
Initial TSS=1.00
Forebay: (1.00)(1.00-0.25)= 0.75 TSS
Rain Garden: (0.75)(1.00-0.80)= 0.15 TSS
Infiltration System (Isolator row): (0.15)(1.00-0.80)= 0.03 TSS
Total TSS Removal= 97%

PR-Watershed-2: Parking Lot / Driveway and Fire Access Road
Initial TSS=1.00
Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
WQU: (0.75)(1.00-0.80)= 0.15 TSS
Infiltration System (Isolator row): (0.15)(1.00-0.80)= 0.03 TSS
Total TSS Removal= 97%

PR-Watershed-5: Driveway (Redevelopment)
Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
Total TSS Removal= 25%

PR-Watershed-8: Driveway
Initial TSS=1.00
Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
Infiltration System (Isolator row): (0.75)(1.00-0.80)= 0.15 TSS
Total TSS Removal= 85%

PR-Watershed-9: Driveway
Initial TSS=1.00
Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
Water Quality Unit:(0.75)(1.00-0.80*)=0.15
Total TSS Removal= 85%

*MASTEP and NJCAT Rating

Weighted Average

The weighted average method described below demonstrated that an 80% TSS removal rate is achieved on a site-wide basis for purpose of design.

$$Weighted\ Average\% = \frac{(Area_1)(TSS_1\%) + (Area_2)(TSS_2\%) + (Area_n)(TSS_n\%))}{(Area_1 + Area_2 + Area_n)}$$

Area = size, expressed in acres, square feet, or other units

TSS% = Assigned TSS removal rate, expressed as % (e.g. 25%)

Area $_{WS-1}$ = 42,801 sf ; TSS $_{WS-1}$ = 85%
Area $_{WS-1A}$ = 120,105 sf ; TSS $_{WS-1A}$ = 97%
Area $_{WS-1B}$ = 8,760 sf ; TSS $_{WS-1B}$ = 97%
Area $_{WS-1C}$ = 48,219 sf ; TSS $_{WS-1C}$ = 97%
Area $_{WS-1D}$ = 15,164 sf ; TSS $_{WS-1C}$ = 97%
Area $_{WS-2}$ = 60,887 sf ; TSS $_{WS-2}$ = 97%
Area $_{WS-5}$ = 13,090 ; TSS $_{WS-5}$ = 25%
Area $_{WS-8}$ = 220,543 sf ; TSS $_{WS-8}$ = 85%
Area $_{WS-9}$ = 31,969 sf ; TSS $_{WS-9}$ = 85%

Weighted Average % = [(42,801 sf) (85%) + (120,105 sf) (97%) + (8,760 sf) (97%) + (48,219 sf) (97%) + (15,164 sf) (97%) + (60,887 sf) (97%) + (13,090 sf) (25%) + (220,543 sf) (85%) + (31,969 sf) (85%)] / [(42,801 sf)+ (120,105 sf)+ (8,760 sf)+ (48,219 sf)+ (15,164 sf)+ (60,887 sf)+ (13,090 sf)+ (220,543 sf)+ (31,969 sf)]
= 508,326 sf / 561,538 sf = 90.5%

Water Quality Volume:

The stormwater management system has been sized to treat for the 1.0" runoff rate applied to the total impervious area for the water quality volume, as shown in the calculations provided below. The calculations for the infiltration stormwater BMPs are shown below. Where site topography and groundwater elevation precluded the use of infiltration BMPs, proprietary water quality unit are proposed which are specifically designed to address water quality prior to discharge.

Impervious area requiring water quality treatment= 240,169 sf
240,169 sf x .0833 ft = 20,006 CF

Total Water Quality Volume Required = 20,006 CF

Infiltration System #1A = 3,545 cf

Infiltration System #1B = 350 cf

Infiltration System #2 = 22,181 cf

Infiltration System #3 =334 cf

Rain Garden #1 = 1,242 cf

Total provided water quality volume: 27,711 cf

Therefore Standard #4 is met.

Standard #5: Higher potential pollutant loads

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

Therefore Standard #5 is met.

Standard #6: Protection of critical areas

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

The site is not located within critical areas, therefore Standard #6 is met.

Standard #7: Redevelopment projects

While a good portion of the site is being redeveloped, there is an increase in impervious area, thus the project is considered New Construction and all of the Standards will be met.

Therefore Standard #7 is met.

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

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

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

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

The erosion and sediment control plan to be in place during the construction phase is detailed within the NOI narrative (under separate cover).

Therefore Standard #8 is met.

Standard #9: Operation/maintenance plan

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

Therefore Standard #9 is met.

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

The Illicit discharge statement is included with this submission.

Therefore Standard #10 is met.

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APPENDIX 1:
PEER REVIEW RESPONSE

MEMORANDUM

Re: Florence Roche Elementary School SCI File # 19088.00
Peer Review Response - Earth Removal Stormwater Advisory Committee

To: Michelle Collete, Stormwater Inspector/ADA Coordinator

From: Stephen Powers, PE February 4, 2022

This memo is a response to the engineering review of the stormwater management calculations and design for the Florence Roche Elementary School located at 342 Main Street, Groton, MA by Nitsch Engineering from January 18, 2022. The Nitsch Engineering review comments are in *italics* with our response following:

A. Groton Stormwater Design Criteria and the Massachusetts Stormwater Management Standards

Comment 1: Section 352-2.F.(1)(a) states that the site plan shall include the following information: a north arrow. A north arrow is not shown on Plan C503. The Plan should be revised to include a north arrow.

Response: Included with this response memo are revised plans. A north arrow is shown on Plan C503.

Comment 2: Section 352-2.G.(8) states that the site plan shall include the following information: proposed limits of vegetation clearing. The proposed Plans should be revised to include the proposed tree line or proposed limit of vegetation clearing.

Response: Included with this response memo are the site preparation plans, Sheet C101-C103, which show the proposed limit of vegetation clearing. Additionally, the proposed tree line is shown on the Vehicular Layout C201-C203 and Grading Plans C301-C303.

Comment 3: Section 352-11.C.(3) states that the compaction of soils in designed recharge areas must be minimized during and after construction. Nitsch Engineering recommends that the proposed Plans include a note or a callout to minimize compaction in recharge areas during construction.

Response: Included with this response memo are updated proposed plans (Construction Plan Sheets C501-C503), which note that compaction in recharge/infiltration systems shall be minimized during and after construction.

Comment 4: Section 352-11.C.(10) states that underground recharge systems may only be used to recharge stormwater runoff directly from rooftops. They may not be used to recharge stormwater runoff from other surfaces due to sediments in the runoff that may cause clogging of the recharge system and difficulty to rehabilitate these systems once they have failed.

Infiltration Systems #1, #2, and #3 are underground recharge systems that collect roadway runoff from the driveway and parking lots. The Applicant should revise the Plans to comply with this Section or request a waiver from the Earth Removal Stormwater Advisory Committee. Nitsch Engineering would take no exceptions to this waiver request provided that a minimum of 80% TSS removal is provided prior to discharge of non-roof runoff to any underground recharge systems.

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Response: Six (6) water quality units are proposed in the revised plans to provide the minimum requirement of at least 80% TSS removal of non-roof runoff prior to discharging to any underground recharge systems. The project will also request a waiver for the Section 35211.C.(10) requirement.

Comment 5: Section 352-11.C.(14) states that a mounding analysis must be performed when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four feet and the recharge system is proposed to attenuate peak discharge from a ten-year or higher twenty-four-hour storm. The mounding analysis must demonstrate that the recharge volume is fully dewatered within 72 hours and that the groundwater mound that forms under the recharge system will not break out above the land or water surface of a wetland. The Hantush or other equivalent method may be used to conduct the mounding analysis.

Two feet minimum separation is required between the bottom of infiltration systems and estimated seasonal high groundwater (ESUGW). Infiltration System #4 shows less than two feet of separation from the bottom of the system to ESHGW. All proposed infiltration systems should be provided with at least two feet separation from the bottom of the system to ESHGW. The design should be modified to meet this requirement. The Applicant should also provide a mounding analysis if the separation is between two and four feet.

Response: Mounding calculations and groundwater mounding sketches (SKCE-006 – SKCE-009) for three (3) infiltration systems have been included with this response memo, which illustrate the amended design meeting the Bylaw Requirements. Infiltration System #4 is to be wrapped in an impervious barrier, thus will not be an infiltration BMP. The drawdown calculations can be found on page 9 of the attached Stormwater Management Narrative incorporated to the calculations for Standard #3.

Comment 6: Section 352-12.B. states that the pretreatment structures shall be sized to hold an annual sediment loading. The Applicant should provide calculations to confirm that pretreatment structures have been designed to provide a minimum of one year's worth of sediment storage volume.

Response: Revised plans and supporting calculations are included with this response memo that illustrate that the pretreatment structures are sized to hold an annual sediment loading.

Comment 7: Section 352-13.G. states that the Applicant shall use the curve number (CN) values as provided in Table 2 to calculate stormwater runoff rates for pre-/post-construction ground surface conditions.

The Applicant has used some CN values that are different from the values found in Table 2. The CN values used for grass cover assume a "good" condition while this Section requires CN values for lawns assume a "poor" condition for grass cover since the post-construction amount of grass cover cannot be predicted or guaranteed (refer to Note 2 under Table 2). The Applicant should provide supporting documentation for these CN values and request a waiver from this Section, or revise the hydrologic calculations to only utilize CN values from Table 2.

Response: Included with this response memo are the revised existing and proposed hydrology reports, which only utilize the CN values from Table 2 of Section 352-13.G. Tables A-E (POA #1-5 Peak Rates of Runoff), on page 7 of the attached Stormwater Management Narrative, show that there still is a reduction in stormwater runoff rates with the revised CN values.

Comment 8: Section 352-15.A. states that the water quality volume shall be calculated as 1-inch times the total impervious area.

The water quality volume was calculated as 0.5-inch times the total impervious area. The Applicant should update the water quality volume calculations to comply with this Section.

Response: The revised plans and Stormwater Narrative reflect the updated water quality volume calculations of 1-inch times the total impervious area and show that Standard #4 is met. Calculations can be seen on page 11 of the Stormwater Management Narrative.

B. General Comments

Comment 9: Dimensions for Infiltration System #4 on the plans do not match the dimensions on the HydroCAD report. The plans and the HydroCAD report should be updated so they are consistent.

Response: Dimensions of Infiltration System #4 have been updated to match in the plans and in the HydroCAD report.

Comment 10: Nitsch Engineering recommends the Applicant consider options to provide 80% TSS removal for Proposed Watershed 5 (WS-PR5 area) and/or provide a weighted average TSS removal calculation for the entire site to confirm the average TSS removal is at least 80%.

Response: The revised Stormwater Narrative provides a weighted average TSS removal calculation for the entire site that confirms the average TSS removal is 90.5%.

Comment 11: The Stormwater Report Checklist notes that the Stormwater Pollution Prevention Plan (SWPPP) will be submitted before land disturbance begins. Nitsch Engineering recommends this requirement be included as a condition of the stormwater management permit.

Response: It is acknowledged that the Stormwater Pollution Prevention Plan (SWPPP) will be submitted before land disturbance begins per Environmental Protection Agency (EPA) requirements.

Comment 12: The Applicant should provide a stage-storage table for each infiltration system to confirm the proposed recharge volume.

Response: Included with this response memo is a revised HydroCAD report that provides a stage-storage table for each infiltration system.

Comment 13: The Applicant should provide capture area adjustment calculations to confirm Standard 3 is being met since not all impervious areas are discharging to infiltration BMPs per their stormwater checklist.

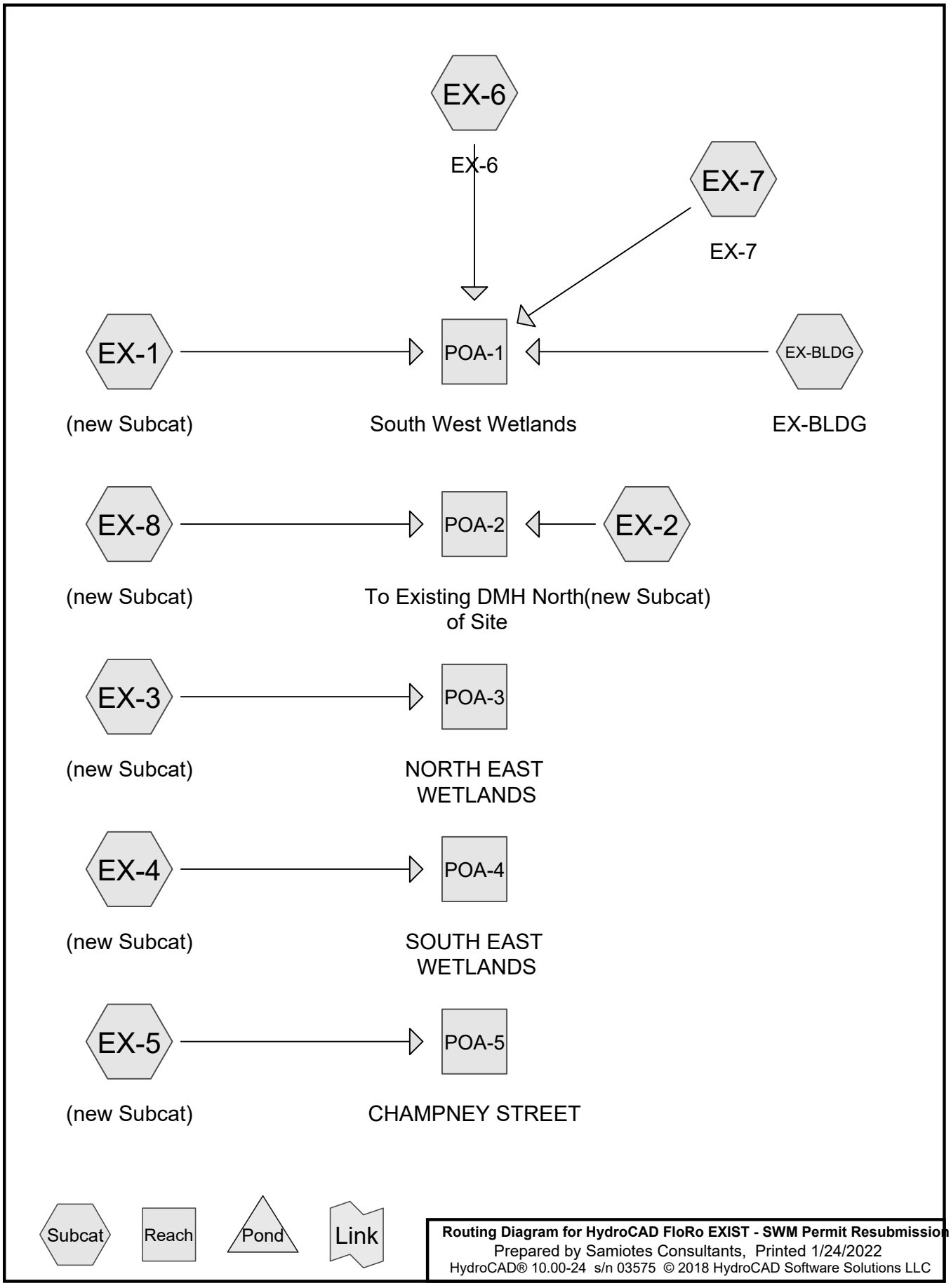
Response: The recharge calculations in the Stormwater Narrative show that more than 8 times of the minimum required adjusted recharge areas are provided.

Comment 14: The Applicant should provide water quality flow rate calculations for all water quality units to confirm Standard 4 is being met. Water quality flow rates should also be provided on the Plans so the properly sized units are submitted and installed by the Contractor.

Response: Included with this response memo is updated Plan Sheet C602 that illustrates a new table for the Water Quality Unit Detail #13, which summarizes the water quality flow rates for all six (6) pretreatment structures. The sizing calculations are also included with this memo.

If any further questions or response clarifications are required, please call or email me jpilat@samiotes.com at 508-877-6688 (ext. 23) or Stephen Powers, PE at spowers@samiotes.com (ext. 14).

APPENDIX 2:
EXISTING HYDROLOGY REPORT



Routing Diagram for HydroCAD FloRo EXIST - SWM Permit Resubmission
Prepared by Samiotes Consultants, Printed 1/24/2022

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
400,280	79	>75% Grass cover, Good, HSG B (EX-1, EX-2, EX-3, EX-4, EX-5, EX-6, EX-7, EX-8)
13,342	98	Paved Asphalt (EX-8)
211,827	98	Paved parking, HSG B (EX-1, EX-2, EX-3, EX-4, EX-5, EX-6, EX-7, EX-BLDG)
100,048	55	Woods, Good, HSG B (EX-2, EX-3, EX-4, EX-5, EX-6, EX-7, EX-8)
725,497	**82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
712,155	HSG B	EX-1, EX-2, EX-3, EX-4, EX-5, EX-6, EX-7, EX-8, EX-BLDG
0	HSG C	
0	HSG D	
13,342	Other	EX-8
725,497		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	400,280	0	0	0	400,280	>75% Grass cover, Good	
0	0	0	0	13,342	13,342	Paved Asphalt	
0	211,827	0	0	0	211,827	Paved parking	
0	100,048	0	0	0	100,048	Woods, Good	
0	**712,155**	**0**	**0**	**13,342**	**725,497**	**TOTAL AREA**	

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

Subcatchment EX-1: (new Subcat) Runoff Area=44,748 sf 54.45% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=89 Runoff=2.49 cfs 7,762 cf

Subcatchment EX-2: (new Subcat) Runoff Area=97,501 sf 65.85% Impervious Runoff Depth=2.26"
Flow Length=214' Tc=8.2 min CN=91 Runoff=5.41 cfs 18,349 cf

Subcatchment EX-3: (new Subcat) Runoff Area=94,680 sf 13.33% Impervious Runoff Depth=1.21"
Flow Length=299' Tc=13.1 min CN=77 Runoff=2.38 cfs 9,561 cf

Subcatchment EX-4: (new Subcat) Runoff Area=121,423 sf 17.08% Impervious Runoff Depth=1.15"
Flow Length=659' Tc=16.4 min CN=76 Runoff=2.64 cfs 11,657 cf

Subcatchment EX-5: (new Subcat) Runoff Area=14,262 sf 36.27% Impervious Runoff Depth=1.61"
Tc=6.0 min CN=83 Runoff=0.62 cfs 1,913 cf

Subcatchment EX-6: EX-6 Runoff Area=56,568 sf 70.88% Impervious Runoff Depth=2.17"
Tc=6.0 min CN=90 Runoff=3.27 cfs 10,223 cf

Subcatchment EX-7: EX-7 Runoff Area=7,291 sf 2.03% Impervious Runoff Depth=0.88"
Tc=6.0 min CN=71 Runoff=0.16 cfs 534 cf

Subcatchment EX-8: (new Subcat) Runoff Area=244,558 sf 5.46% Impervious Runoff Depth=1.15"
Flow Length=356' Tc=12.6 min CN=76 Runoff=5.88 cfs 23,478 cf

Subcatchment EX-BLDG: EX-BLDG Runoff Area=44,466 sf 100.00% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=98 Runoff=3.17 cfs 10,996 cf

Reach POA-1: South West Wetlands Inflow=9.08 cfs 29,514 cf
Outflow=9.08 cfs 29,514 cf

Reach POA-2: To Existing DMH North of Site Inflow=10.72 cfs 41,826 cf
Outflow=10.72 cfs 41,826 cf

Reach POA-3: NORTH EAST WETLANDS Inflow=2.38 cfs 9,561 cf
Outflow=2.38 cfs 9,561 cf

Reach POA-4: SOUTH EAST WETLANDS Inflow=2.64 cfs 11,657 cf
Outflow=2.64 cfs 11,657 cf

Reach POA-5: CHAMPNEY STREET Inflow=0.62 cfs 1,913 cf
Outflow=0.62 cfs 1,913 cf

Total Runoff Area = 725,497 sf Runoff Volume = 94,471 cf Average Runoff Depth = 1.56"
68.96% Pervious = 500,328 sf 31.04% Impervious = 225,169 sf

Summary for Subcatchment EX-1: (new Subcat)

Runoff = 2.49 cfs @ 12.09 hrs, Volume= 7,762 cf, Depth= 2.08"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	20,383	79	>75% Grass cover, Good, HSG B
	24,365	98	Paved parking, HSG B
	44,748	89	Weighted Average
	20,383		45.55% Pervious Area
	24,365		54.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-2: (new Subcat)

Runoff = 5.41 cfs @ 12.11 hrs, Volume= 18,349 cf, Depth= 2.26"

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 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	29,252	79	>75% Grass cover, Good, HSG B
	64,209	98	Paved parking, HSG B
	4,040	55	Woods, Good, HSG B
	97,501	91	Weighted Average
	33,292		34.15% Pervious Area
	64,209		65.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	132	0.0390	2.96		**Shallow Concentrated Flow, 131.81 scf grass** Grassed Waterway Kv= 15.0 fps
0.1	32	0.0410	4.11		**Shallow Concentrated Flow, 32.07** Paved Kv= 20.3 fps
8.2	214	Total			

Summary for Subcatchment EX-3: (new Subcat)

Runoff = 2.38 cfs @ 12.19 hrs, Volume= 9,561 cf, Depth= 1.21"

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 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	63,074	79	>75% Grass cover, Good, HSG B
	12,625	98	Paved parking, HSG B
	18,981	55	Woods, Good, HSG B
	94,680	77	Weighted Average
	82,055		86.67% Pervious Area
	12,625		13.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, 50' sf** Grass: Short n= 0.150 P2= 3.20"
0.8	72	0.0100	1.50		**Shallow Concentrated Flow, 72.13' scf** Grassed Waterway Kv= 15.0 fps
0.2	25	0.0100	2.03		**Shallow Concentrated Flow, 25' paved scf** Paved Kv= 20.3 fps
2.3	152	0.0500	1.12		**Shallow Concentrated Flow, 152** Woodland Kv= 5.0 fps
13.1	299	Total			

Summary for Subcatchment EX-4: (new Subcat)

Runoff = 2.64 cfs @ 12.23 hrs, Volume= 11,657 cf, Depth= 1.15"

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 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	71,368	79	>75% Grass cover, Good, HSG B
	20,744	98	Paved parking, HSG B
	29,311	55	Woods, Good, HSG B
	121,423	76	Weighted Average
	100,679		82.92% Pervious Area
	20,744		17.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, 50'** Grass: Short n= 0.150 P2= 3.20"
0.1	8	0.0180	2.01		**Shallow Concentrated Flow, 8.39 scf** Grassed Waterway Kv= 15.0 fps
0.2	29	0.0100	2.03		**Shallow Concentrated Flow, 29'** Paved Kv= 20.3 fps
5.8	420	0.0065	1.21		**Shallow Concentrated Flow, 419.93** Grassed Waterway Kv= 15.0 fps
4.4	152	0.0130	0.57		**Shallow Concentrated Flow, 152.12** Woodland Kv= 5.0 fps
16.4	659	Total			

Summary for Subcatchment EX-5: (new Subcat)

Runoff = 0.62 cfs @ 12.09 hrs, Volume= 1,913 cf, Depth= 1.61"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	7,271	79	>75% Grass cover, Good, HSG B
	5,173	98	Paved parking, HSG B
	1,818	55	Woods, Good, HSG B
	14,262	83	Weighted Average
	9,089		63.73% Pervious Area
	5,173		36.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-6: EX-6

Runoff = 3.27 cfs @ 12.09 hrs, Volume= 10,223 cf, Depth= 2.17"

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 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	9,829	79	>75% Grass cover, Good, HSG B
	40,097	98	Paved parking, HSG B
	6,642	55	Woods, Good, HSG B
	56,568	90	Weighted Average
	16,471		29.12% Pervious Area
	40,097		70.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-7: EX-7

Runoff = 0.16 cfs @ 12.10 hrs, Volume= 534 cf, Depth= 0.88"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	4,717	79	>75% Grass cover, Good, HSG B
	148	98	Paved parking, HSG B
	2,426	55	Woods, Good, HSG B
	7,291	71	Weighted Average
	7,143		97.97% Pervious Area
	148		2.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-8: (new Subcat)

Runoff = 5.88 cfs @ 12.18 hrs, Volume= 23,478 cf, Depth= 1.15"

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 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	13,342	98	Paved Asphalt
	36,830	55	Woods, Good, HSG B
*	194,386	79	>75% Grass cover, Good, HSG B
	244,558	76	Weighted Average
	231,216		94.54% Pervious Area
	13,342		5.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, 50' sf grass .018** Grass: Short n= 0.150 P2= 3.20"
6.4	296	0.0120	0.77		**Shallow Concentrated Flow, 296' sf grass .012** Short Grass Pasture Kv= 7.0 fps
0.3	10	0.0100	0.50		**Shallow Concentrated Flow, 10' sf woods** Woodland Kv= 5.0 fps
12.6	356	Total			

Summary for Subcatchment EX-BLDG: EX-BLDG

Runoff = 3.17 cfs @ 12.08 hrs, Volume= 10,996 cf, Depth= 2.97"

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 2 yr Rainfall=3.20"

Area (sf)	CN	Description
44,466	98	Paved parking, HSG B
44,466		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Reach POA-1: South West Wetlands

Inflow Area = 153,073 sf, 71.26% Impervious, Inflow Depth = 2.31" for 2 yr event
Inflow = 9.08 cfs @ 12.09 hrs, Volume= 29,514 cf
Outflow = 9.08 cfs @ 12.09 hrs, Volume= 29,514 cf, 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 POA-2: To Existing DMH North of Site

Inflow Area = 342,059 sf, 22.67% Impervious, Inflow Depth = 1.47" for 2 yr event
Inflow = 10.72 cfs @ 12.14 hrs, Volume= 41,826 cf
Outflow = 10.72 cfs @ 12.14 hrs, Volume= 41,826 cf, 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 POA-3: NORTH EAST WETLANDS

Inflow Area = 94,680 sf, 13.33% Impervious, Inflow Depth = 1.21" for 2 yr event
Inflow = 2.38 cfs @ 12.19 hrs, Volume= 9,561 cf
Outflow = 2.38 cfs @ 12.19 hrs, Volume= 9,561 cf, 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 POA-4: SOUTH EAST WETLANDS

Inflow Area = 121,423 sf, 17.08% Impervious, Inflow Depth = 1.15" for 2 yr event
Inflow = 2.64 cfs @ 12.23 hrs, Volume= 11,657 cf
Outflow = 2.64 cfs @ 12.23 hrs, Volume= 11,657 cf, 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 POA-5: CHAMPNEY STREET

Inflow Area = 14,262 sf, 36.27% Impervious, Inflow Depth = 1.61" for 2 yr event
Inflow = 0.62 cfs @ 12.09 hrs, Volume= 1,913 cf
Outflow = 0.62 cfs @ 12.09 hrs, Volume= 1,913 cf, Atten= 0%, Lag= 0.0 min

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

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

Subcatchment EX-1: (new Subcat) Runoff Area=44,748 sf 54.45% Impervious Runoff Depth=3.30"
Tc=6.0 min CN=89 Runoff=3.88 cfs 12,288 cf

Subcatchment EX-2: (new Subcat) Runoff Area=97,501 sf 65.85% Impervious Runoff Depth=3.50"
Flow Length=214' Tc=8.2 min CN=91 Runoff=8.22 cfs 28,422 cf

Subcatchment EX-3: (new Subcat) Runoff Area=94,680 sf 13.33% Impervious Runoff Depth=2.21"
Flow Length=299' Tc=13.1 min CN=77 Runoff=4.47 cfs 17,442 cf

Subcatchment EX-4: (new Subcat) Runoff Area=121,423 sf 17.08% Impervious Runoff Depth=2.13"
Flow Length=659' Tc=16.4 min CN=76 Runoff=5.06 cfs 21,551 cf

Subcatchment EX-5: (new Subcat) Runoff Area=14,262 sf 36.27% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=83 Runoff=1.04 cfs 3,239 cf

Subcatchment EX-6: EX-6 Runoff Area=56,568 sf 70.88% Impervious Runoff Depth=3.40"
Tc=6.0 min CN=90 Runoff=5.02 cfs 16,008 cf

Subcatchment EX-7: EX-7 Runoff Area=7,291 sf 2.03% Impervious Runoff Depth=1.75"
Tc=6.0 min CN=71 Runoff=0.33 cfs 1,061 cf

Subcatchment EX-8: (new Subcat) Runoff Area=244,558 sf 5.46% Impervious Runoff Depth=2.13"
Flow Length=356' Tc=12.6 min CN=76 Runoff=11.24 cfs 43,405 cf

Subcatchment EX-BLDG: EX-BLDG Runoff Area=44,466 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=4.49 cfs 15,800 cf

Reach POA-1: South West Wetlands Inflow=13.72 cfs 45,157 cf
Outflow=13.72 cfs 45,157 cf

Reach POA-2: To Existing DMH North of Site Inflow=18.61 cfs 71,827 cf
Outflow=18.61 cfs 71,827 cf

Reach POA-3: NORTH EAST WETLANDS Inflow=4.47 cfs 17,442 cf
Outflow=4.47 cfs 17,442 cf

Reach POA-4: SOUTH EAST WETLANDS Inflow=5.06 cfs 21,551 cf
Outflow=5.06 cfs 21,551 cf

Reach POA-5: CHAMPNEY STREET Inflow=1.04 cfs 3,239 cf
Outflow=1.04 cfs 3,239 cf

Total Runoff Area = 725,497 sf Runoff Volume = 159,215 cf Average Runoff Depth = 2.63"
68.96% Pervious = 500,328 sf 31.04% Impervious = 225,169 sf

Summary for Subcatchment EX-1: (new Subcat)

Runoff = 3.88 cfs @ 12.09 hrs, Volume= 12,288 cf, Depth= 3.30"

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 Rainfall=4.50"

	Area (sf)	CN	Description
*	20,383	79	>75% Grass cover, Good, HSG B
	24,365	98	Paved parking, HSG B
	44,748	89	Weighted Average
	20,383		45.55% Pervious Area
	24,365		54.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-2: (new Subcat)

Runoff = 8.22 cfs @ 12.11 hrs, Volume= 28,422 cf, Depth= 3.50"

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 Rainfall=4.50"

	Area (sf)	CN	Description
*	29,252	79	>75% Grass cover, Good, HSG B
	64,209	98	Paved parking, HSG B
	4,040	55	Woods, Good, HSG B
	97,501	91	Weighted Average
	33,292		34.15% Pervious Area
	64,209		65.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	132	0.0390	2.96		**Shallow Concentrated Flow, 131.81 scf grass** Grassed Waterway Kv= 15.0 fps
0.1	32	0.0410	4.11		**Shallow Concentrated Flow, 32.07** Paved Kv= 20.3 fps
8.2	214	Total			

Summary for Subcatchment EX-3: (new Subcat)

Runoff = 4.47 cfs @ 12.18 hrs, Volume= 17,442 cf, Depth= 2.21"

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 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	63,074	79	>75% Grass cover, Good, HSG B
	12,625	98	Paved parking, HSG B
	18,981	55	Woods, Good, HSG B
	94,680	77	Weighted Average
	82,055		86.67% Pervious Area
	12,625		13.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, 50' sf** Grass: Short n= 0.150 P2= 3.20"
0.8	72	0.0100	1.50		**Shallow Concentrated Flow, 72.13' scf** Grassed Waterway Kv= 15.0 fps
0.2	25	0.0100	2.03		**Shallow Concentrated Flow, 25' paved scf** Paved Kv= 20.3 fps
2.3	152	0.0500	1.12		**Shallow Concentrated Flow, 152** Woodland Kv= 5.0 fps
13.1	299	Total			

Summary for Subcatchment EX-4: (new Subcat)

Runoff = 5.06 cfs @ 12.23 hrs, Volume= 21,551 cf, Depth= 2.13"

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 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	71,368	79	>75% Grass cover, Good, HSG B
	20,744	98	Paved parking, HSG B
	29,311	55	Woods, Good, HSG B
	121,423	76	Weighted Average
	100,679		82.92% Pervious Area
	20,744		17.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, 50'** Grass: Short n= 0.150 P2= 3.20"
0.1	8	0.0180	2.01		**Shallow Concentrated Flow, 8.39 scf** Grassed Waterway Kv= 15.0 fps
0.2	29	0.0100	2.03		**Shallow Concentrated Flow, 29'** Paved Kv= 20.3 fps
5.8	420	0.0065	1.21		**Shallow Concentrated Flow, 419.93** Grassed Waterway Kv= 15.0 fps
4.4	152	0.0130	0.57		**Shallow Concentrated Flow, 152.12** Woodland Kv= 5.0 fps
16.4	659	Total			

Summary for Subcatchment EX-5: (new Subcat)

Runoff = 1.04 cfs @ 12.09 hrs, Volume= 3,239 cf, 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 Rainfall=4.50"

	Area (sf)	CN	Description
*	7,271	79	>75% Grass cover, Good, HSG B
	5,173	98	Paved parking, HSG B
	1,818	55	Woods, Good, HSG B
	14,262	83	Weighted Average
	9,089		63.73% Pervious Area
	5,173		36.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-6: EX-6

Runoff = 5.02 cfs @ 12.09 hrs, Volume= 16,008 cf, Depth= 3.40"

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 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	9,829	79	>75% Grass cover, Good, HSG B
	40,097	98	Paved parking, HSG B
	6,642	55	Woods, Good, HSG B
	56,568	90	Weighted Average
	16,471		29.12% Pervious Area
	40,097		70.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-7: EX-7

Runoff = 0.33 cfs @ 12.09 hrs, Volume= 1,061 cf, Depth= 1.75"

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 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	4,717	79	>75% Grass cover, Good, HSG B
	148	98	Paved parking, HSG B
	2,426	55	Woods, Good, HSG B
	7,291	71	Weighted Average
	7,143		97.97% Pervious Area
	148		2.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-8: (new Subcat)

Runoff = 11.24 cfs @ 12.18 hrs, Volume= 43,405 cf, Depth= 2.13"

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 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	13,342	98	Paved Asphalt
	36,830	55	Woods, Good, HSG B
*	194,386	79	>75% Grass cover, Good, HSG B
	244,558	76	Weighted Average
	231,216		94.54% Pervious Area
	13,342		5.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, 50' sf grass .018** Grass: Short n= 0.150 P2= 3.20"
6.4	296	0.0120	0.77		**Shallow Concentrated Flow, 296' sf grass .012** Short Grass Pasture Kv= 7.0 fps
0.3	10	0.0100	0.50		**Shallow Concentrated Flow, 10' sf woods** Woodland Kv= 5.0 fps
12.6	356	Total			

Summary for Subcatchment EX-BLDG: EX-BLDG

Runoff = 4.49 cfs @ 12.08 hrs, Volume= 15,800 cf, Depth= 4.26"

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 10 yr Rainfall=4.50"

Area (sf)	CN	Description
44,466	98	Paved parking, HSG B
44,466		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Reach POA-1: South West Wetlands

Inflow Area = 153,073 sf, 71.26% Impervious, Inflow Depth = 3.54" for 10 yr event
Inflow = 13.72 cfs @ 12.08 hrs, Volume= 45,157 cf
Outflow = 13.72 cfs @ 12.08 hrs, Volume= 45,157 cf, 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 POA-2: To Existing DMH North of Site

Inflow Area = 342,059 sf, 22.67% Impervious, Inflow Depth = 2.52" for 10 yr event
Inflow = 18.61 cfs @ 12.14 hrs, Volume= 71,827 cf
Outflow = 18.61 cfs @ 12.14 hrs, Volume= 71,827 cf, 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 POA-3: NORTH EAST WETLANDS

Inflow Area = 94,680 sf, 13.33% Impervious, Inflow Depth = 2.21" for 10 yr event
Inflow = 4.47 cfs @ 12.18 hrs, Volume= 17,442 cf
Outflow = 4.47 cfs @ 12.18 hrs, Volume= 17,442 cf, 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 POA-4: SOUTH EAST WETLANDS

Inflow Area = 121,423 sf, 17.08% Impervious, Inflow Depth = 2.13" for 10 yr event
Inflow = 5.06 cfs @ 12.23 hrs, Volume= 21,551 cf
Outflow = 5.06 cfs @ 12.23 hrs, Volume= 21,551 cf, 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 POA-5: CHAMPNEY STREET

Inflow Area = 14,262 sf, 36.27% Impervious, Inflow Depth = 2.73" for 10 yr event
Inflow = 1.04 cfs @ 12.09 hrs, Volume= 3,239 cf
Outflow = 1.04 cfs @ 12.09 hrs, Volume= 3,239 cf, Atten= 0%, Lag= 0.0 min

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

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

SubcatchmentEX-1: (new Subcat) Runoff Area=44,748 sf 54.45% Impervious Runoff Depth=4.16"
Tc=6.0 min CN=89 Runoff=4.84 cfs 15,498 cf

SubcatchmentEX-2: (new Subcat) Runoff Area=97,501 sf 65.85% Impervious Runoff Depth=4.37"
Flow Length=214' Tc=8.2 min CN=91 Runoff=10.15 cfs 35,516 cf

SubcatchmentEX-3: (new Subcat) Runoff Area=94,680 sf 13.33% Impervious Runoff Depth=2.96"
Flow Length=299' Tc=13.1 min CN=77 Runoff=6.01 cfs 23,362 cf

SubcatchmentEX-4: (new Subcat) Runoff Area=121,423 sf 17.08% Impervious Runoff Depth=2.87"
Flow Length=659' Tc=16.4 min CN=76 Runoff=6.85 cfs 29,027 cf

SubcatchmentEX-5: (new Subcat) Runoff Area=14,262 sf 36.27% Impervious Runoff Depth=3.54"
Tc=6.0 min CN=83 Runoff=1.35 cfs 4,205 cf

SubcatchmentEX-6: EX-6 Runoff Area=56,568 sf 70.88% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=90 Runoff=6.23 cfs 20,096 cf

SubcatchmentEX-7: EX-7 Runoff Area=7,291 sf 2.03% Impervious Runoff Depth=2.42"
Tc=6.0 min CN=71 Runoff=0.47 cfs 1,472 cf

SubcatchmentEX-8: (new Subcat) Runoff Area=244,558 sf 5.46% Impervious Runoff Depth=2.87"
Flow Length=356' Tc=12.6 min CN=76 Runoff=15.24 cfs 58,463 cf

SubcatchmentEX-BLDG: EX-BLDG Runoff Area=44,466 sf 100.00% Impervious Runoff Depth=5.16"
Tc=6.0 min CN=98 Runoff=5.40 cfs 19,130 cf

Reach POA-1: South West Wetlands Inflow=16.93 cfs 56,196 cf
Outflow=16.93 cfs 56,196 cf

Reach POA-2: To Existing DMH North of Site Inflow=24.34 cfs 93,979 cf
Outflow=24.34 cfs 93,979 cf

Reach POA-3: NORTH EAST WETLANDS Inflow=6.01 cfs 23,362 cf
Outflow=6.01 cfs 23,362 cf

Reach POA-4: SOUTH EAST WETLANDS Inflow=6.85 cfs 29,027 cf
Outflow=6.85 cfs 29,027 cf

Reach POA-5: CHAMPNEY STREET Inflow=1.35 cfs 4,205 cf
Outflow=1.35 cfs 4,205 cf

Total Runoff Area = 725,497 sf Runoff Volume = 206,768 cf Average Runoff Depth = 3.42"
68.96% Pervious = 500,328 sf 31.04% Impervious = 225,169 sf

Summary for Subcatchment EX-1: (new Subcat)

Runoff = 4.84 cfs @ 12.09 hrs, Volume= 15,498 cf, Depth= 4.16"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	20,383	79	>75% Grass cover, Good, HSG B
	24,365	98	Paved parking, HSG B
	44,748	89	Weighted Average
	20,383		45.55% Pervious Area
	24,365		54.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-2: (new Subcat)

Runoff = 10.15 cfs @ 12.11 hrs, Volume= 35,516 cf, Depth= 4.37"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	29,252	79	>75% Grass cover, Good, HSG B
	64,209	98	Paved parking, HSG B
	4,040	55	Woods, Good, HSG B
	97,501	91	Weighted Average
	33,292		34.15% Pervious Area
	64,209		65.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	132	0.0390	2.96		**Shallow Concentrated Flow, 131.81 scf grass** Grassed Waterway Kv= 15.0 fps
0.1	32	0.0410	4.11		**Shallow Concentrated Flow, 32.07** Paved Kv= 20.3 fps
8.2	214	Total			

Summary for Subcatchment EX-3: (new Subcat)

Runoff = 6.01 cfs @ 12.18 hrs, Volume= 23,362 cf, Depth= 2.96"

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 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	63,074	79	>75% Grass cover, Good, HSG B
	12,625	98	Paved parking, HSG B
	18,981	55	Woods, Good, HSG B
	94,680	77	Weighted Average
	82,055		86.67% Pervious Area
	12,625		13.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, 50' sf** Grass: Short n= 0.150 P2= 3.20"
0.8	72	0.0100	1.50		**Shallow Concentrated Flow, 72.13' scf** Grassed Waterway Kv= 15.0 fps
0.2	25	0.0100	2.03		**Shallow Concentrated Flow, 25' paved scf** Paved Kv= 20.3 fps
2.3	152	0.0500	1.12		**Shallow Concentrated Flow, 152** Woodland Kv= 5.0 fps
13.1	299	Total			

Summary for Subcatchment EX-4: (new Subcat)

Runoff = 6.85 cfs @ 12.23 hrs, Volume= 29,027 cf, Depth= 2.87"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	71,368	79	>75% Grass cover, Good, HSG B
	20,744	98	Paved parking, HSG B
	29,311	55	Woods, Good, HSG B
	121,423	76	Weighted Average
	100,679		82.92% Pervious Area
	20,744		17.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, 50'** Grass: Short n= 0.150 P2= 3.20"
0.1	8	0.0180	2.01		**Shallow Concentrated Flow, 8.39 scf** Grassed Waterway Kv= 15.0 fps
0.2	29	0.0100	2.03		**Shallow Concentrated Flow, 29'** Paved Kv= 20.3 fps
5.8	420	0.0065	1.21		**Shallow Concentrated Flow, 419.93** Grassed Waterway Kv= 15.0 fps
4.4	152	0.0130	0.57		**Shallow Concentrated Flow, 152.12** Woodland Kv= 5.0 fps
16.4	659	Total			

Summary for Subcatchment EX-5: (new Subcat)

Runoff = 1.35 cfs @ 12.09 hrs, Volume= 4,205 cf, Depth= 3.54"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	7,271	79	>75% Grass cover, Good, HSG B
	5,173	98	Paved parking, HSG B
	1,818	55	Woods, Good, HSG B
	14,262	83	Weighted Average
	9,089		63.73% Pervious Area
	5,173		36.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-6: EX-6

Runoff = 6.23 cfs @ 12.08 hrs, Volume= 20,096 cf, Depth= 4.26"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	9,829	79	>75% Grass cover, Good, HSG B
	40,097	98	Paved parking, HSG B
	6,642	55	Woods, Good, HSG B
	56,568	90	Weighted Average
	16,471		29.12% Pervious Area
	40,097		70.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-7: EX-7

Runoff = 0.47 cfs @ 12.09 hrs, Volume= 1,472 cf, Depth= 2.42"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	4,717	79	>75% Grass cover, Good, HSG B
	148	98	Paved parking, HSG B
	2,426	55	Woods, Good, HSG B
	7,291	71	Weighted Average
	7,143		97.97% Pervious Area
	148		2.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-8: (new Subcat)

Runoff = 15.24 cfs @ 12.17 hrs, Volume= 58,463 cf, Depth= 2.87"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	13,342	98	Paved Asphalt
	36,830	55	Woods, Good, HSG B
*	194,386	79	>75% Grass cover, Good, HSG B
	244,558	76	Weighted Average
	231,216		94.54% Pervious Area
	13,342		5.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, 50' sf grass .018** Grass: Short n= 0.150 P2= 3.20"
6.4	296	0.0120	0.77		**Shallow Concentrated Flow, 296' sf grass .012** Short Grass Pasture Kv= 7.0 fps
0.3	10	0.0100	0.50		**Shallow Concentrated Flow, 10' sf woods** Woodland Kv= 5.0 fps
12.6	356	Total			

Summary for Subcatchment EX-BLDG: EX-BLDG

Runoff = 5.40 cfs @ 12.08 hrs, Volume= 19,130 cf, Depth= 5.16"

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 Rainfall=5.40"

Area (sf)	CN	Description
44,466	98	Paved parking, HSG B
44,466		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Reach POA-1: South West Wetlands

Inflow Area = 153,073 sf, 71.26% Impervious, Inflow Depth = 4.41" for 25 yr event
Inflow = 16.93 cfs @ 12.08 hrs, Volume= 56,196 cf
Outflow = 16.93 cfs @ 12.08 hrs, Volume= 56,196 cf, 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 POA-2: To Existing DMH North of Site

Inflow Area = 342,059 sf, 22.67% Impervious, Inflow Depth = 3.30" for 25 yr event
Inflow = 24.34 cfs @ 12.14 hrs, Volume= 93,979 cf
Outflow = 24.34 cfs @ 12.14 hrs, Volume= 93,979 cf, 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 POA-3: NORTH EAST WETLANDS

Inflow Area = 94,680 sf, 13.33% Impervious, Inflow Depth = 2.96" for 25 yr event
Inflow = 6.01 cfs @ 12.18 hrs, Volume= 23,362 cf
Outflow = 6.01 cfs @ 12.18 hrs, Volume= 23,362 cf, 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 POA-4: SOUTH EAST WETLANDS

Inflow Area = 121,423 sf, 17.08% Impervious, Inflow Depth = 2.87" for 25 yr event
Inflow = 6.85 cfs @ 12.23 hrs, Volume= 29,027 cf
Outflow = 6.85 cfs @ 12.23 hrs, Volume= 29,027 cf, 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 POA-5: CHAMPNEY STREET

Inflow Area = 14,262 sf, 36.27% Impervious, Inflow Depth = 3.54" for 25 yr event
Inflow = 1.35 cfs @ 12.09 hrs, Volume= 4,205 cf
Outflow = 1.35 cfs @ 12.09 hrs, Volume= 4,205 cf, Atten= 0%, Lag= 0.0 min

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

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

Subcatchment EX-1: (new Subcat) Runoff Area=44,748 sf 54.45% Impervious Runoff Depth=5.71"
Tc=6.0 min CN=89 Runoff=6.53 cfs 21,285 cf

Subcatchment EX-2: (new Subcat) Runoff Area=97,501 sf 65.85% Impervious Runoff Depth=5.94"
Flow Length=214' Tc=8.2 min CN=91 Runoff=13.55 cfs 48,253 cf

Subcatchment EX-3: (new Subcat) Runoff Area=94,680 sf 13.33% Impervious Runoff Depth=4.37"
Flow Length=299' Tc=13.1 min CN=77 Runoff=8.85 cfs 34,446 cf

Subcatchment EX-4: (new Subcat) Runoff Area=121,423 sf 17.08% Impervious Runoff Depth=4.26"
Flow Length=659' Tc=16.4 min CN=76 Runoff=10.17 cfs 43,078 cf

Subcatchment EX-5: (new Subcat) Runoff Area=14,262 sf 36.27% Impervious Runoff Depth=5.03"
Tc=6.0 min CN=83 Runoff=1.89 cfs 5,976 cf

Subcatchment EX-6: EX-6 Runoff Area=56,568 sf 70.88% Impervious Runoff Depth=5.82"
Tc=6.0 min CN=90 Runoff=8.36 cfs 27,450 cf

Subcatchment EX-7: EX-7 Runoff Area=7,291 sf 2.03% Impervious Runoff Depth=3.72"
Tc=6.0 min CN=71 Runoff=0.73 cfs 2,262 cf

Subcatchment EX-8: (new Subcat) Runoff Area=244,558 sf 5.46% Impervious Runoff Depth=4.26"
Flow Length=356' Tc=12.6 min CN=76 Runoff=22.62 cfs 86,764 cf

Subcatchment EX-BLDG: EX-BLDG Runoff Area=44,466 sf 100.00% Impervious Runoff Depth=6.76"
Tc=6.0 min CN=98 Runoff=7.01 cfs 25,053 cf

Reach POA-1: South West Wetlands Inflow=22.63 cfs 76,051 cf
Outflow=22.63 cfs 76,051 cf

Reach POA-2: To Existing DMH North of Site Inflow=34.79 cfs 135,017 cf
Outflow=34.79 cfs 135,017 cf

Reach POA-3: NORTH EAST WETLANDS Inflow=8.85 cfs 34,446 cf
Outflow=8.85 cfs 34,446 cf

Reach POA-4: SOUTH EAST WETLANDS Inflow=10.17 cfs 43,078 cf
Outflow=10.17 cfs 43,078 cf

Reach POA-5: CHAMPNEY STREET Inflow=1.89 cfs 5,976 cf
Outflow=1.89 cfs 5,976 cf

Total Runoff Area = 725,497 sf Runoff Volume = 294,567 cf Average Runoff Depth = 4.87"
68.96% Pervious = 500,328 sf 31.04% Impervious = 225,169 sf

Summary for Subcatchment EX-1: (new Subcat)

Runoff = 6.53 cfs @ 12.08 hrs, Volume= 21,285 cf, Depth= 5.71"

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 Rainfall=7.00"

	Area (sf)	CN	Description
*	20,383	79	>75% Grass cover, Good, HSG B
	24,365	98	Paved parking, HSG B
	44,748	89	Weighted Average
	20,383		45.55% Pervious Area
	24,365		54.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-2: (new Subcat)

Runoff = 13.55 cfs @ 12.11 hrs, Volume= 48,253 cf, Depth= 5.94"

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 Rainfall=7.00"

	Area (sf)	CN	Description
*	29,252	79	>75% Grass cover, Good, HSG B
	64,209	98	Paved parking, HSG B
	4,040	55	Woods, Good, HSG B
	97,501	91	Weighted Average
	33,292		34.15% Pervious Area
	64,209		65.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.7	132	0.0390	2.96		**Shallow Concentrated Flow, 131.81 scf grass** Grassed Waterway Kv= 15.0 fps
0.1	32	0.0410	4.11		**Shallow Concentrated Flow, 32.07** Paved Kv= 20.3 fps
8.2	214	Total			

Summary for Subcatchment EX-3: (new Subcat)

Runoff = 8.85 cfs @ 12.18 hrs, Volume= 34,446 cf, Depth= 4.37"

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 Rainfall=7.00"

	Area (sf)	CN	Description
*	63,074	79	>75% Grass cover, Good, HSG B
	12,625	98	Paved parking, HSG B
	18,981	55	Woods, Good, HSG B
	94,680	77	Weighted Average
	82,055		86.67% Pervious Area
	12,625		13.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, 50' sf** Grass: Short n= 0.150 P2= 3.20"
0.8	72	0.0100	1.50		**Shallow Concentrated Flow, 72.13' scf** Grassed Waterway Kv= 15.0 fps
0.2	25	0.0100	2.03		**Shallow Concentrated Flow, 25' paved scf** Paved Kv= 20.3 fps
2.3	152	0.0500	1.12		**Shallow Concentrated Flow, 152** Woodland Kv= 5.0 fps
13.1	299	Total			

Summary for Subcatchment EX-4: (new Subcat)

Runoff = 10.17 cfs @ 12.23 hrs, Volume= 43,078 cf, Depth= 4.26"

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 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	71,368	79	>75% Grass cover, Good, HSG B
	20,744	98	Paved parking, HSG B
	29,311	55	Woods, Good, HSG B
	121,423	76	Weighted Average
	100,679		82.92% Pervious Area
	20,744		17.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, 50'** Grass: Short n= 0.150 P2= 3.20"
0.1	8	0.0180	2.01		**Shallow Concentrated Flow, 8.39 scf** Grassed Waterway Kv= 15.0 fps
0.2	29	0.0100	2.03		**Shallow Concentrated Flow, 29'** Paved Kv= 20.3 fps
5.8	420	0.0065	1.21		**Shallow Concentrated Flow, 419.93** Grassed Waterway Kv= 15.0 fps
4.4	152	0.0130	0.57		**Shallow Concentrated Flow, 152.12** Woodland Kv= 5.0 fps
16.4	659	Total			

Summary for Subcatchment EX-5: (new Subcat)

Runoff = 1.89 cfs @ 12.09 hrs, Volume= 5,976 cf, 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 Rainfall=7.00"

	Area (sf)	CN	Description
*	7,271	79	>75% Grass cover, Good, HSG B
	5,173	98	Paved parking, HSG B
	1,818	55	Woods, Good, HSG B
	14,262	83	Weighted Average
	9,089		63.73% Pervious Area
	5,173		36.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-6: EX-6

Runoff = 8.36 cfs @ 12.08 hrs, Volume= 27,450 cf, Depth= 5.82"

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 Rainfall=7.00"

	Area (sf)	CN	Description
*	9,829	79	>75% Grass cover, Good, HSG B
	40,097	98	Paved parking, HSG B
	6,642	55	Woods, Good, HSG B
	56,568	90	Weighted Average
	16,471		29.12% Pervious Area
	40,097		70.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-7: EX-7

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 2,262 cf, Depth= 3.72"

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 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	4,717	79	>75% Grass cover, Good, HSG B
	148	98	Paved parking, HSG B
	2,426	55	Woods, Good, HSG B
	7,291	71	Weighted Average
	7,143		97.97% Pervious Area
	148		2.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Subcatchment EX-8: (new Subcat)

Runoff = 22.62 cfs @ 12.17 hrs, Volume= 86,764 cf, Depth= 4.26"

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 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	13,342	98	Paved Asphalt
	36,830	55	Woods, Good, HSG B
*	194,386	79	>75% Grass cover, Good, HSG B
	244,558	76	Weighted Average
	231,216		94.54% Pervious Area
	13,342		5.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.0180	0.14		**Sheet Flow, 50' sf grass .018** Grass: Short n= 0.150 P2= 3.20"
6.4	296	0.0120	0.77		**Shallow Concentrated Flow, 296' sf grass .012** Short Grass Pasture Kv= 7.0 fps
0.3	10	0.0100	0.50		**Shallow Concentrated Flow, 10' sf woods** Woodland Kv= 5.0 fps
12.6	356	Total			

Summary for Subcatchment EX-BLDG: EX-BLDG

Runoff = 7.01 cfs @ 12.08 hrs, Volume= 25,053 cf, Depth= 6.76"

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 Rainfall=7.00"

Area (sf)	CN	Description
44,466	98	Paved parking, HSG B
44,466		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Summary for Reach POA-1: South West Wetlands

Inflow Area = 153,073 sf, 71.26% Impervious, Inflow Depth = 5.96" for 100 yr event
Inflow = 22.63 cfs @ 12.08 hrs, Volume= 76,051 cf
Outflow = 22.63 cfs @ 12.08 hrs, Volume= 76,051 cf, 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 POA-2: To Existing DMH North of Site

Inflow Area = 342,059 sf, 22.67% Impervious, Inflow Depth = 4.74" for 100 yr event
Inflow = 34.79 cfs @ 12.14 hrs, Volume= 135,017 cf
Outflow = 34.79 cfs @ 12.14 hrs, Volume= 135,017 cf, 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 POA-3: NORTH EAST WETLANDS

Inflow Area = 94,680 sf, 13.33% Impervious, Inflow Depth = 4.37" for 100 yr event
Inflow = 8.85 cfs @ 12.18 hrs, Volume= 34,446 cf
Outflow = 8.85 cfs @ 12.18 hrs, Volume= 34,446 cf, 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 POA-4: SOUTH EAST WETLANDS

Inflow Area = 121,423 sf, 17.08% Impervious, Inflow Depth = 4.26" for 100 yr event
Inflow = 10.17 cfs @ 12.23 hrs, Volume= 43,078 cf
Outflow = 10.17 cfs @ 12.23 hrs, Volume= 43,078 cf, Atten= 0%, Lag= 0.0 min

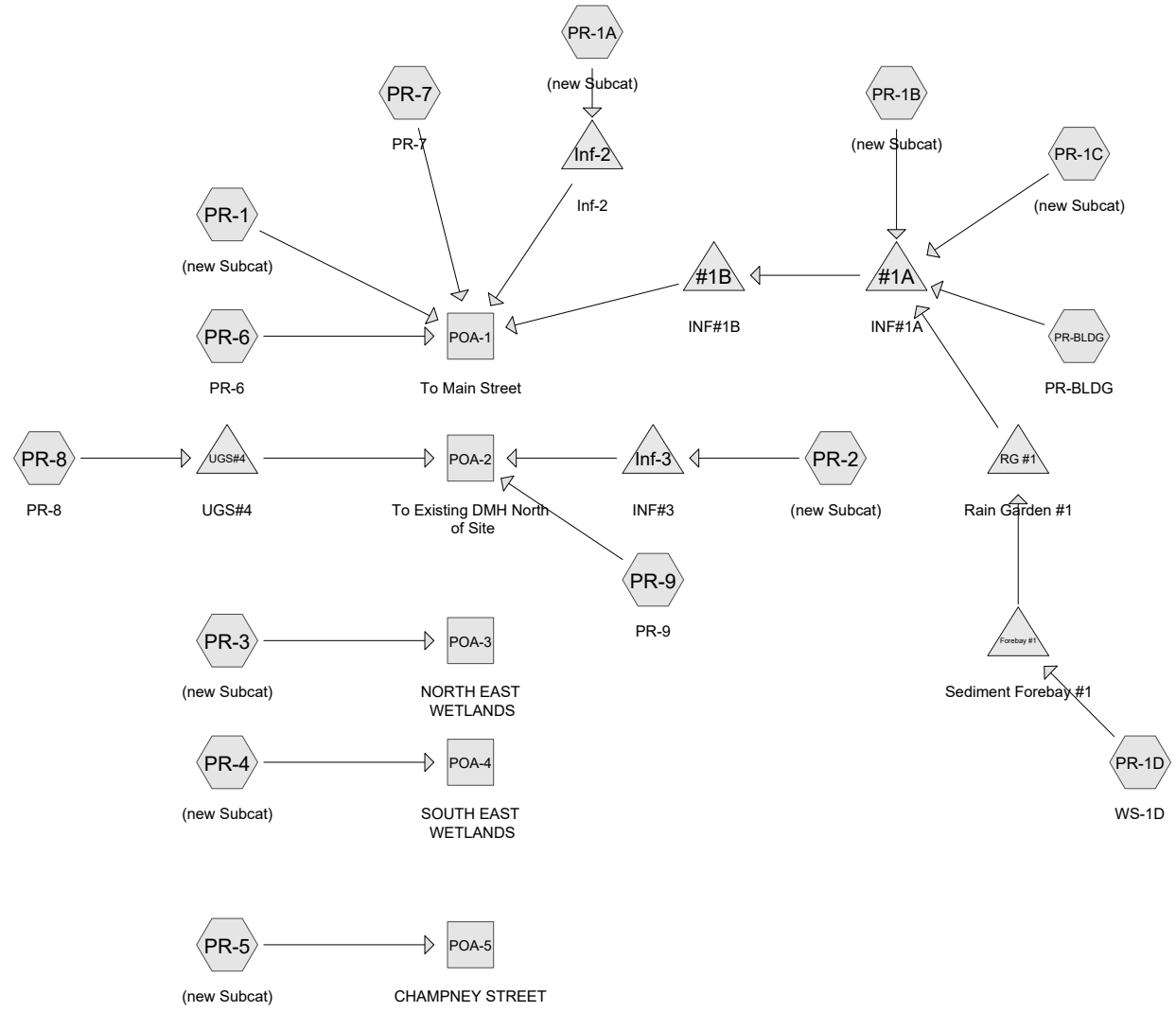
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach POA-5: CHAMPNEY STREET

Inflow Area = 14,262 sf, 36.27% Impervious, Inflow Depth = 5.03" for 100 yr event
Inflow = 1.89 cfs @ 12.09 hrs, Volume= 5,976 cf
Outflow = 1.89 cfs @ 12.09 hrs, Volume= 5,976 cf, Atten= 0%, Lag= 0.0 min

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

APPENDIX 3:
PROPOSED HYDROLOGY REPORT



Subcat Reach Pond Link

Routing Diagram for HydroCAD FloRo PROP SWM Permit Resubmission 02-2-22 Rain Garden Test

Prepared by Samiotes Consultants, Printed 2/4/2022

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
3,164	79	<50% Grass cover, Poor, HSG B (PR-1D)
6,834	79	>75% Grass cover, Good, HSG B (PR-5)
376,243	79	>75% Grass cover, HSG B (PR-1, PR-1A, PR-1B, PR-1C, PR-2, PR-3, PR-4, PR-6, PR-7, PR-8, PR-9)
1,153	98	Paved Parking, HSG B (PR-9)
58,745	98	Paved parking, HSG A (PR-8)
239,631	98	Paved parking, HSG B (PR-1, PR-1A, PR-1B, PR-1C, PR-1D, PR-2, PR-5, PR-9, PR-BLDG)
178	98	Wall (PR-6)
38,679	65	Woods, Poor, HSG B (PR-4, PR-5, PR-6, PR-7)
870	98	parking (PR-2)
725,497	**86**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
58,745	HSG A	PR-8
665,704	HSG B	PR-1, PR-1A, PR-1B, PR-1C, PR-1D, PR-2, PR-3, PR-4, PR-5, PR-6, PR-7, PR-8, PR-9, PR-BLDG
0	HSG C	
0	HSG D	
1,048	Other	PR-2, PR-6
725,497		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	3,164	0	0	0	3,164	<50% Grass cover, Poor	
0	376,243	0	0	0	376,243	>75% Grass cover	
0	6,834	0	0	0	6,834	>75% Grass cover, Good	
0	1,153	0	0	0	1,153	Paved Parking	
58,745	239,631	0	0	0	298,376	Paved parking	
0	0	0	0	178	178	Wall	
0	38,679	0	0	0	38,679	Woods, Poor	
0	0	0	0	870	870	parking	
58,745	**665,704**	**0**	**0**	**1,048**	**725,497**	**TOTAL AREA**	

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: (new Subcat) Runoff Area=42,801 sf 45.13% Impervious Runoff Depth=2.00"
Tc=6.0 min CN=88 Runoff=2.29 cfs 7,123 cf

Subcatchment PR-1A: (new Subcat) Runoff Area=120,105 sf 40.62% Impervious Runoff Depth=1.91"
Flow Length=98' Slope=0.0100 '/' Tc=7.9 min CN=87 Runoff=5.79 cfs 19,166 cf

Subcatchment PR-1B: (new Subcat) Runoff Area=8,760 sf 76.99% Impervious Runoff Depth=2.54"
Tc=6.0 min CN=94 Runoff=0.57 cfs 1,857 cf

Subcatchment PR-1C: (new Subcat) Runoff Area=48,219 sf 77.13% Impervious Runoff Depth=2.54"
Tc=6.0 min CN=94 Runoff=3.16 cfs 10,222 cf

Subcatchment PR-1D: WS-1D Runoff Area=15,164 sf 79.13% Impervious Runoff Depth=2.54"
Tc=6.0 min CN=94 Runoff=0.99 cfs 3,215 cf

Subcatchment PR-2: (new Subcat) Runoff Area=60,887 sf 66.57% Impervious Runoff Depth=2.35"
Tc=6.0 min CN=92 Runoff=3.76 cfs 11,927 cf

Subcatchment PR-3: (new Subcat) Runoff Area=37,434 sf 0.00% Impervious Runoff Depth=1.34"
Flow Length=151' Tc=9.0 min CN=79 Runoff=1.20 cfs 4,170 cf

Subcatchment PR-4: (new Subcat) Runoff Area=45,815 sf 0.00% Impervious Runoff Depth=0.83"
Tc=6.0 min CN=70 Runoff=0.91 cfs 3,162 cf

Subcatchment PR-5: (new Subcat) Runoff Area=13,090 sf 33.90% Impervious Runoff Depth=1.61"
Tc=6.0 min CN=83 Runoff=0.57 cfs 1,755 cf

Subcatchment PR-6: PR-6 Runoff Area=10,196 sf 1.75% Impervious Runoff Depth=0.88"
Tc=6.0 min CN=71 Runoff=0.22 cfs 746 cf

Subcatchment PR-7: PR-7 Runoff Area=7,291 sf 0.00% Impervious Runoff Depth=1.04"
Tc=6.0 min CN=74 Runoff=0.19 cfs 630 cf

Subcatchment PR-8: PR-8 Runoff Area=220,543 sf 26.64% Impervious Runoff Depth=1.68"
Flow Length=117' Tc=8.7 min CN=84 Runoff=9.10 cfs 30,919 cf

Subcatchment PR-9: PR-9 Runoff Area=31,969 sf 29.48% Impervious Runoff Depth=1.76"
Tc=6.0 min CN=85 Runoff=1.51 cfs 4,682 cf

Subcatchment PR-BLDG: PR-BLDG Runoff Area=63,223 sf 100.00% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=98 Runoff=4.51 cfs 15,634 cf

Reach POA-1: To Main Street Inflow=8.61 cfs 28,915 cf
Outflow=8.61 cfs 28,915 cf

Reach POA-2: To Existing DMH North of Site Inflow=9.59 cfs 46,268 cf
Outflow=9.59 cfs 46,268 cf

Reach POA-3: NORTH EAST WETLANDS Inflow=1.20 cfs 4,170 cf
Outflow=1.20 cfs 4,170 cf

Reach POA-4: SOUTH EAST WETLANDS Inflow=0.91 cfs 3,162 cf
Outflow=0.91 cfs 3,162 cf

Reach POA-5: CHAMPNEY STREET Inflow=0.57 cfs 1,755 cf
Outflow=0.57 cfs 1,755 cf

Pond #1A: INF#1A Peak Elev=324.82' Storage=5,571 cf Inflow=9.21 cfs 30,353 cf
Discarded=0.05 cfs 7,349 cf Primary=8.34 cfs 23,005 cf Outflow=8.39 cfs 30,354 cf

Pond #1B: INF#1B Peak Elev=322.75' Storage=2,181 cf Inflow=8.34 cfs 23,005 cf
Discarded=0.05 cfs 2,590 cf Primary=6.72 cfs 20,416 cf Outflow=6.77 cfs 23,006 cf

Pond Forebay #1: Sediment Forebay #1 Peak Elev=332.62' Storage=634 cf Inflow=0.99 cfs 3,215 cf
Outflow=0.98 cfs 2,640 cf

Pond Inf-2: Inf-2 Peak Elev=319.49' Storage=12,576 cf Inflow=5.79 cfs 19,166 cf
Discarded=0.14 cfs 19,167 cf Primary=0.00 cfs 0 cf Outflow=0.14 cfs 19,167 cf

Pond Inf-3: INF#3 Peak Elev=322.90' Storage=520 cf Inflow=3.76 cfs 11,927 cf
Discarded=0.01 cfs 1,261 cf Primary=3.73 cfs 10,665 cf Outflow=3.74 cfs 11,927 cf

Pond RG #1: Rain Garden #1 Peak Elev=331.00' Storage=0 cf Inflow=0.98 cfs 2,640 cf
Outflow=0.98 cfs 2,640 cf

Pond UGS#4: UGS#4 Peak Elev=318.36' Storage=4,266 cf Inflow=9.10 cfs 30,919 cf
Outflow=5.78 cfs 30,920 cf

Total Runoff Area = 725,497 sf Runoff Volume = 115,208 cf Average Runoff Depth = 1.91"
58.57% Pervious = 424,920 sf 41.43% Impervious = 300,577 sf

Summary for Subcatchment PR-1: (new Subcat)

Runoff = 2.29 cfs @ 12.09 hrs, Volume= 7,123 cf, Depth= 2.00"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	23,486	79	>75% Grass cover, HSG B
	19,315	98	Paved parking, HSG B
	42,801	88	Weighted Average
	23,486		54.87% Pervious Area
	19,315		45.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-1: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.36	0.01	0.01
9.00	0.47	0.02	0.03
10.00	0.60	0.07	0.05
11.00	0.80	0.15	0.11
12.00	1.60	0.65	**1.35**
13.00	2.40	1.30	**0.22**
14.00	2.60	1.46	0.14
15.00	2.73	1.58	0.11
16.00	2.84	1.67	0.08
17.00	2.91	1.74	0.06
18.00	2.97	1.79	0.05
19.00	3.02	1.83	0.04
20.00	3.06	1.87	0.04
21.00	3.10	1.91	0.03
22.00	3.14	1.94	0.03
23.00	3.17	1.97	0.03
24.00	**3.20**	**2.00**	0.02
25.00	3.20	2.00	0.00
26.00	3.20	2.00	0.00
27.00	3.20	2.00	0.00
28.00	3.20	2.00	0.00
29.00	3.20	2.00	0.00
30.00	3.20	2.00	0.00
31.00	3.20	2.00	0.00
32.00	3.20	2.00	0.00
33.00	3.20	2.00	0.00
34.00	3.20	2.00	0.00
35.00	3.20	2.00	0.00
36.00	3.20	2.00	0.00
37.00	3.20	2.00	0.00
38.00	3.20	2.00	0.00
39.00	3.20	2.00	0.00
40.00	3.20	2.00	0.00
41.00	3.20	2.00	0.00
42.00	3.20	2.00	0.00
43.00	3.20	2.00	0.00
44.00	3.20	2.00	0.00
45.00	3.20	2.00	0.00
46.00	3.20	2.00	0.00
47.00	3.20	2.00	0.00
48.00	3.20	2.00	0.00
49.00	3.20	2.00	0.00
50.00	3.20	2.00	0.00
51.00	3.20	2.00	0.00
52.00	3.20	2.00	0.00
53.00	3.20	2.00	0.00
54.00	3.20	2.00	0.00
55.00	3.20	2.00	0.00
56.00	3.20	2.00	0.00
57.00	3.20	2.00	0.00
58.00	3.20	2.00	0.00
59.00	3.20	2.00	0.00
60.00	3.20	2.00	0.00
61.00	3.20	2.00	0.00
62.00	3.20	2.00	0.00
63.00	3.20	2.00	0.00
64.00	3.20	2.00	0.00
65.00	3.20	2.00	0.00
66.00	3.20	2.00	0.00
67.00	3.20	2.00	0.00
68.00	3.20	2.00	0.00
69.00	3.20	2.00	0.00
70.00	3.20	2.00	0.00
71.00	3.20	2.00	0.00
72.00	3.20	2.00	0.00

Summary for Subcatchment PR-1A: (new Subcat)

Runoff = 5.79 cfs @ 12.11 hrs, Volume= 19,166 cf, Depth= 1.91"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	71,317	79	>75% Grass cover, HSG B
	48,788	98	Paved parking, HSG B
	120,105	87	Weighted Average
	71,317		59.38% Pervious Area
	48,788		40.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 sf** Grass: Short n= 0.150 P2= 3.20"
0.5	48	0.0100	1.50		**Shallow Concentrated Flow, 48.32' of SCF** Grassed Waterway Kv= 15.0 fps
7.9	98	Total			

Hydrograph for Subcatchment PR-1A: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.36	0.00	0.02
9.00	0.47	0.02	0.06
10.00	0.60	0.05	0.13
11.00	0.80	0.13	0.26
12.00	1.60	0.61	**3.03**
13.00	2.40	1.23	**0.62**
14.00	2.60	1.39	0.39
15.00	2.73	1.51	0.30
16.00	2.84	1.60	0.21
17.00	2.91	1.66	0.17
18.00	2.97	1.71	0.13
19.00	3.02	1.76	0.11
20.00	3.06	1.79	0.10
21.00	3.10	1.83	0.09
22.00	3.14	1.86	0.09
23.00	3.17	1.89	0.08
24.00	**3.20**	**1.91**	0.07
25.00	3.20	1.91	0.00
26.00	3.20	1.91	0.00
27.00	3.20	1.91	0.00
28.00	3.20	1.91	0.00
29.00	3.20	1.91	0.00
30.00	3.20	1.91	0.00
31.00	3.20	1.91	0.00
32.00	3.20	1.91	0.00
33.00	3.20	1.91	0.00
34.00	3.20	1.91	0.00
35.00	3.20	1.91	0.00
36.00	3.20	1.91	0.00
37.00	3.20	1.91	0.00
38.00	3.20	1.91	0.00
39.00	3.20	1.91	0.00
40.00	3.20	1.91	0.00
41.00	3.20	1.91	0.00
42.00	3.20	1.91	0.00
43.00	3.20	1.91	0.00
44.00	3.20	1.91	0.00
45.00	3.20	1.91	0.00
46.00	3.20	1.91	0.00
47.00	3.20	1.91	0.00
48.00	3.20	1.91	0.00
49.00	3.20	1.91	0.00
50.00	3.20	1.91	0.00
51.00	3.20	1.91	0.00
52.00	3.20	1.91	0.00
53.00	3.20	1.91	0.00
54.00	3.20	1.91	0.00
55.00	3.20	1.91	0.00
56.00	3.20	1.91	0.00
57.00	3.20	1.91	0.00
58.00	3.20	1.91	0.00
59.00	3.20	1.91	0.00
60.00	3.20	1.91	0.00
61.00	3.20	1.91	0.00
62.00	3.20	1.91	0.00
63.00	3.20	1.91	0.00
64.00	3.20	1.91	0.00
65.00	3.20	1.91	0.00
66.00	3.20	1.91	0.00
67.00	3.20	1.91	0.00
68.00	3.20	1.91	0.00
69.00	3.20	1.91	0.00
70.00	3.20	1.91	0.00
71.00	3.20	1.91	0.00
72.00	3.20	1.91	0.00

Summary for Subcatchment PR-1B: (new Subcat)

Runoff = 0.57 cfs @ 12.08 hrs, Volume= 1,857 cf, Depth= 2.54"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	2,016	79	>75% Grass cover, HSG B
	6,744	98	Paved parking, HSG B
	8,760	94	Weighted Average
	2,016		23.01% Pervious Area
	6,744		76.99% Impervious Area

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

Hydrograph for Subcatchment PR-1B: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.01	0.00
7.00	0.29	0.03	0.00
8.00	0.36	0.06	0.01
9.00	0.47	0.12	0.01
10.00	0.60	0.20	0.02
11.00	0.80	0.34	0.03
12.00	1.60	1.03	**0.35**
13.00	2.40	1.77	**0.05**
14.00	2.60	1.96	0.03
15.00	2.73	2.09	0.02
16.00	2.84	2.19	0.02
17.00	2.91	2.26	0.01
18.00	2.97	2.32	0.01
19.00	3.02	2.37	0.01
20.00	3.06	2.41	0.01
21.00	3.10	2.45	0.01
22.00	3.14	2.48	0.01
23.00	3.17	2.52	0.01
24.00	**3.20**	**2.54**	0.01
25.00	3.20	2.54	0.00
26.00	3.20	2.54	0.00
27.00	3.20	2.54	0.00
28.00	3.20	2.54	0.00
29.00	3.20	2.54	0.00
30.00	3.20	2.54	0.00
31.00	3.20	2.54	0.00
32.00	3.20	2.54	0.00
33.00	3.20	2.54	0.00
34.00	3.20	2.54	0.00
35.00	3.20	2.54	0.00
36.00	3.20	2.54	0.00
37.00	3.20	2.54	0.00
38.00	3.20	2.54	0.00
39.00	3.20	2.54	0.00
40.00	3.20	2.54	0.00
41.00	3.20	2.54	0.00
42.00	3.20	2.54	0.00
43.00	3.20	2.54	0.00
44.00	3.20	2.54	0.00
45.00	3.20	2.54	0.00
46.00	3.20	2.54	0.00
47.00	3.20	2.54	0.00
48.00	3.20	2.54	0.00
49.00	3.20	2.54	0.00
50.00	3.20	2.54	0.00
51.00	3.20	2.54	0.00
52.00	3.20	2.54	0.00
53.00	3.20	2.54	0.00
54.00	3.20	2.54	0.00
55.00	3.20	2.54	0.00
56.00	3.20	2.54	0.00
57.00	3.20	2.54	0.00
58.00	3.20	2.54	0.00
59.00	3.20	2.54	0.00
60.00	3.20	2.54	0.00
61.00	3.20	2.54	0.00
62.00	3.20	2.54	0.00
63.00	3.20	2.54	0.00
64.00	3.20	2.54	0.00
65.00	3.20	2.54	0.00
66.00	3.20	2.54	0.00
67.00	3.20	2.54	0.00
68.00	3.20	2.54	0.00
69.00	3.20	2.54	0.00
70.00	3.20	2.54	0.00
71.00	3.20	2.54	0.00
72.00	3.20	2.54	0.00

Summary for Subcatchment PR-1C: (new Subcat)

Runoff = 3.16 cfs @ 12.08 hrs, Volume= 10,222 cf, Depth= 2.54"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	11,027	79	>75% Grass cover, HSG B
	37,192	98	Paved parking, HSG B
	48,219	94	Weighted Average
	11,027		22.87% Pervious Area
	37,192		77.13% Impervious Area

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

Hydrograph for Subcatchment PR-1C: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.01
6.00	0.23	0.01	0.01
7.00	0.29	0.03	0.03
8.00	0.36	0.06	0.04
9.00	0.47	0.12	0.07
10.00	0.60	0.20	0.11
11.00	0.80	0.34	0.19
12.00	1.60	1.03	**1.95**
13.00	2.40	1.77	**0.28**
14.00	2.60	1.96	0.18
15.00	2.73	2.09	0.13
16.00	2.84	2.19	0.09
17.00	2.91	2.26	0.07
18.00	2.97	2.32	0.06
19.00	3.02	2.37	0.05
20.00	3.06	2.41	0.05
21.00	3.10	2.45	0.04
22.00	3.14	2.48	0.04
23.00	3.17	2.52	0.03
24.00	**3.20**	**2.54**	0.03
25.00	3.20	2.54	0.00
26.00	3.20	2.54	0.00
27.00	3.20	2.54	0.00
28.00	3.20	2.54	0.00
29.00	3.20	2.54	0.00
30.00	3.20	2.54	0.00
31.00	3.20	2.54	0.00
32.00	3.20	2.54	0.00
33.00	3.20	2.54	0.00
34.00	3.20	2.54	0.00
35.00	3.20	2.54	0.00
36.00	3.20	2.54	0.00
37.00	3.20	2.54	0.00
38.00	3.20	2.54	0.00
39.00	3.20	2.54	0.00
40.00	3.20	2.54	0.00
41.00	3.20	2.54	0.00
42.00	3.20	2.54	0.00
43.00	3.20	2.54	0.00
44.00	3.20	2.54	0.00
45.00	3.20	2.54	0.00
46.00	3.20	2.54	0.00
47.00	3.20	2.54	0.00
48.00	3.20	2.54	0.00
49.00	3.20	2.54	0.00
50.00	3.20	2.54	0.00
51.00	3.20	2.54	0.00
52.00	3.20	2.54	0.00
53.00	3.20	2.54	0.00
54.00	3.20	2.54	0.00
55.00	3.20	2.54	0.00
56.00	3.20	2.54	0.00
57.00	3.20	2.54	0.00
58.00	3.20	2.54	0.00
59.00	3.20	2.54	0.00
60.00	3.20	2.54	0.00
61.00	3.20	2.54	0.00
62.00	3.20	2.54	0.00
63.00	3.20	2.54	0.00
64.00	3.20	2.54	0.00
65.00	3.20	2.54	0.00
66.00	3.20	2.54	0.00
67.00	3.20	2.54	0.00
68.00	3.20	2.54	0.00
69.00	3.20	2.54	0.00
70.00	3.20	2.54	0.00
71.00	3.20	2.54	0.00
72.00	3.20	2.54	0.00

Summary for Subcatchment PR-1D: WS-1D

Runoff = 0.99 cfs @ 12.08 hrs, Volume= 3,215 cf, Depth= 2.54"

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 Rainfall=3.20"

Area (sf)	CN	Description
12,000	98	Paved parking, HSG B
3,164	79	<50% Grass cover, Poor, HSG B
15,164	94	Weighted Average
3,164		20.87% Pervious Area
12,000		79.13% Impervious Area

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

Hydrograph for Subcatchment PR-1D: WS-1D

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.01	0.00
7.00	0.29	0.03	0.01
8.00	0.36	0.06	0.01
9.00	0.47	0.12	0.02
10.00	0.60	0.20	0.04
11.00	0.80	0.34	0.06
12.00	1.60	1.03	**0.61**
13.00	2.40	1.77	**0.09**
14.00	2.60	1.96	0.06
15.00	2.73	2.09	0.04
16.00	2.84	2.19	0.03
17.00	2.91	2.26	0.02
18.00	2.97	2.32	0.02
19.00	3.02	2.37	0.02
20.00	3.06	2.41	0.01
21.00	3.10	2.45	0.01
22.00	3.14	2.48	0.01
23.00	3.17	2.52	0.01
24.00	**3.20**	**2.54**	0.01
25.00	3.20	2.54	0.00
26.00	3.20	2.54	0.00
27.00	3.20	2.54	0.00
28.00	3.20	2.54	0.00
29.00	3.20	2.54	0.00
30.00	3.20	2.54	0.00
31.00	3.20	2.54	0.00
32.00	3.20	2.54	0.00
33.00	3.20	2.54	0.00
34.00	3.20	2.54	0.00
35.00	3.20	2.54	0.00
36.00	3.20	2.54	0.00
37.00	3.20	2.54	0.00
38.00	3.20	2.54	0.00
39.00	3.20	2.54	0.00
40.00	3.20	2.54	0.00
41.00	3.20	2.54	0.00
42.00	3.20	2.54	0.00
43.00	3.20	2.54	0.00
44.00	3.20	2.54	0.00
45.00	3.20	2.54	0.00
46.00	3.20	2.54	0.00
47.00	3.20	2.54	0.00
48.00	3.20	2.54	0.00
49.00	3.20	2.54	0.00
50.00	3.20	2.54	0.00
51.00	3.20	2.54	0.00
52.00	3.20	2.54	0.00
53.00	3.20	2.54	0.00
54.00	3.20	2.54	0.00
55.00	3.20	2.54	0.00
56.00	3.20	2.54	0.00
57.00	3.20	2.54	0.00
58.00	3.20	2.54	0.00
59.00	3.20	2.54	0.00
60.00	3.20	2.54	0.00
61.00	3.20	2.54	0.00
62.00	3.20	2.54	0.00
63.00	3.20	2.54	0.00
64.00	3.20	2.54	0.00
65.00	3.20	2.54	0.00
66.00	3.20	2.54	0.00
67.00	3.20	2.54	0.00
68.00	3.20	2.54	0.00
69.00	3.20	2.54	0.00
70.00	3.20	2.54	0.00
71.00	3.20	2.54	0.00
72.00	3.20	2.54	0.00

Summary for Subcatchment PR-2: (new Subcat)

Runoff = 3.76 cfs @ 12.09 hrs, Volume= 11,927 cf, Depth= 2.35"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	20,356	79	>75% Grass cover, HSG B
	39,661	98	Paved parking, HSG B
*	870	98	parking
	60,887	92	Weighted Average
	20,356		33.43% Pervious Area
	40,531		66.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-2: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.01
7.00	0.29	0.01	0.02
8.00	0.36	0.03	0.04
9.00	0.47	0.07	0.07
10.00	0.60	0.14	0.12
11.00	0.80	0.26	0.21
12.00	1.60	0.89	**2.29**
13.00	2.40	1.60	**0.34**
14.00	2.60	1.78	0.21
15.00	2.73	1.91	0.16
16.00	2.84	2.01	0.11
17.00	2.91	2.08	0.09
18.00	2.97	2.13	0.07
19.00	3.02	2.18	0.06
20.00	3.06	2.22	0.06
21.00	3.10	2.26	0.05
22.00	3.14	2.29	0.05
23.00	3.17	2.32	0.04
24.00	**3.20**	**2.35**	0.04
25.00	3.20	2.35	0.00
26.00	3.20	2.35	0.00
27.00	3.20	2.35	0.00
28.00	3.20	2.35	0.00
29.00	3.20	2.35	0.00
30.00	3.20	2.35	0.00
31.00	3.20	2.35	0.00
32.00	3.20	2.35	0.00
33.00	3.20	2.35	0.00
34.00	3.20	2.35	0.00
35.00	3.20	2.35	0.00
36.00	3.20	2.35	0.00
37.00	3.20	2.35	0.00
38.00	3.20	2.35	0.00
39.00	3.20	2.35	0.00
40.00	3.20	2.35	0.00
41.00	3.20	2.35	0.00
42.00	3.20	2.35	0.00
43.00	3.20	2.35	0.00
44.00	3.20	2.35	0.00
45.00	3.20	2.35	0.00
46.00	3.20	2.35	0.00
47.00	3.20	2.35	0.00
48.00	3.20	2.35	0.00
49.00	3.20	2.35	0.00
50.00	3.20	2.35	0.00
51.00	3.20	2.35	0.00
52.00	3.20	2.35	0.00
53.00	3.20	2.35	0.00
54.00	3.20	2.35	0.00
55.00	3.20	2.35	0.00
56.00	3.20	2.35	0.00
57.00	3.20	2.35	0.00
58.00	3.20	2.35	0.00
59.00	3.20	2.35	0.00
60.00	3.20	2.35	0.00
61.00	3.20	2.35	0.00
62.00	3.20	2.35	0.00
63.00	3.20	2.35	0.00
64.00	3.20	2.35	0.00
65.00	3.20	2.35	0.00
66.00	3.20	2.35	0.00
67.00	3.20	2.35	0.00
68.00	3.20	2.35	0.00
69.00	3.20	2.35	0.00
70.00	3.20	2.35	0.00
71.00	3.20	2.35	0.00
72.00	3.20	2.35	0.00

Summary for Subcatchment PR-3: (new Subcat)

Runoff = 1.20 cfs @ 12.13 hrs, Volume= 4,170 cf, Depth= 1.34"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	37,434	79	>75% Grass cover, HSG B
	37,434		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 sf** Grass: Short n= 0.150 P2= 3.20"
0.2	20	0.0100	2.03		**Shallow Concentrated Flow, 20' scf paved** Paved Kv= 20.3 fps
1.4	81	0.0200	0.99		**Shallow Concentrated Flow, 81' scf grass** Short Grass Pasture Kv= 7.0 fps
9.0	151	Total			

Hydrograph for Subcatchment PR-3: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.36	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.60	0.00	0.00
11.00	0.80	0.02	0.03
12.00	1.60	0.31	**0.54**
13.00	2.40	0.77	**0.15**
14.00	2.60	0.90	0.10
15.00	2.73	1.00	0.08
16.00	2.84	1.07	0.05
17.00	2.91	1.12	0.04
18.00	2.97	1.17	0.03
19.00	3.02	1.20	0.03
20.00	3.06	1.23	0.03
21.00	3.10	1.26	0.02
22.00	3.14	1.29	0.02
23.00	3.17	1.31	0.02
24.00	**3.20**	**1.34**	0.02
25.00	3.20	1.34	0.00
26.00	3.20	1.34	0.00
27.00	3.20	1.34	0.00
28.00	3.20	1.34	0.00
29.00	3.20	1.34	0.00
30.00	3.20	1.34	0.00
31.00	3.20	1.34	0.00
32.00	3.20	1.34	0.00
33.00	3.20	1.34	0.00
34.00	3.20	1.34	0.00
35.00	3.20	1.34	0.00
36.00	3.20	1.34	0.00
37.00	3.20	1.34	0.00
38.00	3.20	1.34	0.00
39.00	3.20	1.34	0.00
40.00	3.20	1.34	0.00
41.00	3.20	1.34	0.00
42.00	3.20	1.34	0.00
43.00	3.20	1.34	0.00
44.00	3.20	1.34	0.00
45.00	3.20	1.34	0.00
46.00	3.20	1.34	0.00
47.00	3.20	1.34	0.00
48.00	3.20	1.34	0.00
49.00	3.20	1.34	0.00
50.00	3.20	1.34	0.00
51.00	3.20	1.34	0.00
52.00	3.20	1.34	0.00
53.00	3.20	1.34	0.00
54.00	3.20	1.34	0.00
55.00	3.20	1.34	0.00
56.00	3.20	1.34	0.00
57.00	3.20	1.34	0.00
58.00	3.20	1.34	0.00
59.00	3.20	1.34	0.00
60.00	3.20	1.34	0.00
61.00	3.20	1.34	0.00
62.00	3.20	1.34	0.00
63.00	3.20	1.34	0.00
64.00	3.20	1.34	0.00
65.00	3.20	1.34	0.00
66.00	3.20	1.34	0.00
67.00	3.20	1.34	0.00
68.00	3.20	1.34	0.00
69.00	3.20	1.34	0.00
70.00	3.20	1.34	0.00
71.00	3.20	1.34	0.00
72.00	3.20	1.34	0.00

Summary for Subcatchment PR-4: (new Subcat)

Runoff = 0.91 cfs @ 12.10 hrs, Volume= 3,162 cf, Depth= 0.83"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	17,215	79	>75% Grass cover, HSG B
*	28,600	65	Woods, Poor, HSG B
	45,815	70	Weighted Average
	45,815		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-4: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.36	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.60	0.00	0.00
11.00	0.80	0.00	0.00
12.00	1.60	0.11	**0.43**
13.00	2.40	0.41	**0.13**
14.00	2.60	0.50	0.09
15.00	2.73	0.57	0.07
16.00	2.84	0.62	0.05
17.00	2.91	0.67	0.04
18.00	2.97	0.70	0.03
19.00	3.02	0.72	0.03
20.00	3.06	0.75	0.03
21.00	3.10	0.77	0.02
22.00	3.14	0.79	0.02
23.00	3.17	0.81	0.02
24.00	**3.20**	**0.83**	0.02
25.00	3.20	0.83	0.00
26.00	3.20	0.83	0.00
27.00	3.20	0.83	0.00
28.00	3.20	0.83	0.00
29.00	3.20	0.83	0.00
30.00	3.20	0.83	0.00
31.00	3.20	0.83	0.00
32.00	3.20	0.83	0.00
33.00	3.20	0.83	0.00
34.00	3.20	0.83	0.00
35.00	3.20	0.83	0.00
36.00	3.20	0.83	0.00
37.00	3.20	0.83	0.00
38.00	3.20	0.83	0.00
39.00	3.20	0.83	0.00
40.00	3.20	0.83	0.00
41.00	3.20	0.83	0.00
42.00	3.20	0.83	0.00
43.00	3.20	0.83	0.00
44.00	3.20	0.83	0.00
45.00	3.20	0.83	0.00
46.00	3.20	0.83	0.00
47.00	3.20	0.83	0.00
48.00	3.20	0.83	0.00
49.00	3.20	0.83	0.00
50.00	3.20	0.83	0.00
51.00	3.20	0.83	0.00
52.00	3.20	0.83	0.00
53.00	3.20	0.83	0.00
54.00	3.20	0.83	0.00
55.00	3.20	0.83	0.00
56.00	3.20	0.83	0.00
57.00	3.20	0.83	0.00
58.00	3.20	0.83	0.00
59.00	3.20	0.83	0.00
60.00	3.20	0.83	0.00
61.00	3.20	0.83	0.00
62.00	3.20	0.83	0.00
63.00	3.20	0.83	0.00
64.00	3.20	0.83	0.00
65.00	3.20	0.83	0.00
66.00	3.20	0.83	0.00
67.00	3.20	0.83	0.00
68.00	3.20	0.83	0.00
69.00	3.20	0.83	0.00
70.00	3.20	0.83	0.00
71.00	3.20	0.83	0.00
72.00	3.20	0.83	0.00

Summary for Subcatchment PR-5: (new Subcat)

Runoff = 0.57 cfs @ 12.09 hrs, Volume= 1,755 cf, Depth= 1.61"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	6,834	79	>75% Grass cover, Good, HSG B
	4,438	98	Paved parking, HSG B
*	1,818	65	Woods, Poor, HSG B
	13,090	83	Weighted Average
	8,652		66.10% Pervious Area
	4,438		33.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-5: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.36	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.60	0.02	0.01
11.00	0.80	0.06	0.02
12.00	1.60	0.44	**0.32**
13.00	2.40	0.98	**0.06**
14.00	2.60	1.13	0.04
15.00	2.73	1.24	0.03
16.00	2.84	1.32	0.02
17.00	2.91	1.37	0.02
18.00	2.97	1.42	0.01
19.00	3.02	1.46	0.01
20.00	3.06	1.50	0.01
21.00	3.10	1.53	0.01
22.00	3.14	1.56	0.01
23.00	3.17	1.59	0.01
24.00	**3.20**	**1.61**	0.01
25.00	3.20	1.61	0.00
26.00	3.20	1.61	0.00
27.00	3.20	1.61	0.00
28.00	3.20	1.61	0.00
29.00	3.20	1.61	0.00
30.00	3.20	1.61	0.00
31.00	3.20	1.61	0.00
32.00	3.20	1.61	0.00
33.00	3.20	1.61	0.00
34.00	3.20	1.61	0.00
35.00	3.20	1.61	0.00
36.00	3.20	1.61	0.00
37.00	3.20	1.61	0.00
38.00	3.20	1.61	0.00
39.00	3.20	1.61	0.00
40.00	3.20	1.61	0.00
41.00	3.20	1.61	0.00
42.00	3.20	1.61	0.00
43.00	3.20	1.61	0.00
44.00	3.20	1.61	0.00
45.00	3.20	1.61	0.00
46.00	3.20	1.61	0.00
47.00	3.20	1.61	0.00
48.00	3.20	1.61	0.00
49.00	3.20	1.61	0.00
50.00	3.20	1.61	0.00
51.00	3.20	1.61	0.00
52.00	3.20	1.61	0.00
53.00	3.20	1.61	0.00
54.00	3.20	1.61	0.00
55.00	3.20	1.61	0.00
56.00	3.20	1.61	0.00
57.00	3.20	1.61	0.00
58.00	3.20	1.61	0.00
59.00	3.20	1.61	0.00
60.00	3.20	1.61	0.00
61.00	3.20	1.61	0.00
62.00	3.20	1.61	0.00
63.00	3.20	1.61	0.00
64.00	3.20	1.61	0.00
65.00	3.20	1.61	0.00
66.00	3.20	1.61	0.00
67.00	3.20	1.61	0.00
68.00	3.20	1.61	0.00
69.00	3.20	1.61	0.00
70.00	3.20	1.61	0.00
71.00	3.20	1.61	0.00
72.00	3.20	1.61	0.00

Summary for Subcatchment PR-6: PR-6

Runoff = 0.22 cfs @ 12.10 hrs, Volume= 746 cf, Depth= 0.88"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	4,183	79	>75% Grass cover, HSG B
*	5,835	65	Woods, Poor, HSG B
*	178	98	Wall
	10,196	71	Weighted Average
	10,018		98.25% Pervious Area
	178		1.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-6: PR-6

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.36	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.60	0.00	0.00
11.00	0.80	0.00	0.00
12.00	1.60	0.13	**0.10**
13.00	2.40	0.44	**0.03**
14.00	2.60	0.54	0.02
15.00	2.73	0.61	0.02
16.00	2.84	0.67	0.01
17.00	2.91	0.71	0.01
18.00	2.97	0.74	0.01
19.00	3.02	0.77	0.01
20.00	3.06	0.80	0.01
21.00	3.10	0.82	0.01
22.00	3.14	0.84	0.00
23.00	3.17	0.86	0.00
24.00	**3.20**	**0.88**	0.00
25.00	3.20	0.88	0.00
26.00	3.20	0.88	0.00
27.00	3.20	0.88	0.00
28.00	3.20	0.88	0.00
29.00	3.20	0.88	0.00
30.00	3.20	0.88	0.00
31.00	3.20	0.88	0.00
32.00	3.20	0.88	0.00
33.00	3.20	0.88	0.00
34.00	3.20	0.88	0.00
35.00	3.20	0.88	0.00
36.00	3.20	0.88	0.00
37.00	3.20	0.88	0.00
38.00	3.20	0.88	0.00
39.00	3.20	0.88	0.00
40.00	3.20	0.88	0.00
41.00	3.20	0.88	0.00
42.00	3.20	0.88	0.00
43.00	3.20	0.88	0.00
44.00	3.20	0.88	0.00
45.00	3.20	0.88	0.00
46.00	3.20	0.88	0.00
47.00	3.20	0.88	0.00
48.00	3.20	0.88	0.00
49.00	3.20	0.88	0.00
50.00	3.20	0.88	0.00
51.00	3.20	0.88	0.00
52.00	3.20	0.88	0.00
53.00	3.20	0.88	0.00
54.00	3.20	0.88	0.00
55.00	3.20	0.88	0.00
56.00	3.20	0.88	0.00
57.00	3.20	0.88	0.00
58.00	3.20	0.88	0.00
59.00	3.20	0.88	0.00
60.00	3.20	0.88	0.00
61.00	3.20	0.88	0.00
62.00	3.20	0.88	0.00
63.00	3.20	0.88	0.00
64.00	3.20	0.88	0.00
65.00	3.20	0.88	0.00
66.00	3.20	0.88	0.00
67.00	3.20	0.88	0.00
68.00	3.20	0.88	0.00
69.00	3.20	0.88	0.00
70.00	3.20	0.88	0.00
71.00	3.20	0.88	0.00
72.00	3.20	0.88	0.00

Summary for Subcatchment PR-7: PR-7

Runoff = 0.19 cfs @ 12.10 hrs, Volume= 630 cf, Depth= 1.04"

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 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	4,865	79	>75% Grass cover, HSG B
*	2,426	65	Woods, Poor, HSG B
	7,291	74	Weighted Average
	7,291		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-7: PR-7

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.36	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.60	0.00	0.00
11.00	0.80	0.00	0.00
12.00	1.60	0.18	**0.10**
13.00	2.40	0.55	**0.02**
14.00	2.60	0.66	0.02
15.00	2.73	0.74	0.01
16.00	2.84	0.81	0.01
17.00	2.91	0.85	0.01
18.00	2.97	0.89	0.01
19.00	3.02	0.92	0.01
20.00	3.06	0.95	0.00
21.00	3.10	0.97	0.00
22.00	3.14	1.00	0.00
23.00	3.17	1.02	0.00
24.00	**3.20**	**1.04**	0.00
25.00	3.20	1.04	0.00
26.00	3.20	1.04	0.00
27.00	3.20	1.04	0.00
28.00	3.20	1.04	0.00
29.00	3.20	1.04	0.00
30.00	3.20	1.04	0.00
31.00	3.20	1.04	0.00
32.00	3.20	1.04	0.00
33.00	3.20	1.04	0.00
34.00	3.20	1.04	0.00
35.00	3.20	1.04	0.00
36.00	3.20	1.04	0.00
37.00	3.20	1.04	0.00
38.00	3.20	1.04	0.00
39.00	3.20	1.04	0.00
40.00	3.20	1.04	0.00
41.00	3.20	1.04	0.00
42.00	3.20	1.04	0.00
43.00	3.20	1.04	0.00
44.00	3.20	1.04	0.00
45.00	3.20	1.04	0.00
46.00	3.20	1.04	0.00
47.00	3.20	1.04	0.00
48.00	3.20	1.04	0.00
49.00	3.20	1.04	0.00
50.00	3.20	1.04	0.00
51.00	3.20	1.04	0.00
52.00	3.20	1.04	0.00
53.00	3.20	1.04	0.00
54.00	3.20	1.04	0.00
55.00	3.20	1.04	0.00
56.00	3.20	1.04	0.00
57.00	3.20	1.04	0.00
58.00	3.20	1.04	0.00
59.00	3.20	1.04	0.00
60.00	3.20	1.04	0.00
61.00	3.20	1.04	0.00
62.00	3.20	1.04	0.00
63.00	3.20	1.04	0.00
64.00	3.20	1.04	0.00
65.00	3.20	1.04	0.00
66.00	3.20	1.04	0.00
67.00	3.20	1.04	0.00
68.00	3.20	1.04	0.00
69.00	3.20	1.04	0.00
70.00	3.20	1.04	0.00
71.00	3.20	1.04	0.00
72.00	3.20	1.04	0.00

Summary for Subcatchment PR-8: PR-8

Runoff = 9.10 cfs @ 12.13 hrs, Volume= 30,919 cf, Depth= 1.68"

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 Rainfall=3.20"

	Area (sf)	CN	Description
	58,745	98	Paved parking, HSG A
*	161,798	79	>75% Grass cover, HSG B
	220,543	84	Weighted Average
	161,798		73.36% Pervious Area
	58,745		26.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 grass sf 1%** Grass: Short n= 0.150 P2= 3.20"
1.3	67	0.0150	0.86		**Shallow Concentrated Flow, 67 scf grass 1.5%** Short Grass Pasture Kv= 7.0 fps
8.7	117	Total			

Hydrograph for Subcatchment PR-8: PR-8

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.36	0.00	0.00
9.00	0.47	0.00	0.04
10.00	0.60	0.02	0.14
11.00	0.80	0.08	0.35
12.00	1.60	0.48	**4.45**
13.00	2.40	1.04	**1.06**
14.00	2.60	1.19	0.67
15.00	2.73	1.30	0.51
16.00	2.84	1.38	0.36
17.00	2.91	1.44	0.29
18.00	2.97	1.49	0.22
19.00	3.02	1.53	0.20
20.00	3.06	1.57	0.18
21.00	3.10	1.60	0.16
22.00	3.14	1.63	0.15
23.00	3.17	1.66	0.13
24.00	**3.20**	**1.68**	0.12
25.00	3.20	1.68	0.00
26.00	3.20	1.68	0.00
27.00	3.20	1.68	0.00
28.00	3.20	1.68	0.00
29.00	3.20	1.68	0.00
30.00	3.20	1.68	0.00
31.00	3.20	1.68	0.00
32.00	3.20	1.68	0.00
33.00	3.20	1.68	0.00
34.00	3.20	1.68	0.00
35.00	3.20	1.68	0.00
36.00	3.20	1.68	0.00
37.00	3.20	1.68	0.00
38.00	3.20	1.68	0.00
39.00	3.20	1.68	0.00
40.00	3.20	1.68	0.00
41.00	3.20	1.68	0.00
42.00	3.20	1.68	0.00
43.00	3.20	1.68	0.00
44.00	3.20	1.68	0.00
45.00	3.20	1.68	0.00
46.00	3.20	1.68	0.00
47.00	3.20	1.68	0.00
48.00	3.20	1.68	0.00
49.00	3.20	1.68	0.00
50.00	3.20	1.68	0.00
51.00	3.20	1.68	0.00
52.00	3.20	1.68	0.00
53.00	3.20	1.68	0.00
54.00	3.20	1.68	0.00
55.00	3.20	1.68	0.00
56.00	3.20	1.68	0.00
57.00	3.20	1.68	0.00
58.00	3.20	1.68	0.00
59.00	3.20	1.68	0.00
60.00	3.20	1.68	0.00
61.00	3.20	1.68	0.00
62.00	3.20	1.68	0.00
63.00	3.20	1.68	0.00
64.00	3.20	1.68	0.00
65.00	3.20	1.68	0.00
66.00	3.20	1.68	0.00
67.00	3.20	1.68	0.00
68.00	3.20	1.68	0.00
69.00	3.20	1.68	0.00
70.00	3.20	1.68	0.00
71.00	3.20	1.68	0.00
72.00	3.20	1.68	0.00

Summary for Subcatchment PR-9: PR-9

Runoff = 1.51 cfs @ 12.09 hrs, Volume= 4,682 cf, Depth= 1.76"

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 Rainfall=3.20"

	Area (sf)	CN	Description
*	22,546	79	>75% Grass cover, HSG B
	8,270	98	Paved parking, HSG B
*	1,153	98	Paved Parking, HSG B
	31,969	85	Weighted Average
	22,546		70.52% Pervious Area
	9,423		29.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-9: PR-9

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.10	0.00	0.00
4.00	0.14	0.00	0.00
5.00	0.18	0.00	0.00
6.00	0.23	0.00	0.00
7.00	0.29	0.00	0.00
8.00	0.36	0.00	0.00
9.00	0.47	0.01	0.01
10.00	0.60	0.03	0.03
11.00	0.80	0.09	0.06
12.00	1.60	0.52	**0.87**
13.00	2.40	1.10	**0.15**
14.00	2.60	1.25	0.10
15.00	2.73	1.37	0.07
16.00	2.84	1.45	0.05
17.00	2.91	1.51	0.04
18.00	2.97	1.56	0.03
19.00	3.02	1.60	0.03
20.00	3.06	1.64	0.03
21.00	3.10	1.67	0.02
22.00	3.14	1.71	0.02
23.00	3.17	1.73	0.02
24.00	**3.20**	**1.76**	0.02
25.00	3.20	1.76	0.00
26.00	3.20	1.76	0.00
27.00	3.20	1.76	0.00
28.00	3.20	1.76	0.00
29.00	3.20	1.76	0.00
30.00	3.20	1.76	0.00
31.00	3.20	1.76	0.00
32.00	3.20	1.76	0.00
33.00	3.20	1.76	0.00
34.00	3.20	1.76	0.00
35.00	3.20	1.76	0.00
36.00	3.20	1.76	0.00
37.00	3.20	1.76	0.00
38.00	3.20	1.76	0.00
39.00	3.20	1.76	0.00
40.00	3.20	1.76	0.00
41.00	3.20	1.76	0.00
42.00	3.20	1.76	0.00
43.00	3.20	1.76	0.00
44.00	3.20	1.76	0.00
45.00	3.20	1.76	0.00
46.00	3.20	1.76	0.00
47.00	3.20	1.76	0.00
48.00	3.20	1.76	0.00
49.00	3.20	1.76	0.00
50.00	3.20	1.76	0.00
51.00	3.20	1.76	0.00
52.00	3.20	1.76	0.00
53.00	3.20	1.76	0.00
54.00	3.20	1.76	0.00
55.00	3.20	1.76	0.00
56.00	3.20	1.76	0.00
57.00	3.20	1.76	0.00
58.00	3.20	1.76	0.00
59.00	3.20	1.76	0.00
60.00	3.20	1.76	0.00
61.00	3.20	1.76	0.00
62.00	3.20	1.76	0.00
63.00	3.20	1.76	0.00
64.00	3.20	1.76	0.00
65.00	3.20	1.76	0.00
66.00	3.20	1.76	0.00
67.00	3.20	1.76	0.00
68.00	3.20	1.76	0.00
69.00	3.20	1.76	0.00
70.00	3.20	1.76	0.00
71.00	3.20	1.76	0.00
72.00	3.20	1.76	0.00

Summary for Subcatchment PR-BLDG: PR-BLDG

Runoff = 4.51 cfs @ 12.08 hrs, Volume= 15,634 cf, Depth= 2.97"

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 2 yr Rainfall=3.20"

Area (sf)	CN	Description
63,223	98	Paved parking, HSG B
63,223		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-BLDG: PR-BLDG

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.01
3.00	0.10	0.01	0.02
4.00	0.14	0.03	0.03
5.00	0.18	0.06	0.04
6.00	0.23	0.09	0.05
7.00	0.29	0.14	0.08
8.00	0.36	0.20	0.10
9.00	0.47	0.29	0.15
10.00	0.60	0.41	0.21
11.00	0.80	0.60	0.32
12.00	1.60	1.38	**2.83**
13.00	2.40	2.17	**0.38**
14.00	2.60	2.37	0.24
15.00	2.73	2.50	0.18
16.00	2.84	2.60	0.13
17.00	2.91	2.68	0.10
18.00	2.97	2.74	0.08
19.00	3.02	2.79	0.07
20.00	3.06	2.83	0.06
21.00	3.10	2.87	0.06
22.00	3.14	2.91	0.05
23.00	3.17	2.94	0.05
24.00	**3.20**	**2.97**	0.04
25.00	3.20	2.97	0.00
26.00	3.20	2.97	0.00
27.00	3.20	2.97	0.00
28.00	3.20	2.97	0.00
29.00	3.20	2.97	0.00
30.00	3.20	2.97	0.00
31.00	3.20	2.97	0.00
32.00	3.20	2.97	0.00
33.00	3.20	2.97	0.00
34.00	3.20	2.97	0.00
35.00	3.20	2.97	0.00
36.00	3.20	2.97	0.00
37.00	3.20	2.97	0.00
38.00	3.20	2.97	0.00
39.00	3.20	2.97	0.00
40.00	3.20	2.97	0.00
41.00	3.20	2.97	0.00
42.00	3.20	2.97	0.00
43.00	3.20	2.97	0.00
44.00	3.20	2.97	0.00
45.00	3.20	2.97	0.00
46.00	3.20	2.97	0.00
47.00	3.20	2.97	0.00
48.00	3.20	2.97	0.00
49.00	3.20	2.97	0.00
50.00	3.20	2.97	0.00
51.00	3.20	2.97	0.00
52.00	3.20	2.97	0.00
53.00	3.20	2.97	0.00
54.00	3.20	2.97	0.00
55.00	3.20	2.97	0.00
56.00	3.20	2.97	0.00
57.00	3.20	2.97	0.00
58.00	3.20	2.97	0.00
59.00	3.20	2.97	0.00
60.00	3.20	2.97	0.00
61.00	3.20	2.97	0.00
62.00	3.20	2.97	0.00
63.00	3.20	2.97	0.00
64.00	3.20	2.97	0.00
65.00	3.20	2.97	0.00
66.00	3.20	2.97	0.00
67.00	3.20	2.97	0.00
68.00	3.20	2.97	0.00
69.00	3.20	2.97	0.00
70.00	3.20	2.97	0.00
71.00	3.20	2.97	0.00
72.00	3.20	2.97	0.00

Summary for Reach POA-1: To Main Street

Inflow Area = 315,759 sf, 59.36% Impervious, Inflow Depth = 1.10" for 2 yr event
Inflow = 8.61 cfs @ 12.15 hrs, Volume= 28,915 cf
Outflow = 8.61 cfs @ 12.15 hrs, Volume= 28,915 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-1: To Main Street

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.01		0.01
9.00	0.03		0.03
10.00	0.05		0.05
11.00	0.11		0.11
12.00	**4.85**		**4.85**
13.00	**1.11**		**1.11**
14.00	0.62		0.62
15.00	0.44		0.44
16.00	0.29		0.29
17.00	0.20		0.20
18.00	0.14		0.14
19.00	0.10		0.10
20.00	0.08		0.08
21.00	0.07		0.07
22.00	0.05		0.05
23.00	0.04		0.04
24.00	0.03		0.03
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-2: To Existing DMH North of Site

Inflow Area = 313,399 sf, 34.68% Impervious, Inflow Depth = 1.77" for 2 yr event
Inflow = 9.59 cfs @ 12.12 hrs, Volume= 46,268 cf
Outflow = 9.59 cfs @ 12.12 hrs, Volume= 46,268 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-2: To Existing DMH North of Site

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.05		0.05
10.00	0.23		0.23
11.00	0.53		0.53
12.00	**5.71**		**5.71**
13.00	**1.87**		**1.87**
14.00	1.02		1.02
15.00	0.76		0.76
16.00	0.55		0.55
17.00	0.43		0.43
18.00	0.33		0.33
19.00	0.28		0.28
20.00	0.25		0.25
21.00	0.23		0.23
22.00	0.21		0.21
23.00	0.19		0.19
24.00	0.16		0.16
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-3: NORTH EAST WETLANDS

Inflow Area = 37,434 sf, 0.00% Impervious, Inflow Depth = 1.34" for 2 yr event
Inflow = 1.20 cfs @ 12.13 hrs, Volume= 4,170 cf
Outflow = 1.20 cfs @ 12.13 hrs, Volume= 4,170 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-3: NORTH EAST WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.00		0.00
10.00	0.00		0.00
11.00	0.03		0.03
12.00	**0.54**		**0.54**
13.00	**0.15**		**0.15**
14.00	0.10		0.10
15.00	0.08		0.08
16.00	0.05		0.05
17.00	0.04		0.04
18.00	0.03		0.03
19.00	0.03		0.03
20.00	0.03		0.03
21.00	0.02		0.02
22.00	0.02		0.02
23.00	0.02		0.02
24.00	0.02		0.02
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-4: SOUTH EAST WETLANDS

Inflow Area = 45,815 sf, 0.00% Impervious, Inflow Depth = 0.83" for 2 yr event
Inflow = 0.91 cfs @ 12.10 hrs, Volume= 3,162 cf
Outflow = 0.91 cfs @ 12.10 hrs, Volume= 3,162 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-4: SOUTH EAST WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.00		0.00
10.00	0.00		0.00
11.00	0.00		0.00
12.00	**0.43**		**0.43**
13.00	**0.13**		**0.13**
14.00	0.09		0.09
15.00	0.07		0.07
16.00	0.05		0.05
17.00	0.04		0.04
18.00	0.03		0.03
19.00	0.03		0.03
20.00	0.03		0.03
21.00	0.02		0.02
22.00	0.02		0.02
23.00	0.02		0.02
24.00	0.02		0.02
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-5: CHAMPNEY STREET

Inflow Area = 13,090 sf, 33.90% Impervious, Inflow Depth = 1.61" for 2 yr event
Inflow = 0.57 cfs @ 12.09 hrs, Volume= 1,755 cf
Outflow = 0.57 cfs @ 12.09 hrs, Volume= 1,755 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-5: CHAMPNEY STREET

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.00		0.00
10.00	0.01		0.01
11.00	0.02		0.02
12.00	**0.32**		**0.32**
13.00	**0.06**		**0.06**
14.00	0.04		0.04
15.00	0.03		0.03
16.00	0.02		0.02
17.00	0.02		0.02
18.00	0.01		0.01
19.00	0.01		0.01
20.00	0.01		0.01
21.00	0.01		0.01
22.00	0.01		0.01
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Pond #1A: INF#1A

Inflow Area = 135,366 sf, 88.03% Impervious, Inflow Depth = 2.69" for 2 yr event
Inflow = 9.21 cfs @ 12.09 hrs, Volume= 30,353 cf
Outflow = 8.39 cfs @ 12.12 hrs, Volume= 30,354 cf, Atten= 9%, Lag= 2.2 min
Discarded = 0.05 cfs @ 6.22 hrs, Volume= 7,349 cf
Primary = 8.34 cfs @ 12.12 hrs, Volume= 23,005 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 324.82' @ 12.12 hrs Surf.Area= 2,119 sf Storage= 5,571 cf
Flood Elev= 327.75' Surf.Area= 2,119 sf Storage= 8,726 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 180.2 min (955.4 - 775.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.00'	3,720 cf	**30.50'W x 69.49'L x 6.75'H Field A** 14,307 cf Overall - 5,006 cf Embedded = 9,300 cf x 40.0% Voids
#2A	321.75'	5,006 cf	**ADS_StormTech MC-4500 +Cap** x 45 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 45 Chambers in 3 Rows Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,726 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.90'	**24.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 321.90' / 321.86' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#3	Device 2	325.00'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	323.50'	**15.0" W x 12.0" H Vert. Orifice/Grate** X 2 rows with 6.0" cc spacing C= 0.600

Discarded OutFlow Max=0.05 cfs @ 6.22 hrs HW=321.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=8.33 cfs @ 12.12 hrs HW=324.82' TW=322.55' (Dynamic Tailwater)
└**2=Culvert** (Passes 8.33 cfs of 16.54 cfs potential flow)
  ├**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Orifice Controls 8.33 cfs @ 3.66 fps)

Pond #1A: INF#1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

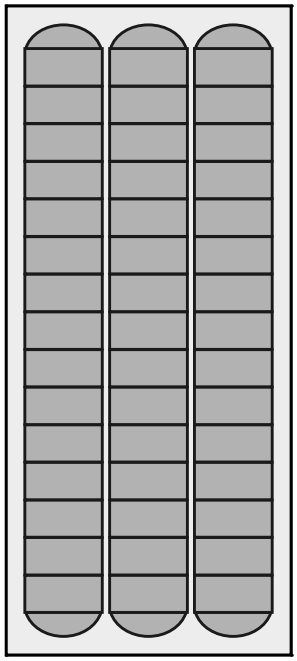
15 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 65.49' Row Length +24.0" End Stone x 2 = 69.49' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 24.0" Side Stone x 2 = 30.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

45 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 5,006.3 cf Chamber Storage

14,306.6 cf Field - 5,006.3 cf Chambers = 9,300.3 cf Stone x 40.0% Voids = 3,720.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,726.4 cf = 0.200 af
Overall Storage Efficiency = 61.0%
Overall System Size = 69.49' x 30.50' x 6.75'

45 Chambers
529.9 cy Field
344.5 cy Stone



Hydrograph for Pond #1A: INF#1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.00	0.00	0.00	0.00
2.00	0.01	0	321.00	0.01	0.01	0.00
4.00	0.03	0	321.00	0.03	0.03	0.00
6.00	0.07	40	321.05	0.05	**0.05**	0.00
8.00	0.15	456	321.54	0.05	**0.05**	0.00
10.00	0.34	1,830	322.46	0.05	0.05	0.00
12.00	**5.68**	**4,942**	**324.39**	**4.44**	0.05	**4.39**
14.00	**0.50**	**3,935**	**323.74**	**0.53**	0.05	**0.48**
16.00	0.27	3,787	323.65	0.29	0.05	0.24
18.00	0.16	3,702	323.60	0.17	0.05	0.12
20.00	0.13	3,666	323.58	0.13	0.05	0.08
22.00	0.11	3,643	323.56	0.11	0.05	0.06
24.00	0.09	3,618	323.55	0.09	0.05	0.04
26.00	0.00	3,260	323.32	0.05	0.05	0.00
28.00	0.00	2,900	323.10	0.05	0.05	0.00
30.00	0.00	2,540	322.88	0.05	0.05	0.00
32.00	0.00	2,179	322.67	0.05	0.05	0.00
34.00	0.00	1,819	322.45	0.05	0.05	0.00
36.00	0.00	1,459	322.24	0.05	0.05	0.00
38.00	0.00	1,098	322.02	0.05	0.05	0.00
40.00	0.00	738	321.81	0.05	0.05	0.00
42.00	0.00	378	321.45	0.05	0.05	0.00
44.00	0.00	17	321.02	0.05	0.05	0.00
46.00	0.00	0	321.00	0.00	0.00	0.00
48.00	0.00	0	321.00	0.00	0.00	0.00
50.00	0.00	0	321.00	0.00	0.00	0.00
52.00	0.00	0	321.00	0.00	0.00	0.00
54.00	0.00	0	321.00	0.00	0.00	0.00
56.00	0.00	0	321.00	0.00	0.00	0.00
58.00	0.00	0	321.00	0.00	0.00	0.00
60.00	0.00	0	321.00	0.00	0.00	0.00
62.00	0.00	0	321.00	0.00	0.00	0.00
64.00	0.00	0	321.00	0.00	0.00	0.00
66.00	0.00	0	321.00	0.00	0.00	0.00
68.00	0.00	0	321.00	0.00	0.00	0.00
70.00	0.00	0	321.00	0.00	0.00	0.00
72.00	0.00	0	321.00	0.00	0.00	0.00

Stage-Area-Storage for Pond #1A: INF#1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.00	**2,119**	0
321.10	2,119	85
321.20	2,119	170
321.30	2,119	254
321.40	2,119	339
321.50	2,119	424
321.60	2,119	509
321.70	2,119	593
321.80	2,119	721
321.90	2,119	891
322.00	2,119	1,061
322.10	2,119	1,230
322.20	2,119	1,399
322.30	2,119	1,567
322.40	2,119	1,735
322.50	2,119	1,903
322.60	2,119	2,070
322.70	2,119	2,237
322.80	2,119	2,402
322.90	2,119	2,568
323.00	2,119	2,732
323.10	2,119	2,897
323.20	2,119	3,060
323.30	2,119	3,222
323.40	2,119	3,384
323.50	2,119	3,545
323.60	2,119	3,705
323.70	2,119	3,864
323.80	2,119	4,023
323.90	2,119	4,180
324.00	2,119	4,336
324.10	2,119	4,491
324.20	2,119	4,645
324.30	2,119	4,798
324.40	2,119	4,950
324.50	2,119	5,100
324.60	2,119	5,249
324.70	2,119	5,396
324.80	2,119	5,542
324.90	2,119	5,687
325.00	2,119	5,830
325.10	2,119	5,971
325.20	2,119	6,110
325.30	2,119	6,247
325.40	2,119	6,382
325.50	2,119	6,515
325.60	2,119	6,646
325.70	2,119	6,774
325.80	2,119	6,899
325.90	2,119	7,021
326.00	2,119	7,140
326.10	2,119	7,255
326.20	2,119	7,366
326.30	2,119	7,469
326.40	2,119	7,566
326.50	2,119	7,658
326.60	2,119	7,748
326.70	2,119	7,836
326.80	2,119	7,921
326.90	2,119	8,006
327.00	2,119	8,091
327.10	2,119	8,175
327.20	2,119	8,260
327.30	2,119	8,345
327.40	2,119	8,430
327.50	2,119	8,514
327.60	2,119	8,599
327.70	2,119	**8,684**

Summary for Pond #1B: INF#1B

Inflow Area = 135,366 sf, 88.03% Impervious, Inflow Depth = 2.04" for 2 yr event
Inflow = 8.34 cfs @ 12.12 hrs, Volume= 23,005 cf
Outflow = 6.77 cfs @ 12.19 hrs, Volume= 23,006 cf, Atten= 19%, Lag= 4.3 min
Discarded = 0.05 cfs @ 11.34 hrs, Volume= 2,590 cf
Primary = 6.72 cfs @ 12.19 hrs, Volume= 20,416 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 322.75' @ 12.19 hrs Surf.Area= 1,997 sf Storage= 2,181 cf
Flood Elev= 327.75' Surf.Area= 1,997 sf Storage= 8,203 cf

Plug-Flow detention time= 17.4 min calculated for 23,002 cf (100% of inflow)
Center-of-Mass det. time= 17.4 min (823.9 - 806.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.00'	3,516 cf	**30.50'W x 65.47'L x 6.75'H Field A** 13,478 cf Overall - 4,687 cf Embedded = 8,791 cf x 40.0% Voids
#2A	321.75'	4,687 cf	**ADS_StormTech MC-4500 +Cap** x 42 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 42 Chambers in 3 Rows Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,203 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.00'	**18.0" Round Culvert** L= 8.0' Ke= 0.900 Inlet / Outlet Invert= 321.00' / 320.44' S= 0.0700 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#3	Device 2	321.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 11.34 hrs HW=321.08' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=6.72 cfs @ 12.19 hrs HW=322.75' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 6.72 cfs @ 3.80 fps)
└**3=Broad-Crested Rectangular Weir** (Passes 6.72 cfs of 23.18 cfs potential flow)

Pond #1B: INF#1B - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

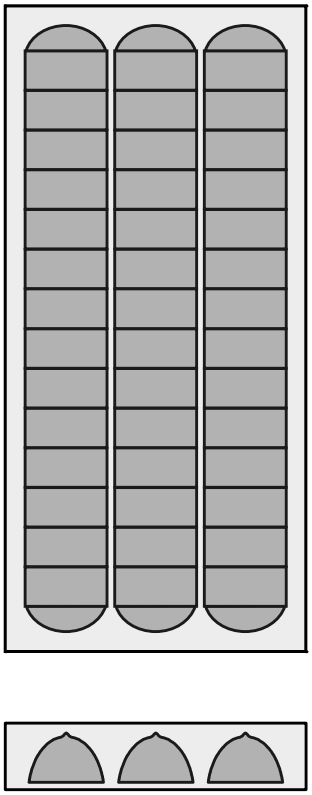
14 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 61.47' Row Length +24.0" End Stone x 2 = 65.47' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 24.0" Side Stone x 2 = 30.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

42 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,686.8 cf Chamber Storage

13,478.0 cf Field - 4,686.8 cf Chambers = 8,791.2 cf Stone x 40.0% Voids = 3,516.5 cf Stone Storage

Chamber Storage + Stone Storage = 8,203.3 cf = 0.188 af
Overall Storage Efficiency = 60.9%
Overall System Size = 65.47' x 30.50' x 6.75'

42 Chambers
499.2 cy Field
325.6 cy Stone



Hydrograph for Pond #1B: INF#1B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.00	0.00	0.00	0.00
2.00	0.00	0	321.00	0.00	0.00	0.00
4.00	0.00	0	321.00	0.00	0.00	0.00
6.00	0.00	0	321.00	0.00	0.00	0.00
8.00	0.00	0	321.00	0.00	0.00	0.00
10.00	0.00	0	321.00	0.00	**0.00**	0.00
12.00	**4.39**	**976**	**321.99**	**3.34**	**0.05**	**3.29**
14.00	**0.48**	**480**	**321.60**	**0.49**	0.05	**0.45**
16.00	0.24	445	321.56	0.24	0.05	0.19
18.00	0.12	425	321.53	0.13	0.05	0.08
20.00	0.08	415	321.52	0.08	0.05	0.04
22.00	0.06	407	321.51	0.06	0.05	0.01
24.00	0.04	388	321.49	0.05	0.05	0.00
26.00	0.00	77	321.10	0.05	0.05	0.00
28.00	0.00	0	321.00	0.00	0.00	0.00
30.00	0.00	0	321.00	0.00	0.00	0.00
32.00	0.00	0	321.00	0.00	0.00	0.00
34.00	0.00	0	321.00	0.00	0.00	0.00
36.00	0.00	0	321.00	0.00	0.00	0.00
38.00	0.00	0	321.00	0.00	0.00	0.00
40.00	0.00	0	321.00	0.00	0.00	0.00
42.00	0.00	0	321.00	0.00	0.00	0.00
44.00	0.00	0	321.00	0.00	0.00	0.00
46.00	0.00	0	321.00	0.00	0.00	0.00
48.00	0.00	0	321.00	0.00	0.00	0.00
50.00	0.00	0	321.00	0.00	0.00	0.00
52.00	0.00	0	321.00	0.00	0.00	0.00
54.00	0.00	0	321.00	0.00	0.00	0.00
56.00	0.00	0	321.00	0.00	0.00	0.00
58.00	0.00	0	321.00	0.00	0.00	0.00
60.00	0.00	0	321.00	0.00	0.00	0.00
62.00	0.00	0	321.00	0.00	0.00	0.00
64.00	0.00	0	321.00	0.00	0.00	0.00
66.00	0.00	0	321.00	0.00	0.00	0.00
68.00	0.00	0	321.00	0.00	0.00	0.00
70.00	0.00	0	321.00	0.00	0.00	0.00
72.00	0.00	0	321.00	0.00	0.00	0.00

Stage-Area-Storage for Pond #1B: INF#1B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.00	**1,997**	0
321.10	1,997	80
321.20	1,997	160
321.30	1,997	240
321.40	1,997	319
321.50	1,997	399
321.60	1,997	479
321.70	1,997	559
321.80	1,997	679
321.90	1,997	839
322.00	1,997	998
322.10	1,997	1,157
322.20	1,997	1,316
322.30	1,997	1,474
322.40	1,997	1,632
322.50	1,997	1,789
322.60	1,997	1,946
322.70	1,997	2,102
322.80	1,997	2,258
322.90	1,997	2,413
323.00	1,997	2,568
323.10	1,997	2,722
323.20	1,997	2,876
323.30	1,997	3,028
323.40	1,997	3,180
323.50	1,997	3,331
323.60	1,997	3,482
323.70	1,997	3,631
323.80	1,997	3,780
323.90	1,997	3,928
324.00	1,997	4,074
324.10	1,997	4,220
324.20	1,997	4,365
324.30	1,997	4,508
324.40	1,997	4,651
324.50	1,997	4,792
324.60	1,997	4,932
324.70	1,997	5,070
324.80	1,997	5,208
324.90	1,997	5,343
325.00	1,997	5,478
325.10	1,997	5,610
325.20	1,997	5,741
325.30	1,997	5,870
325.40	1,997	5,997
325.50	1,997	6,122
325.60	1,997	6,245
325.70	1,997	6,365
325.80	1,997	6,483
325.90	1,997	6,598
326.00	1,997	6,710
326.10	1,997	6,818
326.20	1,997	6,922
326.30	1,997	7,019
326.40	1,997	7,110
326.50	1,997	7,197
326.60	1,997	7,282
326.70	1,997	7,364
326.80	1,997	7,445
326.90	1,997	7,524
327.00	1,997	7,604
327.10	1,997	7,684
327.20	1,997	7,764
327.30	1,997	7,844
327.40	1,997	7,924
327.50	1,997	8,004
327.60	1,997	8,083
327.70	1,997	**8,163**

Summary for Pond Forebay #1: Sediment Forebay #1

Inflow Area = 15,164 sf, 79.13% Impervious, Inflow Depth = 2.54" for 2 yr event
Inflow = 0.99 cfs @ 12.08 hrs, Volume= 3,215 cf
Outflow = 0.98 cfs @ 12.10 hrs, Volume= 2,640 cf, Atten= 1%, Lag= 0.7 min
Primary = 0.98 cfs @ 12.10 hrs, Volume= 2,640 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 332.62' @ 12.10 hrs Surf.Area= 515 sf Storage= 634 cf

Plug-Flow detention time= 115.5 min calculated for 2,640 cf (82% of inflow)
Center-of-Mass det. time= 44.8 min (831.9 - 787.1)

Volume	Invert	Avail.Storage	Storage Description
#1	330.00'	848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
330.00	0	0	0
331.00	179	90	90
332.00	365	272	362
333.00	607	486	848

Device	Routing	Invert	Outlet Devices
#1	Primary	332.50'	**10.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.98 cfs @ 12.10 hrs HW=332.62' TW=331.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.98 cfs @ 0.82 fps)

Hydrograph for Pond Forebay #1: Sediment Forebay #1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	330.00	0.00
2.00	0.00	0	330.00	0.00
4.00	0.00	0	330.03	0.00
6.00	0.00	16	330.43	0.00
8.00	0.01	77	330.93	0.00
10.00	0.04	246	331.65	0.00
12.00	**0.61**	**615**	**332.58**	**0.55**
14.00	**0.06**	**583**	**332.52**	**0.06**
16.00	0.03	580	332.51	0.03
18.00	0.02	578	332.51	0.02
20.00	0.01	578	332.51	0.01
22.00	0.01	577	332.51	0.01
24.00	0.01	577	332.51	0.01
26.00	0.00	574	332.50	0.00
28.00	0.00	574	332.50	0.00
30.00	0.00	574	332.50	0.00
32.00	0.00	574	332.50	0.00
34.00	0.00	574	332.50	0.00
36.00	0.00	574	332.50	0.00
38.00	0.00	574	332.50	0.00
40.00	0.00	574	332.50	0.00
42.00	0.00	574	332.50	0.00
44.00	0.00	574	332.50	0.00
46.00	0.00	574	332.50	0.00
48.00	0.00	574	332.50	0.00
50.00	0.00	574	332.50	0.00
52.00	0.00	574	332.50	0.00
54.00	0.00	574	332.50	0.00
56.00	0.00	574	332.50	0.00
58.00	0.00	574	332.50	0.00
60.00	0.00	574	332.50	0.00
62.00	0.00	574	332.50	0.00
64.00	0.00	574	332.50	0.00
66.00	0.00	574	332.50	0.00
68.00	0.00	574	332.50	0.00
70.00	0.00	574	332.50	0.00
72.00	0.00	574	332.50	0.00

Stage-Area-Storage for Pond Forebay #1: Sediment Forebay #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
330.00	0	0
330.05	9	0
330.10	18	1
330.15	27	2
330.20	36	4
330.25	45	6
330.30	54	8
330.35	63	11
330.40	72	14
330.45	81	18
330.50	90	22
330.55	98	27
330.60	107	32
330.65	116	38
330.70	125	44
330.75	134	50
330.80	143	57
330.85	152	65
330.90	161	72
330.95	170	81
331.00	179	90
331.05	188	99
331.10	198	108
331.15	207	118
331.20	216	129
331.25	226	140
331.30	235	152
331.35	244	164
331.40	253	176
331.45	263	189
331.50	272	202
331.55	281	216
331.60	291	230
331.65	300	245
331.70	309	260
331.75	319	276
331.80	328	292
331.85	337	309
331.90	346	326
331.95	356	343
332.00	365	362
332.05	377	380
332.10	389	399
332.15	401	419
332.20	413	439
332.25	426	460
332.30	438	482
332.35	450	504
332.40	462	527
332.45	474	550
332.50	486	574
332.55	498	599
332.60	510	624
332.65	522	650
332.70	534	676
332.75	547	703
332.80	559	731
332.85	571	759
332.90	583	788
332.95	595	817
333.00	**607**	**848**

Summary for Pond Inf-2: Inf-2

Inflow Area = 120,105 sf, 40.62% Impervious, Inflow Depth = 1.91" for 2 yr event
Inflow = 5.79 cfs @ 12.11 hrs, Volume= 19,166 cf
Outflow = 0.14 cfs @ 10.97 hrs, Volume= 19,167 cf, Atten= 98%, Lag= 0.0 min
Discarded = 0.14 cfs @ 10.97 hrs, Volume= 19,167 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 319.49' @ 17.68 hrs Surf.Area= 5,967 sf Storage= 12,576 cf
Flood Elev= 323.33' Surf.Area= 5,967 sf Storage= 25,910 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 858.3 min (1,679.0 - 820.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	316.58'	9,579 cf	**46.67'W x 127.87'L x 6.75'H Field A** 40,278 cf Overall - 16,331 cf Embedded = 23,947 cf x 40.0% Voids
#2A	317.33'	16,331 cf	**ADS_StormTech MC-4500 +Cap** x 150 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 150 Chambers in 5 Rows Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf
		25,910 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	316.58'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	317.33'	**12.0" Round Culvert** L= 18.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 317.33' / 316.33' S= 0.0556 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#3	Device 2	321.83'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.14 cfs @ 10.97 hrs HW=316.65' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=316.58' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Inf-2: Inf-2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

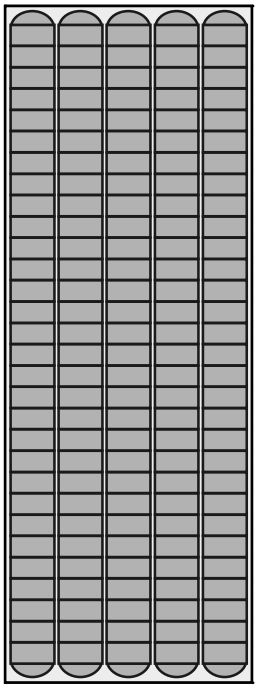
30 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 125.87' Row Length +12.0" End Stone x 2 = 127.87' Base Length
5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

150 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 5 Rows = 16,330.6 cf Chamber Storage

40,278.0 cf Field - 16,330.6 cf Chambers = 23,947.4 cf Stone x 40.0% Voids = 9,579.0 cf Stone Storage

Chamber Storage + Stone Storage = 25,909.5 cf = 0.595 af
Overall Storage Efficiency = 64.3%
Overall System Size = 127.87' x 46.67' x 6.75'

150 Chambers
1,491.8 cy Field
886.9 cy Stone



Hydrograph for Pond Inf-2: Inf-2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	316.58	0.00	0.00	**0.00**
2.00	0.00	0	316.58	0.00	0.00	0.00
4.00	0.00	0	316.58	0.00	0.00	0.00
6.00	0.00	0	316.58	0.00	0.00	0.00
8.00	0.02	0	316.58	0.02	0.02	0.00
10.00	0.13	0	316.58	**0.13**	**0.13**	0.00
12.00	**3.03**	2,611	317.49	**0.14**	**0.14**	0.00
14.00	**0.39**	11,269	319.21	0.14	0.14	0.00
16.00	0.21	**12,382**	**319.45**	0.14	0.14	0.00
18.00	0.13	**12,569**	**319.49**	0.14	0.14	0.00
20.00	0.10	12,377	319.45	0.14	0.14	0.00
22.00	0.09	12,039	319.38	0.14	0.14	0.00
24.00	0.07	11,577	319.28	0.14	0.14	0.00
26.00	0.00	10,592	319.07	0.14	0.14	0.00
28.00	0.00	9,577	318.87	0.14	0.14	0.00
30.00	0.00	8,563	318.66	0.14	0.14	0.00
32.00	0.00	7,549	318.46	0.14	0.14	0.00
34.00	0.00	6,534	318.26	0.14	0.14	0.00
36.00	0.00	5,520	318.06	0.14	0.14	0.00
38.00	0.00	4,505	317.86	0.14	0.14	0.00
40.00	0.00	3,491	317.66	0.14	0.14	0.00
42.00	0.00	2,477	317.46	0.14	0.14	0.00
44.00	0.00	1,462	317.19	0.14	0.14	0.00
46.00	0.00	448	316.77	0.14	0.14	0.00
48.00	0.00	0	316.58	0.00	0.00	0.00
50.00	0.00	0	316.58	0.00	0.00	0.00
52.00	0.00	0	316.58	0.00	0.00	0.00
54.00	0.00	0	316.58	0.00	0.00	0.00
56.00	0.00	0	316.58	0.00	0.00	0.00
58.00	0.00	0	316.58	0.00	0.00	0.00
60.00	0.00	0	316.58	0.00	0.00	0.00
62.00	0.00	0	316.58	0.00	0.00	0.00
64.00	0.00	0	316.58	0.00	0.00	0.00
66.00	0.00	0	316.58	0.00	0.00	0.00
68.00	0.00	0	316.58	0.00	0.00	0.00
70.00	0.00	0	316.58	0.00	0.00	0.00
72.00	0.00	0	316.58	0.00	0.00	0.00

Stage-Area-Storage for Pond Inf-2: Inf-2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
316.58	**5,967**	0
316.68	5,967	239
316.78	5,967	477
316.88	5,967	716
316.98	5,967	955
317.08	5,967	1,193
317.18	5,967	1,432
317.28	5,967	1,671
317.38	5,967	2,049
317.48	5,967	2,566
317.58	5,967	3,081
317.68	5,967	3,596
317.78	5,967	4,109
317.88	5,967	4,621
317.98	5,967	5,131
318.08	5,967	5,639
318.18	5,967	6,146
318.28	5,967	6,652
318.38	5,967	7,155
318.48	5,967	7,657
318.58	5,967	8,156
318.68	5,967	8,653
318.78	5,967	9,148
318.88	5,967	9,641
318.98	5,967	10,130
319.08	5,967	10,618
319.18	5,967	11,102
319.28	5,967	11,583
319.38	5,967	12,062
319.48	5,967	12,537
319.58	5,967	13,008
319.68	5,967	13,477
319.78	5,967	13,941
319.88	5,967	14,402
319.98	5,967	14,858
320.08	5,967	15,311
320.18	5,967	15,758
320.28	5,967	16,202
320.38	5,967	16,640
320.48	5,967	17,073
320.58	5,967	17,501
320.68	5,967	17,924
320.78	5,967	18,340
320.88	5,967	18,749
320.98	5,967	19,152
321.08	5,967	19,548
321.18	5,967	19,936
321.28	5,967	20,316
321.38	5,967	20,687
321.48	5,967	21,048
321.58	5,967	21,399
321.68	5,967	21,736
321.78	5,967	22,058
321.88	5,967	22,358
321.98	5,967	22,634
322.08	5,967	22,897
322.18	5,967	23,153
322.28	5,967	23,402
322.38	5,967	23,642
322.48	5,967	23,881
322.58	5,967	24,119
322.68	5,967	24,358
322.78	5,967	24,597
322.88	5,967	24,835
322.98	5,967	25,074
323.08	5,967	25,313
323.18	5,967	25,552
323.28	5,967	**25,790**

Summary for Pond Inf-3: INF#3

Inflow Area = 60,887 sf, 66.57% Impervious, Inflow Depth = 2.35" for 2 yr event
Inflow = 3.76 cfs @ 12.09 hrs, Volume= 11,927 cf
Outflow = 3.74 cfs @ 12.09 hrs, Volume= 11,927 cf, Atten= 0%, Lag= 0.5 min
Discarded = 0.01 cfs @ 7.17 hrs, Volume= 1,261 cf
Primary = 3.73 cfs @ 12.09 hrs, Volume= 10,665 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 322.90' @ 12.09 hrs Surf.Area= 588 sf Storage= 520 cf
Flood Elev= 325.00' Surf.Area= 588 sf Storage= 1,209 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 34.3 min (832.0 - 797.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.50'	566 cf	**11.00'W x 53.46'L x 3.50'H Field A** 2,058 cf Overall - 643 cf Embedded = 1,415 cf x 40.0% Voids
#2A	322.00'	643 cf	**ADS_StormTech SC-740 +Cap** x 14 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 14 Chambers in 2 Rows
		1,209 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.50'	**18.0" Round Culvert** L= 5.0' Ke= 0.900 Inlet / Outlet Invert= 321.50' / 321.45' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf
#3	Device 2	322.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 7.17 hrs HW=321.54' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=3.72 cfs @ 12.09 hrs HW=322.90' TW=0.00' (Dynamic Tailwater)
↑└**2=Culvert** (Passes 3.72 cfs of 4.82 cfs potential flow)
↑└**3=Broad-Crested Rectangular Weir** (Weir Controls 3.72 cfs @ 1.85 fps)

Pond Inf-3: INF#3 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

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

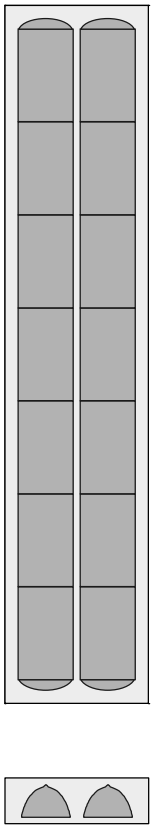
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

14 Chambers x 45.9 cf = 643.2 cf Chamber Storage

2,058.1 cf Field - 643.2 cf Chambers = 1,414.9 cf Stone x 40.0% Voids = 566.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,209.1 cf = 0.028 af
Overall Storage Efficiency = 58.8%
Overall System Size = 53.46' x 11.00' x 3.50'

14 Chambers
76.2 cy Field
52.4 cy Stone



Hydrograph for Pond Inf-3: INF#3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.50	0.00	0.00	0.00
2.00	0.00	0	321.50	0.00	0.00	0.00
4.00	0.00	0	321.50	0.00	0.00	0.00
6.00	0.01	0	321.50	0.01	**0.01**	0.00
8.00	0.04	54	321.73	0.01	**0.01**	0.00
10.00	0.12	361	322.54	0.12	0.01	0.10
12.00	**2.29**	**467**	**322.78**	**2.10**	0.01	**2.09**
14.00	**0.21**	**371**	**322.56**	**0.22**	0.01	**0.20**
16.00	0.11	361	322.54	0.12	0.01	0.10
18.00	0.07	356	322.53	0.07	0.01	0.06
20.00	0.06	353	322.52	0.06	0.01	0.04
22.00	0.05	352	322.52	0.05	0.01	0.03
24.00	0.04	350	322.51	0.04	0.01	0.02
26.00	0.00	254	322.30	0.01	0.01	0.00
28.00	0.00	154	322.08	0.01	0.01	0.00
30.00	0.00	54	321.73	0.01	0.01	0.00
32.00	0.00	0	321.50	0.00	0.00	0.00
34.00	0.00	0	321.50	0.00	0.00	0.00
36.00	0.00	0	321.50	0.00	0.00	0.00
38.00	0.00	0	321.50	0.00	0.00	0.00
40.00	0.00	0	321.50	0.00	0.00	0.00
42.00	0.00	0	321.50	0.00	0.00	0.00
44.00	0.00	0	321.50	0.00	0.00	0.00
46.00	0.00	0	321.50	0.00	0.00	0.00
48.00	0.00	0	321.50	0.00	0.00	0.00
50.00	0.00	0	321.50	0.00	0.00	0.00
52.00	0.00	0	321.50	0.00	0.00	0.00
54.00	0.00	0	321.50	0.00	0.00	0.00
56.00	0.00	0	321.50	0.00	0.00	0.00
58.00	0.00	0	321.50	0.00	0.00	0.00
60.00	0.00	0	321.50	0.00	0.00	0.00
62.00	0.00	0	321.50	0.00	0.00	0.00
64.00	0.00	0	321.50	0.00	0.00	0.00
66.00	0.00	0	321.50	0.00	0.00	0.00
68.00	0.00	0	321.50	0.00	0.00	0.00
70.00	0.00	0	321.50	0.00	0.00	0.00
72.00	0.00	0	321.50	0.00	0.00	0.00

Stage-Area-Storage for Pond Inf-3: INF#3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.50	**588**	0
321.55	588	12
321.60	588	24
321.65	588	35
321.70	588	47
321.75	588	59
321.80	588	71
321.85	588	82
321.90	588	94
321.95	588	106
322.00	588	118
322.05	588	140
322.10	588	163
322.15	588	186
322.20	588	209
322.25	588	232
322.30	588	254
322.35	588	277
322.40	588	299
322.45	588	322
322.50	588	344
322.55	588	366
322.60	588	389
322.65	588	411
322.70	588	433
322.75	588	454
322.80	588	476
322.85	588	498
322.90	588	519
322.95	588	541
323.00	588	562
323.05	588	583
323.10	588	604
323.15	588	625
323.20	588	646
323.25	588	666
323.30	588	687
323.35	588	707
323.40	588	727
323.45	588	747
323.50	588	766
323.55	588	786
323.60	588	805
323.65	588	824
323.70	588	843
323.75	588	861
323.80	588	880
323.85	588	898
323.90	588	915
323.95	588	933
324.00	588	950
324.05	588	966
324.10	588	983
324.15	588	998
324.20	588	1,014
324.25	588	1,028
324.30	588	1,042
324.35	588	1,055
324.40	588	1,067
324.45	588	1,080
324.50	588	1,092
324.55	588	1,103
324.60	588	1,115
324.65	588	1,127
324.70	588	1,139
324.75	588	1,150
324.80	588	1,162
324.85	588	1,174
324.90	588	1,186
324.95	588	1,197
325.00	588	**1,209**

Summary for Pond RG #1: Rain Garden #1

Inflow Area = 15,164 sf, 79.13% Impervious, Inflow Depth = 2.09" for 2 yr event
Inflow = 0.98 cfs @ 12.10 hrs, Volume= 2,640 cf
Outflow = 0.98 cfs @ 12.10 hrs, Volume= 2,640 cf, Atten= 0%, Lag= 0.2 min
Primary = 0.98 cfs @ 12.10 hrs, Volume= 2,640 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 331.00' @ 12.10 hrs Surf.Area= 570 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (831.9 - 831.9)

Volume	Invert	Avail.Storage	Storage Description
#1	331.00'	2,551 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
331.00	570	0	0
332.00	908	739	739
333.00	1,303	1,106	1,845
333.50	1,521	706	2,551

Device	Routing	Invert	Outlet Devices
#1	Device 2	331.00'	**1.02 cfs Exfiltration at all elevations**
#2	Primary	328.50'	**6.0" Round Culvert** L= 75.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 328.50' / 328.13' S= 0.0049 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 2	332.50'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.02 cfs @ 12.10 hrs HW=331.00' TW=324.79' (Dynamic Tailwater)
└**2=Culvert** (Passes 1.02 cfs of 1.04 cfs potential flow)
  ├**1=Exfiltration** (Exfiltration Controls 1.02 cfs)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Hydrograph for Pond RG #1: Rain Garden #1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	331.00	0.00
2.00	0.00	0	331.00	0.00
4.00	0.00	0	331.00	0.00
6.00	0.00	0	331.00	0.00
8.00	0.00	0	331.00	0.00
10.00	0.00	0	331.00	0.00
12.00	**0.55**	**0**	**331.00**	**0.55**
14.00	**0.06**	**0**	**331.00**	**0.06**
16.00	0.03	0	331.00	0.03
18.00	0.02	0	331.00	0.02
20.00	0.01	0	331.00	0.01
22.00	0.01	0	331.00	0.01
24.00	0.01	0	331.00	0.01
26.00	0.00	0	331.00	0.00
28.00	0.00	0	331.00	0.00
30.00	0.00	0	331.00	0.00
32.00	0.00	0	331.00	0.00
34.00	0.00	0	331.00	0.00
36.00	0.00	0	331.00	0.00
38.00	0.00	0	331.00	0.00
40.00	0.00	0	331.00	0.00
42.00	0.00	0	331.00	0.00
44.00	0.00	0	331.00	0.00
46.00	0.00	0	331.00	0.00
48.00	0.00	0	331.00	0.00
50.00	0.00	0	331.00	0.00
52.00	0.00	0	331.00	0.00
54.00	0.00	0	331.00	0.00
56.00	0.00	0	331.00	0.00
58.00	0.00	0	331.00	0.00
60.00	0.00	0	331.00	0.00
62.00	0.00	0	331.00	0.00
64.00	0.00	0	331.00	0.00
66.00	0.00	0	331.00	0.00
68.00	0.00	0	331.00	0.00
70.00	0.00	0	331.00	0.00
72.00	0.00	0	331.00	0.00

Stage-Area-Storage for Pond RG #1: Rain Garden #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
331.00	570	0
331.05	587	29
331.10	604	59
331.15	621	89
331.20	638	121
331.25	655	153
331.30	671	186
331.35	688	220
331.40	705	255
331.45	722	291
331.50	739	327
331.55	756	365
331.60	773	403
331.65	790	442
331.70	807	482
331.75	824	523
331.80	840	564
331.85	857	607
331.90	874	650
331.95	891	694
332.00	908	739
332.05	928	785
332.10	948	832
332.15	967	880
332.20	987	928
332.25	1,007	978
332.30	1,027	1,029
332.35	1,046	1,081
332.40	1,066	1,134
332.45	1,086	1,188
332.50	1,106	1,242
332.55	1,125	1,298
332.60	1,145	1,355
332.65	1,165	1,413
332.70	1,184	1,471
332.75	1,204	1,531
332.80	1,224	1,592
332.85	1,244	1,653
332.90	1,263	1,716
332.95	1,283	1,780
333.00	1,303	1,845
333.05	1,325	1,910
333.10	1,347	1,977
333.15	1,368	2,045
333.20	1,390	2,114
333.25	1,412	2,184
333.30	1,434	2,255
333.35	1,456	2,327
333.40	1,477	2,401
333.45	1,499	2,475
333.50	**1,521**	**2,551**

Summary for Pond UGS#4: UGS#4

Inflow Area = 220,543 sf, 26.64% Impervious, Inflow Depth = 1.68" for 2 yr event
Inflow = 9.10 cfs @ 12.13 hrs, Volume= 30,919 cf
Outflow = 5.78 cfs @ 12.26 hrs, Volume= 30,920 cf, Atten= 36%, Lag= 7.9 min
Primary = 5.78 cfs @ 12.26 hrs, Volume= 30,920 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 318.36' @ 12.26 hrs Surf.Area= 5,330 sf Storage= 4,266 cf
Flood Elev= 322.50' Surf.Area= 5,330 sf Storage= 17,771 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 14.0 min (846.1 - 832.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	317.00'	7,697 cf	**46.25'W x 115.25'L x 5.50'H Field A** 29,317 cf Overall - 10,074 cf Embedded = 19,242 cf x 40.0% Voids
#2A	317.75'	10,074 cf	**ADS_StormTech MC-3500 d +Cap** x 90 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 90 Chambers in 6 Rows Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf
		17,771 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	316.90'	**18.0" Round Culvert** L= 73.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 316.90' / 314.90' S= 0.0274 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Primary	317.00'	**12.0" W x 0.2" H Vert. Orifice/Grate** X 6 rows with 86.0" cc spacing C= 0.600

Primary OutFlow Max=5.78 cfs @ 12.26 hrs HW=318.36' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 5.68 cfs @ 3.24 fps)
2=Orifice/Grate (Orifice Controls 0.09 cfs @ 5.59 fps)

Pond UGS#4: UGS#4 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

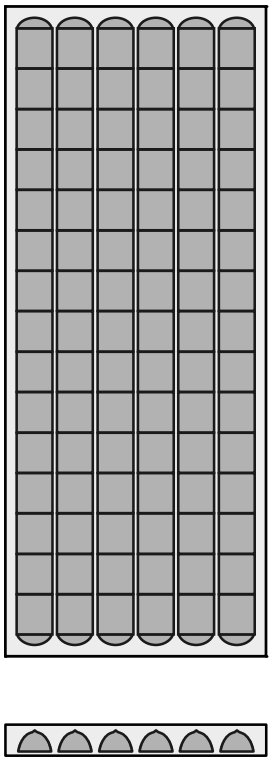
15 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 111.25' Row Length +24.0" End Stone x 2 = 115.25' Base Length
6 Rows x 77.0" Wide + 9.0" Spacing x 5 + 24.0" Side Stone x 2 = 46.25' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

90 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 6 Rows = 10,074.5 cf Chamber Storage

29,316.7 cf Field - 10,074.5 cf Chambers = 19,242.2 cf Stone x 40.0% Voids = 7,696.9 cf Stone Storage

Chamber Storage + Stone Storage = 17,771.4 cf = 0.408 af
Overall Storage Efficiency = 60.6%
Overall System Size = 115.25' x 46.25' x 5.50'

90 Chambers
1,085.8 cy Field
712.7 cy Stone



Hydrograph for Pond UGS#4: UGS#4

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	317.00	0.00
2.00	0.00	0	317.00	0.00
4.00	0.00	0	317.00	0.00
6.00	0.00	0	317.00	0.00
8.00	0.00	0	317.00	0.00
10.00	0.14	89	317.04	0.10
12.00	**4.45**	**1,697**	**317.77**	**2.75**
14.00	**0.67**	**663**	**317.31**	**0.72**
16.00	0.36	420	317.20	0.40
18.00	0.22	270	317.13	0.24
20.00	0.18	204	317.10	0.18
22.00	0.15	164	317.08	0.15
24.00	0.12	124	317.06	0.12
26.00	0.00	0	317.00	0.00
28.00	0.00	0	317.00	0.00
30.00	0.00	0	317.00	0.00
32.00	0.00	0	317.00	0.00
34.00	0.00	0	317.00	0.00
36.00	0.00	0	317.00	0.00
38.00	0.00	0	317.00	0.00
40.00	0.00	0	317.00	0.00
42.00	0.00	0	317.00	0.00
44.00	0.00	0	317.00	0.00
46.00	0.00	0	317.00	0.00
48.00	0.00	0	317.00	0.00
50.00	0.00	0	317.00	0.00
52.00	0.00	0	317.00	0.00
54.00	0.00	0	317.00	0.00
56.00	0.00	0	317.00	0.00
58.00	0.00	0	317.00	0.00
60.00	0.00	0	317.00	0.00
62.00	0.00	0	317.00	0.00
64.00	0.00	0	317.00	0.00
66.00	0.00	0	317.00	0.00
68.00	0.00	0	317.00	0.00
70.00	0.00	0	317.00	0.00
72.00	0.00	0	317.00	0.00

Stage-Area-Storage for Pond UGS#4: UGS#4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
317.00	0	337.80	17,771
317.40	853	338.20	17,771
317.80	1,821	338.60	17,771
318.20	3,584	339.00	17,771
318.60	5,317	339.40	17,771
319.00	7,013	339.80	17,771
319.40	8,662	340.20	17,771
319.80	10,250	340.60	17,771
320.20	11,760	341.00	17,771
320.60	13,167	341.40	17,771
321.00	14,425	341.80	17,771
321.40	15,421	342.20	17,771
321.80	16,279	342.60	17,771
322.20	**17,132**	343.00	17,771
322.60	**17,771**	343.40	17,771
323.00	17,771	343.80	17,771
323.40	17,771	344.20	17,771
323.80	17,771	344.60	17,771
324.20	17,771	345.00	17,771
324.60	17,771	345.40	17,771
325.00	17,771	345.80	17,771
325.40	17,771	346.20	17,771
325.80	17,771	346.60	17,771
326.20	17,771	347.00	17,771
326.60	17,771	347.40	17,771
327.00	17,771	347.80	17,771
327.40	17,771	348.20	17,771
327.80	17,771	348.60	17,771
328.20	17,771	349.00	17,771
328.60	17,771	349.40	17,771
329.00	17,771	349.80	17,771
329.40	17,771	350.20	17,771
329.80	17,771	350.60	17,771
330.20	17,771	351.00	17,771
330.60	17,771	351.40	17,771
331.00	17,771	351.80	17,771
331.40	17,771	352.20	17,771
331.80	17,771	352.60	17,771
332.20	17,771		
332.60	17,771		
333.00	17,771		
333.40	17,771		
333.80	17,771		
334.20	17,771		
334.60	17,771		
335.00	17,771		
335.40	17,771		
335.80	17,771		
336.20	17,771		
336.60	17,771		
337.00	17,771		
337.40	17,771		

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPR-1: (new Subcat) Runoff Area=42,801 sf 45.13% Impervious Runoff Depth=3.20"
Tc=6.0 min CN=88 Runoff=3.62 cfs 11,400 cf

SubcatchmentPR-1A: (new Subcat) Runoff Area=120,105 sf 40.62% Impervious Runoff Depth=3.10"
Flow Length=98' Slope=0.0100 '/' Tc=7.9 min CN=87 Runoff=9.26 cfs 31,016 cf

SubcatchmentPR-1B: (new Subcat) Runoff Area=8,760 sf 76.99% Impervious Runoff Depth=3.82"
Tc=6.0 min CN=94 Runoff=0.84 cfs 2,785 cf

SubcatchmentPR-1C: (new Subcat) Runoff Area=48,219 sf 77.13% Impervious Runoff Depth=3.82"
Tc=6.0 min CN=94 Runoff=4.64 cfs 15,331 cf

SubcatchmentPR-1D: WS-1D Runoff Area=15,164 sf 79.13% Impervious Runoff Depth=3.82"
Tc=6.0 min CN=94 Runoff=1.46 cfs 4,821 cf

SubcatchmentPR-2: (new Subcat) Runoff Area=60,887 sf 66.57% Impervious Runoff Depth=3.60"
Tc=6.0 min CN=92 Runoff=5.64 cfs 18,277 cf

SubcatchmentPR-3: (new Subcat) Runoff Area=37,434 sf 0.00% Impervious Runoff Depth=2.38"
Flow Length=151' Tc=9.0 min CN=79 Runoff=2.16 cfs 7,413 cf

SubcatchmentPR-4: (new Subcat) Runoff Area=45,815 sf 0.00% Impervious Runoff Depth=1.67"
Tc=6.0 min CN=70 Runoff=2.00 cfs 6,390 cf

SubcatchmentPR-5: (new Subcat) Runoff Area=13,090 sf 33.90% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=83 Runoff=0.96 cfs 2,973 cf

SubcatchmentPR-6: PR-6 Runoff Area=10,196 sf 1.75% Impervious Runoff Depth=1.75"
Tc=6.0 min CN=71 Runoff=0.47 cfs 1,484 cf

SubcatchmentPR-7: PR-7 Runoff Area=7,291 sf 0.00% Impervious Runoff Depth=1.97"
Tc=6.0 min CN=74 Runoff=0.38 cfs 1,198 cf

SubcatchmentPR-8: PR-8 Runoff Area=220,543 sf 26.64% Impervious Runoff Depth=2.82"
Flow Length=117' Tc=8.7 min CN=84 Runoff=15.19 cfs 51,765 cf

SubcatchmentPR-9: PR-9 Runoff Area=31,969 sf 29.48% Impervious Runoff Depth=2.91"
Tc=6.0 min CN=85 Runoff=2.49 cfs 7,750 cf

SubcatchmentPR-BLDG: PR-BLDG Runoff Area=63,223 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=6.38 cfs 22,465 cf

Reach POA-1: To Main Street Inflow=12.24 cfs 49,259 cf
Outflow=12.24 cfs 49,259 cf

Reach POA-2: To Existing DMH North of Site Inflow=14.70 cfs 76,457 cf
Outflow=14.70 cfs 76,457 cf

Reach POA-3: NORTH EAST WETLANDS Inflow=2.16 cfs 7,413 cf
Outflow=2.16 cfs 7,413 cf

Reach POA-4: SOUTH EAST WETLANDS Inflow=2.00 cfs 6,390 cf
Outflow=2.00 cfs 6,390 cf

Reach POA-5: CHAMPNEY STREET Inflow=0.96 cfs 2,973 cf
Outflow=0.96 cfs 2,973 cf

Pond #1A: INF#1A Peak Elev=325.16' Storage=6,056 cf Inflow=12.88 cfs 44,831 cf
Discarded=0.05 cfs 7,571 cf Primary=12.10 cfs 37,260 cf Outflow=12.15 cfs 44,831 cf

Pond #1B: INF#1B Peak Elev=323.56' Storage=3,418 cf Inflow=12.10 cfs 37,260 cf
Discarded=0.05 cfs 2,837 cf Primary=9.03 cfs 34,424 cf Outflow=9.08 cfs 37,261 cf

Pond Forebay #1: Sediment Forebay #1 Peak Elev=332.65' Storage=652 cf Inflow=1.46 cfs 4,821 cf
Outflow=1.45 cfs 4,247 cf

Pond Inf-2: Inf-2 Peak Elev=321.87' Storage=22,324 cf Inflow=9.26 cfs 31,016 cf
Discarded=0.14 cfs 30,266 cf Primary=0.10 cfs 752 cf Outflow=0.25 cfs 31,018 cf

Pond Inf-3: INF#3 Peak Elev=323.04' Storage=578 cf Inflow=5.64 cfs 18,277 cf
Discarded=0.01 cfs 1,335 cf Primary=5.53 cfs 16,942 cf Outflow=5.55 cfs 18,277 cf

Pond RG #1: Rain Garden #1 Peak Elev=331.23' Storage=141 cf Inflow=1.45 cfs 4,247 cf
Outflow=1.02 cfs 4,249 cf

Pond UGS#4: UGS#4 Peak Elev=319.23' Storage=7,984 cf Inflow=15.19 cfs 51,765 cf
Outflow=8.57 cfs 51,765 cf

Total Runoff Area = 725,497 sf Runoff Volume = 185,070 cf Average Runoff Depth = 3.06"
58.57% Pervious = 424,920 sf 41.43% Impervious = 300,577 sf

Summary for Subcatchment PR-1: (new Subcat)

Runoff = 3.62 cfs @ 12.09 hrs, Volume= 11,400 cf, 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 Rainfall=4.50"

	Area (sf)	CN	Description
*	23,486	79	>75% Grass cover, HSG B
	19,315	98	Paved parking, HSG B
	42,801	88	Weighted Average
	23,486		54.87% Pervious Area
	19,315		45.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-1: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.00	0.00
5.00	0.26	0.00	0.00
6.00	0.32	0.00	0.00
7.00	0.41	0.01	0.01
8.00	0.51	0.04	0.03
9.00	0.66	0.08	0.06
10.00	0.85	0.17	0.11
11.00	1.13	0.33	0.19
12.00	2.25	1.17	**2.18**
13.00	3.37	2.16	**0.33**
14.00	3.65	2.41	0.21
15.00	3.84	2.58	0.16
16.00	3.99	2.72	0.11
17.00	4.09	2.82	0.09
18.00	4.18	2.89	0.07
19.00	4.24	2.96	0.06
20.00	4.31	3.01	0.05
21.00	4.36	3.07	0.05
22.00	4.41	3.11	0.05
23.00	4.46	3.16	0.04
24.00	**4.50**	**3.20**	0.04
25.00	4.50	3.20	0.00
26.00	4.50	3.20	0.00
27.00	4.50	3.20	0.00
28.00	4.50	3.20	0.00
29.00	4.50	3.20	0.00
30.00	4.50	3.20	0.00
31.00	4.50	3.20	0.00
32.00	4.50	3.20	0.00
33.00	4.50	3.20	0.00
34.00	4.50	3.20	0.00
35.00	4.50	3.20	0.00
36.00	4.50	3.20	0.00
37.00	4.50	3.20	0.00
38.00	4.50	3.20	0.00
39.00	4.50	3.20	0.00
40.00	4.50	3.20	0.00
41.00	4.50	3.20	0.00
42.00	4.50	3.20	0.00
43.00	4.50	3.20	0.00
44.00	4.50	3.20	0.00
45.00	4.50	3.20	0.00
46.00	4.50	3.20	0.00
47.00	4.50	3.20	0.00
48.00	4.50	3.20	0.00
49.00	4.50	3.20	0.00
50.00	4.50	3.20	0.00
51.00	4.50	3.20	0.00
52.00	4.50	3.20	0.00
53.00	4.50	3.20	0.00
54.00	4.50	3.20	0.00
55.00	4.50	3.20	0.00
56.00	4.50	3.20	0.00
57.00	4.50	3.20	0.00
58.00	4.50	3.20	0.00
59.00	4.50	3.20	0.00
60.00	4.50	3.20	0.00
61.00	4.50	3.20	0.00
62.00	4.50	3.20	0.00
63.00	4.50	3.20	0.00
64.00	4.50	3.20	0.00
65.00	4.50	3.20	0.00
66.00	4.50	3.20	0.00
67.00	4.50	3.20	0.00
68.00	4.50	3.20	0.00
69.00	4.50	3.20	0.00
70.00	4.50	3.20	0.00
71.00	4.50	3.20	0.00
72.00	4.50	3.20	0.00

Summary for Subcatchment PR-1A: (new Subcat)

Runoff = 9.26 cfs @ 12.11 hrs, Volume= 31,016 cf, 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 Rainfall=4.50"

	Area (sf)	CN	Description
*	71,317	79	>75% Grass cover, HSG B
	48,788	98	Paved parking, HSG B
	120,105	87	Weighted Average
	71,317		59.38% Pervious Area
	48,788		40.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 sf** Grass: Short n= 0.150 P2= 3.20"
0.5	48	0.0100	1.50		**Shallow Concentrated Flow, 48.32' of SCF** Grassed Waterway Kv= 15.0 fps
7.9	98	Total			

Hydrograph for Subcatchment PR-1A: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.00	0.00
5.00	0.26	0.00	0.00
6.00	0.32	0.00	0.00
7.00	0.41	0.01	0.03
8.00	0.51	0.03	0.07
9.00	0.66	0.07	0.15
10.00	0.85	0.15	0.27
11.00	1.13	0.29	0.50
12.00	2.25	1.10	**5.00**
13.00	3.37	2.07	**0.94**
14.00	3.65	2.32	0.59
15.00	3.84	2.49	0.44
16.00	3.99	2.62	0.31
17.00	4.09	2.72	0.25
18.00	4.18	2.80	0.19
19.00	4.24	2.86	0.17
20.00	4.31	2.92	0.15
21.00	4.36	2.97	0.14
22.00	4.41	3.02	0.13
23.00	4.46	3.06	0.11
24.00	**4.50**	**3.10**	0.10
25.00	4.50	3.10	0.00
26.00	4.50	3.10	0.00
27.00	4.50	3.10	0.00
28.00	4.50	3.10	0.00
29.00	4.50	3.10	0.00
30.00	4.50	3.10	0.00
31.00	4.50	3.10	0.00
32.00	4.50	3.10	0.00
33.00	4.50	3.10	0.00
34.00	4.50	3.10	0.00
35.00	4.50	3.10	0.00
36.00	4.50	3.10	0.00
37.00	4.50	3.10	0.00
38.00	4.50	3.10	0.00
39.00	4.50	3.10	0.00
40.00	4.50	3.10	0.00
41.00	4.50	3.10	0.00
42.00	4.50	3.10	0.00
43.00	4.50	3.10	0.00
44.00	4.50	3.10	0.00
45.00	4.50	3.10	0.00
46.00	4.50	3.10	0.00
47.00	4.50	3.10	0.00
48.00	4.50	3.10	0.00
49.00	4.50	3.10	0.00
50.00	4.50	3.10	0.00
51.00	4.50	3.10	0.00
52.00	4.50	3.10	0.00
53.00	4.50	3.10	0.00
54.00	4.50	3.10	0.00
55.00	4.50	3.10	0.00
56.00	4.50	3.10	0.00
57.00	4.50	3.10	0.00
58.00	4.50	3.10	0.00
59.00	4.50	3.10	0.00
60.00	4.50	3.10	0.00
61.00	4.50	3.10	0.00
62.00	4.50	3.10	0.00
63.00	4.50	3.10	0.00
64.00	4.50	3.10	0.00
65.00	4.50	3.10	0.00
66.00	4.50	3.10	0.00
67.00	4.50	3.10	0.00
68.00	4.50	3.10	0.00
69.00	4.50	3.10	0.00
70.00	4.50	3.10	0.00
71.00	4.50	3.10	0.00
72.00	4.50	3.10	0.00

Summary for Subcatchment PR-1B: (new Subcat)

Runoff = 0.84 cfs @ 12.08 hrs, Volume= 2,785 cf, Depth= 3.82"

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 Rainfall=4.50"

	Area (sf)	CN	Description
*	2,016	79	>75% Grass cover, HSG B
	6,744	98	Paved parking, HSG B
	8,760	94	Weighted Average
	2,016		23.01% Pervious Area
	6,744		76.99% Impervious Area

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

Hydrograph for Subcatchment PR-1B: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.01	0.00
5.00	0.26	0.02	0.00
6.00	0.32	0.05	0.01
7.00	0.41	0.09	0.01
8.00	0.51	0.15	0.01
9.00	0.66	0.24	0.02
10.00	0.85	0.38	0.03
11.00	1.13	0.61	0.05
12.00	2.25	1.63	**0.52**
13.00	3.37	2.71	**0.07**
14.00	3.65	2.98	0.05
15.00	3.84	3.17	0.03
16.00	3.99	3.31	0.02
17.00	4.09	3.42	0.02
18.00	4.18	3.50	0.01
19.00	4.24	3.56	0.01
20.00	4.31	3.63	0.01
21.00	4.36	3.68	0.01
22.00	4.41	3.73	0.01
23.00	4.46	3.78	0.01
24.00	**4.50**	**3.82**	0.01
25.00	4.50	3.82	0.00
26.00	4.50	3.82	0.00
27.00	4.50	3.82	0.00
28.00	4.50	3.82	0.00
29.00	4.50	3.82	0.00
30.00	4.50	3.82	0.00
31.00	4.50	3.82	0.00
32.00	4.50	3.82	0.00
33.00	4.50	3.82	0.00
34.00	4.50	3.82	0.00
35.00	4.50	3.82	0.00
36.00	4.50	3.82	0.00
37.00	4.50	3.82	0.00
38.00	4.50	3.82	0.00
39.00	4.50	3.82	0.00
40.00	4.50	3.82	0.00
41.00	4.50	3.82	0.00
42.00	4.50	3.82	0.00
43.00	4.50	3.82	0.00
44.00	4.50	3.82	0.00
45.00	4.50	3.82	0.00
46.00	4.50	3.82	0.00
47.00	4.50	3.82	0.00
48.00	4.50	3.82	0.00
49.00	4.50	3.82	0.00
50.00	4.50	3.82	0.00
51.00	4.50	3.82	0.00
52.00	4.50	3.82	0.00
53.00	4.50	3.82	0.00
54.00	4.50	3.82	0.00
55.00	4.50	3.82	0.00
56.00	4.50	3.82	0.00
57.00	4.50	3.82	0.00
58.00	4.50	3.82	0.00
59.00	4.50	3.82	0.00
60.00	4.50	3.82	0.00
61.00	4.50	3.82	0.00
62.00	4.50	3.82	0.00
63.00	4.50	3.82	0.00
64.00	4.50	3.82	0.00
65.00	4.50	3.82	0.00
66.00	4.50	3.82	0.00
67.00	4.50	3.82	0.00
68.00	4.50	3.82	0.00
69.00	4.50	3.82	0.00
70.00	4.50	3.82	0.00
71.00	4.50	3.82	0.00
72.00	4.50	3.82	0.00

Summary for Subcatchment PR-1C: (new Subcat)

Runoff = 4.64 cfs @ 12.08 hrs, Volume= 15,331 cf, Depth= 3.82"

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 Rainfall=4.50"

	Area (sf)	CN	Description
*	11,027	79	>75% Grass cover, HSG B
	37,192	98	Paved parking, HSG B
	48,219	94	Weighted Average
	11,027		22.87% Pervious Area
	37,192		77.13% Impervious Area

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

Hydrograph for Subcatchment PR-1C: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.01	0.01
5.00	0.26	0.02	0.02
6.00	0.32	0.05	0.03
7.00	0.41	0.09	0.05
8.00	0.51	0.15	0.08
9.00	0.66	0.24	0.13
10.00	0.85	0.38	0.19
11.00	1.13	0.61	0.30
12.00	2.25	1.63	**2.88**
13.00	3.37	2.71	**0.40**
14.00	3.65	2.98	0.25
15.00	3.84	3.17	0.19
16.00	3.99	3.31	0.13
17.00	4.09	3.42	0.11
18.00	4.18	3.50	0.08
19.00	4.24	3.56	0.07
20.00	4.31	3.63	0.06
21.00	4.36	3.68	0.06
22.00	4.41	3.73	0.05
23.00	4.46	3.78	0.05
24.00	**4.50**	**3.82**	0.04
25.00	4.50	3.82	0.00
26.00	4.50	3.82	0.00
27.00	4.50	3.82	0.00
28.00	4.50	3.82	0.00
29.00	4.50	3.82	0.00
30.00	4.50	3.82	0.00
31.00	4.50	3.82	0.00
32.00	4.50	3.82	0.00
33.00	4.50	3.82	0.00
34.00	4.50	3.82	0.00
35.00	4.50	3.82	0.00
36.00	4.50	3.82	0.00
37.00	4.50	3.82	0.00
38.00	4.50	3.82	0.00
39.00	4.50	3.82	0.00
40.00	4.50	3.82	0.00
41.00	4.50	3.82	0.00
42.00	4.50	3.82	0.00
43.00	4.50	3.82	0.00
44.00	4.50	3.82	0.00
45.00	4.50	3.82	0.00
46.00	4.50	3.82	0.00
47.00	4.50	3.82	0.00
48.00	4.50	3.82	0.00
49.00	4.50	3.82	0.00
50.00	4.50	3.82	0.00
51.00	4.50	3.82	0.00
52.00	4.50	3.82	0.00
53.00	4.50	3.82	0.00
54.00	4.50	3.82	0.00
55.00	4.50	3.82	0.00
56.00	4.50	3.82	0.00
57.00	4.50	3.82	0.00
58.00	4.50	3.82	0.00
59.00	4.50	3.82	0.00
60.00	4.50	3.82	0.00
61.00	4.50	3.82	0.00
62.00	4.50	3.82	0.00
63.00	4.50	3.82	0.00
64.00	4.50	3.82	0.00
65.00	4.50	3.82	0.00
66.00	4.50	3.82	0.00
67.00	4.50	3.82	0.00
68.00	4.50	3.82	0.00
69.00	4.50	3.82	0.00
70.00	4.50	3.82	0.00
71.00	4.50	3.82	0.00
72.00	4.50	3.82	0.00

Summary for Subcatchment PR-1D: WS-1D

Runoff = 1.46 cfs @ 12.08 hrs, Volume= 4,821 cf, Depth= 3.82"

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 Rainfall=4.50"

Area (sf)	CN	Description
12,000	98	Paved parking, HSG B
3,164	79	<50% Grass cover, Poor, HSG B
15,164	94	Weighted Average
3,164		20.87% Pervious Area
12,000		79.13% Impervious Area

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

Hydrograph for Subcatchment PR-1D: WS-1D

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.01	0.00
5.00	0.26	0.02	0.01
6.00	0.32	0.05	0.01
7.00	0.41	0.09	0.02
8.00	0.51	0.15	0.02
9.00	0.66	0.24	0.04
10.00	0.85	0.38	0.06
11.00	1.13	0.61	0.09
12.00	2.25	1.63	**0.91**
13.00	3.37	2.71	**0.13**
14.00	3.65	2.98	0.08
15.00	3.84	3.17	0.06
16.00	3.99	3.31	0.04
17.00	4.09	3.42	0.03
18.00	4.18	3.50	0.03
19.00	4.24	3.56	0.02
20.00	4.31	3.63	0.02
21.00	4.36	3.68	0.02
22.00	4.41	3.73	0.02
23.00	4.46	3.78	0.02
24.00	**4.50**	**3.82**	0.01
25.00	4.50	3.82	0.00
26.00	4.50	3.82	0.00
27.00	4.50	3.82	0.00
28.00	4.50	3.82	0.00
29.00	4.50	3.82	0.00
30.00	4.50	3.82	0.00
31.00	4.50	3.82	0.00
32.00	4.50	3.82	0.00
33.00	4.50	3.82	0.00
34.00	4.50	3.82	0.00
35.00	4.50	3.82	0.00
36.00	4.50	3.82	0.00
37.00	4.50	3.82	0.00
38.00	4.50	3.82	0.00
39.00	4.50	3.82	0.00
40.00	4.50	3.82	0.00
41.00	4.50	3.82	0.00
42.00	4.50	3.82	0.00
43.00	4.50	3.82	0.00
44.00	4.50	3.82	0.00
45.00	4.50	3.82	0.00
46.00	4.50	3.82	0.00
47.00	4.50	3.82	0.00
48.00	4.50	3.82	0.00
49.00	4.50	3.82	0.00
50.00	4.50	3.82	0.00
51.00	4.50	3.82	0.00
52.00	4.50	3.82	0.00
53.00	4.50	3.82	0.00
54.00	4.50	3.82	0.00
55.00	4.50	3.82	0.00
56.00	4.50	3.82	0.00
57.00	4.50	3.82	0.00
58.00	4.50	3.82	0.00
59.00	4.50	3.82	0.00
60.00	4.50	3.82	0.00
61.00	4.50	3.82	0.00
62.00	4.50	3.82	0.00
63.00	4.50	3.82	0.00
64.00	4.50	3.82	0.00
65.00	4.50	3.82	0.00
66.00	4.50	3.82	0.00
67.00	4.50	3.82	0.00
68.00	4.50	3.82	0.00
69.00	4.50	3.82	0.00
70.00	4.50	3.82	0.00
71.00	4.50	3.82	0.00
72.00	4.50	3.82	0.00

Summary for Subcatchment PR-2: (new Subcat)

Runoff = 5.64 cfs @ 12.08 hrs, Volume= 18,277 cf, Depth= 3.60"

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 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	20,356	79	>75% Grass cover, HSG B
	39,661	98	Paved parking, HSG B
*	870	98	parking
	60,887	92	Weighted Average
	20,356		33.43% Pervious Area
	40,531		66.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-2: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.00	0.00
5.00	0.26	0.01	0.01
6.00	0.32	0.02	0.03
7.00	0.41	0.05	0.05
8.00	0.51	0.10	0.08
9.00	0.66	0.17	0.13
10.00	0.85	0.30	0.21
11.00	1.13	0.50	0.34
12.00	2.25	1.46	**3.48**
13.00	3.37	2.52	**0.49**
14.00	3.65	2.78	0.31
15.00	3.84	2.97	0.24
16.00	3.99	3.10	0.17
17.00	4.09	3.21	0.13
18.00	4.18	3.29	0.10
19.00	4.24	3.35	0.09
20.00	4.31	3.41	0.08
21.00	4.36	3.47	0.07
22.00	4.41	3.52	0.07
23.00	4.46	3.56	0.06
24.00	**4.50**	**3.60**	0.05
25.00	4.50	3.60	0.00
26.00	4.50	3.60	0.00
27.00	4.50	3.60	0.00
28.00	4.50	3.60	0.00
29.00	4.50	3.60	0.00
30.00	4.50	3.60	0.00
31.00	4.50	3.60	0.00
32.00	4.50	3.60	0.00
33.00	4.50	3.60	0.00
34.00	4.50	3.60	0.00
35.00	4.50	3.60	0.00
36.00	4.50	3.60	0.00
37.00	4.50	3.60	0.00
38.00	4.50	3.60	0.00
39.00	4.50	3.60	0.00
40.00	4.50	3.60	0.00
41.00	4.50	3.60	0.00
42.00	4.50	3.60	0.00
43.00	4.50	3.60	0.00
44.00	4.50	3.60	0.00
45.00	4.50	3.60	0.00
46.00	4.50	3.60	0.00
47.00	4.50	3.60	0.00
48.00	4.50	3.60	0.00
49.00	4.50	3.60	0.00
50.00	4.50	3.60	0.00
51.00	4.50	3.60	0.00
52.00	4.50	3.60	0.00
53.00	4.50	3.60	0.00
54.00	4.50	3.60	0.00
55.00	4.50	3.60	0.00
56.00	4.50	3.60	0.00
57.00	4.50	3.60	0.00
58.00	4.50	3.60	0.00
59.00	4.50	3.60	0.00
60.00	4.50	3.60	0.00
61.00	4.50	3.60	0.00
62.00	4.50	3.60	0.00
63.00	4.50	3.60	0.00
64.00	4.50	3.60	0.00
65.00	4.50	3.60	0.00
66.00	4.50	3.60	0.00
67.00	4.50	3.60	0.00
68.00	4.50	3.60	0.00
69.00	4.50	3.60	0.00
70.00	4.50	3.60	0.00
71.00	4.50	3.60	0.00
72.00	4.50	3.60	0.00

Summary for Subcatchment PR-3: (new Subcat)

Runoff = 2.16 cfs @ 12.13 hrs, Volume= 7,413 cf, Depth= 2.38"

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 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	37,434	79	>75% Grass cover, HSG B
	37,434		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 sf** Grass: Short n= 0.150 P2= 3.20"
0.2	20	0.0100	2.03		**Shallow Concentrated Flow, 20' scf paved** Paved Kv= 20.3 fps
1.4	81	0.0200	0.99		**Shallow Concentrated Flow, 81' scf grass** Short Grass Pasture Kv= 7.0 fps
9.0	151	Total			

Hydrograph for Subcatchment PR-3: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.00	0.00
5.00	0.26	0.00	0.00
6.00	0.32	0.00	0.00
7.00	0.41	0.00	0.00
8.00	0.51	0.00	0.00
9.00	0.66	0.01	0.01
10.00	0.85	0.03	0.03
11.00	1.13	0.11	0.09
12.00	2.25	0.67	**1.04**
13.00	3.37	1.47	**0.25**
14.00	3.65	1.68	0.16
15.00	3.84	1.84	0.12
16.00	3.99	1.95	0.09
17.00	4.09	2.04	0.07
18.00	4.18	2.11	0.05
19.00	4.24	2.16	0.05
20.00	4.31	2.22	0.04
21.00	4.36	2.26	0.04
22.00	4.41	2.30	0.04
23.00	4.46	2.34	0.03
24.00	**4.50**	**2.38**	0.03
25.00	4.50	2.38	0.00
26.00	4.50	2.38	0.00
27.00	4.50	2.38	0.00
28.00	4.50	2.38	0.00
29.00	4.50	2.38	0.00
30.00	4.50	2.38	0.00
31.00	4.50	2.38	0.00
32.00	4.50	2.38	0.00
33.00	4.50	2.38	0.00
34.00	4.50	2.38	0.00
35.00	4.50	2.38	0.00
36.00	4.50	2.38	0.00
37.00	4.50	2.38	0.00
38.00	4.50	2.38	0.00
39.00	4.50	2.38	0.00
40.00	4.50	2.38	0.00
41.00	4.50	2.38	0.00
42.00	4.50	2.38	0.00
43.00	4.50	2.38	0.00
44.00	4.50	2.38	0.00
45.00	4.50	2.38	0.00
46.00	4.50	2.38	0.00
47.00	4.50	2.38	0.00
48.00	4.50	2.38	0.00
49.00	4.50	2.38	0.00
50.00	4.50	2.38	0.00
51.00	4.50	2.38	0.00
52.00	4.50	2.38	0.00
53.00	4.50	2.38	0.00
54.00	4.50	2.38	0.00
55.00	4.50	2.38	0.00
56.00	4.50	2.38	0.00
57.00	4.50	2.38	0.00
58.00	4.50	2.38	0.00
59.00	4.50	2.38	0.00
60.00	4.50	2.38	0.00
61.00	4.50	2.38	0.00
62.00	4.50	2.38	0.00
63.00	4.50	2.38	0.00
64.00	4.50	2.38	0.00
65.00	4.50	2.38	0.00
66.00	4.50	2.38	0.00
67.00	4.50	2.38	0.00
68.00	4.50	2.38	0.00
69.00	4.50	2.38	0.00
70.00	4.50	2.38	0.00
71.00	4.50	2.38	0.00
72.00	4.50	2.38	0.00

Summary for Subcatchment PR-4: (new Subcat)

Runoff = 2.00 cfs @ 12.09 hrs, Volume= 6,390 cf, Depth= 1.67"

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 Rainfall=4.50"

	Area (sf)	CN	Description
*	17,215	79	>75% Grass cover, HSG B
*	28,600	65	Woods, Poor, HSG B
	45,815	70	Weighted Average
	45,815		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-4: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.00	0.00
5.00	0.26	0.00	0.00
6.00	0.32	0.00	0.00
7.00	0.41	0.00	0.00
8.00	0.51	0.00	0.00
9.00	0.66	0.00	0.00
10.00	0.85	0.00	0.00
11.00	1.13	0.02	0.03
12.00	2.25	0.34	**1.06**
13.00	3.37	0.93	**0.23**
14.00	3.65	1.10	0.15
15.00	3.84	1.23	0.12
16.00	3.99	1.32	0.09
17.00	4.09	1.39	0.07
18.00	4.18	1.45	0.05
19.00	4.24	1.50	0.05
20.00	4.31	1.54	0.04
21.00	4.36	1.58	0.04
22.00	4.41	1.61	0.04
23.00	4.46	1.64	0.03
24.00	**4.50**	**1.67**	0.03
25.00	4.50	1.67	0.00
26.00	4.50	1.67	0.00
27.00	4.50	1.67	0.00
28.00	4.50	1.67	0.00
29.00	4.50	1.67	0.00
30.00	4.50	1.67	0.00
31.00	4.50	1.67	0.00
32.00	4.50	1.67	0.00
33.00	4.50	1.67	0.00
34.00	4.50	1.67	0.00
35.00	4.50	1.67	0.00
36.00	4.50	1.67	0.00
37.00	4.50	1.67	0.00
38.00	4.50	1.67	0.00
39.00	4.50	1.67	0.00
40.00	4.50	1.67	0.00
41.00	4.50	1.67	0.00
42.00	4.50	1.67	0.00
43.00	4.50	1.67	0.00
44.00	4.50	1.67	0.00
45.00	4.50	1.67	0.00
46.00	4.50	1.67	0.00
47.00	4.50	1.67	0.00
48.00	4.50	1.67	0.00
49.00	4.50	1.67	0.00
50.00	4.50	1.67	0.00
51.00	4.50	1.67	0.00
52.00	4.50	1.67	0.00
53.00	4.50	1.67	0.00
54.00	4.50	1.67	0.00
55.00	4.50	1.67	0.00
56.00	4.50	1.67	0.00
57.00	4.50	1.67	0.00
58.00	4.50	1.67	0.00
59.00	4.50	1.67	0.00
60.00	4.50	1.67	0.00
61.00	4.50	1.67	0.00
62.00	4.50	1.67	0.00
63.00	4.50	1.67	0.00
64.00	4.50	1.67	0.00
65.00	4.50	1.67	0.00
66.00	4.50	1.67	0.00
67.00	4.50	1.67	0.00
68.00	4.50	1.67	0.00
69.00	4.50	1.67	0.00
70.00	4.50	1.67	0.00
71.00	4.50	1.67	0.00
72.00	4.50	1.67	0.00

Summary for Subcatchment PR-5: (new Subcat)

Runoff = 0.96 cfs @ 12.09 hrs, Volume= 2,973 cf, 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 Rainfall=4.50"

	Area (sf)	CN	Description
*	6,834	79	>75% Grass cover, Good, HSG B
	4,438	98	Paved parking, HSG B
*	1,818	65	Woods, Poor, HSG B
	13,090	83	Weighted Average
	8,652		66.10% Pervious Area
	4,438		33.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-5: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.00	0.00
5.00	0.26	0.00	0.00
6.00	0.32	0.00	0.00
7.00	0.41	0.00	0.00
8.00	0.51	0.00	0.00
9.00	0.66	0.03	0.01
10.00	0.85	0.08	0.02
11.00	1.13	0.19	0.04
12.00	2.25	0.87	**0.56**
13.00	3.37	1.75	**0.09**
14.00	3.65	1.98	0.06
15.00	3.84	2.15	0.05
16.00	3.99	2.27	0.03
17.00	4.09	2.37	0.03
18.00	4.18	2.44	0.02
19.00	4.24	2.50	0.02
20.00	4.31	2.55	0.02
21.00	4.36	2.60	0.01
22.00	4.41	2.65	0.01
23.00	4.46	2.69	0.01
24.00	**4.50**	**2.73**	0.01
25.00	4.50	2.73	0.00
26.00	4.50	2.73	0.00
27.00	4.50	2.73	0.00
28.00	4.50	2.73	0.00
29.00	4.50	2.73	0.00
30.00	4.50	2.73	0.00
31.00	4.50	2.73	0.00
32.00	4.50	2.73	0.00
33.00	4.50	2.73	0.00
34.00	4.50	2.73	0.00
35.00	4.50	2.73	0.00
36.00	4.50	2.73	0.00
37.00	4.50	2.73	0.00
38.00	4.50	2.73	0.00
39.00	4.50	2.73	0.00
40.00	4.50	2.73	0.00
41.00	4.50	2.73	0.00
42.00	4.50	2.73	0.00
43.00	4.50	2.73	0.00
44.00	4.50	2.73	0.00
45.00	4.50	2.73	0.00
46.00	4.50	2.73	0.00
47.00	4.50	2.73	0.00
48.00	4.50	2.73	0.00
49.00	4.50	2.73	0.00
50.00	4.50	2.73	0.00
51.00	4.50	2.73	0.00
52.00	4.50	2.73	0.00
53.00	4.50	2.73	0.00
54.00	4.50	2.73	0.00
55.00	4.50	2.73	0.00
56.00	4.50	2.73	0.00
57.00	4.50	2.73	0.00
58.00	4.50	2.73	0.00
59.00	4.50	2.73	0.00
60.00	4.50	2.73	0.00
61.00	4.50	2.73	0.00
62.00	4.50	2.73	0.00
63.00	4.50	2.73	0.00
64.00	4.50	2.73	0.00
65.00	4.50	2.73	0.00
66.00	4.50	2.73	0.00
67.00	4.50	2.73	0.00
68.00	4.50	2.73	0.00
69.00	4.50	2.73	0.00
70.00	4.50	2.73	0.00
71.00	4.50	2.73	0.00
72.00	4.50	2.73	0.00

Summary for Subcatchment PR-6: PR-6

Runoff = 0.47 cfs @ 12.09 hrs, Volume= 1,484 cf, Depth= 1.75"

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 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	4,183	79	>75% Grass cover, HSG B
*	5,835	65	Woods, Poor, HSG B
*	178	98	Wall
	10,196	71	Weighted Average
	10,018		98.25% Pervious Area
	178		1.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-6: PR-6

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.00	0.00
5.00	0.26	0.00	0.00
6.00	0.32	0.00	0.00
7.00	0.41	0.00	0.00
8.00	0.51	0.00	0.00
9.00	0.66	0.00	0.00
10.00	0.85	0.00	0.00
11.00	1.13	0.02	0.01
12.00	2.25	0.37	**0.25**
13.00	3.37	0.99	**0.05**
14.00	3.65	1.16	0.04
15.00	3.84	1.29	0.03
16.00	3.99	1.39	0.02
17.00	4.09	1.46	0.02
18.00	4.18	1.52	0.01
19.00	4.24	1.56	0.01
20.00	4.31	1.61	0.01
21.00	4.36	1.65	0.01
22.00	4.41	1.68	0.01
23.00	4.46	1.72	0.01
24.00	**4.50**	**1.75**	0.01
25.00	4.50	1.75	0.00
26.00	4.50	1.75	0.00
27.00	4.50	1.75	0.00
28.00	4.50	1.75	0.00
29.00	4.50	1.75	0.00
30.00	4.50	1.75	0.00
31.00	4.50	1.75	0.00
32.00	4.50	1.75	0.00
33.00	4.50	1.75	0.00
34.00	4.50	1.75	0.00
35.00	4.50	1.75	0.00
36.00	4.50	1.75	0.00
37.00	4.50	1.75	0.00
38.00	4.50	1.75	0.00
39.00	4.50	1.75	0.00
40.00	4.50	1.75	0.00
41.00	4.50	1.75	0.00
42.00	4.50	1.75	0.00
43.00	4.50	1.75	0.00
44.00	4.50	1.75	0.00
45.00	4.50	1.75	0.00
46.00	4.50	1.75	0.00
47.00	4.50	1.75	0.00
48.00	4.50	1.75	0.00
49.00	4.50	1.75	0.00
50.00	4.50	1.75	0.00
51.00	4.50	1.75	0.00
52.00	4.50	1.75	0.00
53.00	4.50	1.75	0.00
54.00	4.50	1.75	0.00
55.00	4.50	1.75	0.00
56.00	4.50	1.75	0.00
57.00	4.50	1.75	0.00
58.00	4.50	1.75	0.00
59.00	4.50	1.75	0.00
60.00	4.50	1.75	0.00
61.00	4.50	1.75	0.00
62.00	4.50	1.75	0.00
63.00	4.50	1.75	0.00
64.00	4.50	1.75	0.00
65.00	4.50	1.75	0.00
66.00	4.50	1.75	0.00
67.00	4.50	1.75	0.00
68.00	4.50	1.75	0.00
69.00	4.50	1.75	0.00
70.00	4.50	1.75	0.00
71.00	4.50	1.75	0.00
72.00	4.50	1.75	0.00

Summary for Subcatchment PR-7: PR-7

Runoff = 0.38 cfs @ 12.09 hrs, Volume= 1,198 cf, Depth= 1.97"

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 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	4,865	79	>75% Grass cover, HSG B
*	2,426	65	Woods, Poor, HSG B
	7,291	74	Weighted Average
	7,291		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-7: PR-7

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.00	0.00
5.00	0.26	0.00	0.00
6.00	0.32	0.00	0.00
7.00	0.41	0.00	0.00
8.00	0.51	0.00	0.00
9.00	0.66	0.00	0.00
10.00	0.85	0.01	0.00
11.00	1.13	0.05	0.01
12.00	2.25	0.47	**0.21**
13.00	3.37	1.15	**0.04**
14.00	3.65	1.34	0.03
15.00	3.84	1.48	0.02
16.00	3.99	1.59	0.02
17.00	4.09	1.66	0.01
18.00	4.18	1.73	0.01
19.00	4.24	1.78	0.01
20.00	4.31	1.82	0.01
21.00	4.36	1.87	0.01
22.00	4.41	1.91	0.01
23.00	4.46	1.94	0.01
24.00	**4.50**	**1.97**	0.01
25.00	4.50	1.97	0.00
26.00	4.50	1.97	0.00
27.00	4.50	1.97	0.00
28.00	4.50	1.97	0.00
29.00	4.50	1.97	0.00
30.00	4.50	1.97	0.00
31.00	4.50	1.97	0.00
32.00	4.50	1.97	0.00
33.00	4.50	1.97	0.00
34.00	4.50	1.97	0.00
35.00	4.50	1.97	0.00
36.00	4.50	1.97	0.00
37.00	4.50	1.97	0.00
38.00	4.50	1.97	0.00
39.00	4.50	1.97	0.00
40.00	4.50	1.97	0.00
41.00	4.50	1.97	0.00
42.00	4.50	1.97	0.00
43.00	4.50	1.97	0.00
44.00	4.50	1.97	0.00
45.00	4.50	1.97	0.00
46.00	4.50	1.97	0.00
47.00	4.50	1.97	0.00
48.00	4.50	1.97	0.00
49.00	4.50	1.97	0.00
50.00	4.50	1.97	0.00
51.00	4.50	1.97	0.00
52.00	4.50	1.97	0.00
53.00	4.50	1.97	0.00
54.00	4.50	1.97	0.00
55.00	4.50	1.97	0.00
56.00	4.50	1.97	0.00
57.00	4.50	1.97	0.00
58.00	4.50	1.97	0.00
59.00	4.50	1.97	0.00
60.00	4.50	1.97	0.00
61.00	4.50	1.97	0.00
62.00	4.50	1.97	0.00
63.00	4.50	1.97	0.00
64.00	4.50	1.97	0.00
65.00	4.50	1.97	0.00
66.00	4.50	1.97	0.00
67.00	4.50	1.97	0.00
68.00	4.50	1.97	0.00
69.00	4.50	1.97	0.00
70.00	4.50	1.97	0.00
71.00	4.50	1.97	0.00
72.00	4.50	1.97	0.00

Summary for Subcatchment PR-8: PR-8

Runoff = 15.19 cfs @ 12.12 hrs, Volume= 51,765 cf, Depth= 2.82"

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 Rainfall=4.50"

	Area (sf)	CN	Description
	58,745	98	Paved parking, HSG A
*	161,798	79	>75% Grass cover, HSG B
	220,543	84	Weighted Average
	161,798		73.36% Pervious Area
	58,745		26.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 grass sf 1%** Grass: Short n= 0.150 P2= 3.20"
1.3	67	0.0150	0.86		**Shallow Concentrated Flow, 67 scf grass 1.5%** Short Grass Pasture Kv= 7.0 fps
8.7	117	Total			

Hydrograph for Subcatchment PR-8: PR-8

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.00	0.00
5.00	0.26	0.00	0.00
6.00	0.32	0.00	0.00
7.00	0.41	0.00	0.01
8.00	0.51	0.01	0.07
9.00	0.66	0.03	0.18
10.00	0.85	0.09	0.37
11.00	1.13	0.21	0.75
12.00	2.25	0.93	**7.75**
13.00	3.37	1.83	**1.66**
14.00	3.65	2.07	1.03
15.00	3.84	2.23	0.78
16.00	3.99	2.36	0.56
17.00	4.09	2.45	0.44
18.00	4.18	2.53	0.34
19.00	4.24	2.59	0.30
20.00	4.31	2.64	0.27
21.00	4.36	2.69	0.25
22.00	4.41	2.74	0.22
23.00	4.46	2.78	0.20
24.00	**4.50**	**2.82**	0.18
25.00	4.50	2.82	0.00
26.00	4.50	2.82	0.00
27.00	4.50	2.82	0.00
28.00	4.50	2.82	0.00
29.00	4.50	2.82	0.00
30.00	4.50	2.82	0.00
31.00	4.50	2.82	0.00
32.00	4.50	2.82	0.00
33.00	4.50	2.82	0.00
34.00	4.50	2.82	0.00
35.00	4.50	2.82	0.00
36.00	4.50	2.82	0.00
37.00	4.50	2.82	0.00
38.00	4.50	2.82	0.00
39.00	4.50	2.82	0.00
40.00	4.50	2.82	0.00
41.00	4.50	2.82	0.00
42.00	4.50	2.82	0.00
43.00	4.50	2.82	0.00
44.00	4.50	2.82	0.00
45.00	4.50	2.82	0.00
46.00	4.50	2.82	0.00
47.00	4.50	2.82	0.00
48.00	4.50	2.82	0.00
49.00	4.50	2.82	0.00
50.00	4.50	2.82	0.00
51.00	4.50	2.82	0.00
52.00	4.50	2.82	0.00
53.00	4.50	2.82	0.00
54.00	4.50	2.82	0.00
55.00	4.50	2.82	0.00
56.00	4.50	2.82	0.00
57.00	4.50	2.82	0.00
58.00	4.50	2.82	0.00
59.00	4.50	2.82	0.00
60.00	4.50	2.82	0.00
61.00	4.50	2.82	0.00
62.00	4.50	2.82	0.00
63.00	4.50	2.82	0.00
64.00	4.50	2.82	0.00
65.00	4.50	2.82	0.00
66.00	4.50	2.82	0.00
67.00	4.50	2.82	0.00
68.00	4.50	2.82	0.00
69.00	4.50	2.82	0.00
70.00	4.50	2.82	0.00
71.00	4.50	2.82	0.00
72.00	4.50	2.82	0.00

Summary for Subcatchment PR-9: PR-9

Runoff = 2.49 cfs @ 12.09 hrs, Volume= 7,750 cf, Depth= 2.91"

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 Rainfall=4.50"

	Area (sf)	CN	Description
*	22,546	79	>75% Grass cover, HSG B
	8,270	98	Paved parking, HSG B
*	1,153	98	Paved Parking, HSG B
	31,969	85	Weighted Average
	22,546		70.52% Pervious Area
	9,423		29.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-9: PR-9

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.00	0.00
3.00	0.14	0.00	0.00
4.00	0.19	0.00	0.00
5.00	0.26	0.00	0.00
6.00	0.32	0.00	0.00
7.00	0.41	0.00	0.00
8.00	0.51	0.01	0.01
9.00	0.66	0.04	0.03
10.00	0.85	0.11	0.06
11.00	1.13	0.23	0.12
12.00	2.25	0.98	**1.48**
13.00	3.37	1.91	**0.23**
14.00	3.65	2.15	0.15
15.00	3.84	2.32	0.11
16.00	3.99	2.45	0.08
17.00	4.09	2.54	0.06
18.00	4.18	2.62	0.05
19.00	4.24	2.68	0.04
20.00	4.31	2.73	0.04
21.00	4.36	2.78	0.04
22.00	4.41	2.83	0.03
23.00	4.46	2.87	0.03
24.00	**4.50**	**2.91**	0.03
25.00	4.50	2.91	0.00
26.00	4.50	2.91	0.00
27.00	4.50	2.91	0.00
28.00	4.50	2.91	0.00
29.00	4.50	2.91	0.00
30.00	4.50	2.91	0.00
31.00	4.50	2.91	0.00
32.00	4.50	2.91	0.00
33.00	4.50	2.91	0.00
34.00	4.50	2.91	0.00
35.00	4.50	2.91	0.00
36.00	4.50	2.91	0.00
37.00	4.50	2.91	0.00
38.00	4.50	2.91	0.00
39.00	4.50	2.91	0.00
40.00	4.50	2.91	0.00
41.00	4.50	2.91	0.00
42.00	4.50	2.91	0.00
43.00	4.50	2.91	0.00
44.00	4.50	2.91	0.00
45.00	4.50	2.91	0.00
46.00	4.50	2.91	0.00
47.00	4.50	2.91	0.00
48.00	4.50	2.91	0.00
49.00	4.50	2.91	0.00
50.00	4.50	2.91	0.00
51.00	4.50	2.91	0.00
52.00	4.50	2.91	0.00
53.00	4.50	2.91	0.00
54.00	4.50	2.91	0.00
55.00	4.50	2.91	0.00
56.00	4.50	2.91	0.00
57.00	4.50	2.91	0.00
58.00	4.50	2.91	0.00
59.00	4.50	2.91	0.00
60.00	4.50	2.91	0.00
61.00	4.50	2.91	0.00
62.00	4.50	2.91	0.00
63.00	4.50	2.91	0.00
64.00	4.50	2.91	0.00
65.00	4.50	2.91	0.00
66.00	4.50	2.91	0.00
67.00	4.50	2.91	0.00
68.00	4.50	2.91	0.00
69.00	4.50	2.91	0.00
70.00	4.50	2.91	0.00
71.00	4.50	2.91	0.00
72.00	4.50	2.91	0.00

Summary for Subcatchment PR-BLDG: PR-BLDG

Runoff = 6.38 cfs @ 12.08 hrs, Volume= 22,465 cf, Depth= 4.26"

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 10 yr Rainfall=4.50"

Area (sf)	CN	Description
63,223	98	Paved parking, HSG B
63,223		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-BLDG: PR-BLDG

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.04	0.00	0.00
2.00	0.09	0.01	0.02
3.00	0.14	0.03	0.04
4.00	0.19	0.07	0.06
5.00	0.26	0.11	0.07
6.00	0.32	0.16	0.09
7.00	0.41	0.24	0.12
8.00	0.51	0.33	0.15
9.00	0.66	0.46	0.22
10.00	0.85	0.65	0.30
11.00	1.13	0.91	0.45
12.00	2.25	2.02	**4.02**
13.00	3.37	3.14	**0.54**
14.00	3.65	3.42	0.34
15.00	3.84	3.61	0.25
16.00	3.99	3.75	0.18
17.00	4.09	3.86	0.14
18.00	4.18	3.94	0.11
19.00	4.24	4.01	0.10
20.00	4.31	4.07	0.09
21.00	4.36	4.13	0.08
22.00	4.41	4.18	0.07
23.00	4.46	4.22	0.06
24.00	**4.50**	**4.26**	0.06
25.00	4.50	4.26	0.00
26.00	4.50	4.26	0.00
27.00	4.50	4.26	0.00
28.00	4.50	4.26	0.00
29.00	4.50	4.26	0.00
30.00	4.50	4.26	0.00
31.00	4.50	4.26	0.00
32.00	4.50	4.26	0.00
33.00	4.50	4.26	0.00
34.00	4.50	4.26	0.00
35.00	4.50	4.26	0.00
36.00	4.50	4.26	0.00
37.00	4.50	4.26	0.00
38.00	4.50	4.26	0.00
39.00	4.50	4.26	0.00
40.00	4.50	4.26	0.00
41.00	4.50	4.26	0.00
42.00	4.50	4.26	0.00
43.00	4.50	4.26	0.00
44.00	4.50	4.26	0.00
45.00	4.50	4.26	0.00
46.00	4.50	4.26	0.00
47.00	4.50	4.26	0.00
48.00	4.50	4.26	0.00
49.00	4.50	4.26	0.00
50.00	4.50	4.26	0.00
51.00	4.50	4.26	0.00
52.00	4.50	4.26	0.00
53.00	4.50	4.26	0.00
54.00	4.50	4.26	0.00
55.00	4.50	4.26	0.00
56.00	4.50	4.26	0.00
57.00	4.50	4.26	0.00
58.00	4.50	4.26	0.00
59.00	4.50	4.26	0.00
60.00	4.50	4.26	0.00
61.00	4.50	4.26	0.00
62.00	4.50	4.26	0.00
63.00	4.50	4.26	0.00
64.00	4.50	4.26	0.00
65.00	4.50	4.26	0.00
66.00	4.50	4.26	0.00
67.00	4.50	4.26	0.00
68.00	4.50	4.26	0.00
69.00	4.50	4.26	0.00
70.00	4.50	4.26	0.00
71.00	4.50	4.26	0.00
72.00	4.50	4.26	0.00

Summary for Reach POA-1: To Main Street

Inflow Area = 315,759 sf, 59.36% Impervious, Inflow Depth = 1.87" for 10 yr event
Inflow = 12.24 cfs @ 12.13 hrs, Volume= 49,259 cf
Outflow = 12.24 cfs @ 12.13 hrs, Volume= 49,259 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-1: To Main Street

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.01		0.01
8.00	0.03		0.03
9.00	0.06		0.06
10.00	0.11		0.11
11.00	0.96		0.96
12.00	**7.57**		**7.57**
13.00	**1.62**		**1.62**
14.00	0.94		0.94
15.00	0.68		0.68
16.00	0.46		0.46
17.00	0.44		0.44
18.00	0.30		0.30
19.00	0.23		0.23
20.00	0.18		0.18
21.00	0.15		0.15
22.00	0.12		0.12
23.00	0.10		0.10
24.00	0.08		0.08
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-2: To Existing DMH North of Site

Inflow Area = 313,399 sf, 34.68% Impervious, Inflow Depth = 2.93" for 10 yr event
Inflow = 14.70 cfs @ 12.12 hrs, Volume= 76,457 cf
Outflow = 14.70 cfs @ 12.12 hrs, Volume= 76,457 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-2: To Existing DMH North of Site

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.01		0.01
8.00	0.06		0.06
9.00	0.28		0.28
10.00	0.56		0.56
11.00	1.10		1.10
12.00	**9.04**		**9.04**
13.00	**3.59**		**3.59**
14.00	1.56		1.56
15.00	1.16		1.16
16.00	0.84		0.84
17.00	0.65		0.65
18.00	0.50		0.50
19.00	0.43		0.43
20.00	0.39		0.39
21.00	0.35		0.35
22.00	0.32		0.32
23.00	0.28		0.28
24.00	0.25		0.25
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-3: NORTH EAST WETLANDS

Inflow Area = 37,434 sf, 0.00% Impervious, Inflow Depth = 2.38" for 10 yr event
Inflow = 2.16 cfs @ 12.13 hrs, Volume= 7,413 cf
Outflow = 2.16 cfs @ 12.13 hrs, Volume= 7,413 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-3: NORTH EAST WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.01		0.01
10.00	0.03		0.03
11.00	0.09		0.09
12.00	**1.04**		**1.04**
13.00	**0.25**		**0.25**
14.00	0.16		0.16
15.00	0.12		0.12
16.00	0.09		0.09
17.00	0.07		0.07
18.00	0.05		0.05
19.00	0.05		0.05
20.00	0.04		0.04
21.00	0.04		0.04
22.00	0.04		0.04
23.00	0.03		0.03
24.00	0.03		0.03
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-4: SOUTH EAST WETLANDS

Inflow Area = 45,815 sf, 0.00% Impervious, Inflow Depth = 1.67" for 10 yr event
Inflow = 2.00 cfs @ 12.09 hrs, Volume= 6,390 cf
Outflow = 2.00 cfs @ 12.09 hrs, Volume= 6,390 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-4: SOUTH EAST WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.00		0.00
10.00	0.00		0.00
11.00	0.03		0.03
12.00	**1.06**		**1.06**
13.00	**0.23**		**0.23**
14.00	0.15		0.15
15.00	0.12		0.12
16.00	0.09		0.09
17.00	0.07		0.07
18.00	0.05		0.05
19.00	0.05		0.05
20.00	0.04		0.04
21.00	0.04		0.04
22.00	0.04		0.04
23.00	0.03		0.03
24.00	0.03		0.03
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-5: CHAMPNEY STREET

Inflow Area = 13,090 sf, 33.90% Impervious, Inflow Depth = 2.73" for 10 yr event
Inflow = 0.96 cfs @ 12.09 hrs, Volume= 2,973 cf
Outflow = 0.96 cfs @ 12.09 hrs, Volume= 2,973 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-5: CHAMPNEY STREET

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00	52.00	0.00		0.00
1.00	0.00		0.00	53.00	0.00		0.00
2.00	0.00		0.00	54.00	0.00		0.00
3.00	0.00		0.00	55.00	0.00		0.00
4.00	0.00		0.00	56.00	0.00		0.00
5.00	0.00		0.00	57.00	0.00		0.00
6.00	0.00		0.00	58.00	0.00		0.00
7.00	0.00		0.00	59.00	0.00		0.00
8.00	0.00		0.00	60.00	0.00		0.00
9.00	0.01		0.01	61.00	0.00		0.00
10.00	0.02		0.02	62.00	0.00		0.00
11.00	0.04		0.04	63.00	0.00		0.00
12.00	**0.56**		**0.56**	64.00	0.00		0.00
13.00	**0.09**		**0.09**	65.00	0.00		0.00
14.00	0.06		0.06	66.00	0.00		0.00
15.00	0.05		0.05	67.00	0.00		0.00
16.00	0.03		0.03	68.00	0.00		0.00
17.00	0.03		0.03	69.00	0.00		0.00
18.00	0.02		0.02	70.00	0.00		0.00
19.00	0.02		0.02	71.00	0.00		0.00
20.00	0.02		0.02	72.00	0.00		0.00
21.00	0.01		0.01				
22.00	0.01		0.01				
23.00	0.01		0.01				
24.00	0.01		0.01				
25.00	0.00		0.00				
26.00	0.00		0.00				
27.00	0.00		0.00				
28.00	0.00		0.00				
29.00	0.00		0.00				
30.00	0.00		0.00				
31.00	0.00		0.00				
32.00	0.00		0.00				
33.00	0.00		0.00				
34.00	0.00		0.00				
35.00	0.00		0.00				
36.00	0.00		0.00				
37.00	0.00		0.00				
38.00	0.00		0.00				
39.00	0.00		0.00				
40.00	0.00		0.00				
41.00	0.00		0.00				
42.00	0.00		0.00				
43.00	0.00		0.00				
44.00	0.00		0.00				
45.00	0.00		0.00				
46.00	0.00		0.00				
47.00	0.00		0.00				
48.00	0.00		0.00				
49.00	0.00		0.00				
50.00	0.00		0.00				
51.00	0.00		0.00				

Summary for Pond #1A: INF#1A

Inflow Area = 135,366 sf, 88.03% Impervious, Inflow Depth = 3.97" for 10 yr event
Inflow = 12.88 cfs @ 12.08 hrs, Volume= 44,831 cf
Outflow = 12.15 cfs @ 12.11 hrs, Volume= 44,831 cf, Atten= 6%, Lag= 1.8 min
Discarded = 0.05 cfs @ 4.40 hrs, Volume= 7,571 cf
Primary = 12.10 cfs @ 12.11 hrs, Volume= 37,260 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 325.16' @ 12.11 hrs Surf.Area= 2,119 sf Storage= 6,056 cf
Flood Elev= 327.75' Surf.Area= 2,119 sf Storage= 8,726 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 131.6 min (898.3 - 766.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.00'	3,720 cf	**30.50'W x 69.49'L x 6.75'H Field A** 14,307 cf Overall - 5,006 cf Embedded = 9,300 cf x 40.0% Voids
#2A	321.75'	5,006 cf	**ADS_StormTech MC-4500 +Cap** x 45 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 45 Chambers in 3 Rows Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,726 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.90'	**24.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 321.90' / 321.86' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#3	Device 2	325.00'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	323.50'	**15.0" W x 12.0" H Vert. Orifice/Grate** X 2 rows with 6.0" cc spacing C= 0.600

Discarded OutFlow Max=0.05 cfs @ 4.40 hrs HW=321.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=12.08 cfs @ 12.11 hrs HW=325.16' TW=323.12' (Dynamic Tailwater)
└**2=Culvert** (Passes 12.08 cfs of 17.04 cfs potential flow)
  ├**3=Broad-Crested Rectangular Weir** (Weir Controls 0.90 cfs @ 1.12 fps)
  └**4=Orifice/Grate** (Orifice Controls 11.19 cfs @ 4.47 fps)

Pond #1A: INF#1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

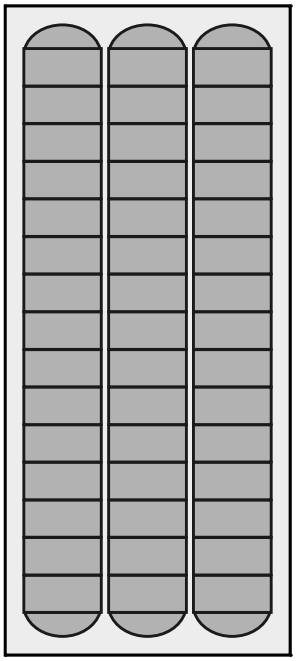
15 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 65.49' Row Length +24.0" End Stone x 2 = 69.49' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 24.0" Side Stone x 2 = 30.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

45 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 5,006.3 cf Chamber Storage

14,306.6 cf Field - 5,006.3 cf Chambers = 9,300.3 cf Stone x 40.0% Voids = 3,720.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,726.4 cf = 0.200 af
Overall Storage Efficiency = 61.0%
Overall System Size = 69.49' x 30.50' x 6.75'

45 Chambers
529.9 cy Field
344.5 cy Stone



Hydrograph for Pond #1A: INF#1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.00	0.00	0.00	0.00
2.00	0.02	0	321.00	0.02	0.02	0.00
4.00	0.07	23	321.03	0.05	**0.05**	0.00
6.00	0.12	357	321.42	0.05	**0.05**	0.00
8.00	0.24	1,295	322.14	0.05	0.05	0.00
10.00	0.52	3,640	323.56	0.11	0.05	0.06
12.00	**8.24**	**5,268**	**324.61**	**6.53**	0.05	**6.48**
14.00	**0.79**	**4,044**	**323.81**	**0.76**	0.05	**0.71**
16.00	0.42	3,861	323.70	0.40	0.05	0.35
18.00	0.26	3,757	323.63	0.24	0.05	0.19
20.00	0.20	3,715	323.61	0.19	0.05	0.14
22.00	0.17	3,687	323.59	0.16	0.05	0.11
24.00	0.13	3,658	323.57	0.12	0.05	0.07
26.00	0.00	3,280	323.34	0.05	0.05	0.00
28.00	0.00	2,919	323.11	0.05	0.05	0.00
30.00	0.00	2,559	322.89	0.05	0.05	0.00
32.00	0.00	2,199	322.68	0.05	0.05	0.00
34.00	0.00	1,838	322.46	0.05	0.05	0.00
36.00	0.00	1,478	322.25	0.05	0.05	0.00
38.00	0.00	1,118	322.03	0.05	0.05	0.00
40.00	0.00	758	321.82	0.05	0.05	0.00
42.00	0.00	397	321.47	0.05	0.05	0.00
44.00	0.00	37	321.04	0.05	0.05	0.00
46.00	0.00	0	321.00	0.00	0.00	0.00
48.00	0.00	0	321.00	0.00	0.00	0.00
50.00	0.00	0	321.00	0.00	0.00	0.00
52.00	0.00	0	321.00	0.00	0.00	0.00
54.00	0.00	0	321.00	0.00	0.00	0.00
56.00	0.00	0	321.00	0.00	0.00	0.00
58.00	0.00	0	321.00	0.00	0.00	0.00
60.00	0.00	0	321.00	0.00	0.00	0.00
62.00	0.00	0	321.00	0.00	0.00	0.00
64.00	0.00	0	321.00	0.00	0.00	0.00
66.00	0.00	0	321.00	0.00	0.00	0.00
68.00	0.00	0	321.00	0.00	0.00	0.00
70.00	0.00	0	321.00	0.00	0.00	0.00
72.00	0.00	0	321.00	0.00	0.00	0.00

Stage-Area-Storage for Pond #1A: INF#1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.00	**2,119**	0
321.10	2,119	85
321.20	2,119	170
321.30	2,119	254
321.40	2,119	339
321.50	2,119	424
321.60	2,119	509
321.70	2,119	593
321.80	2,119	721
321.90	2,119	891
322.00	2,119	1,061
322.10	2,119	1,230
322.20	2,119	1,399
322.30	2,119	1,567
322.40	2,119	1,735
322.50	2,119	1,903
322.60	2,119	2,070
322.70	2,119	2,237
322.80	2,119	2,402
322.90	2,119	2,568
323.00	2,119	2,732
323.10	2,119	2,897
323.20	2,119	3,060
323.30	2,119	3,222
323.40	2,119	3,384
323.50	2,119	3,545
323.60	2,119	3,705
323.70	2,119	3,864
323.80	2,119	4,023
323.90	2,119	4,180
324.00	2,119	4,336
324.10	2,119	4,491
324.20	2,119	4,645
324.30	2,119	4,798
324.40	2,119	4,950
324.50	2,119	5,100
324.60	2,119	5,249
324.70	2,119	5,396
324.80	2,119	5,542
324.90	2,119	5,687
325.00	2,119	5,830
325.10	2,119	5,971
325.20	2,119	6,110
325.30	2,119	6,247
325.40	2,119	6,382
325.50	2,119	6,515
325.60	2,119	6,646
325.70	2,119	6,774
325.80	2,119	6,899
325.90	2,119	7,021
326.00	2,119	7,140
326.10	2,119	7,255
326.20	2,119	7,366
326.30	2,119	7,469
326.40	2,119	7,566
326.50	2,119	7,658
326.60	2,119	7,748
326.70	2,119	7,836
326.80	2,119	7,921
326.90	2,119	8,006
327.00	2,119	8,091
327.10	2,119	8,175
327.20	2,119	8,260
327.30	2,119	8,345
327.40	2,119	8,430
327.50	2,119	8,514
327.60	2,119	8,599
327.70	2,119	**8,684**

Summary for Pond #1B: INF#1B

Inflow Area = 135,366 sf, 88.03% Impervious, Inflow Depth = 3.30" for 10 yr event
Inflow = 12.10 cfs @ 12.11 hrs, Volume= 37,260 cf
Outflow = 9.08 cfs @ 12.20 hrs, Volume= 37,261 cf, Atten= 25%, Lag= 5.4 min
Discarded = 0.05 cfs @ 10.14 hrs, Volume= 2,837 cf
Primary = 9.03 cfs @ 12.20 hrs, Volume= 34,424 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 323.56' @ 12.20 hrs Surf.Area= 1,997 sf Storage= 3,418 cf
Flood Elev= 327.75' Surf.Area= 1,997 sf Storage= 8,203 cf

Plug-Flow detention time= 13.2 min calculated for 37,255 cf (100% of inflow)
Center-of-Mass det. time= 13.2 min (811.4 - 798.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.00'	3,516 cf	**30.50'W x 65.47'L x 6.75'H Field A** 13,478 cf Overall - 4,687 cf Embedded = 8,791 cf x 40.0% Voids
#2A	321.75'	4,687 cf	**ADS_StormTech MC-4500 +Cap** x 42 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 42 Chambers in 3 Rows Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,203 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.00'	**18.0" Round Culvert** L= 8.0' Ke= 0.900 Inlet / Outlet Invert= 321.00' / 320.44' S= 0.0700 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#3	Device 2	321.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 10.14 hrs HW=321.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=9.03 cfs @ 12.20 hrs HW=323.56' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 9.03 cfs @ 5.11 fps)
└**3=Broad-Crested Rectangular Weir** (Passes 9.03 cfs of 48.97 cfs potential flow)

Pond #1B: INF#1B - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

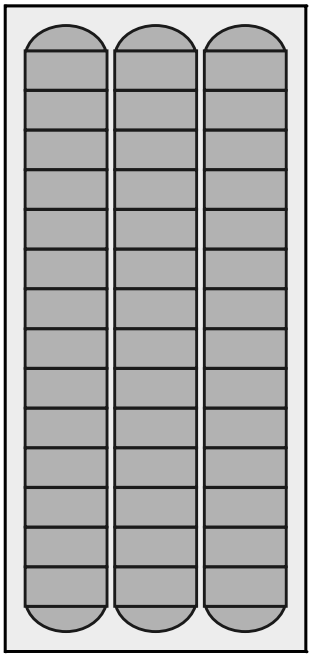
14 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 61.47' Row Length +24.0" End Stone x 2 = 65.47' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 24.0" Side Stone x 2 = 30.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

42 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,686.8 cf Chamber Storage

13,478.0 cf Field - 4,686.8 cf Chambers = 8,791.2 cf Stone x 40.0% Voids = 3,516.5 cf Stone Storage

Chamber Storage + Stone Storage = 8,203.3 cf = 0.188 af
Overall Storage Efficiency = 60.9%
Overall System Size = 65.47' x 30.50' x 6.75'

42 Chambers
499.2 cy Field
325.6 cy Stone



Hydrograph for Pond #1B: INF#1B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.00	0.00	0.00	0.00
2.00	0.00	0	321.00	0.00	0.00	0.00
4.00	0.00	0	321.00	0.00	0.00	0.00
6.00	0.00	0	321.00	0.00	0.00	0.00
8.00	0.00	0	321.00	0.00	0.00	0.00
10.00	0.06	0	321.00	0.05	**0.05**	0.00
12.00	**6.48**	**1,454**	**322.29**	**4.97**	**0.05**	**4.92**
14.00	**0.71**	**505**	**321.63**	**0.72**	0.05	**0.67**
16.00	0.35	463	321.58	0.36	0.05	0.31
18.00	0.19	438	321.55	0.20	0.05	0.15
20.00	0.14	427	321.54	0.14	0.05	0.09
22.00	0.11	420	321.53	0.11	0.05	0.06
24.00	0.07	412	321.52	0.08	0.05	0.03
26.00	0.00	115	321.14	0.05	0.05	0.00
28.00	0.00	0	321.00	0.00	0.00	0.00
30.00	0.00	0	321.00	0.00	0.00	0.00
32.00	0.00	0	321.00	0.00	0.00	0.00
34.00	0.00	0	321.00	0.00	0.00	0.00
36.00	0.00	0	321.00	0.00	0.00	0.00
38.00	0.00	0	321.00	0.00	0.00	0.00
40.00	0.00	0	321.00	0.00	0.00	0.00
42.00	0.00	0	321.00	0.00	0.00	0.00
44.00	0.00	0	321.00	0.00	0.00	0.00
46.00	0.00	0	321.00	0.00	0.00	0.00
48.00	0.00	0	321.00	0.00	0.00	0.00
50.00	0.00	0	321.00	0.00	0.00	0.00
52.00	0.00	0	321.00	0.00	0.00	0.00
54.00	0.00	0	321.00	0.00	0.00	0.00
56.00	0.00	0	321.00	0.00	0.00	0.00
58.00	0.00	0	321.00	0.00	0.00	0.00
60.00	0.00	0	321.00	0.00	0.00	0.00
62.00	0.00	0	321.00	0.00	0.00	0.00
64.00	0.00	0	321.00	0.00	0.00	0.00
66.00	0.00	0	321.00	0.00	0.00	0.00
68.00	0.00	0	321.00	0.00	0.00	0.00
70.00	0.00	0	321.00	0.00	0.00	0.00
72.00	0.00	0	321.00	0.00	0.00	0.00

Stage-Area-Storage for Pond #1B: INF#1B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.00	**1,997**	0
321.10	1,997	80
321.20	1,997	160
321.30	1,997	240
321.40	1,997	319
321.50	1,997	399
321.60	1,997	479
321.70	1,997	559
321.80	1,997	679
321.90	1,997	839
322.00	1,997	998
322.10	1,997	1,157
322.20	1,997	1,316
322.30	1,997	1,474
322.40	1,997	1,632
322.50	1,997	1,789
322.60	1,997	1,946
322.70	1,997	2,102
322.80	1,997	2,258
322.90	1,997	2,413
323.00	1,997	2,568
323.10	1,997	2,722
323.20	1,997	2,876
323.30	1,997	3,028
323.40	1,997	3,180
323.50	1,997	3,331
323.60	1,997	3,482
323.70	1,997	3,631
323.80	1,997	3,780
323.90	1,997	3,928
324.00	1,997	4,074
324.10	1,997	4,220
324.20	1,997	4,365
324.30	1,997	4,508
324.40	1,997	4,651
324.50	1,997	4,792
324.60	1,997	4,932
324.70	1,997	5,070
324.80	1,997	5,208
324.90	1,997	5,343
325.00	1,997	5,478
325.10	1,997	5,610
325.20	1,997	5,741
325.30	1,997	5,870
325.40	1,997	5,997
325.50	1,997	6,122
325.60	1,997	6,245
325.70	1,997	6,365
325.80	1,997	6,483
325.90	1,997	6,598
326.00	1,997	6,710
326.10	1,997	6,818
326.20	1,997	6,922
326.30	1,997	7,019
326.40	1,997	7,110
326.50	1,997	7,197
326.60	1,997	7,282
326.70	1,997	7,364
326.80	1,997	7,445
326.90	1,997	7,524
327.00	1,997	7,604
327.10	1,997	7,684
327.20	1,997	7,764
327.30	1,997	7,844
327.40	1,997	7,924
327.50	1,997	8,004
327.60	1,997	8,083
327.70	1,997	**8,163**

Summary for Pond Forebay #1: Sediment Forebay #1

Inflow Area = 15,164 sf, 79.13% Impervious, Inflow Depth = 3.82" for 10 yr event
Inflow = 1.46 cfs @ 12.08 hrs, Volume= 4,821 cf
Outflow = 1.45 cfs @ 12.09 hrs, Volume= 4,247 cf, Atten= 1%, Lag= 0.6 min
Primary = 1.45 cfs @ 12.09 hrs, Volume= 4,247 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 332.65' @ 12.09 hrs Surf.Area= 524 sf Storage= 652 cf

Plug-Flow detention time= 92.6 min calculated for 4,246 cf (88% of inflow)
Center-of-Mass det. time= 37.6 min (814.1 - 776.5)

Volume	Invert	Avail.Storage	Storage Description
#1	330.00'	848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
330.00	0	0	0
331.00	179	90	90
332.00	365	272	362
333.00	607	486	848

Device	Routing	Invert	Outlet Devices
#1	Primary	332.50'	**10.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=1.44 cfs @ 12.09 hrs HW=332.65' TW=331.11' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.44 cfs @ 0.93 fps)

Hydrograph for Pond Forebay #1: Sediment Forebay #1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	330.00	0.00
2.00	0.00	0	330.00	0.00
4.00	0.00	7	330.27	0.00
6.00	0.01	55	330.78	0.00
8.00	0.02	175	331.40	0.00
10.00	0.06	465	332.26	0.00
12.00	**0.91**	**627**	**332.61**	**0.82**
14.00	**0.08**	**585**	**332.52**	**0.08**
16.00	0.04	581	332.51	0.04
18.00	0.03	579	332.51	0.03
20.00	0.02	579	332.51	0.02
22.00	0.02	578	332.51	0.02
24.00	0.01	578	332.51	0.01
26.00	0.00	574	332.50	0.00
28.00	0.00	574	332.50	0.00
30.00	0.00	574	332.50	0.00
32.00	0.00	574	332.50	0.00
34.00	0.00	574	332.50	0.00
36.00	0.00	574	332.50	0.00
38.00	0.00	574	332.50	0.00
40.00	0.00	574	332.50	0.00
42.00	0.00	574	332.50	0.00
44.00	0.00	574	332.50	0.00
46.00	0.00	574	332.50	0.00
48.00	0.00	574	332.50	0.00
50.00	0.00	574	332.50	0.00
52.00	0.00	574	332.50	0.00
54.00	0.00	574	332.50	0.00
56.00	0.00	574	332.50	0.00
58.00	0.00	574	332.50	0.00
60.00	0.00	574	332.50	0.00
62.00	0.00	574	332.50	0.00
64.00	0.00	574	332.50	0.00
66.00	0.00	574	332.50	0.00
68.00	0.00	574	332.50	0.00
70.00	0.00	574	332.50	0.00
72.00	0.00	574	332.50	0.00

Stage-Area-Storage for Pond Forebay #1: Sediment Forebay #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
330.00	0	0
330.05	9	0
330.10	18	1
330.15	27	2
330.20	36	4
330.25	45	6
330.30	54	8
330.35	63	11
330.40	72	14
330.45	81	18
330.50	90	22
330.55	98	27
330.60	107	32
330.65	116	38
330.70	125	44
330.75	134	50
330.80	143	57
330.85	152	65
330.90	161	72
330.95	170	81
331.00	179	90
331.05	188	99
331.10	198	108
331.15	207	118
331.20	216	129
331.25	226	140
331.30	235	152
331.35	244	164
331.40	253	176
331.45	263	189
331.50	272	202
331.55	281	216
331.60	291	230
331.65	300	245
331.70	309	260
331.75	319	276
331.80	328	292
331.85	337	309
331.90	346	326
331.95	356	343
332.00	365	362
332.05	377	380
332.10	389	399
332.15	401	419
332.20	413	439
332.25	426	460
332.30	438	482
332.35	450	504
332.40	462	527
332.45	474	550
332.50	486	574
332.55	498	599
332.60	510	624
332.65	522	650
332.70	534	676
332.75	547	703
332.80	559	731
332.85	571	759
332.90	583	788
332.95	595	817
333.00	**607**	**848**

Summary for Pond Inf-2: Inf-2

Inflow Area = 120,105 sf, 40.62% Impervious, Inflow Depth = 3.10" for 10 yr event
Inflow = 9.26 cfs @ 12.11 hrs, Volume= 31,016 cf
Outflow = 0.25 cfs @ 17.05 hrs, Volume= 31,018 cf, Atten= 97%, Lag= 296.3 min
Discarded = 0.14 cfs @ 9.81 hrs, Volume= 30,266 cf
Primary = 0.10 cfs @ 17.05 hrs, Volume= 752 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 321.87' @ 17.05 hrs Surf.Area= 5,967 sf Storage= 22,324 cf
Flood Elev= 323.33' Surf.Area= 5,967 sf Storage= 25,910 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1,421.1 min (2,228.1 - 806.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	316.58'	9,579 cf	**46.67'W x 127.87'L x 6.75'H Field A** 40,278 cf Overall - 16,331 cf Embedded = 23,947 cf x 40.0% Voids
#2A	317.33'	16,331 cf	**ADS_StormTech MC-4500 +Cap** x 150 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 150 Chambers in 5 Rows Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf
		25,910 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	316.58'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	317.33'	**12.0" Round Culvert** L= 18.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 317.33' / 316.33' S= 0.0556 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#3	Device 2	321.83'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.14 cfs @ 9.81 hrs HW=316.65' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.10 cfs @ 17.05 hrs HW=321.87' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 0.10 cfs of 6.00 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.55 fps)

Pond Inf-2: Inf-2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

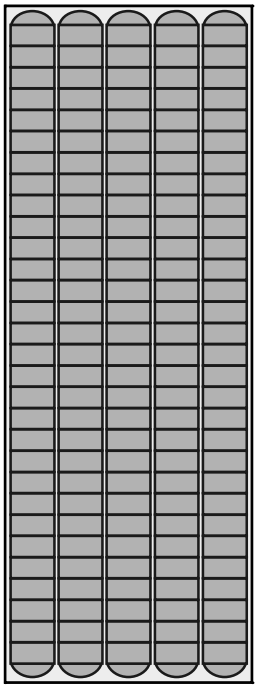
30 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 125.87' Row Length +12.0" End Stone x 2 = 127.87' Base Length
5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

150 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 5 Rows = 16,330.6 cf Chamber Storage

40,278.0 cf Field - 16,330.6 cf Chambers = 23,947.4 cf Stone x 40.0% Voids = 9,579.0 cf Stone Storage

Chamber Storage + Stone Storage = 25,909.5 cf = 0.595 af
Overall Storage Efficiency = 64.3%
Overall System Size = 127.87' x 46.67' x 6.75'

150 Chambers
1,491.8 cy Field
886.9 cy Stone



Hydrograph for Pond Inf-2: Inf-2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	316.58	0.00	0.00	0.00
2.00	0.00	0	316.58	0.00	0.00	0.00
4.00	0.00	0	316.58	0.00	0.00	0.00
6.00	0.00	0	316.58	0.00	0.00	0.00
8.00	0.07	0	316.58	0.07	**0.07**	0.00
10.00	0.27	242	316.68	0.14	**0.14**	0.00
12.00	**5.00**	5,701	318.09	0.14	0.14	0.00
14.00	**0.59**	19,786	321.14	0.14	0.14	0.00
16.00	0.31	**21,966**	**321.75**	**0.14**	0.14	**0.00**
18.00	0.19	**22,292**	**321.86**	**0.20**	0.14	**0.06**
20.00	0.15	22,246	321.84	0.16	0.14	0.02
22.00	0.13	22,190	321.82	0.14	0.14	0.00
24.00	0.10	21,993	321.76	0.14	0.14	0.00
26.00	0.00	21,023	321.47	0.14	0.14	0.00
28.00	0.00	20,009	321.20	0.14	0.14	0.00
30.00	0.00	18,994	320.94	0.14	0.14	0.00
32.00	0.00	17,980	320.69	0.14	0.14	0.00
34.00	0.00	16,965	320.45	0.14	0.14	0.00
36.00	0.00	15,951	320.22	0.14	0.14	0.00
38.00	0.00	14,937	320.00	0.14	0.14	0.00
40.00	0.00	13,922	319.78	0.14	0.14	0.00
42.00	0.00	12,908	319.56	0.14	0.14	0.00
44.00	0.00	11,893	319.34	0.14	0.14	0.00
46.00	0.00	10,879	319.13	0.14	0.14	0.00
48.00	0.00	9,865	318.93	0.14	0.14	0.00
50.00	0.00	8,850	318.72	0.14	0.14	0.00
52.00	0.00	7,836	318.52	0.14	0.14	0.00
54.00	0.00	6,821	318.31	0.14	0.14	0.00
56.00	0.00	5,807	318.11	0.14	0.14	0.00
58.00	0.00	4,792	317.91	0.14	0.14	0.00
60.00	0.00	3,778	317.72	0.14	0.14	0.00
62.00	0.00	2,764	317.52	0.14	0.14	0.00
64.00	0.00	1,749	317.31	0.14	0.14	0.00
66.00	0.00	735	316.89	0.14	0.14	0.00
68.00	0.00	0	316.58	0.00	0.00	0.00
70.00	0.00	0	316.58	0.00	0.00	0.00
72.00	0.00	0	316.58	0.00	0.00	0.00

Stage-Area-Storage for Pond Inf-2: Inf-2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
316.58	**5,967**	0
316.68	5,967	239
316.78	5,967	477
316.88	5,967	716
316.98	5,967	955
317.08	5,967	1,193
317.18	5,967	1,432
317.28	5,967	1,671
317.38	5,967	2,049
317.48	5,967	2,566
317.58	5,967	3,081
317.68	5,967	3,596
317.78	5,967	4,109
317.88	5,967	4,621
317.98	5,967	5,131
318.08	5,967	5,639
318.18	5,967	6,146
318.28	5,967	6,652
318.38	5,967	7,155
318.48	5,967	7,657
318.58	5,967	8,156
318.68	5,967	8,653
318.78	5,967	9,148
318.88	5,967	9,641
318.98	5,967	10,130
319.08	5,967	10,618
319.18	5,967	11,102
319.28	5,967	11,583
319.38	5,967	12,062
319.48	5,967	12,537
319.58	5,967	13,008
319.68	5,967	13,477
319.78	5,967	13,941
319.88	5,967	14,402
319.98	5,967	14,858
320.08	5,967	15,311
320.18	5,967	15,758
320.28	5,967	16,202
320.38	5,967	16,640
320.48	5,967	17,073
320.58	5,967	17,501
320.68	5,967	17,924
320.78	5,967	18,340
320.88	5,967	18,749
320.98	5,967	19,152
321.08	5,967	19,548
321.18	5,967	19,936
321.28	5,967	20,316
321.38	5,967	20,687
321.48	5,967	21,048
321.58	5,967	21,399
321.68	5,967	21,736
321.78	5,967	22,058
321.88	5,967	22,358
321.98	5,967	22,634
322.08	5,967	22,897
322.18	5,967	23,153
322.28	5,967	23,402
322.38	5,967	23,642
322.48	5,967	23,881
322.58	5,967	24,119
322.68	5,967	24,358
322.78	5,967	24,597
322.88	5,967	24,835
322.98	5,967	25,074
323.08	5,967	25,313
323.18	5,967	25,552
323.28	5,967	**25,790**

Summary for Pond Inf-3: INF#3

Inflow Area = 60,887 sf, 66.57% Impervious, Inflow Depth = 3.60" for 10 yr event
Inflow = 5.64 cfs @ 12.08 hrs, Volume= 18,277 cf
Outflow = 5.55 cfs @ 12.10 hrs, Volume= 18,277 cf, Atten= 2%, Lag= 0.9 min
Discarded = 0.01 cfs @ 5.61 hrs, Volume= 1,335 cf
Primary = 5.53 cfs @ 12.10 hrs, Volume= 16,942 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 323.04' @ 12.10 hrs Surf.Area= 588 sf Storage= 578 cf
Flood Elev= 325.00' Surf.Area= 588 sf Storage= 1,209 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 24.4 min (810.5 - 786.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.50'	566 cf	**11.00'W x 53.46'L x 3.50'H Field A** 2,058 cf Overall - 643 cf Embedded = 1,415 cf x 40.0% Voids
#2A	322.00'	643 cf	**ADS_StormTech SC-740 +Cap** x 14 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 14 Chambers in 2 Rows
		1,209 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.50'	**18.0" Round Culvert** L= 5.0' Ke= 0.900 Inlet / Outlet Invert= 321.50' / 321.45' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf
#3	Device 2	322.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 5.61 hrs HW=321.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=5.53 cfs @ 12.10 hrs HW=323.04' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Barrel Controls 5.53 cfs @ 3.80 fps)
↑—**3=Broad-Crested Rectangular Weir** (Passes 5.53 cfs of 5.97 cfs potential flow)

Pond Inf-3: INF#3 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

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

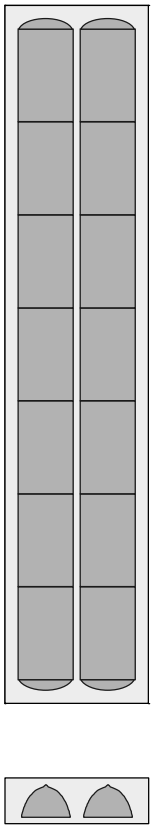
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

14 Chambers x 45.9 cf = 643.2 cf Chamber Storage

2,058.1 cf Field - 643.2 cf Chambers = 1,414.9 cf Stone x 40.0% Voids = 566.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,209.1 cf = 0.028 af
Overall Storage Efficiency = 58.8%
Overall System Size = 53.46' x 11.00' x 3.50'

14 Chambers
76.2 cy Field
52.4 cy Stone



Hydrograph for Pond Inf-3: INF#3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.50	0.00	0.00	0.00
2.00	0.00	0	321.50	0.00	0.00	0.00
4.00	0.00	0	321.50	0.00	**0.00**	0.00
6.00	0.03	23	321.60	0.01	**0.01**	0.00
8.00	0.08	276	322.35	0.01	0.01	0.00
10.00	0.21	369	322.56	0.20	0.01	0.19
12.00	**3.48**	**505**	**322.87**	**3.24**	0.01	**3.23**
14.00	**0.31**	**379**	**322.58**	**0.31**	0.01	**0.30**
16.00	0.17	366	322.55	0.17	0.01	0.15
18.00	0.10	359	322.53	0.10	0.01	0.09
20.00	0.08	357	322.53	0.08	0.01	0.07
22.00	0.07	355	322.52	0.07	0.01	0.05
24.00	0.05	353	322.52	0.05	0.01	0.04
26.00	0.00	255	322.30	0.01	0.01	0.00
28.00	0.00	155	322.08	0.01	0.01	0.00
30.00	0.00	55	321.73	0.01	0.01	0.00
32.00	0.00	0	321.50	0.00	0.00	0.00
34.00	0.00	0	321.50	0.00	0.00	0.00
36.00	0.00	0	321.50	0.00	0.00	0.00
38.00	0.00	0	321.50	0.00	0.00	0.00
40.00	0.00	0	321.50	0.00	0.00	0.00
42.00	0.00	0	321.50	0.00	0.00	0.00
44.00	0.00	0	321.50	0.00	0.00	0.00
46.00	0.00	0	321.50	0.00	0.00	0.00
48.00	0.00	0	321.50	0.00	0.00	0.00
50.00	0.00	0	321.50	0.00	0.00	0.00
52.00	0.00	0	321.50	0.00	0.00	0.00
54.00	0.00	0	321.50	0.00	0.00	0.00
56.00	0.00	0	321.50	0.00	0.00	0.00
58.00	0.00	0	321.50	0.00	0.00	0.00
60.00	0.00	0	321.50	0.00	0.00	0.00
62.00	0.00	0	321.50	0.00	0.00	0.00
64.00	0.00	0	321.50	0.00	0.00	0.00
66.00	0.00	0	321.50	0.00	0.00	0.00
68.00	0.00	0	321.50	0.00	0.00	0.00
70.00	0.00	0	321.50	0.00	0.00	0.00
72.00	0.00	0	321.50	0.00	0.00	0.00

Stage-Area-Storage for Pond Inf-3: INF#3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.50	**588**	0
321.55	588	12
321.60	588	24
321.65	588	35
321.70	588	47
321.75	588	59
321.80	588	71
321.85	588	82
321.90	588	94
321.95	588	106
322.00	588	118
322.05	588	140
322.10	588	163
322.15	588	186
322.20	588	209
322.25	588	232
322.30	588	254
322.35	588	277
322.40	588	299
322.45	588	322
322.50	588	344
322.55	588	366
322.60	588	389
322.65	588	411
322.70	588	433
322.75	588	454
322.80	588	476
322.85	588	498
322.90	588	519
322.95	588	541
323.00	588	562
323.05	588	583
323.10	588	604
323.15	588	625
323.20	588	646
323.25	588	666
323.30	588	687
323.35	588	707
323.40	588	727
323.45	588	747
323.50	588	766
323.55	588	786
323.60	588	805
323.65	588	824
323.70	588	843
323.75	588	861
323.80	588	880
323.85	588	898
323.90	588	915
323.95	588	933
324.00	588	950
324.05	588	966
324.10	588	983
324.15	588	998
324.20	588	1,014
324.25	588	1,028
324.30	588	1,042
324.35	588	1,055
324.40	588	1,067
324.45	588	1,080
324.50	588	1,092
324.55	588	1,103
324.60	588	1,115
324.65	588	1,127
324.70	588	1,139
324.75	588	1,150
324.80	588	1,162
324.85	588	1,174
324.90	588	1,186
324.95	588	1,197
325.00	588	**1,209**

Summary for Pond RG #1: Rain Garden #1

Inflow Area = 15,164 sf, 79.13% Impervious, Inflow Depth = 3.36" for 10 yr event
Inflow = 1.45 cfs @ 12.09 hrs, Volume= 4,247 cf
Outflow = 1.02 cfs @ 12.06 hrs, Volume= 4,249 cf, Atten= 29%, Lag= 0.0 min
Primary = 1.02 cfs @ 12.06 hrs, Volume= 4,249 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 331.23' @ 12.17 hrs Surf.Area= 648 sf Storage= 141 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.4 min (814.5 - 814.1)

Volume	Invert	Avail.Storage	Storage Description
#1	331.00'	2,551 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
331.00	570	0	0
332.00	908	739	739
333.00	1,303	1,106	1,845
333.50	1,521	706	2,551

Device	Routing	Invert	Outlet Devices
#1	Device 2	331.00'	**1.02 cfs Exfiltration at all elevations**
#2	Primary	328.50'	**6.0" Round Culvert** L= 75.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 328.50' / 328.13' S= 0.0049 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 2	332.50'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.02 cfs @ 12.06 hrs HW=331.04' TW=324.97' (Dynamic Tailwater)
└**2=Culvert** (Passes 1.02 cfs of 1.05 cfs potential flow)
  ├**1=Exfiltration** (Exfiltration Controls 1.02 cfs)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Hydrograph for Pond RG #1: Rain Garden #1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	331.00	0.00
2.00	0.00	0	331.00	0.00
4.00	0.00	0	331.00	0.00
6.00	0.00	0	331.00	0.00
8.00	0.00	0	331.00	0.00
10.00	0.00	0	331.00	0.00
12.00	**0.82**	**0**	**331.00**	**0.82**
14.00	**0.08**	**0**	**331.00**	**0.16**
16.00	0.04	0	331.00	0.09
18.00	0.03	0	331.00	0.05
20.00	0.02	0	331.00	0.04
22.00	0.02	0	331.00	0.03
24.00	0.01	0	331.00	0.03
26.00	0.00	0	331.00	0.00
28.00	0.00	0	331.00	0.00
30.00	0.00	0	331.00	0.00
32.00	0.00	0	331.00	0.00
34.00	0.00	0	331.00	0.00
36.00	0.00	0	331.00	0.00
38.00	0.00	0	331.00	0.00
40.00	0.00	0	331.00	0.00
42.00	0.00	0	331.00	0.00
44.00	0.00	0	331.00	0.00
46.00	0.00	0	331.00	0.00
48.00	0.00	0	331.00	0.00
50.00	0.00	0	331.00	0.00
52.00	0.00	0	331.00	0.00
54.00	0.00	0	331.00	0.00
56.00	0.00	0	331.00	0.00
58.00	0.00	0	331.00	0.00
60.00	0.00	0	331.00	0.00
62.00	0.00	0	331.00	0.00
64.00	0.00	0	331.00	0.00
66.00	0.00	0	331.00	0.00
68.00	0.00	0	331.00	0.00
70.00	0.00	0	331.00	0.00
72.00	0.00	0	331.00	0.00

Stage-Area-Storage for Pond RG #1: Rain Garden #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
331.00	570	0
331.05	587	29
331.10	604	59
331.15	621	89
331.20	638	121
331.25	655	153
331.30	671	186
331.35	688	220
331.40	705	255
331.45	722	291
331.50	739	327
331.55	756	365
331.60	773	403
331.65	790	442
331.70	807	482
331.75	824	523
331.80	840	564
331.85	857	607
331.90	874	650
331.95	891	694
332.00	908	739
332.05	928	785
332.10	948	832
332.15	967	880
332.20	987	928
332.25	1,007	978
332.30	1,027	1,029
332.35	1,046	1,081
332.40	1,066	1,134
332.45	1,086	1,188
332.50	1,106	1,242
332.55	1,125	1,298
332.60	1,145	1,355
332.65	1,165	1,413
332.70	1,184	1,471
332.75	1,204	1,531
332.80	1,224	1,592
332.85	1,244	1,653
332.90	1,263	1,716
332.95	1,283	1,780
333.00	1,303	1,845
333.05	1,325	1,910
333.10	1,347	1,977
333.15	1,368	2,045
333.20	1,390	2,114
333.25	1,412	2,184
333.30	1,434	2,255
333.35	1,456	2,327
333.40	1,477	2,401
333.45	1,499	2,475
333.50	**1,521**	**2,551**

Summary for Pond UGS#4: UGS#4

Inflow Area = 220,543 sf, 26.64% Impervious, Inflow Depth = 2.82" for 10 yr event
Inflow = 15.19 cfs @ 12.12 hrs, Volume= 51,765 cf
Outflow = 8.57 cfs @ 12.28 hrs, Volume= 51,765 cf, Atten= 44%, Lag= 9.7 min
Primary = 8.57 cfs @ 12.28 hrs, Volume= 51,765 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 319.23' @ 12.28 hrs Surf.Area= 5,330 sf Storage= 7,984 cf
Flood Elev= 322.50' Surf.Area= 5,330 sf Storage= 17,771 cf

Plug-Flow detention time= 14.4 min calculated for 51,758 cf (100% of inflow)
Center-of-Mass det. time= 14.4 min (831.6 - 817.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	317.00'	7,697 cf	**46.25'W x 115.25'L x 5.50'H Field A** 29,317 cf Overall - 10,074 cf Embedded = 19,242 cf x 40.0% Voids
#2A	317.75'	10,074 cf	**ADS_StormTech MC-3500 d +Cap** x 90 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 90 Chambers in 6 Rows Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf
		17,771 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	316.90'	**18.0" Round Culvert** L= 73.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 316.90' / 314.90' S= 0.0274 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Primary	317.00'	**12.0" W x 0.2" H Vert. Orifice/Grate** X 6 rows with 86.0" cc spacing C= 0.600

Primary OutFlow Max=8.57 cfs @ 12.28 hrs HW=319.23' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 8.45 cfs @ 4.78 fps)
2=Orifice/Grate (Orifice Controls 0.12 cfs @ 7.18 fps)

Pond UGS#4: UGS#4 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

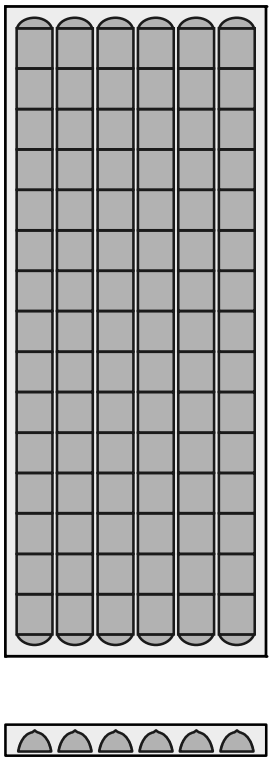
15 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 111.25' Row Length +24.0" End Stone x 2 = 115.25' Base Length
6 Rows x 77.0" Wide + 9.0" Spacing x 5 + 24.0" Side Stone x 2 = 46.25' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

90 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 6 Rows = 10,074.5 cf Chamber Storage

29,316.7 cf Field - 10,074.5 cf Chambers = 19,242.2 cf Stone x 40.0% Voids = 7,696.9 cf Stone Storage

Chamber Storage + Stone Storage = 17,771.4 cf = 0.408 af
Overall Storage Efficiency = 60.6%
Overall System Size = 115.25' x 46.25' x 5.50'

90 Chambers
1,085.8 cy Field
712.7 cy Stone



Hydrograph for Pond UGS#4: UGS#4

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	317.00	0.00
2.00	0.00	0	317.00	0.00
4.00	0.00	0	317.00	0.00
6.00	0.00	0	317.00	0.00
8.00	0.07	11	317.01	0.05
10.00	0.37	341	317.16	0.31
12.00	**7.75**	**2,974**	**318.06**	**4.33**
14.00	**1.03**	**895**	**317.42**	**1.11**
16.00	0.56	580	317.27	0.60
18.00	0.34	390	317.18	0.36
20.00	0.27	309	317.14	0.28
22.00	0.22	258	317.12	0.23
24.00	0.18	206	317.10	0.19
26.00	0.00	0	317.00	0.00
28.00	0.00	0	317.00	0.00
30.00	0.00	0	317.00	0.00
32.00	0.00	0	317.00	0.00
34.00	0.00	0	317.00	0.00
36.00	0.00	0	317.00	0.00
38.00	0.00	0	317.00	0.00
40.00	0.00	0	317.00	0.00
42.00	0.00	0	317.00	0.00
44.00	0.00	0	317.00	0.00
46.00	0.00	0	317.00	0.00
48.00	0.00	0	317.00	0.00
50.00	0.00	0	317.00	0.00
52.00	0.00	0	317.00	0.00
54.00	0.00	0	317.00	0.00
56.00	0.00	0	317.00	0.00
58.00	0.00	0	317.00	0.00
60.00	0.00	0	317.00	0.00
62.00	0.00	0	317.00	0.00
64.00	0.00	0	317.00	0.00
66.00	0.00	0	317.00	0.00
68.00	0.00	0	317.00	0.00
70.00	0.00	0	317.00	0.00
72.00	0.00	0	317.00	0.00

Stage-Area-Storage for Pond UGS#4: UGS#4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
317.00	0	337.80	17,771
317.40	853	338.20	17,771
317.80	1,821	338.60	17,771
318.20	3,584	339.00	17,771
318.60	5,317	339.40	17,771
319.00	7,013	339.80	17,771
319.40	8,662	340.20	17,771
319.80	10,250	340.60	17,771
320.20	11,760	341.00	17,771
320.60	13,167	341.40	17,771
321.00	14,425	341.80	17,771
321.40	15,421	342.20	17,771
321.80	16,279	342.60	17,771
322.20	**17,132**	343.00	17,771
322.60	**17,771**	343.40	17,771
323.00	17,771	343.80	17,771
323.40	17,771	344.20	17,771
323.80	17,771	344.60	17,771
324.20	17,771	345.00	17,771
324.60	17,771	345.40	17,771
325.00	17,771	345.80	17,771
325.40	17,771	346.20	17,771
325.80	17,771	346.60	17,771
326.20	17,771	347.00	17,771
326.60	17,771	347.40	17,771
327.00	17,771	347.80	17,771
327.40	17,771	348.20	17,771
327.80	17,771	348.60	17,771
328.20	17,771	349.00	17,771
328.60	17,771	349.40	17,771
329.00	17,771	349.80	17,771
329.40	17,771	350.20	17,771
329.80	17,771	350.60	17,771
330.20	17,771	351.00	17,771
330.60	17,771	351.40	17,771
331.00	17,771	351.80	17,771
331.40	17,771	352.20	17,771
331.80	17,771	352.60	17,771
332.20	17,771		
332.60	17,771		
333.00	17,771		
333.40	17,771		
333.80	17,771		
334.20	17,771		
334.60	17,771		
335.00	17,771		
335.40	17,771		
335.80	17,771		
336.20	17,771		
336.60	17,771		
337.00	17,771		
337.40	17,771		

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPR-1: (new Subcat) Runoff Area=42,801 sf 45.13% Impervious Runoff Depth=4.05"
Tc=6.0 min CN=88 Runoff=4.54 cfs 14,446 cf

SubcatchmentPR-1A: (new Subcat) Runoff Area=120,105 sf 40.62% Impervious Runoff Depth=3.95"
Flow Length=98' Slope=0.0100 '/' Tc=7.9 min CN=87 Runoff=11.69 cfs 39,489 cf

SubcatchmentPR-1B: (new Subcat) Runoff Area=8,760 sf 76.99% Impervious Runoff Depth=4.70"
Tc=6.0 min CN=94 Runoff=1.03 cfs 3,433 cf

SubcatchmentPR-1C: (new Subcat) Runoff Area=48,219 sf 77.13% Impervious Runoff Depth=4.70"
Tc=6.0 min CN=94 Runoff=5.65 cfs 18,898 cf

SubcatchmentPR-1D: WS-1D Runoff Area=15,164 sf 79.13% Impervious Runoff Depth=4.70"
Tc=6.0 min CN=94 Runoff=1.78 cfs 5,943 cf

SubcatchmentPR-2: (new Subcat) Runoff Area=60,887 sf 66.57% Impervious Runoff Depth=4.48"
Tc=6.0 min CN=92 Runoff=6.93 cfs 22,734 cf

SubcatchmentPR-3: (new Subcat) Runoff Area=37,434 sf 0.00% Impervious Runoff Depth=3.15"
Flow Length=151' Tc=9.0 min CN=79 Runoff=2.86 cfs 9,823 cf

SubcatchmentPR-4: (new Subcat) Runoff Area=45,815 sf 0.00% Impervious Runoff Depth=2.34"
Tc=6.0 min CN=70 Runoff=2.85 cfs 8,925 cf

SubcatchmentPR-5: (new Subcat) Runoff Area=13,090 sf 33.90% Impervious Runoff Depth=3.54"
Tc=6.0 min CN=83 Runoff=1.24 cfs 3,860 cf

SubcatchmentPR-6: PR-6 Runoff Area=10,196 sf 1.75% Impervious Runoff Depth=2.42"
Tc=6.0 min CN=71 Runoff=0.66 cfs 2,059 cf

SubcatchmentPR-7: PR-7 Runoff Area=7,291 sf 0.00% Impervious Runoff Depth=2.69"
Tc=6.0 min CN=74 Runoff=0.53 cfs 1,633 cf

SubcatchmentPR-8: PR-8 Runoff Area=220,543 sf 26.64% Impervious Runoff Depth=3.64"
Flow Length=117' Tc=8.7 min CN=84 Runoff=19.49 cfs 66,867 cf

SubcatchmentPR-9: PR-9 Runoff Area=31,969 sf 29.48% Impervious Runoff Depth=3.74"
Tc=6.0 min CN=85 Runoff=3.17 cfs 9,962 cf

SubcatchmentPR-BLDG: PR-BLDG Runoff Area=63,223 sf 100.00% Impervious Runoff Depth=5.16"
Tc=6.0 min CN=98 Runoff=7.67 cfs 27,200 cf

Reach POA-1: To Main Street Inflow=14.78 cfs 71,052 cf
Outflow=14.78 cfs 71,052 cf

Reach POA-2: To Existing DMH North of Site Inflow=17.94 cfs 98,195 cf
Outflow=17.94 cfs 98,195 cf

Reach POA-3: NORTH EAST WETLANDS Inflow=2.86 cfs 9,823 cf
Outflow=2.86 cfs 9,823 cf

Reach POA-4: SOUTH EAST WETLANDS Inflow=2.85 cfs 8,925 cf
Outflow=2.85 cfs 8,925 cf

Reach POA-5: CHAMPNEY STREET Inflow=1.24 cfs 3,860 cf
Outflow=1.24 cfs 3,860 cf

Pond #1A: INF#1A Peak Elev=325.32' Storage=6,271 cf Inflow=15.37 cfs 54,900 cf
Discarded=0.05 cfs 7,665 cf Primary=14.78 cfs 47,234 cf Outflow=14.83 cfs 54,900 cf

Pond #1B: INF#1B Peak Elev=324.17' Storage=4,326 cf Inflow=14.78 cfs 47,234 cf
Discarded=0.05 cfs 2,968 cf Primary=10.46 cfs 44,266 cf Outflow=10.50 cfs 47,234 cf

Pond Forebay #1: Sediment Forebay #1 Peak Elev=332.68' Storage=664 cf Inflow=1.78 cfs 5,943 cf
Outflow=1.76 cfs 5,369 cf

Pond Inf-2: Inf-2 Peak Elev=322.00' Storage=22,699 cf Inflow=11.69 cfs 39,489 cf
Discarded=0.14 cfs 30,842 cf Primary=1.02 cfs 8,648 cf Outflow=1.16 cfs 39,490 cf

Pond Inf-3: INF#3 Peak Elev=323.27' Storage=676 cf Inflow=6.93 cfs 22,734 cf
Discarded=0.01 cfs 1,369 cf Primary=6.70 cfs 21,366 cf Outflow=6.71 cfs 22,734 cf

Pond RG #1: Rain Garden #1 Peak Elev=331.48' Storage=314 cf Inflow=1.76 cfs 5,369 cf
Outflow=1.02 cfs 5,369 cf

Pond UGS#4: UGS#4 Peak Elev=319.98' Storage=10,947 cf Inflow=19.49 cfs 66,867 cf
Outflow=10.40 cfs 66,867 cf

Total Runoff Area = 725,497 sf Runoff Volume = 235,270 cf Average Runoff Depth = 3.89"
58.57% Pervious = 424,920 sf 41.43% Impervious = 300,577 sf

Summary for Subcatchment PR-1: (new Subcat)

Runoff = 4.54 cfs @ 12.09 hrs, Volume= 14,446 cf, Depth= 4.05"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	23,486	79	>75% Grass cover, HSG B
	19,315	98	Paved parking, HSG B
	42,801	88	Weighted Average
	23,486		54.87% Pervious Area
	19,315		45.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-1: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.00	0.00
5.00	0.31	0.00	0.00
6.00	0.39	0.01	0.01
7.00	0.49	0.03	0.03
8.00	0.62	0.07	0.05
9.00	0.79	0.14	0.09
10.00	1.02	0.26	0.15
11.00	1.35	0.48	0.26
12.00	2.70	1.55	**2.77**
13.00	4.05	2.78	**0.40**
14.00	4.38	3.08	0.26
15.00	4.61	3.30	0.19
16.00	4.78	3.46	0.14
17.00	4.91	3.58	0.11
18.00	5.01	3.68	0.08
19.00	5.09	3.76	0.07
20.00	5.17	3.83	0.07
21.00	5.23	3.89	0.06
22.00	5.30	3.95	0.06
23.00	5.35	4.00	0.05
24.00	**5.40**	**4.05**	0.04
25.00	5.40	4.05	0.00
26.00	5.40	4.05	0.00
27.00	5.40	4.05	0.00
28.00	5.40	4.05	0.00
29.00	5.40	4.05	0.00
30.00	5.40	4.05	0.00
31.00	5.40	4.05	0.00
32.00	5.40	4.05	0.00
33.00	5.40	4.05	0.00
34.00	5.40	4.05	0.00
35.00	5.40	4.05	0.00
36.00	5.40	4.05	0.00
37.00	5.40	4.05	0.00
38.00	5.40	4.05	0.00
39.00	5.40	4.05	0.00
40.00	5.40	4.05	0.00
41.00	5.40	4.05	0.00
42.00	5.40	4.05	0.00
43.00	5.40	4.05	0.00
44.00	5.40	4.05	0.00
45.00	5.40	4.05	0.00
46.00	5.40	4.05	0.00
47.00	5.40	4.05	0.00
48.00	5.40	4.05	0.00
49.00	5.40	4.05	0.00
50.00	5.40	4.05	0.00
51.00	5.40	4.05	0.00
52.00	5.40	4.05	0.00
53.00	5.40	4.05	0.00
54.00	5.40	4.05	0.00
55.00	5.40	4.05	0.00
56.00	5.40	4.05	0.00
57.00	5.40	4.05	0.00
58.00	5.40	4.05	0.00
59.00	5.40	4.05	0.00
60.00	5.40	4.05	0.00
61.00	5.40	4.05	0.00
62.00	5.40	4.05	0.00
63.00	5.40	4.05	0.00
64.00	5.40	4.05	0.00
65.00	5.40	4.05	0.00
66.00	5.40	4.05	0.00
67.00	5.40	4.05	0.00
68.00	5.40	4.05	0.00
69.00	5.40	4.05	0.00
70.00	5.40	4.05	0.00
71.00	5.40	4.05	0.00
72.00	5.40	4.05	0.00

Summary for Subcatchment PR-1A: (new Subcat)

Runoff = 11.69 cfs @ 12.11 hrs, Volume= 39,489 cf, Depth= 3.95"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	71,317	79	>75% Grass cover, HSG B
	48,788	98	Paved parking, HSG B
	120,105	87	Weighted Average
	71,317		59.38% Pervious Area
	48,788		40.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 sf** Grass: Short n= 0.150 P2= 3.20"
0.5	48	0.0100	1.50		**Shallow Concentrated Flow, 48.32' of SCF** Grassed Waterway Kv= 15.0 fps
7.9	98	Total			

Hydrograph for Subcatchment PR-1A: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.00	0.00
5.00	0.31	0.00	0.00
6.00	0.39	0.01	0.02
7.00	0.49	0.02	0.06
8.00	0.62	0.06	0.12
9.00	0.79	0.12	0.23
10.00	1.02	0.24	0.38
11.00	1.35	0.43	0.68
12.00	2.70	1.48	**6.38**
13.00	4.05	2.68	**1.16**
14.00	4.38	2.99	0.72
15.00	4.61	3.20	0.55
16.00	4.78	3.36	0.39
17.00	4.91	3.48	0.30
18.00	5.01	3.58	0.23
19.00	5.09	3.66	0.21
20.00	5.17	3.73	0.19
21.00	5.23	3.79	0.17
22.00	5.30	3.85	0.15
23.00	5.35	3.90	0.14
24.00	**5.40**	**3.95**	0.12
25.00	5.40	3.95	0.00
26.00	5.40	3.95	0.00
27.00	5.40	3.95	0.00
28.00	5.40	3.95	0.00
29.00	5.40	3.95	0.00
30.00	5.40	3.95	0.00
31.00	5.40	3.95	0.00
32.00	5.40	3.95	0.00
33.00	5.40	3.95	0.00
34.00	5.40	3.95	0.00
35.00	5.40	3.95	0.00
36.00	5.40	3.95	0.00
37.00	5.40	3.95	0.00
38.00	5.40	3.95	0.00
39.00	5.40	3.95	0.00
40.00	5.40	3.95	0.00
41.00	5.40	3.95	0.00
42.00	5.40	3.95	0.00
43.00	5.40	3.95	0.00
44.00	5.40	3.95	0.00
45.00	5.40	3.95	0.00
46.00	5.40	3.95	0.00
47.00	5.40	3.95	0.00
48.00	5.40	3.95	0.00
49.00	5.40	3.95	0.00
50.00	5.40	3.95	0.00
51.00	5.40	3.95	0.00
52.00	5.40	3.95	0.00
53.00	5.40	3.95	0.00
54.00	5.40	3.95	0.00
55.00	5.40	3.95	0.00
56.00	5.40	3.95	0.00
57.00	5.40	3.95	0.00
58.00	5.40	3.95	0.00
59.00	5.40	3.95	0.00
60.00	5.40	3.95	0.00
61.00	5.40	3.95	0.00
62.00	5.40	3.95	0.00
63.00	5.40	3.95	0.00
64.00	5.40	3.95	0.00
65.00	5.40	3.95	0.00
66.00	5.40	3.95	0.00
67.00	5.40	3.95	0.00
68.00	5.40	3.95	0.00
69.00	5.40	3.95	0.00
70.00	5.40	3.95	0.00
71.00	5.40	3.95	0.00
72.00	5.40	3.95	0.00

Summary for Subcatchment PR-1B: (new Subcat)

Runoff = 1.03 cfs @ 12.08 hrs, Volume= 3,433 cf, 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 Rainfall=5.40"

	Area (sf)	CN	Description
*	2,016	79	>75% Grass cover, HSG B
	6,744	98	Paved parking, HSG B
	8,760	94	Weighted Average
	2,016		23.01% Pervious Area
	6,744		76.99% Impervious Area

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

Hydrograph for Subcatchment PR-1B: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.01	0.00
5.00	0.31	0.04	0.01
6.00	0.39	0.08	0.01
7.00	0.49	0.13	0.01
8.00	0.62	0.21	0.02
9.00	0.79	0.34	0.03
10.00	1.02	0.52	0.04
11.00	1.35	0.80	0.07
12.00	2.70	2.06	**0.64**
13.00	4.05	3.37	**0.09**
14.00	4.38	3.70	0.06
15.00	4.61	3.93	0.04
16.00	4.78	4.10	0.03
17.00	4.91	4.22	0.02
18.00	5.01	4.32	0.02
19.00	5.09	4.40	0.02
20.00	5.17	4.47	0.01
21.00	5.23	4.54	0.01
22.00	5.30	4.60	0.01
23.00	5.35	4.65	0.01
24.00	**5.40**	**4.70**	0.01
25.00	5.40	4.70	0.00
26.00	5.40	4.70	0.00
27.00	5.40	4.70	0.00
28.00	5.40	4.70	0.00
29.00	5.40	4.70	0.00
30.00	5.40	4.70	0.00
31.00	5.40	4.70	0.00
32.00	5.40	4.70	0.00
33.00	5.40	4.70	0.00
34.00	5.40	4.70	0.00
35.00	5.40	4.70	0.00
36.00	5.40	4.70	0.00
37.00	5.40	4.70	0.00
38.00	5.40	4.70	0.00
39.00	5.40	4.70	0.00
40.00	5.40	4.70	0.00
41.00	5.40	4.70	0.00
42.00	5.40	4.70	0.00
43.00	5.40	4.70	0.00
44.00	5.40	4.70	0.00
45.00	5.40	4.70	0.00
46.00	5.40	4.70	0.00
47.00	5.40	4.70	0.00
48.00	5.40	4.70	0.00
49.00	5.40	4.70	0.00
50.00	5.40	4.70	0.00
51.00	5.40	4.70	0.00
52.00	5.40	4.70	0.00
53.00	5.40	4.70	0.00
54.00	5.40	4.70	0.00
55.00	5.40	4.70	0.00
56.00	5.40	4.70	0.00
57.00	5.40	4.70	0.00
58.00	5.40	4.70	0.00
59.00	5.40	4.70	0.00
60.00	5.40	4.70	0.00
61.00	5.40	4.70	0.00
62.00	5.40	4.70	0.00
63.00	5.40	4.70	0.00
64.00	5.40	4.70	0.00
65.00	5.40	4.70	0.00
66.00	5.40	4.70	0.00
67.00	5.40	4.70	0.00
68.00	5.40	4.70	0.00
69.00	5.40	4.70	0.00
70.00	5.40	4.70	0.00
71.00	5.40	4.70	0.00
72.00	5.40	4.70	0.00

Summary for Subcatchment PR-1C: (new Subcat)

Runoff = 5.65 cfs @ 12.08 hrs, Volume= 18,898 cf, 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 Rainfall=5.40"

	Area (sf)	CN	Description
*	11,027	79	>75% Grass cover, HSG B
	37,192	98	Paved parking, HSG B
	48,219	94	Weighted Average
	11,027		22.87% Pervious Area
	37,192		77.13% Impervious Area

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

Hydrograph for Subcatchment PR-1C: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.01
4.00	0.23	0.01	0.02
5.00	0.31	0.04	0.03
6.00	0.39	0.08	0.05
7.00	0.49	0.13	0.07
8.00	0.62	0.21	0.10
9.00	0.79	0.34	0.16
10.00	1.02	0.52	0.24
11.00	1.35	0.80	0.37
12.00	2.70	2.06	**3.52**
13.00	4.05	3.37	**0.48**
14.00	4.38	3.70	0.30
15.00	4.61	3.93	0.23
16.00	4.78	4.10	0.16
17.00	4.91	4.22	0.13
18.00	5.01	4.32	0.10
19.00	5.09	4.40	0.09
20.00	5.17	4.47	0.08
21.00	5.23	4.54	0.07
22.00	5.30	4.60	0.06
23.00	5.35	4.65	0.06
24.00	**5.40**	**4.70**	0.05
25.00	5.40	4.70	0.00
26.00	5.40	4.70	0.00
27.00	5.40	4.70	0.00
28.00	5.40	4.70	0.00
29.00	5.40	4.70	0.00
30.00	5.40	4.70	0.00
31.00	5.40	4.70	0.00
32.00	5.40	4.70	0.00
33.00	5.40	4.70	0.00
34.00	5.40	4.70	0.00
35.00	5.40	4.70	0.00
36.00	5.40	4.70	0.00
37.00	5.40	4.70	0.00
38.00	5.40	4.70	0.00
39.00	5.40	4.70	0.00
40.00	5.40	4.70	0.00
41.00	5.40	4.70	0.00
42.00	5.40	4.70	0.00
43.00	5.40	4.70	0.00
44.00	5.40	4.70	0.00
45.00	5.40	4.70	0.00
46.00	5.40	4.70	0.00
47.00	5.40	4.70	0.00
48.00	5.40	4.70	0.00
49.00	5.40	4.70	0.00
50.00	5.40	4.70	0.00
51.00	5.40	4.70	0.00
52.00	5.40	4.70	0.00
53.00	5.40	4.70	0.00
54.00	5.40	4.70	0.00
55.00	5.40	4.70	0.00
56.00	5.40	4.70	0.00
57.00	5.40	4.70	0.00
58.00	5.40	4.70	0.00
59.00	5.40	4.70	0.00
60.00	5.40	4.70	0.00
61.00	5.40	4.70	0.00
62.00	5.40	4.70	0.00
63.00	5.40	4.70	0.00
64.00	5.40	4.70	0.00
65.00	5.40	4.70	0.00
66.00	5.40	4.70	0.00
67.00	5.40	4.70	0.00
68.00	5.40	4.70	0.00
69.00	5.40	4.70	0.00
70.00	5.40	4.70	0.00
71.00	5.40	4.70	0.00
72.00	5.40	4.70	0.00

Summary for Subcatchment PR-1D: WS-1D

Runoff = 1.78 cfs @ 12.08 hrs, Volume= 5,943 cf, 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 Rainfall=5.40"

Area (sf)	CN	Description
12,000	98	Paved parking, HSG B
3,164	79	<50% Grass cover, Poor, HSG B
15,164	94	Weighted Average
3,164		20.87% Pervious Area
12,000		79.13% Impervious Area

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

Hydrograph for Subcatchment PR-1D: WS-1D

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.01	0.01
5.00	0.31	0.04	0.01
6.00	0.39	0.08	0.01
7.00	0.49	0.13	0.02
8.00	0.62	0.21	0.03
9.00	0.79	0.34	0.05
10.00	1.02	0.52	0.07
11.00	1.35	0.80	0.12
12.00	2.70	2.06	**1.11**
13.00	4.05	3.37	**0.15**
14.00	4.38	3.70	0.10
15.00	4.61	3.93	0.07
16.00	4.78	4.10	0.05
17.00	4.91	4.22	0.04
18.00	5.01	4.32	0.03
19.00	5.09	4.40	0.03
20.00	5.17	4.47	0.02
21.00	5.23	4.54	0.02
22.00	5.30	4.60	0.02
23.00	5.35	4.65	0.02
24.00	**5.40**	**4.70**	0.02
25.00	5.40	4.70	0.00
26.00	5.40	4.70	0.00
27.00	5.40	4.70	0.00
28.00	5.40	4.70	0.00
29.00	5.40	4.70	0.00
30.00	5.40	4.70	0.00
31.00	5.40	4.70	0.00
32.00	5.40	4.70	0.00
33.00	5.40	4.70	0.00
34.00	5.40	4.70	0.00
35.00	5.40	4.70	0.00
36.00	5.40	4.70	0.00
37.00	5.40	4.70	0.00
38.00	5.40	4.70	0.00
39.00	5.40	4.70	0.00
40.00	5.40	4.70	0.00
41.00	5.40	4.70	0.00
42.00	5.40	4.70	0.00
43.00	5.40	4.70	0.00
44.00	5.40	4.70	0.00
45.00	5.40	4.70	0.00
46.00	5.40	4.70	0.00
47.00	5.40	4.70	0.00
48.00	5.40	4.70	0.00
49.00	5.40	4.70	0.00
50.00	5.40	4.70	0.00
51.00	5.40	4.70	0.00
52.00	5.40	4.70	0.00
53.00	5.40	4.70	0.00
54.00	5.40	4.70	0.00
55.00	5.40	4.70	0.00
56.00	5.40	4.70	0.00
57.00	5.40	4.70	0.00
58.00	5.40	4.70	0.00
59.00	5.40	4.70	0.00
60.00	5.40	4.70	0.00
61.00	5.40	4.70	0.00
62.00	5.40	4.70	0.00
63.00	5.40	4.70	0.00
64.00	5.40	4.70	0.00
65.00	5.40	4.70	0.00
66.00	5.40	4.70	0.00
67.00	5.40	4.70	0.00
68.00	5.40	4.70	0.00
69.00	5.40	4.70	0.00
70.00	5.40	4.70	0.00
71.00	5.40	4.70	0.00
72.00	5.40	4.70	0.00

Summary for Subcatchment PR-2: (new Subcat)

Runoff = 6.93 cfs @ 12.08 hrs, Volume= 22,734 cf, Depth= 4.48"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	20,356	79	>75% Grass cover, HSG B
	39,661	98	Paved parking, HSG B
*	870	98	parking
	60,887	92	Weighted Average
	20,356		33.43% Pervious Area
	40,531		66.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-2: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.00	0.01
5.00	0.31	0.02	0.03
6.00	0.39	0.04	0.04
7.00	0.49	0.08	0.07
8.00	0.62	0.15	0.11
9.00	0.79	0.25	0.18
10.00	1.02	0.42	0.27
11.00	1.35	0.68	0.44
12.00	2.70	1.88	**4.29**
13.00	4.05	3.17	**0.60**
14.00	4.38	3.48	0.38
15.00	4.61	3.71	0.29
16.00	4.78	3.88	0.20
17.00	4.91	4.00	0.16
18.00	5.01	4.10	0.12
19.00	5.09	4.18	0.11
20.00	5.17	4.25	0.10
21.00	5.23	4.32	0.09
22.00	5.30	4.38	0.08
23.00	5.35	4.43	0.07
24.00	**5.40**	**4.48**	0.06
25.00	5.40	4.48	0.00
26.00	5.40	4.48	0.00
27.00	5.40	4.48	0.00
28.00	5.40	4.48	0.00
29.00	5.40	4.48	0.00
30.00	5.40	4.48	0.00
31.00	5.40	4.48	0.00
32.00	5.40	4.48	0.00
33.00	5.40	4.48	0.00
34.00	5.40	4.48	0.00
35.00	5.40	4.48	0.00
36.00	5.40	4.48	0.00
37.00	5.40	4.48	0.00
38.00	5.40	4.48	0.00
39.00	5.40	4.48	0.00
40.00	5.40	4.48	0.00
41.00	5.40	4.48	0.00
42.00	5.40	4.48	0.00
43.00	5.40	4.48	0.00
44.00	5.40	4.48	0.00
45.00	5.40	4.48	0.00
46.00	5.40	4.48	0.00
47.00	5.40	4.48	0.00
48.00	5.40	4.48	0.00
49.00	5.40	4.48	0.00
50.00	5.40	4.48	0.00
51.00	5.40	4.48	0.00
52.00	5.40	4.48	0.00
53.00	5.40	4.48	0.00
54.00	5.40	4.48	0.00
55.00	5.40	4.48	0.00
56.00	5.40	4.48	0.00
57.00	5.40	4.48	0.00
58.00	5.40	4.48	0.00
59.00	5.40	4.48	0.00
60.00	5.40	4.48	0.00
61.00	5.40	4.48	0.00
62.00	5.40	4.48	0.00
63.00	5.40	4.48	0.00
64.00	5.40	4.48	0.00
65.00	5.40	4.48	0.00
66.00	5.40	4.48	0.00
67.00	5.40	4.48	0.00
68.00	5.40	4.48	0.00
69.00	5.40	4.48	0.00
70.00	5.40	4.48	0.00
71.00	5.40	4.48	0.00
72.00	5.40	4.48	0.00

Summary for Subcatchment PR-3: (new Subcat)

Runoff = 2.86 cfs @ 12.13 hrs, Volume= 9,823 cf, Depth= 3.15"

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 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	37,434	79	>75% Grass cover, HSG B
	37,434		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 sf** Grass: Short n= 0.150 P2= 3.20"
0.2	20	0.0100	2.03		**Shallow Concentrated Flow, 20' scf paved** Paved Kv= 20.3 fps
1.4	81	0.0200	0.99		**Shallow Concentrated Flow, 81' scf grass** Short Grass Pasture Kv= 7.0 fps
9.0	151	Total			

Hydrograph for Subcatchment PR-3: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.00	0.00
5.00	0.31	0.00	0.00
6.00	0.39	0.00	0.00
7.00	0.49	0.00	0.00
8.00	0.62	0.00	0.01
9.00	0.79	0.02	0.03
10.00	1.02	0.08	0.06
11.00	1.35	0.19	0.13
12.00	2.70	0.97	**1.42**
13.00	4.05	2.00	**0.33**
14.00	4.38	2.28	0.20
15.00	4.61	2.47	0.15
16.00	4.78	2.62	0.11
17.00	4.91	2.73	0.09
18.00	5.01	2.81	0.07
19.00	5.09	2.88	0.06
20.00	5.17	2.95	0.05
21.00	5.23	3.00	0.05
22.00	5.30	3.06	0.04
23.00	5.35	3.11	0.04
24.00	**5.40**	**3.15**	0.04
25.00	5.40	3.15	0.00
26.00	5.40	3.15	0.00
27.00	5.40	3.15	0.00
28.00	5.40	3.15	0.00
29.00	5.40	3.15	0.00
30.00	5.40	3.15	0.00
31.00	5.40	3.15	0.00
32.00	5.40	3.15	0.00
33.00	5.40	3.15	0.00
34.00	5.40	3.15	0.00
35.00	5.40	3.15	0.00
36.00	5.40	3.15	0.00
37.00	5.40	3.15	0.00
38.00	5.40	3.15	0.00
39.00	5.40	3.15	0.00
40.00	5.40	3.15	0.00
41.00	5.40	3.15	0.00
42.00	5.40	3.15	0.00
43.00	5.40	3.15	0.00
44.00	5.40	3.15	0.00
45.00	5.40	3.15	0.00
46.00	5.40	3.15	0.00
47.00	5.40	3.15	0.00
48.00	5.40	3.15	0.00
49.00	5.40	3.15	0.00
50.00	5.40	3.15	0.00
51.00	5.40	3.15	0.00
52.00	5.40	3.15	0.00
53.00	5.40	3.15	0.00
54.00	5.40	3.15	0.00
55.00	5.40	3.15	0.00
56.00	5.40	3.15	0.00
57.00	5.40	3.15	0.00
58.00	5.40	3.15	0.00
59.00	5.40	3.15	0.00
60.00	5.40	3.15	0.00
61.00	5.40	3.15	0.00
62.00	5.40	3.15	0.00
63.00	5.40	3.15	0.00
64.00	5.40	3.15	0.00
65.00	5.40	3.15	0.00
66.00	5.40	3.15	0.00
67.00	5.40	3.15	0.00
68.00	5.40	3.15	0.00
69.00	5.40	3.15	0.00
70.00	5.40	3.15	0.00
71.00	5.40	3.15	0.00
72.00	5.40	3.15	0.00

Summary for Subcatchment PR-4: (new Subcat)

Runoff = 2.85 cfs @ 12.09 hrs, Volume= 8,925 cf, Depth= 2.34"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	17,215	79	>75% Grass cover, HSG B
*	28,600	65	Woods, Poor, HSG B
	45,815	70	Weighted Average
	45,815		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-4: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.00	0.00
5.00	0.31	0.00	0.00
6.00	0.39	0.00	0.00
7.00	0.49	0.00	0.00
8.00	0.62	0.00	0.00
9.00	0.79	0.00	0.00
10.00	1.02	0.01	0.02
11.00	1.35	0.05	0.07
12.00	2.70	0.55	**1.56**
13.00	4.05	1.36	**0.31**
14.00	4.38	1.59	0.20
15.00	4.61	1.75	0.16
16.00	4.78	1.88	0.11
17.00	4.91	1.97	0.09
18.00	5.01	2.04	0.07
19.00	5.09	2.11	0.06
20.00	5.17	2.16	0.06
21.00	5.23	2.21	0.05
22.00	5.30	2.26	0.05
23.00	5.35	2.30	0.04
24.00	**5.40**	**2.34**	0.04
25.00	5.40	2.34	0.00
26.00	5.40	2.34	0.00
27.00	5.40	2.34	0.00
28.00	5.40	2.34	0.00
29.00	5.40	2.34	0.00
30.00	5.40	2.34	0.00
31.00	5.40	2.34	0.00
32.00	5.40	2.34	0.00
33.00	5.40	2.34	0.00
34.00	5.40	2.34	0.00
35.00	5.40	2.34	0.00
36.00	5.40	2.34	0.00
37.00	5.40	2.34	0.00
38.00	5.40	2.34	0.00
39.00	5.40	2.34	0.00
40.00	5.40	2.34	0.00
41.00	5.40	2.34	0.00
42.00	5.40	2.34	0.00
43.00	5.40	2.34	0.00
44.00	5.40	2.34	0.00
45.00	5.40	2.34	0.00
46.00	5.40	2.34	0.00
47.00	5.40	2.34	0.00
48.00	5.40	2.34	0.00
49.00	5.40	2.34	0.00
50.00	5.40	2.34	0.00
51.00	5.40	2.34	0.00
52.00	5.40	2.34	0.00
53.00	5.40	2.34	0.00
54.00	5.40	2.34	0.00
55.00	5.40	2.34	0.00
56.00	5.40	2.34	0.00
57.00	5.40	2.34	0.00
58.00	5.40	2.34	0.00
59.00	5.40	2.34	0.00
60.00	5.40	2.34	0.00
61.00	5.40	2.34	0.00
62.00	5.40	2.34	0.00
63.00	5.40	2.34	0.00
64.00	5.40	2.34	0.00
65.00	5.40	2.34	0.00
66.00	5.40	2.34	0.00
67.00	5.40	2.34	0.00
68.00	5.40	2.34	0.00
69.00	5.40	2.34	0.00
70.00	5.40	2.34	0.00
71.00	5.40	2.34	0.00
72.00	5.40	2.34	0.00

Summary for Subcatchment PR-5: (new Subcat)

Runoff = 1.24 cfs @ 12.09 hrs, Volume= 3,860 cf, Depth= 3.54"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	6,834	79	>75% Grass cover, Good, HSG B
	4,438	98	Paved parking, HSG B
*	1,818	65	Woods, Poor, HSG B
	13,090	83	Weighted Average
	8,652		66.10% Pervious Area
	4,438		33.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-5: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.00	0.00
5.00	0.31	0.00	0.00
6.00	0.39	0.00	0.00
7.00	0.49	0.00	0.00
8.00	0.62	0.02	0.01
9.00	0.79	0.06	0.02
10.00	1.02	0.14	0.03
11.00	1.35	0.30	0.06
12.00	2.70	1.21	**0.74**
13.00	4.05	2.33	**0.12**
14.00	4.38	2.62	0.07
15.00	4.61	2.83	0.06
16.00	4.78	2.98	0.04
17.00	4.91	3.09	0.03
18.00	5.01	3.18	0.02
19.00	5.09	3.26	0.02
20.00	5.17	3.33	0.02
21.00	5.23	3.39	0.02
22.00	5.30	3.44	0.02
23.00	5.35	3.49	0.01
24.00	**5.40**	**3.54**	0.01
25.00	5.40	3.54	0.00
26.00	5.40	3.54	0.00
27.00	5.40	3.54	0.00
28.00	5.40	3.54	0.00
29.00	5.40	3.54	0.00
30.00	5.40	3.54	0.00
31.00	5.40	3.54	0.00
32.00	5.40	3.54	0.00
33.00	5.40	3.54	0.00
34.00	5.40	3.54	0.00
35.00	5.40	3.54	0.00
36.00	5.40	3.54	0.00
37.00	5.40	3.54	0.00
38.00	5.40	3.54	0.00
39.00	5.40	3.54	0.00
40.00	5.40	3.54	0.00
41.00	5.40	3.54	0.00
42.00	5.40	3.54	0.00
43.00	5.40	3.54	0.00
44.00	5.40	3.54	0.00
45.00	5.40	3.54	0.00
46.00	5.40	3.54	0.00
47.00	5.40	3.54	0.00
48.00	5.40	3.54	0.00
49.00	5.40	3.54	0.00
50.00	5.40	3.54	0.00
51.00	5.40	3.54	0.00
52.00	5.40	3.54	0.00
53.00	5.40	3.54	0.00
54.00	5.40	3.54	0.00
55.00	5.40	3.54	0.00
56.00	5.40	3.54	0.00
57.00	5.40	3.54	0.00
58.00	5.40	3.54	0.00
59.00	5.40	3.54	0.00
60.00	5.40	3.54	0.00
61.00	5.40	3.54	0.00
62.00	5.40	3.54	0.00
63.00	5.40	3.54	0.00
64.00	5.40	3.54	0.00
65.00	5.40	3.54	0.00
66.00	5.40	3.54	0.00
67.00	5.40	3.54	0.00
68.00	5.40	3.54	0.00
69.00	5.40	3.54	0.00
70.00	5.40	3.54	0.00
71.00	5.40	3.54	0.00
72.00	5.40	3.54	0.00

Summary for Subcatchment PR-6: PR-6

Runoff = 0.66 cfs @ 12.09 hrs, Volume= 2,059 cf, Depth= 2.42"

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 Rainfall=5.40"

	Area (sf)	CN	Description
*	4,183	79	>75% Grass cover, HSG B
*	5,835	65	Woods, Poor, HSG B
*	178	98	Wall
	10,196	71	Weighted Average
	10,018		98.25% Pervious Area
	178		1.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-6: PR-6

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.00	0.00
5.00	0.31	0.00	0.00
6.00	0.39	0.00	0.00
7.00	0.49	0.00	0.00
8.00	0.62	0.00	0.00
9.00	0.79	0.00	0.00
10.00	1.02	0.01	0.01
11.00	1.35	0.06	0.02
12.00	2.70	0.59	**0.36**
13.00	4.05	1.43	**0.07**
14.00	4.38	1.66	0.05
15.00	4.61	1.83	0.04
16.00	4.78	1.95	0.03
17.00	4.91	2.05	0.02
18.00	5.01	2.12	0.02
19.00	5.09	2.19	0.01
20.00	5.17	2.24	0.01
21.00	5.23	2.30	0.01
22.00	5.30	2.34	0.01
23.00	5.35	2.39	0.01
24.00	**5.40**	**2.42**	0.01
25.00	5.40	2.42	0.00
26.00	5.40	2.42	0.00
27.00	5.40	2.42	0.00
28.00	5.40	2.42	0.00
29.00	5.40	2.42	0.00
30.00	5.40	2.42	0.00
31.00	5.40	2.42	0.00
32.00	5.40	2.42	0.00
33.00	5.40	2.42	0.00
34.00	5.40	2.42	0.00
35.00	5.40	2.42	0.00
36.00	5.40	2.42	0.00
37.00	5.40	2.42	0.00
38.00	5.40	2.42	0.00
39.00	5.40	2.42	0.00
40.00	5.40	2.42	0.00
41.00	5.40	2.42	0.00
42.00	5.40	2.42	0.00
43.00	5.40	2.42	0.00
44.00	5.40	2.42	0.00
45.00	5.40	2.42	0.00
46.00	5.40	2.42	0.00
47.00	5.40	2.42	0.00
48.00	5.40	2.42	0.00
49.00	5.40	2.42	0.00
50.00	5.40	2.42	0.00
51.00	5.40	2.42	0.00
52.00	5.40	2.42	0.00
53.00	5.40	2.42	0.00
54.00	5.40	2.42	0.00
55.00	5.40	2.42	0.00
56.00	5.40	2.42	0.00
57.00	5.40	2.42	0.00
58.00	5.40	2.42	0.00
59.00	5.40	2.42	0.00
60.00	5.40	2.42	0.00
61.00	5.40	2.42	0.00
62.00	5.40	2.42	0.00
63.00	5.40	2.42	0.00
64.00	5.40	2.42	0.00
65.00	5.40	2.42	0.00
66.00	5.40	2.42	0.00
67.00	5.40	2.42	0.00
68.00	5.40	2.42	0.00
69.00	5.40	2.42	0.00
70.00	5.40	2.42	0.00
71.00	5.40	2.42	0.00
72.00	5.40	2.42	0.00

Summary for Subcatchment PR-7: PR-7

Runoff = 0.53 cfs @ 12.09 hrs, Volume= 1,633 cf, 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 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	4,865	79	>75% Grass cover, HSG B
*	2,426	65	Woods, Poor, HSG B
	7,291	74	Weighted Average
	7,291		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-7: PR-7

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.00	0.00
5.00	0.31	0.00	0.00
6.00	0.39	0.00	0.00
7.00	0.49	0.00	0.00
8.00	0.62	0.00	0.00
9.00	0.79	0.00	0.00
10.00	1.02	0.03	0.01
11.00	1.35	0.10	0.02
12.00	2.70	0.72	**0.30**
13.00	4.05	1.63	**0.05**
14.00	4.38	1.88	0.04
15.00	4.61	2.06	0.03
16.00	4.78	2.19	0.02
17.00	4.91	2.29	0.02
18.00	5.01	2.37	0.01
19.00	5.09	2.44	0.01
20.00	5.17	2.50	0.01
21.00	5.23	2.55	0.01
22.00	5.30	2.60	0.01
23.00	5.35	2.65	0.01
24.00	**5.40**	**2.69**	0.01
25.00	5.40	2.69	0.00
26.00	5.40	2.69	0.00
27.00	5.40	2.69	0.00
28.00	5.40	2.69	0.00
29.00	5.40	2.69	0.00
30.00	5.40	2.69	0.00
31.00	5.40	2.69	0.00
32.00	5.40	2.69	0.00
33.00	5.40	2.69	0.00
34.00	5.40	2.69	0.00
35.00	5.40	2.69	0.00
36.00	5.40	2.69	0.00
37.00	5.40	2.69	0.00
38.00	5.40	2.69	0.00
39.00	5.40	2.69	0.00
40.00	5.40	2.69	0.00
41.00	5.40	2.69	0.00
42.00	5.40	2.69	0.00
43.00	5.40	2.69	0.00
44.00	5.40	2.69	0.00
45.00	5.40	2.69	0.00
46.00	5.40	2.69	0.00
47.00	5.40	2.69	0.00
48.00	5.40	2.69	0.00
49.00	5.40	2.69	0.00
50.00	5.40	2.69	0.00
51.00	5.40	2.69	0.00
52.00	5.40	2.69	0.00
53.00	5.40	2.69	0.00
54.00	5.40	2.69	0.00
55.00	5.40	2.69	0.00
56.00	5.40	2.69	0.00
57.00	5.40	2.69	0.00
58.00	5.40	2.69	0.00
59.00	5.40	2.69	0.00
60.00	5.40	2.69	0.00
61.00	5.40	2.69	0.00
62.00	5.40	2.69	0.00
63.00	5.40	2.69	0.00
64.00	5.40	2.69	0.00
65.00	5.40	2.69	0.00
66.00	5.40	2.69	0.00
67.00	5.40	2.69	0.00
68.00	5.40	2.69	0.00
69.00	5.40	2.69	0.00
70.00	5.40	2.69	0.00
71.00	5.40	2.69	0.00
72.00	5.40	2.69	0.00

Summary for Subcatchment PR-8: PR-8

Runoff = 19.49 cfs @ 12.12 hrs, Volume= 66,867 cf, Depth= 3.64"

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 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
	58,745	98	Paved parking, HSG A
*	161,798	79	>75% Grass cover, HSG B
	220,543	84	Weighted Average
	161,798		73.36% Pervious Area
	58,745		26.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 grass sf 1%** Grass: Short n= 0.150 P2= 3.20"
1.3	67	0.0150	0.86		**Shallow Concentrated Flow, 67 scf grass 1.5%** Short Grass Pasture Kv= 7.0 fps
8.7	117	Total			

Hydrograph for Subcatchment PR-8: PR-8

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.00	0.00
5.00	0.31	0.00	0.00
6.00	0.39	0.00	0.00
7.00	0.49	0.01	0.05
8.00	0.62	0.03	0.14
9.00	0.79	0.07	0.30
10.00	1.02	0.16	0.55
11.00	1.35	0.33	1.05
12.00	2.70	1.27	**10.13**
13.00	4.05	2.42	**2.07**
14.00	4.38	2.71	1.29
15.00	4.61	2.92	0.97
16.00	4.78	3.07	0.69
17.00	4.91	3.19	0.54
18.00	5.01	3.28	0.42
19.00	5.09	3.36	0.37
20.00	5.17	3.42	0.33
21.00	5.23	3.49	0.31
22.00	5.30	3.54	0.28
23.00	5.35	3.59	0.25
24.00	**5.40**	**3.64**	0.22
25.00	5.40	3.64	0.00
26.00	5.40	3.64	0.00
27.00	5.40	3.64	0.00
28.00	5.40	3.64	0.00
29.00	5.40	3.64	0.00
30.00	5.40	3.64	0.00
31.00	5.40	3.64	0.00
32.00	5.40	3.64	0.00
33.00	5.40	3.64	0.00
34.00	5.40	3.64	0.00
35.00	5.40	3.64	0.00
36.00	5.40	3.64	0.00
37.00	5.40	3.64	0.00
38.00	5.40	3.64	0.00
39.00	5.40	3.64	0.00
40.00	5.40	3.64	0.00
41.00	5.40	3.64	0.00
42.00	5.40	3.64	0.00
43.00	5.40	3.64	0.00
44.00	5.40	3.64	0.00
45.00	5.40	3.64	0.00
46.00	5.40	3.64	0.00
47.00	5.40	3.64	0.00
48.00	5.40	3.64	0.00
49.00	5.40	3.64	0.00
50.00	5.40	3.64	0.00
51.00	5.40	3.64	0.00
52.00	5.40	3.64	0.00
53.00	5.40	3.64	0.00
54.00	5.40	3.64	0.00
55.00	5.40	3.64	0.00
56.00	5.40	3.64	0.00
57.00	5.40	3.64	0.00
58.00	5.40	3.64	0.00
59.00	5.40	3.64	0.00
60.00	5.40	3.64	0.00
61.00	5.40	3.64	0.00
62.00	5.40	3.64	0.00
63.00	5.40	3.64	0.00
64.00	5.40	3.64	0.00
65.00	5.40	3.64	0.00
66.00	5.40	3.64	0.00
67.00	5.40	3.64	0.00
68.00	5.40	3.64	0.00
69.00	5.40	3.64	0.00
70.00	5.40	3.64	0.00
71.00	5.40	3.64	0.00
72.00	5.40	3.64	0.00

Summary for Subcatchment PR-9: PR-9

Runoff = 3.17 cfs @ 12.09 hrs, Volume= 9,962 cf, Depth= 3.74"

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 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	22,546	79	>75% Grass cover, HSG B
	8,270	98	Paved parking, HSG B
*	1,153	98	Paved Parking, HSG B
	31,969	85	Weighted Average
	22,546		70.52% Pervious Area
	9,423		29.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-9: PR-9

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.17	0.00	0.00
4.00	0.23	0.00	0.00
5.00	0.31	0.00	0.00
6.00	0.39	0.00	0.00
7.00	0.49	0.01	0.01
8.00	0.62	0.03	0.02
9.00	0.79	0.09	0.05
10.00	1.02	0.18	0.09
11.00	1.35	0.36	0.16
12.00	2.70	1.34	**1.91**
13.00	4.05	2.50	**0.29**
14.00	4.38	2.80	0.19
15.00	4.61	3.01	0.14
16.00	4.78	3.17	0.10
17.00	4.91	3.29	0.08
18.00	5.01	3.38	0.06
19.00	5.09	3.45	0.05
20.00	5.17	3.52	0.05
21.00	5.23	3.59	0.04
22.00	5.30	3.64	0.04
23.00	5.35	3.69	0.04
24.00	**5.40**	**3.74**	0.03
25.00	5.40	3.74	0.00
26.00	5.40	3.74	0.00
27.00	5.40	3.74	0.00
28.00	5.40	3.74	0.00
29.00	5.40	3.74	0.00
30.00	5.40	3.74	0.00
31.00	5.40	3.74	0.00
32.00	5.40	3.74	0.00
33.00	5.40	3.74	0.00
34.00	5.40	3.74	0.00
35.00	5.40	3.74	0.00
36.00	5.40	3.74	0.00
37.00	5.40	3.74	0.00
38.00	5.40	3.74	0.00
39.00	5.40	3.74	0.00
40.00	5.40	3.74	0.00
41.00	5.40	3.74	0.00
42.00	5.40	3.74	0.00
43.00	5.40	3.74	0.00
44.00	5.40	3.74	0.00
45.00	5.40	3.74	0.00
46.00	5.40	3.74	0.00
47.00	5.40	3.74	0.00
48.00	5.40	3.74	0.00
49.00	5.40	3.74	0.00
50.00	5.40	3.74	0.00
51.00	5.40	3.74	0.00
52.00	5.40	3.74	0.00
53.00	5.40	3.74	0.00
54.00	5.40	3.74	0.00
55.00	5.40	3.74	0.00
56.00	5.40	3.74	0.00
57.00	5.40	3.74	0.00
58.00	5.40	3.74	0.00
59.00	5.40	3.74	0.00
60.00	5.40	3.74	0.00
61.00	5.40	3.74	0.00
62.00	5.40	3.74	0.00
63.00	5.40	3.74	0.00
64.00	5.40	3.74	0.00
65.00	5.40	3.74	0.00
66.00	5.40	3.74	0.00
67.00	5.40	3.74	0.00
68.00	5.40	3.74	0.00
69.00	5.40	3.74	0.00
70.00	5.40	3.74	0.00
71.00	5.40	3.74	0.00
72.00	5.40	3.74	0.00

Summary for Subcatchment PR-BLDG: PR-BLDG

Runoff = 7.67 cfs @ 12.08 hrs, Volume= 27,200 cf, Depth= 5.16"

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 Rainfall=5.40"

Area (sf)	CN	Description
63,223	98	Paved parking, HSG B
63,223		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-BLDG: PR-BLDG

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.01
2.00	0.11	0.02	0.03
3.00	0.17	0.05	0.05
4.00	0.23	0.09	0.07
5.00	0.31	0.15	0.09
6.00	0.39	0.22	0.11
7.00	0.49	0.31	0.15
8.00	0.62	0.42	0.19
9.00	0.79	0.59	0.27
10.00	1.02	0.81	0.37
11.00	1.35	1.13	0.55
12.00	2.70	2.47	**4.83**
13.00	4.05	3.81	**0.64**
14.00	4.38	4.14	0.40
15.00	4.61	4.38	0.30
16.00	4.78	4.55	0.21
17.00	4.91	4.67	0.17
18.00	5.01	4.77	0.13
19.00	5.09	4.86	0.12
20.00	5.17	4.93	0.10
21.00	5.23	5.00	0.09
22.00	5.30	5.06	0.09
23.00	5.35	5.11	0.08
24.00	**5.40**	**5.16**	0.07
25.00	5.40	5.16	0.00
26.00	5.40	5.16	0.00
27.00	5.40	5.16	0.00
28.00	5.40	5.16	0.00
29.00	5.40	5.16	0.00
30.00	5.40	5.16	0.00
31.00	5.40	5.16	0.00
32.00	5.40	5.16	0.00
33.00	5.40	5.16	0.00
34.00	5.40	5.16	0.00
35.00	5.40	5.16	0.00
36.00	5.40	5.16	0.00
37.00	5.40	5.16	0.00
38.00	5.40	5.16	0.00
39.00	5.40	5.16	0.00
40.00	5.40	5.16	0.00
41.00	5.40	5.16	0.00
42.00	5.40	5.16	0.00
43.00	5.40	5.16	0.00
44.00	5.40	5.16	0.00
45.00	5.40	5.16	0.00
46.00	5.40	5.16	0.00
47.00	5.40	5.16	0.00
48.00	5.40	5.16	0.00
49.00	5.40	5.16	0.00
50.00	5.40	5.16	0.00
51.00	5.40	5.16	0.00
52.00	5.40	5.16	0.00
53.00	5.40	5.16	0.00
54.00	5.40	5.16	0.00
55.00	5.40	5.16	0.00
56.00	5.40	5.16	0.00
57.00	5.40	5.16	0.00
58.00	5.40	5.16	0.00
59.00	5.40	5.16	0.00
60.00	5.40	5.16	0.00
61.00	5.40	5.16	0.00
62.00	5.40	5.16	0.00
63.00	5.40	5.16	0.00
64.00	5.40	5.16	0.00
65.00	5.40	5.16	0.00
66.00	5.40	5.16	0.00
67.00	5.40	5.16	0.00
68.00	5.40	5.16	0.00
69.00	5.40	5.16	0.00
70.00	5.40	5.16	0.00
71.00	5.40	5.16	0.00
72.00	5.40	5.16	0.00

Summary for Reach POA-1: To Main Street

Inflow Area = 315,759 sf, 59.36% Impervious, Inflow Depth = 2.70" for 25 yr event
Inflow = 14.78 cfs @ 12.13 hrs, Volume= 71,052 cf
Outflow = 14.78 cfs @ 12.13 hrs, Volume= 71,052 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-1: To Main Street

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.01		0.01
7.00	0.03		0.03
8.00	0.05		0.05
9.00	0.09		0.09
10.00	0.72		0.72
11.00	1.24		1.24
12.00	**9.24**		**9.24**
13.00	**2.98**		**2.98**
14.00	1.77		1.77
15.00	1.26		1.26
16.00	0.84		0.84
17.00	0.60		0.60
18.00	0.42		0.42
19.00	0.33		0.33
20.00	0.27		0.27
21.00	0.23		0.23
22.00	0.18		0.18
23.00	0.15		0.15
24.00	0.11		0.11
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-2: To Existing DMH North of Site

Inflow Area = 313,399 sf, 34.68% Impervious, Inflow Depth = 3.76" for 25 yr event
Inflow = 17.94 cfs @ 12.12 hrs, Volume= 98,195 cf
Outflow = 17.94 cfs @ 12.12 hrs, Volume= 98,195 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-2: To Existing DMH North of Site

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.05		0.05
8.00	0.22		0.22
9.00	0.45		0.45
10.00	0.83		0.83
11.00	1.53		1.53
12.00	**11.45**		**11.45**
13.00	**4.89**		**4.89**
14.00	1.92		1.92
15.00	1.43		1.43
16.00	1.03		1.03
17.00	0.80		0.80
18.00	0.62		0.62
19.00	0.53		0.53
20.00	0.48		0.48
21.00	0.43		0.43
22.00	0.39		0.39
23.00	0.35		0.35
24.00	0.31		0.31
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-3: NORTH EAST WETLANDS

Inflow Area = 37,434 sf, 0.00% Impervious, Inflow Depth = 3.15" for 25 yr event
Inflow = 2.86 cfs @ 12.13 hrs, Volume= 9,823 cf
Outflow = 2.86 cfs @ 12.13 hrs, Volume= 9,823 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-3: NORTH EAST WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.01		0.01
9.00	0.03		0.03
10.00	0.06		0.06
11.00	0.13		0.13
12.00	**1.42**		**1.42**
13.00	**0.33**		**0.33**
14.00	0.20		0.20
15.00	0.15		0.15
16.00	0.11		0.11
17.00	0.09		0.09
18.00	0.07		0.07
19.00	0.06		0.06
20.00	0.05		0.05
21.00	0.05		0.05
22.00	0.04		0.04
23.00	0.04		0.04
24.00	0.04		0.04
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-4: SOUTH EAST WETLANDS

Inflow Area = 45,815 sf, 0.00% Impervious, Inflow Depth = 2.34" for 25 yr event
Inflow = 2.85 cfs @ 12.09 hrs, Volume= 8,925 cf
Outflow = 2.85 cfs @ 12.09 hrs, Volume= 8,925 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-4: SOUTH EAST WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.00		0.00
10.00	0.02		0.02
11.00	0.07		0.07
12.00	**1.56**		**1.56**
13.00	**0.31**		**0.31**
14.00	0.20		0.20
15.00	0.16		0.16
16.00	0.11		0.11
17.00	0.09		0.09
18.00	0.07		0.07
19.00	0.06		0.06
20.00	0.06		0.06
21.00	0.05		0.05
22.00	0.05		0.05
23.00	0.04		0.04
24.00	0.04		0.04
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-5: CHAMPNEY STREET

Inflow Area = 13,090 sf, 33.90% Impervious, Inflow Depth = 3.54" for 25 yr event
Inflow = 1.24 cfs @ 12.09 hrs, Volume= 3,860 cf
Outflow = 1.24 cfs @ 12.09 hrs, Volume= 3,860 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-5: CHAMPNEY STREET

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.01		0.01
9.00	0.02		0.02
10.00	0.03		0.03
11.00	0.06		0.06
12.00	**0.74**		**0.74**
13.00	**0.12**		**0.12**
14.00	0.07		0.07
15.00	0.06		0.06
16.00	0.04		0.04
17.00	0.03		0.03
18.00	0.02		0.02
19.00	0.02		0.02
20.00	0.02		0.02
21.00	0.02		0.02
22.00	0.02		0.02
23.00	0.01		0.01
24.00	0.01		0.01
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Pond #1A: INF#1A

Inflow Area = 135,366 sf, 88.03% Impervious, Inflow Depth = 4.87" for 25 yr event
Inflow = 15.37 cfs @ 12.08 hrs, Volume= 54,900 cf
Outflow = 14.83 cfs @ 12.11 hrs, Volume= 54,900 cf, Atten= 3%, Lag= 1.4 min
Discarded = 0.05 cfs @ 3.62 hrs, Volume= 7,665 cf
Primary = 14.78 cfs @ 12.11 hrs, Volume= 47,234 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 325.32' @ 12.11 hrs Surf.Area= 2,119 sf Storage= 6,271 cf
Flood Elev= 327.75' Surf.Area= 2,119 sf Storage= 8,726 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 112.1 min (874.7 - 762.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.00'	3,720 cf	**30.50'W x 69.49'L x 6.75'H Field A** 14,307 cf Overall - 5,006 cf Embedded = 9,300 cf x 40.0% Voids
#2A	321.75'	5,006 cf	**ADS_StormTech MC-4500 +Cap** x 45 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 45 Chambers in 3 Rows Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,726 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.90'	**24.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 321.90' / 321.86' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#3	Device 2	325.00'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	323.50'	**15.0" W x 12.0" H Vert. Orifice/Grate** X 2 rows with 6.0" cc spacing C= 0.600

Discarded OutFlow Max=0.05 cfs @ 3.62 hrs HW=321.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=14.75 cfs @ 12.11 hrs HW=325.32' TW=323.56' (Dynamic Tailwater)
└**2=Culvert** (Passes 14.75 cfs of 15.82 cfs potential flow)
  ├**3=Broad-Crested Rectangular Weir** (Weir Controls 2.55 cfs @ 1.61 fps)
  └**4=Orifice/Grate** (Orifice Controls 12.20 cfs @ 4.88 fps)

Pond #1A: INF#1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

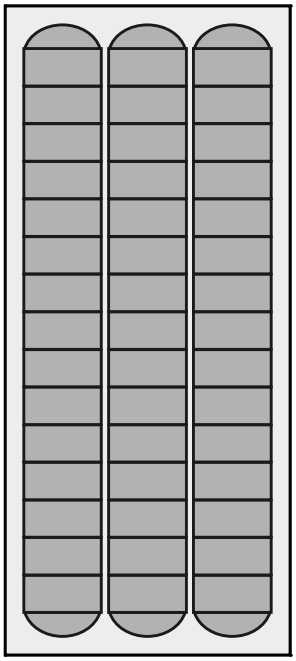
15 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 65.49' Row Length +24.0" End Stone x 2 = 69.49' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 24.0" Side Stone x 2 = 30.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

45 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 5,006.3 cf Chamber Storage

14,306.6 cf Field - 5,006.3 cf Chambers = 9,300.3 cf Stone x 40.0% Voids = 3,720.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,726.4 cf = 0.200 af
Overall Storage Efficiency = 61.0%
Overall System Size = 69.49' x 30.50' x 6.75'

45 Chambers
529.9 cy Field
344.5 cy Stone



Hydrograph for Pond #1A: INF#1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.00	0.00	0.00	0.00
2.00	0.03	0	321.00	0.03	**0.03**	0.00
4.00	0.10	112	321.13	0.05	**0.05**	0.00
6.00	0.16	687	321.78	0.05	0.05	0.00
8.00	0.31	2,000	322.56	0.05	0.05	0.00
10.00	0.72	4,003	323.79	0.67	0.05	0.62
12.00	**9.98**	**5,492**	**324.77**	**7.90**	0.05	**7.85**
14.00	**0.83**	**4,113**	**323.86**	**0.91**	0.05	**0.86**
16.00	0.43	3,907	323.73	0.48	0.05	0.43
18.00	0.25	3,791	323.65	0.29	0.05	0.24
20.00	0.20	3,744	323.62	0.23	0.05	0.18
22.00	0.16	3,713	323.61	0.19	0.05	0.14
24.00	0.13	3,681	323.58	0.15	0.05	0.10
26.00	0.00	3,288	323.34	0.05	0.05	0.00
28.00	0.00	2,928	323.12	0.05	0.05	0.00
30.00	0.00	2,568	322.90	0.05	0.05	0.00
32.00	0.00	2,208	322.68	0.05	0.05	0.00
34.00	0.00	1,847	322.47	0.05	0.05	0.00
36.00	0.00	1,487	322.25	0.05	0.05	0.00
38.00	0.00	1,127	322.04	0.05	0.05	0.00
40.00	0.00	766	321.83	0.05	0.05	0.00
42.00	0.00	406	321.48	0.05	0.05	0.00
44.00	0.00	46	321.05	0.05	0.05	0.00
46.00	0.00	0	321.00	0.00	0.00	0.00
48.00	0.00	0	321.00	0.00	0.00	0.00
50.00	0.00	0	321.00	0.00	0.00	0.00
52.00	0.00	0	321.00	0.00	0.00	0.00
54.00	0.00	0	321.00	0.00	0.00	0.00
56.00	0.00	0	321.00	0.00	0.00	0.00
58.00	0.00	0	321.00	0.00	0.00	0.00
60.00	0.00	0	321.00	0.00	0.00	0.00
62.00	0.00	0	321.00	0.00	0.00	0.00
64.00	0.00	0	321.00	0.00	0.00	0.00
66.00	0.00	0	321.00	0.00	0.00	0.00
68.00	0.00	0	321.00	0.00	0.00	0.00
70.00	0.00	0	321.00	0.00	0.00	0.00
72.00	0.00	0	321.00	0.00	0.00	0.00

Stage-Area-Storage for Pond #1A: INF#1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.00	**2,119**	0
321.10	2,119	85
321.20	2,119	170
321.30	2,119	254
321.40	2,119	339
321.50	2,119	424
321.60	2,119	509
321.70	2,119	593
321.80	2,119	721
321.90	2,119	891
322.00	2,119	1,061
322.10	2,119	1,230
322.20	2,119	1,399
322.30	2,119	1,567
322.40	2,119	1,735
322.50	2,119	1,903
322.60	2,119	2,070
322.70	2,119	2,237
322.80	2,119	2,402
322.90	2,119	2,568
323.00	2,119	2,732
323.10	2,119	2,897
323.20	2,119	3,060
323.30	2,119	3,222
323.40	2,119	3,384
323.50	2,119	3,545
323.60	2,119	3,705
323.70	2,119	3,864
323.80	2,119	4,023
323.90	2,119	4,180
324.00	2,119	4,336
324.10	2,119	4,491
324.20	2,119	4,645
324.30	2,119	4,798
324.40	2,119	4,950
324.50	2,119	5,100
324.60	2,119	5,249
324.70	2,119	5,396
324.80	2,119	5,542
324.90	2,119	5,687
325.00	2,119	5,830
325.10	2,119	5,971
325.20	2,119	6,110
325.30	2,119	6,247
325.40	2,119	6,382
325.50	2,119	6,515
325.60	2,119	6,646
325.70	2,119	6,774
325.80	2,119	6,899
325.90	2,119	7,021
326.00	2,119	7,140
326.10	2,119	7,255
326.20	2,119	7,366
326.30	2,119	7,469
326.40	2,119	7,566
326.50	2,119	7,658
326.60	2,119	7,748
326.70	2,119	7,836
326.80	2,119	7,921
326.90	2,119	8,006
327.00	2,119	8,091
327.10	2,119	8,175
327.20	2,119	8,260
327.30	2,119	8,345
327.40	2,119	8,430
327.50	2,119	8,514
327.60	2,119	8,599
327.70	2,119	**8,684**

Summary for Pond #1B: INF#1B

Inflow Area = 135,366 sf, 88.03% Impervious, Inflow Depth = 4.19" for 25 yr event
Inflow = 14.78 cfs @ 12.11 hrs, Volume= 47,234 cf
Outflow = 10.50 cfs @ 12.19 hrs, Volume= 47,234 cf, Atten= 29%, Lag= 5.2 min
Discarded = 0.05 cfs @ 9.42 hrs, Volume= 2,968 cf
Primary = 10.46 cfs @ 12.19 hrs, Volume= 44,266 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 324.17' @ 12.19 hrs Surf.Area= 1,997 sf Storage= 4,326 cf
Flood Elev= 327.75' Surf.Area= 1,997 sf Storage= 8,203 cf

Plug-Flow detention time= 11.7 min calculated for 47,228 cf (100% of inflow)
Center-of-Mass det. time= 11.7 min (804.6 - 792.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.00'	3,516 cf	**30.50'W x 65.47'L x 6.75'H Field A** 13,478 cf Overall - 4,687 cf Embedded = 8,791 cf x 40.0% Voids
#2A	321.75'	4,687 cf	**ADS_StormTech MC-4500 +Cap** x 42 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 42 Chambers in 3 Rows Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,203 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.00'	**18.0" Round Culvert** L= 8.0' Ke= 0.900 Inlet / Outlet Invert= 321.00' / 320.44' S= 0.0700 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#3	Device 2	321.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 9.42 hrs HW=321.08' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=10.45 cfs @ 12.19 hrs HW=324.17' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 10.45 cfs @ 5.92 fps)
└**3=Broad-Crested Rectangular Weir** (Passes 10.45 cfs of 72.48 cfs potential flow)

Pond #1B: INF#1B - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

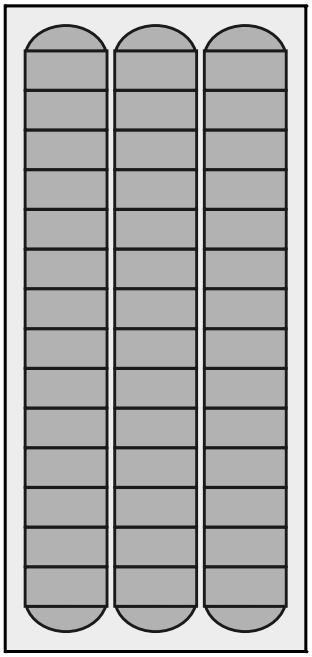
14 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 61.47' Row Length +24.0" End Stone x 2 = 65.47' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 24.0" Side Stone x 2 = 30.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

42 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,686.8 cf Chamber Storage

13,478.0 cf Field - 4,686.8 cf Chambers = 8,791.2 cf Stone x 40.0% Voids = 3,516.5 cf Stone Storage

Chamber Storage + Stone Storage = 8,203.3 cf = 0.188 af
Overall Storage Efficiency = 60.9%
Overall System Size = 65.47' x 30.50' x 6.75'

42 Chambers
499.2 cy Field
325.6 cy Stone



Hydrograph for Pond #1B: INF#1B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.00	0.00	0.00	0.00
2.00	0.00	0	321.00	0.00	0.00	0.00
4.00	0.00	0	321.00	0.00	0.00	0.00
6.00	0.00	0	321.00	0.00	0.00	0.00
8.00	0.00	0	321.00	0.00	**0.00**	0.00
10.00	0.62	493	321.62	0.61	**0.05**	0.56
12.00	**7.85**	**1,787**	**322.50**	**5.86**	0.05	**5.82**
14.00	**0.86**	**520**	**321.65**	**0.87**	0.05	**0.82**
16.00	0.43	473	321.59	0.44	0.05	0.39
18.00	0.24	446	321.56	0.25	0.05	0.20
20.00	0.18	435	321.54	0.18	0.05	0.13
22.00	0.14	427	321.53	0.14	0.05	0.09
24.00	0.10	419	321.52	0.10	0.05	0.05
26.00	0.00	125	321.16	0.05	0.05	0.00
28.00	0.00	0	321.00	0.00	0.00	0.00
30.00	0.00	0	321.00	0.00	0.00	0.00
32.00	0.00	0	321.00	0.00	0.00	0.00
34.00	0.00	0	321.00	0.00	0.00	0.00
36.00	0.00	0	321.00	0.00	0.00	0.00
38.00	0.00	0	321.00	0.00	0.00	0.00
40.00	0.00	0	321.00	0.00	0.00	0.00
42.00	0.00	0	321.00	0.00	0.00	0.00
44.00	0.00	0	321.00	0.00	0.00	0.00
46.00	0.00	0	321.00	0.00	0.00	0.00
48.00	0.00	0	321.00	0.00	0.00	0.00
50.00	0.00	0	321.00	0.00	0.00	0.00
52.00	0.00	0	321.00	0.00	0.00	0.00
54.00	0.00	0	321.00	0.00	0.00	0.00
56.00	0.00	0	321.00	0.00	0.00	0.00
58.00	0.00	0	321.00	0.00	0.00	0.00
60.00	0.00	0	321.00	0.00	0.00	0.00
62.00	0.00	0	321.00	0.00	0.00	0.00
64.00	0.00	0	321.00	0.00	0.00	0.00
66.00	0.00	0	321.00	0.00	0.00	0.00
68.00	0.00	0	321.00	0.00	0.00	0.00
70.00	0.00	0	321.00	0.00	0.00	0.00
72.00	0.00	0	321.00	0.00	0.00	0.00

Stage-Area-Storage for Pond #1B: INF#1B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.00	**1,997**	0
321.10	1,997	80
321.20	1,997	160
321.30	1,997	240
321.40	1,997	319
321.50	1,997	399
321.60	1,997	479
321.70	1,997	559
321.80	1,997	679
321.90	1,997	839
322.00	1,997	998
322.10	1,997	1,157
322.20	1,997	1,316
322.30	1,997	1,474
322.40	1,997	1,632
322.50	1,997	1,789
322.60	1,997	1,946
322.70	1,997	2,102
322.80	1,997	2,258
322.90	1,997	2,413
323.00	1,997	2,568
323.10	1,997	2,722
323.20	1,997	2,876
323.30	1,997	3,028
323.40	1,997	3,180
323.50	1,997	3,331
323.60	1,997	3,482
323.70	1,997	3,631
323.80	1,997	3,780
323.90	1,997	3,928
324.00	1,997	4,074
324.10	1,997	4,220
324.20	1,997	4,365
324.30	1,997	4,508
324.40	1,997	4,651
324.50	1,997	4,792
324.60	1,997	4,932
324.70	1,997	5,070
324.80	1,997	5,208
324.90	1,997	5,343
325.00	1,997	5,478
325.10	1,997	5,610
325.20	1,997	5,741
325.30	1,997	5,870
325.40	1,997	5,997
325.50	1,997	6,122
325.60	1,997	6,245
325.70	1,997	6,365
325.80	1,997	6,483
325.90	1,997	6,598
326.00	1,997	6,710
326.10	1,997	6,818
326.20	1,997	6,922
326.30	1,997	7,019
326.40	1,997	7,110
326.50	1,997	7,197
326.60	1,997	7,282
326.70	1,997	7,364
326.80	1,997	7,445
326.90	1,997	7,524
327.00	1,997	7,604
327.10	1,997	7,684
327.20	1,997	7,764
327.30	1,997	7,844
327.40	1,997	7,924
327.50	1,997	8,004
327.60	1,997	8,083
327.70	1,997	**8,163**

Summary for Pond Forebay #1: Sediment Forebay #1

Inflow Area = 15,164 sf, 79.13% Impervious, Inflow Depth = 4.70" for 25 yr event
Inflow = 1.78 cfs @ 12.08 hrs, Volume= 5,943 cf
Outflow = 1.76 cfs @ 12.09 hrs, Volume= 5,369 cf, Atten= 1%, Lag= 0.6 min
Primary = 1.76 cfs @ 12.09 hrs, Volume= 5,369 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 332.68' @ 12.09 hrs Surf.Area= 529 sf Storage= 664 cf

Plug-Flow detention time= 82.0 min calculated for 5,369 cf (90% of inflow)
Center-of-Mass det. time= 34.2 min (805.5 - 771.3)

Volume	Invert	Avail.Storage	Storage Description
#1	330.00'	848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
330.00	0	0	0
331.00	179	90	90
332.00	365	272	362
333.00	607	486	848

Device	Routing	Invert	Outlet Devices
#1	Primary	332.50'	**10.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=1.76 cfs @ 12.09 hrs HW=332.68' TW=331.24' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.76 cfs @ 1.00 fps)

Hydrograph for Pond Forebay #1: Sediment Forebay #1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	330.00	0.00
2.00	0.00	0	330.00	0.00
4.00	0.01	17	330.43	0.00
6.00	0.01	91	331.01	0.00
8.00	0.03	256	331.69	0.00
10.00	0.07	585	332.52	0.07
12.00	**1.11**	**636**	**332.62**	**1.01**
14.00	**0.10**	**587**	**332.53**	**0.10**
16.00	0.05	582	332.52	0.05
18.00	0.03	580	332.51	0.03
20.00	0.02	579	332.51	0.02
22.00	0.02	579	332.51	0.02
24.00	0.02	578	332.51	0.02
26.00	0.00	574	332.50	0.00
28.00	0.00	574	332.50	0.00
30.00	0.00	574	332.50	0.00
32.00	0.00	574	332.50	0.00
34.00	0.00	574	332.50	0.00
36.00	0.00	574	332.50	0.00
38.00	0.00	574	332.50	0.00
40.00	0.00	574	332.50	0.00
42.00	0.00	574	332.50	0.00
44.00	0.00	574	332.50	0.00
46.00	0.00	574	332.50	0.00
48.00	0.00	574	332.50	0.00
50.00	0.00	574	332.50	0.00
52.00	0.00	574	332.50	0.00
54.00	0.00	574	332.50	0.00
56.00	0.00	574	332.50	0.00
58.00	0.00	574	332.50	0.00
60.00	0.00	574	332.50	0.00
62.00	0.00	574	332.50	0.00
64.00	0.00	574	332.50	0.00
66.00	0.00	574	332.50	0.00
68.00	0.00	574	332.50	0.00
70.00	0.00	574	332.50	0.00
72.00	0.00	574	332.50	0.00

Stage-Area-Storage for Pond Forebay #1: Sediment Forebay #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
330.00	0	0
330.05	9	0
330.10	18	1
330.15	27	2
330.20	36	4
330.25	45	6
330.30	54	8
330.35	63	11
330.40	72	14
330.45	81	18
330.50	90	22
330.55	98	27
330.60	107	32
330.65	116	38
330.70	125	44
330.75	134	50
330.80	143	57
330.85	152	65
330.90	161	72
330.95	170	81
331.00	179	90
331.05	188	99
331.10	198	108
331.15	207	118
331.20	216	129
331.25	226	140
331.30	235	152
331.35	244	164
331.40	253	176
331.45	263	189
331.50	272	202
331.55	281	216
331.60	291	230
331.65	300	245
331.70	309	260
331.75	319	276
331.80	328	292
331.85	337	309
331.90	346	326
331.95	356	343
332.00	365	362
332.05	377	380
332.10	389	399
332.15	401	419
332.20	413	439
332.25	426	460
332.30	438	482
332.35	450	504
332.40	462	527
332.45	474	550
332.50	486	574
332.55	498	599
332.60	510	624
332.65	522	650
332.70	534	676
332.75	547	703
332.80	559	731
332.85	571	759
332.90	583	788
332.95	595	817
333.00	**607**	**848**

Summary for Pond Inf-2: Inf-2

Inflow Area = 120,105 sf, 40.62% Impervious, Inflow Depth = 3.95" for 25 yr event
Inflow = 11.69 cfs @ 12.11 hrs, Volume= 39,489 cf
Outflow = 1.16 cfs @ 13.00 hrs, Volume= 39,490 cf, Atten= 90%, Lag= 53.4 min
Discarded = 0.14 cfs @ 9.16 hrs, Volume= 30,842 cf
Primary = 1.02 cfs @ 13.00 hrs, Volume= 8,648 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 322.00' @ 13.00 hrs Surf.Area= 5,967 sf Storage= 22,699 cf
Flood Elev= 323.33' Surf.Area= 5,967 sf Storage= 25,910 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1,151.3 min (1,951.5 - 800.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	316.58'	9,579 cf	**46.67'W x 127.87'L x 6.75'H Field A** 40,278 cf Overall - 16,331 cf Embedded = 23,947 cf x 40.0% Voids
#2A	317.33'	16,331 cf	**ADS_StormTech MC-4500 +Cap** x 150 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 150 Chambers in 5 Rows Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf
		25,910 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	316.58'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	317.33'	**12.0" Round Culvert** L= 18.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 317.33' / 316.33' S= 0.0556 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#3	Device 2	321.83'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.14 cfs @ 9.16 hrs HW=316.65' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=1.02 cfs @ 13.00 hrs HW=322.00' TW=0.00' (Dynamic Tailwater)
↑└**2=Culvert** (Passes 1.02 cfs of 6.10 cfs potential flow)
↑└**3=Broad-Crested Rectangular Weir** (Weir Controls 1.02 cfs @ 1.17 fps)

Pond Inf-2: Inf-2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

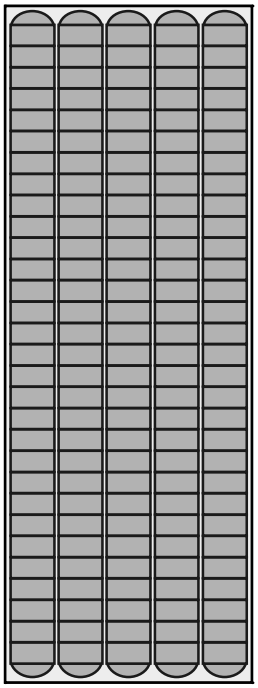
30 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 125.87' Row Length +12.0" End Stone x 2 = 127.87' Base Length
5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

150 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 5 Rows = 16,330.6 cf Chamber Storage

40,278.0 cf Field - 16,330.6 cf Chambers = 23,947.4 cf Stone x 40.0% Voids = 9,579.0 cf Stone Storage

Chamber Storage + Stone Storage = 25,909.5 cf = 0.595 af
Overall Storage Efficiency = 64.3%
Overall System Size = 127.87' x 46.67' x 6.75'

150 Chambers
1,491.8 cy Field
886.9 cy Stone



Hydrograph for Pond Inf-2: Inf-2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	316.58	0.00	0.00	0.00
2.00	0.00	0	316.58	0.00	0.00	0.00
4.00	0.00	0	316.58	0.00	0.00	0.00
6.00	0.02	0	316.58	0.02	0.02	0.00
8.00	0.12	0	316.58	0.12	**0.12**	0.00
10.00	0.38	680	316.86	0.14	**0.14**	0.00
12.00	**6.38**	**8,212**	**318.59**	**0.14**	0.14	**0.00**
14.00	**0.72**	**22,565**	**321.95**	**0.76**	0.14	**0.61**
16.00	0.39	22,418	321.90	0.41	0.14	0.27
18.00	0.23	22,326	321.87	0.25	0.14	0.11
20.00	0.19	22,281	321.85	0.19	0.14	0.05
22.00	0.15	22,248	321.84	0.16	0.14	0.02
24.00	0.12	22,184	321.82	0.14	0.14	0.00
26.00	0.00	21,223	321.53	0.14	0.14	0.00
28.00	0.00	20,209	321.25	0.14	0.14	0.00
30.00	0.00	19,194	320.99	0.14	0.14	0.00
32.00	0.00	18,180	320.74	0.14	0.14	0.00
34.00	0.00	17,166	320.50	0.14	0.14	0.00
36.00	0.00	16,151	320.27	0.14	0.14	0.00
38.00	0.00	15,137	320.04	0.14	0.14	0.00
40.00	0.00	14,122	319.82	0.14	0.14	0.00
42.00	0.00	13,108	319.60	0.14	0.14	0.00
44.00	0.00	12,093	319.39	0.14	0.14	0.00
46.00	0.00	11,079	319.18	0.14	0.14	0.00
48.00	0.00	10,065	318.97	0.14	0.14	0.00
50.00	0.00	9,050	318.76	0.14	0.14	0.00
52.00	0.00	8,036	318.56	0.14	0.14	0.00
54.00	0.00	7,021	318.35	0.14	0.14	0.00
56.00	0.00	6,007	318.15	0.14	0.14	0.00
58.00	0.00	4,993	317.95	0.14	0.14	0.00
60.00	0.00	3,978	317.75	0.14	0.14	0.00
62.00	0.00	2,964	317.56	0.14	0.14	0.00
64.00	0.00	1,949	317.36	0.14	0.14	0.00
66.00	0.00	935	316.97	0.14	0.14	0.00
68.00	0.00	0	316.58	0.00	0.00	0.00
70.00	0.00	0	316.58	0.00	0.00	0.00
72.00	0.00	0	316.58	0.00	0.00	0.00

Stage-Area-Storage for Pond Inf-2: Inf-2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
316.58	**5,967**	0
316.68	5,967	239
316.78	5,967	477
316.88	5,967	716
316.98	5,967	955
317.08	5,967	1,193
317.18	5,967	1,432
317.28	5,967	1,671
317.38	5,967	2,049
317.48	5,967	2,566
317.58	5,967	3,081
317.68	5,967	3,596
317.78	5,967	4,109
317.88	5,967	4,621
317.98	5,967	5,131
318.08	5,967	5,639
318.18	5,967	6,146
318.28	5,967	6,652
318.38	5,967	7,155
318.48	5,967	7,657
318.58	5,967	8,156
318.68	5,967	8,653
318.78	5,967	9,148
318.88	5,967	9,641
318.98	5,967	10,130
319.08	5,967	10,618
319.18	5,967	11,102
319.28	5,967	11,583
319.38	5,967	12,062
319.48	5,967	12,537
319.58	5,967	13,008
319.68	5,967	13,477
319.78	5,967	13,941
319.88	5,967	14,402
319.98	5,967	14,858
320.08	5,967	15,311
320.18	5,967	15,758
320.28	5,967	16,202
320.38	5,967	16,640
320.48	5,967	17,073
320.58	5,967	17,501
320.68	5,967	17,924
320.78	5,967	18,340
320.88	5,967	18,749
320.98	5,967	19,152
321.08	5,967	19,548
321.18	5,967	19,936
321.28	5,967	20,316
321.38	5,967	20,687
321.48	5,967	21,048
321.58	5,967	21,399
321.68	5,967	21,736
321.78	5,967	22,058
321.88	5,967	22,358
321.98	5,967	22,634
322.08	5,967	22,897
322.18	5,967	23,153
322.28	5,967	23,402
322.38	5,967	23,642
322.48	5,967	23,881
322.58	5,967	24,119
322.68	5,967	24,358
322.78	5,967	24,597
322.88	5,967	24,835
322.98	5,967	25,074
323.08	5,967	25,313
323.18	5,967	25,552
323.28	5,967	**25,790**

Summary for Pond Inf-3: INF#3

Inflow Area = 60,887 sf, 66.57% Impervious, Inflow Depth = 4.48" for 25 yr event
Inflow = 6.93 cfs @ 12.08 hrs, Volume= 22,734 cf
Outflow = 6.71 cfs @ 12.11 hrs, Volume= 22,734 cf, Atten= 3%, Lag= 1.2 min
Discarded = 0.01 cfs @ 4.78 hrs, Volume= 1,369 cf
Primary = 6.70 cfs @ 12.11 hrs, Volume= 21,366 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 323.27' @ 12.11 hrs Surf.Area= 588 sf Storage= 676 cf
Flood Elev= 325.00' Surf.Area= 588 sf Storage= 1,209 cf

Plug-Flow detention time= 20.6 min calculated for 22,731 cf (100% of inflow)
Center-of-Mass det. time= 20.7 min (801.0 - 780.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.50'	566 cf	**11.00'W x 53.46'L x 3.50'H Field A** 2,058 cf Overall - 643 cf Embedded = 1,415 cf x 40.0% Voids
#2A	322.00'	643 cf	**ADS_StormTech SC-740 +Cap** x 14 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 14 Chambers in 2 Rows
		1,209 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.50'	**18.0" Round Culvert** L= 5.0' Ke= 0.900 Inlet / Outlet Invert= 321.50' / 321.45' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf
#3	Device 2	322.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 4.78 hrs HW=321.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=6.69 cfs @ 12.11 hrs HW=323.27' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Barrel Controls 6.69 cfs @ 4.04 fps)
↑—**3=Broad-Crested Rectangular Weir** (Passes 6.69 cfs of 11.07 cfs potential flow)

Pond Inf-3: INF#3 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

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

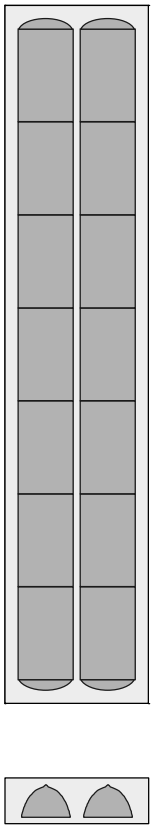
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

14 Chambers x 45.9 cf = 643.2 cf Chamber Storage

2,058.1 cf Field - 643.2 cf Chambers = 1,414.9 cf Stone x 40.0% Voids = 566.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,209.1 cf = 0.028 af
Overall Storage Efficiency = 58.8%
Overall System Size = 53.46' x 11.00' x 3.50'

14 Chambers
76.2 cy Field
52.4 cy Stone



Hydrograph for Pond Inf-3: INF#3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.50	0.00	0.00	0.00
2.00	0.00	0	321.50	0.00	0.00	0.00
4.00	0.01	0	321.50	0.01	**0.01**	0.00
6.00	0.04	88	321.88	0.01	**0.01**	0.00
8.00	0.11	360	322.54	0.11	0.01	0.09
10.00	0.27	375	322.57	0.27	0.01	0.25
12.00	**4.29**	**528**	**322.92**	**4.03**	0.01	**4.02**
14.00	**0.38**	**383**	**322.59**	**0.38**	0.01	**0.37**
16.00	0.20	369	322.56	0.20	0.01	0.19
18.00	0.12	362	322.54	0.12	0.01	0.11
20.00	0.10	359	322.53	0.10	0.01	0.08
22.00	0.08	357	322.53	0.08	0.01	0.07
24.00	0.06	355	322.52	0.06	0.01	0.05
26.00	0.00	255	322.30	0.01	0.01	0.00
28.00	0.00	155	322.08	0.01	0.01	0.00
30.00	0.00	55	321.74	0.01	0.01	0.00
32.00	0.00	0	321.50	0.00	0.00	0.00
34.00	0.00	0	321.50	0.00	0.00	0.00
36.00	0.00	0	321.50	0.00	0.00	0.00
38.00	0.00	0	321.50	0.00	0.00	0.00
40.00	0.00	0	321.50	0.00	0.00	0.00
42.00	0.00	0	321.50	0.00	0.00	0.00
44.00	0.00	0	321.50	0.00	0.00	0.00
46.00	0.00	0	321.50	0.00	0.00	0.00
48.00	0.00	0	321.50	0.00	0.00	0.00
50.00	0.00	0	321.50	0.00	0.00	0.00
52.00	0.00	0	321.50	0.00	0.00	0.00
54.00	0.00	0	321.50	0.00	0.00	0.00
56.00	0.00	0	321.50	0.00	0.00	0.00
58.00	0.00	0	321.50	0.00	0.00	0.00
60.00	0.00	0	321.50	0.00	0.00	0.00
62.00	0.00	0	321.50	0.00	0.00	0.00
64.00	0.00	0	321.50	0.00	0.00	0.00
66.00	0.00	0	321.50	0.00	0.00	0.00
68.00	0.00	0	321.50	0.00	0.00	0.00
70.00	0.00	0	321.50	0.00	0.00	0.00
72.00	0.00	0	321.50	0.00	0.00	0.00

Stage-Area-Storage for Pond Inf-3: INF#3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.50	**588**	0
321.55	588	12
321.60	588	24
321.65	588	35
321.70	588	47
321.75	588	59
321.80	588	71
321.85	588	82
321.90	588	94
321.95	588	106
322.00	588	118
322.05	588	140
322.10	588	163
322.15	588	186
322.20	588	209
322.25	588	232
322.30	588	254
322.35	588	277
322.40	588	299
322.45	588	322
322.50	588	344
322.55	588	366
322.60	588	389
322.65	588	411
322.70	588	433
322.75	588	454
322.80	588	476
322.85	588	498
322.90	588	519
322.95	588	541
323.00	588	562
323.05	588	583
323.10	588	604
323.15	588	625
323.20	588	646
323.25	588	666
323.30	588	687
323.35	588	707
323.40	588	727
323.45	588	747
323.50	588	766
323.55	588	786
323.60	588	805
323.65	588	824
323.70	588	843
323.75	588	861
323.80	588	880
323.85	588	898
323.90	588	915
323.95	588	933
324.00	588	950
324.05	588	966
324.10	588	983
324.15	588	998
324.20	588	1,014
324.25	588	1,028
324.30	588	1,042
324.35	588	1,055
324.40	588	1,067
324.45	588	1,080
324.50	588	1,092
324.55	588	1,103
324.60	588	1,115
324.65	588	1,127
324.70	588	1,139
324.75	588	1,150
324.80	588	1,162
324.85	588	1,174
324.90	588	1,186
324.95	588	1,197
325.00	588	**1,209**

Summary for Pond RG #1: Rain Garden #1

Inflow Area = 15,164 sf, 79.13% Impervious, Inflow Depth = 4.25" for 25 yr event
Inflow = 1.76 cfs @ 12.09 hrs, Volume= 5,369 cf
Outflow = 1.02 cfs @ 12.03 hrs, Volume= 5,369 cf, Atten= 42%, Lag= 0.0 min
Primary = 1.02 cfs @ 12.03 hrs, Volume= 5,369 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 331.48' @ 12.21 hrs Surf.Area= 733 sf Storage= 314 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.0 min (806.5 - 805.5)

Volume	Invert	Avail.Storage	Storage Description
#1	331.00'	2,551 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
331.00	570	0	0
332.00	908	739	739
333.00	1,303	1,106	1,845
333.50	1,521	706	2,551

Device	Routing	Invert	Outlet Devices
#1	Device 2	331.00'	**1.02 cfs Exfiltration at all elevations**
#2	Primary	328.50'	**6.0" Round Culvert** L= 75.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 328.50' / 328.13' S= 0.0049 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 2	332.50'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.02 cfs @ 12.03 hrs HW=331.03' TW=324.96' (Dynamic Tailwater)
↑└─**2=Culvert** (Passes 1.02 cfs of 1.05 cfs potential flow)
↑ ├─**1=Exfiltration** (Exfiltration Controls 1.02 cfs)
 └─**3=Orifice/Grate** (Controls 0.00 cfs)

Hydrograph for Pond RG #1: Rain Garden #1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	331.00	0.00
2.00	0.00	0	331.00	0.00
4.00	0.00	0	331.00	0.00
6.00	0.00	0	331.00	0.00
8.00	0.00	0	331.00	0.00
10.00	0.07	0	331.00	0.07
12.00	**1.01**	**1**	**331.00**	**0.99**
14.00	**0.10**	**0**	**331.00**	**0.07**
16.00	0.05	0	331.00	0.02
18.00	0.03	0	331.00	0.00
20.00	0.02	0	331.00	0.00
22.00	0.02	0	331.00	0.00
24.00	0.02	0	331.00	0.00
26.00	0.00	0	331.00	0.00
28.00	0.00	0	331.00	0.00
30.00	0.00	0	331.00	0.00
32.00	0.00	0	331.00	0.00
34.00	0.00	0	331.00	0.00
36.00	0.00	0	331.00	0.00
38.00	0.00	0	331.00	0.00
40.00	0.00	0	331.00	0.00
42.00	0.00	0	331.00	0.00
44.00	0.00	0	331.00	0.00
46.00	0.00	0	331.00	0.00
48.00	0.00	0	331.00	0.00
50.00	0.00	0	331.00	0.00
52.00	0.00	0	331.00	0.00
54.00	0.00	0	331.00	0.00
56.00	0.00	0	331.00	0.00
58.00	0.00	0	331.00	0.00
60.00	0.00	0	331.00	0.00
62.00	0.00	0	331.00	0.00
64.00	0.00	0	331.00	0.00
66.00	0.00	0	331.00	0.00
68.00	0.00	0	331.00	0.00
70.00	0.00	0	331.00	0.00
72.00	0.00	0	331.00	0.00

Stage-Area-Storage for Pond RG #1: Rain Garden #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
331.00	570	0
331.05	587	29
331.10	604	59
331.15	621	89
331.20	638	121
331.25	655	153
331.30	671	186
331.35	688	220
331.40	705	255
331.45	722	291
331.50	739	327
331.55	756	365
331.60	773	403
331.65	790	442
331.70	807	482
331.75	824	523
331.80	840	564
331.85	857	607
331.90	874	650
331.95	891	694
332.00	908	739
332.05	928	785
332.10	948	832
332.15	967	880
332.20	987	928
332.25	1,007	978
332.30	1,027	1,029
332.35	1,046	1,081
332.40	1,066	1,134
332.45	1,086	1,188
332.50	1,106	1,242
332.55	1,125	1,298
332.60	1,145	1,355
332.65	1,165	1,413
332.70	1,184	1,471
332.75	1,204	1,531
332.80	1,224	1,592
332.85	1,244	1,653
332.90	1,263	1,716
332.95	1,283	1,780
333.00	1,303	1,845
333.05	1,325	1,910
333.10	1,347	1,977
333.15	1,368	2,045
333.20	1,390	2,114
333.25	1,412	2,184
333.30	1,434	2,255
333.35	1,456	2,327
333.40	1,477	2,401
333.45	1,499	2,475
333.50	**1,521**	**2,551**

Summary for Pond UGS#4: UGS#4

Inflow Area = 220,543 sf, 26.64% Impervious, Inflow Depth = 3.64" for 25 yr event
Inflow = 19.49 cfs @ 12.12 hrs, Volume= 66,867 cf
Outflow = 10.40 cfs @ 12.30 hrs, Volume= 66,867 cf, Atten= 47%, Lag= 10.6 min
Primary = 10.40 cfs @ 12.30 hrs, Volume= 66,867 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 319.98' @ 12.30 hrs Surf.Area= 5,330 sf Storage= 10,947 cf
Flood Elev= 322.50' Surf.Area= 5,330 sf Storage= 17,771 cf

Plug-Flow detention time= 14.7 min calculated for 66,858 cf (100% of inflow)
Center-of-Mass det. time= 14.7 min (824.7 - 810.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	317.00'	7,697 cf	**46.25'W x 115.25'L x 5.50'H Field A** 29,317 cf Overall - 10,074 cf Embedded = 19,242 cf x 40.0% Voids
#2A	317.75'	10,074 cf	**ADS_StormTech MC-3500 d +Cap** x 90 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 90 Chambers in 6 Rows Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf
		17,771 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	316.90'	**18.0" Round Culvert** L= 73.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 316.90' / 314.90' S= 0.0274 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Primary	317.00'	**12.0" W x 0.2" H Vert. Orifice/Grate** X 6 rows with 86.0" cc spacing C= 0.600

Primary OutFlow Max=10.40 cfs @ 12.30 hrs HW=319.98' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 10.26 cfs @ 5.80 fps)
2=Orifice/Grate (Orifice Controls 0.14 cfs @ 8.30 fps)

Pond UGS#4: UGS#4 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

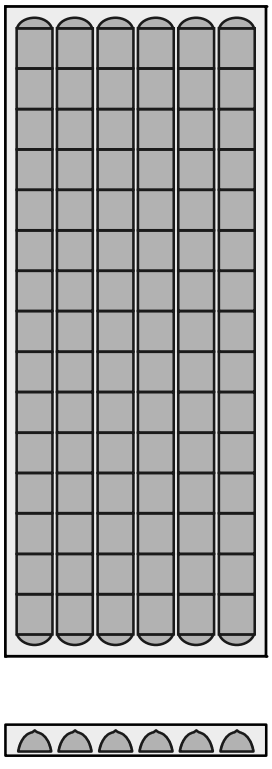
15 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 111.25' Row Length +24.0" End Stone x 2 = 115.25' Base Length
6 Rows x 77.0" Wide + 9.0" Spacing x 5 + 24.0" Side Stone x 2 = 46.25' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

90 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 6 Rows = 10,074.5 cf Chamber Storage

29,316.7 cf Field - 10,074.5 cf Chambers = 19,242.2 cf Stone x 40.0% Voids = 7,696.9 cf Stone Storage

Chamber Storage + Stone Storage = 17,771.4 cf = 0.408 af
Overall Storage Efficiency = 60.6%
Overall System Size = 115.25' x 46.25' x 5.50'

90 Chambers
1,085.8 cy Field
712.7 cy Stone



Hydrograph for Pond UGS#4: UGS#4

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	317.00	0.00
2.00	0.00	0	317.00	0.00
4.00	0.00	0	317.00	0.00
6.00	0.00	0	317.00	0.00
8.00	0.14	88	317.04	0.10
10.00	0.55	497	317.23	0.49
12.00	**10.13**	**3,989**	**318.29**	**5.52**
14.00	**1.29**	**1,035**	**317.49**	**1.37**
16.00	0.69	676	317.32	0.74
18.00	0.42	462	317.22	0.45
20.00	0.33	371	317.17	0.34
22.00	0.28	314	317.15	0.28
24.00	0.22	255	317.12	0.23
26.00	0.00	0	317.00	0.00
28.00	0.00	0	317.00	0.00
30.00	0.00	0	317.00	0.00
32.00	0.00	0	317.00	0.00
34.00	0.00	0	317.00	0.00
36.00	0.00	0	317.00	0.00
38.00	0.00	0	317.00	0.00
40.00	0.00	0	317.00	0.00
42.00	0.00	0	317.00	0.00
44.00	0.00	0	317.00	0.00
46.00	0.00	0	317.00	0.00
48.00	0.00	0	317.00	0.00
50.00	0.00	0	317.00	0.00
52.00	0.00	0	317.00	0.00
54.00	0.00	0	317.00	0.00
56.00	0.00	0	317.00	0.00
58.00	0.00	0	317.00	0.00
60.00	0.00	0	317.00	0.00
62.00	0.00	0	317.00	0.00
64.00	0.00	0	317.00	0.00
66.00	0.00	0	317.00	0.00
68.00	0.00	0	317.00	0.00
70.00	0.00	0	317.00	0.00
72.00	0.00	0	317.00	0.00

Stage-Area-Storage for Pond UGS#4: UGS#4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
317.00	0	337.80	17,771
317.40	853	338.20	17,771
317.80	1,821	338.60	17,771
318.20	3,584	339.00	17,771
318.60	5,317	339.40	17,771
319.00	7,013	339.80	17,771
319.40	8,662	340.20	17,771
319.80	10,250	340.60	17,771
320.20	11,760	341.00	17,771
320.60	13,167	341.40	17,771
321.00	14,425	341.80	17,771
321.40	15,421	342.20	17,771
321.80	16,279	342.60	17,771
322.20	**17,132**	343.00	17,771
322.60	**17,771**	343.40	17,771
323.00	17,771	343.80	17,771
323.40	17,771	344.20	17,771
323.80	17,771	344.60	17,771
324.20	17,771	345.00	17,771
324.60	17,771	345.40	17,771
325.00	17,771	345.80	17,771
325.40	17,771	346.20	17,771
325.80	17,771	346.60	17,771
326.20	17,771	347.00	17,771
326.60	17,771	347.40	17,771
327.00	17,771	347.80	17,771
327.40	17,771	348.20	17,771
327.80	17,771	348.60	17,771
328.20	17,771	349.00	17,771
328.60	17,771	349.40	17,771
329.00	17,771	349.80	17,771
329.40	17,771	350.20	17,771
329.80	17,771	350.60	17,771
330.20	17,771	351.00	17,771
330.60	17,771	351.40	17,771
331.00	17,771	351.80	17,771
331.40	17,771	352.20	17,771
331.80	17,771	352.60	17,771
332.20	17,771		
332.60	17,771		
333.00	17,771		
333.40	17,771		
333.80	17,771		
334.20	17,771		
334.60	17,771		
335.00	17,771		
335.40	17,771		
335.80	17,771		
336.20	17,771		
336.60	17,771		
337.00	17,771		
337.40	17,771		

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 Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: (new Subcat) Runoff Area=42,801 sf 45.13% Impervious Runoff Depth=5.59"
Tc=6.0 min CN=88 Runoff=6.16 cfs 19,950 cf

Subcatchment PR-1A: (new Subcat) Runoff Area=120,105 sf 40.62% Impervious Runoff Depth=5.48"
Flow Length=98' Slope=0.0100 '/' Tc=7.9 min CN=87 Runoff=15.98 cfs 54,841 cf

Subcatchment PR-1B: (new Subcat) Runoff Area=8,760 sf 76.99% Impervious Runoff Depth=6.29"
Tc=6.0 min CN=94 Runoff=1.35 cfs 4,590 cf

Subcatchment PR-1C: (new Subcat) Runoff Area=48,219 sf 77.13% Impervious Runoff Depth=6.29"
Tc=6.0 min CN=94 Runoff=7.43 cfs 25,268 cf

Subcatchment PR-1D: WS-1D Runoff Area=15,164 sf 79.13% Impervious Runoff Depth=6.29"
Tc=6.0 min CN=94 Runoff=2.34 cfs 7,946 cf

Subcatchment PR-2: (new Subcat) Runoff Area=60,887 sf 66.57% Impervious Runoff Depth=6.05"
Tc=6.0 min CN=92 Runoff=9.21 cfs 30,721 cf

Subcatchment PR-3: (new Subcat) Runoff Area=37,434 sf 0.00% Impervious Runoff Depth=4.58"
Flow Length=151' Tc=9.0 min CN=79 Runoff=4.14 cfs 14,301 cf

Subcatchment PR-4: (new Subcat) Runoff Area=45,815 sf 0.00% Impervious Runoff Depth=3.62"
Tc=6.0 min CN=70 Runoff=4.46 cfs 13,815 cf

Subcatchment PR-5: (new Subcat) Runoff Area=13,090 sf 33.90% Impervious Runoff Depth=5.03"
Tc=6.0 min CN=83 Runoff=1.74 cfs 5,484 cf

Subcatchment PR-6: PR-6 Runoff Area=10,196 sf 1.75% Impervious Runoff Depth=3.72"
Tc=6.0 min CN=71 Runoff=1.02 cfs 3,164 cf

Subcatchment PR-7: PR-7 Runoff Area=7,291 sf 0.00% Impervious Runoff Depth=4.04"
Tc=6.0 min CN=74 Runoff=0.79 cfs 2,456 cf

Subcatchment PR-8: PR-8 Runoff Area=220,543 sf 26.64% Impervious Runoff Depth=5.14"
Flow Length=117' Tc=8.7 min CN=84 Runoff=27.19 cfs 94,465 cf

Subcatchment PR-9: PR-9 Runoff Area=31,969 sf 29.48% Impervious Runoff Depth=5.25"
Tc=6.0 min CN=85 Runoff=4.39 cfs 13,993 cf

Subcatchment PR-BLDG: PR-BLDG Runoff Area=63,223 sf 100.00% Impervious Runoff Depth=6.76"
Tc=6.0 min CN=98 Runoff=9.97 cfs 35,620 cf

Reach POA-1: To Main Street Inflow=22.19 cfs 110,838 cf
Outflow=22.19 cfs 110,838 cf

Reach POA-2: To Existing DMH North of Site Inflow=23.47 cfs 137,771 cf
Outflow=23.47 cfs 137,771 cf

Reach POA-3: NORTH EAST WETLANDS Inflow=4.14 cfs 14,301 cf
Outflow=4.14 cfs 14,301 cf

Reach POA-4: SOUTH EAST WETLANDS Inflow=4.46 cfs 13,815 cf
Outflow=4.46 cfs 13,815 cf

Reach POA-5: CHAMPNEY STREET Inflow=1.74 cfs 5,484 cf
Outflow=1.74 cfs 5,484 cf

Pond #1A: INF#1A Peak Elev=326.19' Storage=7,353 cf Inflow=19.77 cfs 72,857 cf
Discarded=0.05 cfs 7,775 cf Primary=16.62 cfs 65,082 cf Outflow=16.67 cfs 72,857 cf

Pond #1B: INF#1B Peak Elev=325.00' Storage=5,472 cf Inflow=16.62 cfs 65,082 cf
Discarded=0.05 cfs 3,167 cf Primary=12.10 cfs 61,916 cf Outflow=12.15 cfs 65,083 cf

Pond Forebay #1: Sediment Forebay #1 Peak Elev=332.71' Storage=683 cf Inflow=2.34 cfs 7,946 cf
Outflow=2.32 cfs 7,372 cf

Pond Inf-2: Inf-2 Peak Elev=322.59' Storage=24,132 cf Inflow=15.98 cfs 54,841 cf
Discarded=0.14 cfs 31,490 cf Primary=6.51 cfs 23,352 cf Outflow=6.65 cfs 54,843 cf

Pond Inf-3: INF#3 Peak Elev=323.91' Storage=918 cf Inflow=9.21 cfs 30,721 cf
Discarded=0.01 cfs 1,409 cf Primary=8.64 cfs 29,312 cf Outflow=8.66 cfs 30,722 cf

Pond RG #1: Rain Garden #1 Peak Elev=331.97' Storage=710 cf Inflow=2.32 cfs 7,372 cf
Outflow=1.02 cfs 7,378 cf

Pond UGS#4: UGS#4 Peak Elev=321.90' Storage=16,484 cf Inflow=27.19 cfs 94,465 cf
Outflow=14.02 cfs 94,465 cf

Total Runoff Area = 725,497 sf Runoff Volume = 326,616 cf Average Runoff Depth = 5.40"
58.57% Pervious = 424,920 sf 41.43% Impervious = 300,577 sf

Summary for Subcatchment PR-1: (new Subcat)

Runoff = 6.16 cfs @ 12.08 hrs, Volume= 19,950 cf, Depth= 5.59"

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 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	23,486	79	>75% Grass cover, HSG B
	19,315	98	Paved parking, HSG B
	42,801	88	Weighted Average
	23,486		54.87% Pervious Area
	19,315		45.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-1: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.00	0.00
4.00	0.30	0.00	0.00
5.00	0.40	0.01	0.01
6.00	0.50	0.03	0.03
7.00	0.63	0.08	0.05
8.00	0.80	0.15	0.08
9.00	1.02	0.26	0.14
10.00	1.32	0.46	0.22
11.00	1.75	0.77	0.37
12.00	3.50	2.27	**3.79**
13.00	5.25	3.91	**0.54**
14.00	5.68	4.32	0.34
15.00	5.98	4.61	0.26
16.00	6.20	4.82	0.18
17.00	6.37	4.98	0.14
18.00	6.50	5.10	0.11
19.00	6.60	5.21	0.10
20.00	6.70	5.30	0.09
21.00	6.79	5.39	0.08
22.00	6.87	5.46	0.07
23.00	6.94	5.53	0.07
24.00	**7.00**	**5.59**	0.06
25.00	7.00	5.59	0.00
26.00	7.00	5.59	0.00
27.00	7.00	5.59	0.00
28.00	7.00	5.59	0.00
29.00	7.00	5.59	0.00
30.00	7.00	5.59	0.00
31.00	7.00	5.59	0.00
32.00	7.00	5.59	0.00
33.00	7.00	5.59	0.00
34.00	7.00	5.59	0.00
35.00	7.00	5.59	0.00
36.00	7.00	5.59	0.00
37.00	7.00	5.59	0.00
38.00	7.00	5.59	0.00
39.00	7.00	5.59	0.00
40.00	7.00	5.59	0.00
41.00	7.00	5.59	0.00
42.00	7.00	5.59	0.00
43.00	7.00	5.59	0.00
44.00	7.00	5.59	0.00
45.00	7.00	5.59	0.00
46.00	7.00	5.59	0.00
47.00	7.00	5.59	0.00
48.00	7.00	5.59	0.00
49.00	7.00	5.59	0.00
50.00	7.00	5.59	0.00
51.00	7.00	5.59	0.00
52.00	7.00	5.59	0.00
53.00	7.00	5.59	0.00
54.00	7.00	5.59	0.00
55.00	7.00	5.59	0.00
56.00	7.00	5.59	0.00
57.00	7.00	5.59	0.00
58.00	7.00	5.59	0.00
59.00	7.00	5.59	0.00
60.00	7.00	5.59	0.00
61.00	7.00	5.59	0.00
62.00	7.00	5.59	0.00
63.00	7.00	5.59	0.00
64.00	7.00	5.59	0.00
65.00	7.00	5.59	0.00
66.00	7.00	5.59	0.00
67.00	7.00	5.59	0.00
68.00	7.00	5.59	0.00
69.00	7.00	5.59	0.00
70.00	7.00	5.59	0.00
71.00	7.00	5.59	0.00
72.00	7.00	5.59	0.00

Summary for Subcatchment PR-1A: (new Subcat)

Runoff = 15.98 cfs @ 12.11 hrs, Volume= 54,841 cf, Depth= 5.48"

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 Rainfall=7.00"

	Area (sf)	CN	Description
*	71,317	79	>75% Grass cover, HSG B
	48,788	98	Paved parking, HSG B
	120,105	87	Weighted Average
	71,317		59.38% Pervious Area
	48,788		40.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 sf** Grass: Short n= 0.150 P2= 3.20"
0.5	48	0.0100	1.50		**Shallow Concentrated Flow, 48.32' of SCF** Grassed Waterway Kv= 15.0 fps
7.9	98	Total			

Hydrograph for Subcatchment PR-1A: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.00	0.00
4.00	0.30	0.00	0.00
5.00	0.40	0.01	0.03
6.00	0.50	0.02	0.07
7.00	0.63	0.06	0.13
8.00	0.80	0.12	0.21
9.00	1.02	0.23	0.37
10.00	1.32	0.42	0.59
11.00	1.75	0.71	1.00
12.00	3.50	2.18	**8.85**
13.00	5.25	3.80	**1.55**
14.00	5.68	4.21	0.96
15.00	5.98	4.50	0.72
16.00	6.20	4.71	0.51
17.00	6.37	4.87	0.40
18.00	6.50	4.99	0.31
19.00	6.60	5.10	0.28
20.00	6.70	5.19	0.25
21.00	6.79	5.27	0.23
22.00	6.87	5.35	0.20
23.00	6.94	5.42	0.18
24.00	**7.00**	**5.48**	0.16
25.00	7.00	5.48	0.00
26.00	7.00	5.48	0.00
27.00	7.00	5.48	0.00
28.00	7.00	5.48	0.00
29.00	7.00	5.48	0.00
30.00	7.00	5.48	0.00
31.00	7.00	5.48	0.00
32.00	7.00	5.48	0.00
33.00	7.00	5.48	0.00
34.00	7.00	5.48	0.00
35.00	7.00	5.48	0.00
36.00	7.00	5.48	0.00
37.00	7.00	5.48	0.00
38.00	7.00	5.48	0.00
39.00	7.00	5.48	0.00
40.00	7.00	5.48	0.00
41.00	7.00	5.48	0.00
42.00	7.00	5.48	0.00
43.00	7.00	5.48	0.00
44.00	7.00	5.48	0.00
45.00	7.00	5.48	0.00
46.00	7.00	5.48	0.00
47.00	7.00	5.48	0.00
48.00	7.00	5.48	0.00
49.00	7.00	5.48	0.00
50.00	7.00	5.48	0.00
51.00	7.00	5.48	0.00
52.00	7.00	5.48	0.00
53.00	7.00	5.48	0.00
54.00	7.00	5.48	0.00
55.00	7.00	5.48	0.00
56.00	7.00	5.48	0.00
57.00	7.00	5.48	0.00
58.00	7.00	5.48	0.00
59.00	7.00	5.48	0.00
60.00	7.00	5.48	0.00
61.00	7.00	5.48	0.00
62.00	7.00	5.48	0.00
63.00	7.00	5.48	0.00
64.00	7.00	5.48	0.00
65.00	7.00	5.48	0.00
66.00	7.00	5.48	0.00
67.00	7.00	5.48	0.00
68.00	7.00	5.48	0.00
69.00	7.00	5.48	0.00
70.00	7.00	5.48	0.00
71.00	7.00	5.48	0.00
72.00	7.00	5.48	0.00

Summary for Subcatchment PR-1B: (new Subcat)

Runoff = 1.35 cfs @ 12.08 hrs, Volume= 4,590 cf, Depth= 6.29"

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 Rainfall=7.00"

	Area (sf)	CN	Description
*	2,016	79	>75% Grass cover, HSG B
	6,744	98	Paved parking, HSG B
	8,760	94	Weighted Average
	2,016		23.01% Pervious Area
	6,744		76.99% Impervious Area

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

Hydrograph for Subcatchment PR-1B: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.01	0.00
4.00	0.30	0.04	0.01
5.00	0.40	0.08	0.01
6.00	0.50	0.14	0.01
7.00	0.63	0.22	0.02
8.00	0.80	0.34	0.03
9.00	1.02	0.52	0.04
10.00	1.32	0.78	0.06
11.00	1.75	1.16	0.09
12.00	3.50	2.84	**0.84**
13.00	5.25	4.55	**0.11**
14.00	5.68	4.98	0.07
15.00	5.98	5.28	0.05
16.00	6.20	5.50	0.04
17.00	6.37	5.66	0.03
18.00	6.50	5.79	0.02
19.00	6.60	5.89	0.02
20.00	6.70	5.99	0.02
21.00	6.79	6.08	0.02
22.00	6.87	6.15	0.02
23.00	6.94	6.23	0.01
24.00	**7.00**	**6.29**	0.01
25.00	7.00	6.29	0.00
26.00	7.00	6.29	0.00
27.00	7.00	6.29	0.00
28.00	7.00	6.29	0.00
29.00	7.00	6.29	0.00
30.00	7.00	6.29	0.00
31.00	7.00	6.29	0.00
32.00	7.00	6.29	0.00
33.00	7.00	6.29	0.00
34.00	7.00	6.29	0.00
35.00	7.00	6.29	0.00
36.00	7.00	6.29	0.00
37.00	7.00	6.29	0.00
38.00	7.00	6.29	0.00
39.00	7.00	6.29	0.00
40.00	7.00	6.29	0.00
41.00	7.00	6.29	0.00
42.00	7.00	6.29	0.00
43.00	7.00	6.29	0.00
44.00	7.00	6.29	0.00
45.00	7.00	6.29	0.00
46.00	7.00	6.29	0.00
47.00	7.00	6.29	0.00
48.00	7.00	6.29	0.00
49.00	7.00	6.29	0.00
50.00	7.00	6.29	0.00
51.00	7.00	6.29	0.00
52.00	7.00	6.29	0.00
53.00	7.00	6.29	0.00
54.00	7.00	6.29	0.00
55.00	7.00	6.29	0.00
56.00	7.00	6.29	0.00
57.00	7.00	6.29	0.00
58.00	7.00	6.29	0.00
59.00	7.00	6.29	0.00
60.00	7.00	6.29	0.00
61.00	7.00	6.29	0.00
62.00	7.00	6.29	0.00
63.00	7.00	6.29	0.00
64.00	7.00	6.29	0.00
65.00	7.00	6.29	0.00
66.00	7.00	6.29	0.00
67.00	7.00	6.29	0.00
68.00	7.00	6.29	0.00
69.00	7.00	6.29	0.00
70.00	7.00	6.29	0.00
71.00	7.00	6.29	0.00
72.00	7.00	6.29	0.00

Summary for Subcatchment PR-1C: (new Subcat)

Runoff = 7.43 cfs @ 12.08 hrs, Volume= 25,268 cf, Depth= 6.29"

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 Rainfall=7.00"

	Area (sf)	CN	Description
*	11,027	79	>75% Grass cover, HSG B
	37,192	98	Paved parking, HSG B
	48,219	94	Weighted Average
	11,027		22.87% Pervious Area
	37,192		77.13% Impervious Area

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

Hydrograph for Subcatchment PR-1C: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.01	0.02
4.00	0.30	0.04	0.04
5.00	0.40	0.08	0.06
6.00	0.50	0.14	0.07
7.00	0.63	0.22	0.11
8.00	0.80	0.34	0.15
9.00	1.02	0.52	0.23
10.00	1.32	0.78	0.33
11.00	1.75	1.16	0.51
12.00	3.50	2.84	**4.65**
13.00	5.25	4.55	**0.63**
14.00	5.68	4.98	0.40
15.00	5.98	5.28	0.30
16.00	6.20	5.50	0.21
17.00	6.37	5.66	0.17
18.00	6.50	5.79	0.13
19.00	6.60	5.89	0.11
20.00	6.70	5.99	0.10
21.00	6.79	6.08	0.09
22.00	6.87	6.15	0.08
23.00	6.94	6.23	0.08
24.00	**7.00**	**6.29**	0.07
25.00	7.00	6.29	0.00
26.00	7.00	6.29	0.00
27.00	7.00	6.29	0.00
28.00	7.00	6.29	0.00
29.00	7.00	6.29	0.00
30.00	7.00	6.29	0.00
31.00	7.00	6.29	0.00
32.00	7.00	6.29	0.00
33.00	7.00	6.29	0.00
34.00	7.00	6.29	0.00
35.00	7.00	6.29	0.00
36.00	7.00	6.29	0.00
37.00	7.00	6.29	0.00
38.00	7.00	6.29	0.00
39.00	7.00	6.29	0.00
40.00	7.00	6.29	0.00
41.00	7.00	6.29	0.00
42.00	7.00	6.29	0.00
43.00	7.00	6.29	0.00
44.00	7.00	6.29	0.00
45.00	7.00	6.29	0.00
46.00	7.00	6.29	0.00
47.00	7.00	6.29	0.00
48.00	7.00	6.29	0.00
49.00	7.00	6.29	0.00
50.00	7.00	6.29	0.00
51.00	7.00	6.29	0.00
52.00	7.00	6.29	0.00
53.00	7.00	6.29	0.00
54.00	7.00	6.29	0.00
55.00	7.00	6.29	0.00
56.00	7.00	6.29	0.00
57.00	7.00	6.29	0.00
58.00	7.00	6.29	0.00
59.00	7.00	6.29	0.00
60.00	7.00	6.29	0.00
61.00	7.00	6.29	0.00
62.00	7.00	6.29	0.00
63.00	7.00	6.29	0.00
64.00	7.00	6.29	0.00
65.00	7.00	6.29	0.00
66.00	7.00	6.29	0.00
67.00	7.00	6.29	0.00
68.00	7.00	6.29	0.00
69.00	7.00	6.29	0.00
70.00	7.00	6.29	0.00
71.00	7.00	6.29	0.00
72.00	7.00	6.29	0.00

Summary for Subcatchment PR-1D: WS-1D

Runoff = 2.34 cfs @ 12.08 hrs, Volume= 7,946 cf, Depth= 6.29"

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 Rainfall=7.00"

Area (sf)	CN	Description
12,000	98	Paved parking, HSG B
3,164	79	<50% Grass cover, Poor, HSG B
15,164	94	Weighted Average
3,164		20.87% Pervious Area
12,000		79.13% Impervious Area

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

Hydrograph for Subcatchment PR-1D: WS-1D

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.01	0.01
4.00	0.30	0.04	0.01
5.00	0.40	0.08	0.02
6.00	0.50	0.14	0.02
7.00	0.63	0.22	0.03
8.00	0.80	0.34	0.05
9.00	1.02	0.52	0.07
10.00	1.32	0.78	0.10
11.00	1.75	1.16	0.16
12.00	3.50	2.84	**1.46**
13.00	5.25	4.55	**0.20**
14.00	5.68	4.98	0.12
15.00	5.98	5.28	0.09
16.00	6.20	5.50	0.07
17.00	6.37	5.66	0.05
18.00	6.50	5.79	0.04
19.00	6.60	5.89	0.04
20.00	6.70	5.99	0.03
21.00	6.79	6.08	0.03
22.00	6.87	6.15	0.03
23.00	6.94	6.23	0.02
24.00	**7.00**	**6.29**	0.02
25.00	7.00	6.29	0.00
26.00	7.00	6.29	0.00
27.00	7.00	6.29	0.00
28.00	7.00	6.29	0.00
29.00	7.00	6.29	0.00
30.00	7.00	6.29	0.00
31.00	7.00	6.29	0.00
32.00	7.00	6.29	0.00
33.00	7.00	6.29	0.00
34.00	7.00	6.29	0.00
35.00	7.00	6.29	0.00
36.00	7.00	6.29	0.00
37.00	7.00	6.29	0.00
38.00	7.00	6.29	0.00
39.00	7.00	6.29	0.00
40.00	7.00	6.29	0.00
41.00	7.00	6.29	0.00
42.00	7.00	6.29	0.00
43.00	7.00	6.29	0.00
44.00	7.00	6.29	0.00
45.00	7.00	6.29	0.00
46.00	7.00	6.29	0.00
47.00	7.00	6.29	0.00
48.00	7.00	6.29	0.00
49.00	7.00	6.29	0.00
50.00	7.00	6.29	0.00
51.00	7.00	6.29	0.00
52.00	7.00	6.29	0.00
53.00	7.00	6.29	0.00
54.00	7.00	6.29	0.00
55.00	7.00	6.29	0.00
56.00	7.00	6.29	0.00
57.00	7.00	6.29	0.00
58.00	7.00	6.29	0.00
59.00	7.00	6.29	0.00
60.00	7.00	6.29	0.00
61.00	7.00	6.29	0.00
62.00	7.00	6.29	0.00
63.00	7.00	6.29	0.00
64.00	7.00	6.29	0.00
65.00	7.00	6.29	0.00
66.00	7.00	6.29	0.00
67.00	7.00	6.29	0.00
68.00	7.00	6.29	0.00
69.00	7.00	6.29	0.00
70.00	7.00	6.29	0.00
71.00	7.00	6.29	0.00
72.00	7.00	6.29	0.00

Summary for Subcatchment PR-2: (new Subcat)

Runoff = 9.21 cfs @ 12.08 hrs, Volume= 30,721 cf, Depth= 6.05"

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 Rainfall=7.00"

	Area (sf)	CN	Description
*	20,356	79	>75% Grass cover, HSG B
	39,661	98	Paved parking, HSG B
*	870	98	parking
	60,887	92	Weighted Average
	20,356		33.43% Pervious Area
	40,531		66.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-2: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.00	0.01
4.00	0.30	0.02	0.03
5.00	0.40	0.05	0.05
6.00	0.50	0.09	0.07
7.00	0.63	0.16	0.11
8.00	0.80	0.26	0.16
9.00	1.02	0.42	0.26
10.00	1.32	0.65	0.38
11.00	1.75	1.02	0.61
12.00	3.50	2.64	**5.74**
13.00	5.25	4.33	**0.79**
14.00	5.68	4.75	0.50
15.00	5.98	5.05	0.37
16.00	6.20	5.27	0.26
17.00	6.37	5.43	0.21
18.00	6.50	5.56	0.16
19.00	6.60	5.66	0.14
20.00	6.70	5.76	0.13
21.00	6.79	5.84	0.12
22.00	6.87	5.92	0.11
23.00	6.94	5.99	0.09
24.00	**7.00**	**6.05**	0.08
25.00	7.00	6.05	0.00
26.00	7.00	6.05	0.00
27.00	7.00	6.05	0.00
28.00	7.00	6.05	0.00
29.00	7.00	6.05	0.00
30.00	7.00	6.05	0.00
31.00	7.00	6.05	0.00
32.00	7.00	6.05	0.00
33.00	7.00	6.05	0.00
34.00	7.00	6.05	0.00
35.00	7.00	6.05	0.00
36.00	7.00	6.05	0.00
37.00	7.00	6.05	0.00
38.00	7.00	6.05	0.00
39.00	7.00	6.05	0.00
40.00	7.00	6.05	0.00
41.00	7.00	6.05	0.00
42.00	7.00	6.05	0.00
43.00	7.00	6.05	0.00
44.00	7.00	6.05	0.00
45.00	7.00	6.05	0.00
46.00	7.00	6.05	0.00
47.00	7.00	6.05	0.00
48.00	7.00	6.05	0.00
49.00	7.00	6.05	0.00
50.00	7.00	6.05	0.00
51.00	7.00	6.05	0.00
52.00	7.00	6.05	0.00
53.00	7.00	6.05	0.00
54.00	7.00	6.05	0.00
55.00	7.00	6.05	0.00
56.00	7.00	6.05	0.00
57.00	7.00	6.05	0.00
58.00	7.00	6.05	0.00
59.00	7.00	6.05	0.00
60.00	7.00	6.05	0.00
61.00	7.00	6.05	0.00
62.00	7.00	6.05	0.00
63.00	7.00	6.05	0.00
64.00	7.00	6.05	0.00
65.00	7.00	6.05	0.00
66.00	7.00	6.05	0.00
67.00	7.00	6.05	0.00
68.00	7.00	6.05	0.00
69.00	7.00	6.05	0.00
70.00	7.00	6.05	0.00
71.00	7.00	6.05	0.00
72.00	7.00	6.05	0.00

Summary for Subcatchment PR-3: (new Subcat)

Runoff = 4.14 cfs @ 12.13 hrs, Volume= 14,301 cf, Depth= 4.58"

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 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	37,434	79	>75% Grass cover, HSG B
	37,434		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 sf** Grass: Short n= 0.150 P2= 3.20"
0.2	20	0.0100	2.03		**Shallow Concentrated Flow, 20' scf paved** Paved Kv= 20.3 fps
1.4	81	0.0200	0.99		**Shallow Concentrated Flow, 81' scf grass** Short Grass Pasture Kv= 7.0 fps
9.0	151	Total			

Hydrograph for Subcatchment PR-3: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.00	0.00
4.00	0.30	0.00	0.00
5.00	0.40	0.00	0.00
6.00	0.50	0.00	0.00
7.00	0.63	0.00	0.01
8.00	0.80	0.02	0.02
9.00	1.02	0.08	0.06
10.00	1.32	0.18	0.11
11.00	1.75	0.38	0.22
12.00	3.50	1.57	**2.11**
13.00	5.25	3.02	**0.45**
14.00	5.68	3.39	0.28
15.00	5.98	3.66	0.21
16.00	6.20	3.86	0.15
17.00	6.37	4.01	0.12
18.00	6.50	4.13	0.09
19.00	6.60	4.22	0.08
20.00	6.70	4.31	0.07
21.00	6.79	4.39	0.07
22.00	6.87	4.46	0.06
23.00	6.94	4.53	0.05
24.00	**7.00**	**4.58**	0.05
25.00	7.00	4.58	0.00
26.00	7.00	4.58	0.00
27.00	7.00	4.58	0.00
28.00	7.00	4.58	0.00
29.00	7.00	4.58	0.00
30.00	7.00	4.58	0.00
31.00	7.00	4.58	0.00
32.00	7.00	4.58	0.00
33.00	7.00	4.58	0.00
34.00	7.00	4.58	0.00
35.00	7.00	4.58	0.00
36.00	7.00	4.58	0.00
37.00	7.00	4.58	0.00
38.00	7.00	4.58	0.00
39.00	7.00	4.58	0.00
40.00	7.00	4.58	0.00
41.00	7.00	4.58	0.00
42.00	7.00	4.58	0.00
43.00	7.00	4.58	0.00
44.00	7.00	4.58	0.00
45.00	7.00	4.58	0.00
46.00	7.00	4.58	0.00
47.00	7.00	4.58	0.00
48.00	7.00	4.58	0.00
49.00	7.00	4.58	0.00
50.00	7.00	4.58	0.00
51.00	7.00	4.58	0.00
52.00	7.00	4.58	0.00
53.00	7.00	4.58	0.00
54.00	7.00	4.58	0.00
55.00	7.00	4.58	0.00
56.00	7.00	4.58	0.00
57.00	7.00	4.58	0.00
58.00	7.00	4.58	0.00
59.00	7.00	4.58	0.00
60.00	7.00	4.58	0.00
61.00	7.00	4.58	0.00
62.00	7.00	4.58	0.00
63.00	7.00	4.58	0.00
64.00	7.00	4.58	0.00
65.00	7.00	4.58	0.00
66.00	7.00	4.58	0.00
67.00	7.00	4.58	0.00
68.00	7.00	4.58	0.00
69.00	7.00	4.58	0.00
70.00	7.00	4.58	0.00
71.00	7.00	4.58	0.00
72.00	7.00	4.58	0.00

Summary for Subcatchment PR-4: (new Subcat)

Runoff = 4.46 cfs @ 12.09 hrs, Volume= 13,815 cf, Depth= 3.62"

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 Rainfall=7.00"

	Area (sf)	CN	Description
*	17,215	79	>75% Grass cover, HSG B
*	28,600	65	Woods, Poor, HSG B
	45,815	70	Weighted Average
	45,815		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-4: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.00	0.00
4.00	0.30	0.00	0.00
5.00	0.40	0.00	0.00
6.00	0.50	0.00	0.00
7.00	0.63	0.00	0.00
8.00	0.80	0.00	0.00
9.00	1.02	0.01	0.02
10.00	1.32	0.05	0.06
11.00	1.75	0.15	0.16
12.00	3.50	1.01	**2.54**
13.00	5.25	2.22	**0.46**
14.00	5.68	2.55	0.30
15.00	5.98	2.79	0.23
16.00	6.20	2.97	0.16
17.00	6.37	3.10	0.13
18.00	6.50	3.20	0.10
19.00	6.60	3.29	0.09
20.00	6.70	3.37	0.08
21.00	6.79	3.44	0.07
22.00	6.87	3.51	0.07
23.00	6.94	3.57	0.06
24.00	**7.00**	**3.62**	0.05
25.00	7.00	3.62	0.00
26.00	7.00	3.62	0.00
27.00	7.00	3.62	0.00
28.00	7.00	3.62	0.00
29.00	7.00	3.62	0.00
30.00	7.00	3.62	0.00
31.00	7.00	3.62	0.00
32.00	7.00	3.62	0.00
33.00	7.00	3.62	0.00
34.00	7.00	3.62	0.00
35.00	7.00	3.62	0.00
36.00	7.00	3.62	0.00
37.00	7.00	3.62	0.00
38.00	7.00	3.62	0.00
39.00	7.00	3.62	0.00
40.00	7.00	3.62	0.00
41.00	7.00	3.62	0.00
42.00	7.00	3.62	0.00
43.00	7.00	3.62	0.00
44.00	7.00	3.62	0.00
45.00	7.00	3.62	0.00
46.00	7.00	3.62	0.00
47.00	7.00	3.62	0.00
48.00	7.00	3.62	0.00
49.00	7.00	3.62	0.00
50.00	7.00	3.62	0.00
51.00	7.00	3.62	0.00
52.00	7.00	3.62	0.00
53.00	7.00	3.62	0.00
54.00	7.00	3.62	0.00
55.00	7.00	3.62	0.00
56.00	7.00	3.62	0.00
57.00	7.00	3.62	0.00
58.00	7.00	3.62	0.00
59.00	7.00	3.62	0.00
60.00	7.00	3.62	0.00
61.00	7.00	3.62	0.00
62.00	7.00	3.62	0.00
63.00	7.00	3.62	0.00
64.00	7.00	3.62	0.00
65.00	7.00	3.62	0.00
66.00	7.00	3.62	0.00
67.00	7.00	3.62	0.00
68.00	7.00	3.62	0.00
69.00	7.00	3.62	0.00
70.00	7.00	3.62	0.00
71.00	7.00	3.62	0.00
72.00	7.00	3.62	0.00

Summary for Subcatchment PR-5: (new Subcat)

Runoff = 1.74 cfs @ 12.09 hrs, Volume= 5,484 cf, 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 Rainfall=7.00"

	Area (sf)	CN	Description
*	6,834	79	>75% Grass cover, Good, HSG B
	4,438	98	Paved parking, HSG B
*	1,818	65	Woods, Poor, HSG B
	13,090	83	Weighted Average
	8,652		66.10% Pervious Area
	4,438		33.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-5: (new Subcat)

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.00	0.00
4.00	0.30	0.00	0.00
5.00	0.40	0.00	0.00
6.00	0.50	0.00	0.00
7.00	0.63	0.02	0.01
8.00	0.80	0.06	0.02
9.00	1.02	0.14	0.03
10.00	1.32	0.28	0.05
11.00	1.75	0.53	0.09
12.00	3.50	1.86	**1.05**
13.00	5.25	3.40	**0.16**
14.00	5.68	3.79	0.10
15.00	5.98	4.07	0.08
16.00	6.20	4.28	0.05
17.00	6.37	4.43	0.04
18.00	6.50	4.55	0.03
19.00	6.60	4.65	0.03
20.00	6.70	4.74	0.03
21.00	6.79	4.83	0.02
22.00	6.87	4.90	0.02
23.00	6.94	4.97	0.02
24.00	**7.00**	**5.03**	0.02
25.00	7.00	5.03	0.00
26.00	7.00	5.03	0.00
27.00	7.00	5.03	0.00
28.00	7.00	5.03	0.00
29.00	7.00	5.03	0.00
30.00	7.00	5.03	0.00
31.00	7.00	5.03	0.00
32.00	7.00	5.03	0.00
33.00	7.00	5.03	0.00
34.00	7.00	5.03	0.00
35.00	7.00	5.03	0.00
36.00	7.00	5.03	0.00
37.00	7.00	5.03	0.00
38.00	7.00	5.03	0.00
39.00	7.00	5.03	0.00
40.00	7.00	5.03	0.00
41.00	7.00	5.03	0.00
42.00	7.00	5.03	0.00
43.00	7.00	5.03	0.00
44.00	7.00	5.03	0.00
45.00	7.00	5.03	0.00
46.00	7.00	5.03	0.00
47.00	7.00	5.03	0.00
48.00	7.00	5.03	0.00
49.00	7.00	5.03	0.00
50.00	7.00	5.03	0.00
51.00	7.00	5.03	0.00
52.00	7.00	5.03	0.00
53.00	7.00	5.03	0.00
54.00	7.00	5.03	0.00
55.00	7.00	5.03	0.00
56.00	7.00	5.03	0.00
57.00	7.00	5.03	0.00
58.00	7.00	5.03	0.00
59.00	7.00	5.03	0.00
60.00	7.00	5.03	0.00
61.00	7.00	5.03	0.00
62.00	7.00	5.03	0.00
63.00	7.00	5.03	0.00
64.00	7.00	5.03	0.00
65.00	7.00	5.03	0.00
66.00	7.00	5.03	0.00
67.00	7.00	5.03	0.00
68.00	7.00	5.03	0.00
69.00	7.00	5.03	0.00
70.00	7.00	5.03	0.00
71.00	7.00	5.03	0.00
72.00	7.00	5.03	0.00

Summary for Subcatchment PR-6: PR-6

Runoff = 1.02 cfs @ 12.09 hrs, Volume= 3,164 cf, Depth= 3.72"

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 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	4,183	79	>75% Grass cover, HSG B
*	5,835	65	Woods, Poor, HSG B
*	178	98	Wall
	10,196	71	Weighted Average
	10,018		98.25% Pervious Area
	178		1.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-6: PR-6

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.00	0.00
4.00	0.30	0.00	0.00
5.00	0.40	0.00	0.00
6.00	0.50	0.00	0.00
7.00	0.63	0.00	0.00
8.00	0.80	0.00	0.00
9.00	1.02	0.01	0.00
10.00	1.32	0.06	0.02
11.00	1.75	0.17	0.04
12.00	3.50	1.06	**0.59**
13.00	5.25	2.31	**0.10**
14.00	5.68	2.64	0.07
15.00	5.98	2.88	0.05
16.00	6.20	3.06	0.04
17.00	6.37	3.20	0.03
18.00	6.50	3.30	0.02
19.00	6.60	3.39	0.02
20.00	6.70	3.47	0.02
21.00	6.79	3.54	0.02
22.00	6.87	3.61	0.02
23.00	6.94	3.67	0.01
24.00	**7.00**	**3.72**	0.01
25.00	7.00	3.72	0.00
26.00	7.00	3.72	0.00
27.00	7.00	3.72	0.00
28.00	7.00	3.72	0.00
29.00	7.00	3.72	0.00
30.00	7.00	3.72	0.00
31.00	7.00	3.72	0.00
32.00	7.00	3.72	0.00
33.00	7.00	3.72	0.00
34.00	7.00	3.72	0.00
35.00	7.00	3.72	0.00
36.00	7.00	3.72	0.00
37.00	7.00	3.72	0.00
38.00	7.00	3.72	0.00
39.00	7.00	3.72	0.00
40.00	7.00	3.72	0.00
41.00	7.00	3.72	0.00
42.00	7.00	3.72	0.00
43.00	7.00	3.72	0.00
44.00	7.00	3.72	0.00
45.00	7.00	3.72	0.00
46.00	7.00	3.72	0.00
47.00	7.00	3.72	0.00
48.00	7.00	3.72	0.00
49.00	7.00	3.72	0.00
50.00	7.00	3.72	0.00
51.00	7.00	3.72	0.00
52.00	7.00	3.72	0.00
53.00	7.00	3.72	0.00
54.00	7.00	3.72	0.00
55.00	7.00	3.72	0.00
56.00	7.00	3.72	0.00
57.00	7.00	3.72	0.00
58.00	7.00	3.72	0.00
59.00	7.00	3.72	0.00
60.00	7.00	3.72	0.00
61.00	7.00	3.72	0.00
62.00	7.00	3.72	0.00
63.00	7.00	3.72	0.00
64.00	7.00	3.72	0.00
65.00	7.00	3.72	0.00
66.00	7.00	3.72	0.00
67.00	7.00	3.72	0.00
68.00	7.00	3.72	0.00
69.00	7.00	3.72	0.00
70.00	7.00	3.72	0.00
71.00	7.00	3.72	0.00
72.00	7.00	3.72	0.00

Summary for Subcatchment PR-7: PR-7

Runoff = 0.79 cfs @ 12.09 hrs, Volume= 2,456 cf, Depth= 4.04"

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 Rainfall=7.00"

	Area (sf)	CN	Description
*	4,865	79	>75% Grass cover, HSG B
*	2,426	65	Woods, Poor, HSG B
	7,291	74	Weighted Average
	7,291		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-7: PR-7

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.00	0.00
4.00	0.30	0.00	0.00
5.00	0.40	0.00	0.00
6.00	0.50	0.00	0.00
7.00	0.63	0.00	0.00
8.00	0.80	0.00	0.00
9.00	1.02	0.03	0.01
10.00	1.32	0.09	0.02
11.00	1.75	0.24	0.03
12.00	3.50	1.24	**0.46**
13.00	5.25	2.57	**0.08**
14.00	5.68	2.92	0.05
15.00	5.98	3.17	0.04
16.00	6.20	3.36	0.03
17.00	6.37	3.50	0.02
18.00	6.50	3.61	0.02
19.00	6.60	3.70	0.01
20.00	6.70	3.78	0.01
21.00	6.79	3.86	0.01
22.00	6.87	3.92	0.01
23.00	6.94	3.99	0.01
24.00	**7.00**	**4.04**	0.01
25.00	7.00	4.04	0.00
26.00	7.00	4.04	0.00
27.00	7.00	4.04	0.00
28.00	7.00	4.04	0.00
29.00	7.00	4.04	0.00
30.00	7.00	4.04	0.00
31.00	7.00	4.04	0.00
32.00	7.00	4.04	0.00
33.00	7.00	4.04	0.00
34.00	7.00	4.04	0.00
35.00	7.00	4.04	0.00
36.00	7.00	4.04	0.00
37.00	7.00	4.04	0.00
38.00	7.00	4.04	0.00
39.00	7.00	4.04	0.00
40.00	7.00	4.04	0.00
41.00	7.00	4.04	0.00
42.00	7.00	4.04	0.00
43.00	7.00	4.04	0.00
44.00	7.00	4.04	0.00
45.00	7.00	4.04	0.00
46.00	7.00	4.04	0.00
47.00	7.00	4.04	0.00
48.00	7.00	4.04	0.00
49.00	7.00	4.04	0.00
50.00	7.00	4.04	0.00
51.00	7.00	4.04	0.00
52.00	7.00	4.04	0.00
53.00	7.00	4.04	0.00
54.00	7.00	4.04	0.00
55.00	7.00	4.04	0.00
56.00	7.00	4.04	0.00
57.00	7.00	4.04	0.00
58.00	7.00	4.04	0.00
59.00	7.00	4.04	0.00
60.00	7.00	4.04	0.00
61.00	7.00	4.04	0.00
62.00	7.00	4.04	0.00
63.00	7.00	4.04	0.00
64.00	7.00	4.04	0.00
65.00	7.00	4.04	0.00
66.00	7.00	4.04	0.00
67.00	7.00	4.04	0.00
68.00	7.00	4.04	0.00
69.00	7.00	4.04	0.00
70.00	7.00	4.04	0.00
71.00	7.00	4.04	0.00
72.00	7.00	4.04	0.00

Summary for Subcatchment PR-8: PR-8

Runoff = 27.19 cfs @ 12.12 hrs, Volume= 94,465 cf, Depth= 5.14"

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 Rainfall=7.00"

	Area (sf)	CN	Description
	58,745	98	Paved parking, HSG A
*	161,798	79	>75% Grass cover, HSG B
	220,543	84	Weighted Average
	161,798		73.36% Pervious Area
	58,745		26.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		**Sheet Flow, 50 grass sf 1%** Grass: Short n= 0.150 P2= 3.20"
1.3	67	0.0150	0.86		**Shallow Concentrated Flow, 67 scf grass 1.5%** Short Grass Pasture Kv= 7.0 fps
8.7	117	Total			

Hydrograph for Subcatchment PR-8: PR-8

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.00	0.00
4.00	0.30	0.00	0.00
5.00	0.40	0.00	0.00
6.00	0.50	0.01	0.06
7.00	0.63	0.03	0.15
8.00	0.80	0.07	0.28
9.00	1.02	0.16	0.55
10.00	1.32	0.31	0.91
11.00	1.75	0.57	1.61
12.00	3.50	1.94	**14.40**
13.00	5.25	3.50	**2.80**
14.00	5.68	3.90	1.73
15.00	5.98	4.18	1.30
16.00	6.20	4.39	0.92
17.00	6.37	4.54	0.73
18.00	6.50	4.66	0.56
19.00	6.60	4.76	0.50
20.00	6.70	4.85	0.45
21.00	6.79	4.94	0.41
22.00	6.87	5.01	0.37
23.00	6.94	5.08	0.33
24.00	**7.00**	**5.14**	0.29
25.00	7.00	5.14	0.00
26.00	7.00	5.14	0.00
27.00	7.00	5.14	0.00
28.00	7.00	5.14	0.00
29.00	7.00	5.14	0.00
30.00	7.00	5.14	0.00
31.00	7.00	5.14	0.00
32.00	7.00	5.14	0.00
33.00	7.00	5.14	0.00
34.00	7.00	5.14	0.00
35.00	7.00	5.14	0.00
36.00	7.00	5.14	0.00
37.00	7.00	5.14	0.00
38.00	7.00	5.14	0.00
39.00	7.00	5.14	0.00
40.00	7.00	5.14	0.00
41.00	7.00	5.14	0.00
42.00	7.00	5.14	0.00
43.00	7.00	5.14	0.00
44.00	7.00	5.14	0.00
45.00	7.00	5.14	0.00
46.00	7.00	5.14	0.00
47.00	7.00	5.14	0.00
48.00	7.00	5.14	0.00
49.00	7.00	5.14	0.00
50.00	7.00	5.14	0.00
51.00	7.00	5.14	0.00
52.00	7.00	5.14	0.00
53.00	7.00	5.14	0.00
54.00	7.00	5.14	0.00
55.00	7.00	5.14	0.00
56.00	7.00	5.14	0.00
57.00	7.00	5.14	0.00
58.00	7.00	5.14	0.00
59.00	7.00	5.14	0.00
60.00	7.00	5.14	0.00
61.00	7.00	5.14	0.00
62.00	7.00	5.14	0.00
63.00	7.00	5.14	0.00
64.00	7.00	5.14	0.00
65.00	7.00	5.14	0.00
66.00	7.00	5.14	0.00
67.00	7.00	5.14	0.00
68.00	7.00	5.14	0.00
69.00	7.00	5.14	0.00
70.00	7.00	5.14	0.00
71.00	7.00	5.14	0.00
72.00	7.00	5.14	0.00

Summary for Subcatchment PR-9: PR-9

Runoff = 4.39 cfs @ 12.09 hrs, Volume= 13,993 cf, Depth= 5.25"

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 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	22,546	79	>75% Grass cover, HSG B
	8,270	98	Paved parking, HSG B
*	1,153	98	Paved Parking, HSG B
	31,969	85	Weighted Average
	22,546		70.52% Pervious Area
	9,423		29.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-9: PR-9

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.00
2.00	0.14	0.00	0.00
3.00	0.22	0.00	0.00
4.00	0.30	0.00	0.00
5.00	0.40	0.00	0.00
6.00	0.50	0.01	0.01
7.00	0.63	0.04	0.03
8.00	0.80	0.09	0.05
9.00	1.02	0.18	0.09
10.00	1.32	0.34	0.14
11.00	1.75	0.62	0.25
12.00	3.50	2.02	**2.68**
13.00	5.25	3.60	**0.39**
14.00	5.68	4.00	0.25
15.00	5.98	4.28	0.19
16.00	6.20	4.49	0.13
17.00	6.37	4.65	0.11
18.00	6.50	4.77	0.08
19.00	6.60	4.87	0.07
20.00	6.70	4.97	0.06
21.00	6.79	5.05	0.06
22.00	6.87	5.12	0.05
23.00	6.94	5.19	0.05
24.00	**7.00**	**5.25**	0.04
25.00	7.00	5.25	0.00
26.00	7.00	5.25	0.00
27.00	7.00	5.25	0.00
28.00	7.00	5.25	0.00
29.00	7.00	5.25	0.00
30.00	7.00	5.25	0.00
31.00	7.00	5.25	0.00
32.00	7.00	5.25	0.00
33.00	7.00	5.25	0.00
34.00	7.00	5.25	0.00
35.00	7.00	5.25	0.00
36.00	7.00	5.25	0.00
37.00	7.00	5.25	0.00
38.00	7.00	5.25	0.00
39.00	7.00	5.25	0.00
40.00	7.00	5.25	0.00
41.00	7.00	5.25	0.00
42.00	7.00	5.25	0.00
43.00	7.00	5.25	0.00
44.00	7.00	5.25	0.00
45.00	7.00	5.25	0.00
46.00	7.00	5.25	0.00
47.00	7.00	5.25	0.00
48.00	7.00	5.25	0.00
49.00	7.00	5.25	0.00
50.00	7.00	5.25	0.00
51.00	7.00	5.25	0.00
52.00	7.00	5.25	0.00
53.00	7.00	5.25	0.00
54.00	7.00	5.25	0.00
55.00	7.00	5.25	0.00
56.00	7.00	5.25	0.00
57.00	7.00	5.25	0.00
58.00	7.00	5.25	0.00
59.00	7.00	5.25	0.00
60.00	7.00	5.25	0.00
61.00	7.00	5.25	0.00
62.00	7.00	5.25	0.00
63.00	7.00	5.25	0.00
64.00	7.00	5.25	0.00
65.00	7.00	5.25	0.00
66.00	7.00	5.25	0.00
67.00	7.00	5.25	0.00
68.00	7.00	5.25	0.00
69.00	7.00	5.25	0.00
70.00	7.00	5.25	0.00
71.00	7.00	5.25	0.00
72.00	7.00	5.25	0.00

Summary for Subcatchment PR-BLDG: PR-BLDG

Runoff = 9.97 cfs @ 12.08 hrs, Volume= 35,620 cf, Depth= 6.76"

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 Rainfall=7.00"

Area (sf)	CN	Description
63,223	98	Paved parking, HSG B
63,223		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Hydrograph for Subcatchment PR-BLDG: PR-BLDG

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.07	0.00	0.02
2.00	0.14	0.03	0.05
3.00	0.22	0.08	0.08
4.00	0.30	0.15	0.11
5.00	0.40	0.23	0.13
6.00	0.50	0.32	0.15
7.00	0.63	0.44	0.20
8.00	0.80	0.60	0.25
9.00	1.02	0.81	0.36
10.00	1.32	1.11	0.48
11.00	1.75	1.53	0.72
12.00	3.50	3.27	**6.28**
13.00	5.25	5.01	**0.83**
14.00	5.68	5.44	0.52
15.00	5.98	5.74	0.39
16.00	6.20	5.96	0.28
17.00	6.37	6.13	0.22
18.00	6.50	6.26	0.17
19.00	6.60	6.36	0.15
20.00	6.70	6.46	0.13
21.00	6.79	6.55	0.12
22.00	6.87	6.63	0.11
23.00	6.94	6.70	0.10
24.00	**7.00**	**6.76**	0.09
25.00	7.00	6.76	0.00
26.00	7.00	6.76	0.00
27.00	7.00	6.76	0.00
28.00	7.00	6.76	0.00
29.00	7.00	6.76	0.00
30.00	7.00	6.76	0.00
31.00	7.00	6.76	0.00
32.00	7.00	6.76	0.00
33.00	7.00	6.76	0.00
34.00	7.00	6.76	0.00
35.00	7.00	6.76	0.00
36.00	7.00	6.76	0.00
37.00	7.00	6.76	0.00
38.00	7.00	6.76	0.00
39.00	7.00	6.76	0.00
40.00	7.00	6.76	0.00
41.00	7.00	6.76	0.00
42.00	7.00	6.76	0.00
43.00	7.00	6.76	0.00
44.00	7.00	6.76	0.00
45.00	7.00	6.76	0.00
46.00	7.00	6.76	0.00
47.00	7.00	6.76	0.00
48.00	7.00	6.76	0.00
49.00	7.00	6.76	0.00
50.00	7.00	6.76	0.00
51.00	7.00	6.76	0.00
52.00	7.00	6.76	0.00
53.00	7.00	6.76	0.00
54.00	7.00	6.76	0.00
55.00	7.00	6.76	0.00
56.00	7.00	6.76	0.00
57.00	7.00	6.76	0.00
58.00	7.00	6.76	0.00
59.00	7.00	6.76	0.00
60.00	7.00	6.76	0.00
61.00	7.00	6.76	0.00
62.00	7.00	6.76	0.00
63.00	7.00	6.76	0.00
64.00	7.00	6.76	0.00
65.00	7.00	6.76	0.00
66.00	7.00	6.76	0.00
67.00	7.00	6.76	0.00
68.00	7.00	6.76	0.00
69.00	7.00	6.76	0.00
70.00	7.00	6.76	0.00
71.00	7.00	6.76	0.00
72.00	7.00	6.76	0.00

Summary for Reach POA-1: To Main Street

Inflow Area = 315,759 sf, 59.36% Impervious, Inflow Depth = 4.21" for 100 yr event
Inflow = 22.19 cfs @ 12.25 hrs, Volume= 110,838 cf
Outflow = 22.19 cfs @ 12.25 hrs, Volume= 110,838 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-1: To Main Street

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.01		0.01
6.00	0.03		0.03
7.00	0.05		0.05
8.00	0.08		0.08
9.00	0.70		0.70
10.00	1.09		1.09
11.00	1.75		1.75
12.00	**12.16**		**12.16**
13.00	**4.22**		**4.22**
14.00	2.41		2.41
15.00	1.73		1.73
16.00	1.18		1.18
17.00	0.86		0.86
18.00	0.62		0.62
19.00	0.50		0.50
20.00	0.43		0.43
21.00	0.37		0.37
22.00	0.31		0.31
23.00	0.26		0.26
24.00	0.20		0.20
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-2: To Existing DMH North of Site

Inflow Area = 313,399 sf, 34.68% Impervious, Inflow Depth = 5.28" for 100 yr event
Inflow = 23.47 cfs @ 12.13 hrs, Volume= 137,771 cf
Outflow = 23.47 cfs @ 12.13 hrs, Volume= 137,771 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-2: To Existing DMH North of Site

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.01		0.01
6.00	0.06		0.06
7.00	0.24		0.24
8.00	0.43		0.43
9.00	0.81		0.81
10.00	1.35		1.35
11.00	2.34		2.34
12.00	**15.26**		**15.26**
13.00	**7.57**		**7.57**
14.00	2.58		2.58
15.00	1.91		1.91
16.00	1.37		1.37
17.00	1.06		1.06
18.00	0.82		0.82
19.00	0.71		0.71
20.00	0.64		0.64
21.00	0.58		0.58
22.00	0.52		0.52
23.00	0.47		0.47
24.00	0.42		0.42
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-3: NORTH EAST WETLANDS

Inflow Area = 37,434 sf, 0.00% Impervious, Inflow Depth = 4.58" for 100 yr event
Inflow = 4.14 cfs @ 12.13 hrs, Volume= 14,301 cf
Outflow = 4.14 cfs @ 12.13 hrs, Volume= 14,301 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-3: NORTH EAST WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.01		0.01
8.00	0.02		0.02
9.00	0.06		0.06
10.00	0.11		0.11
11.00	0.22		0.22
12.00	**2.11**		**2.11**
13.00	**0.45**		**0.45**
14.00	0.28		0.28
15.00	0.21		0.21
16.00	0.15		0.15
17.00	0.12		0.12
18.00	0.09		0.09
19.00	0.08		0.08
20.00	0.07		0.07
21.00	0.07		0.07
22.00	0.06		0.06
23.00	0.05		0.05
24.00	0.05		0.05
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-4: SOUTH EAST WETLANDS

Inflow Area = 45,815 sf, 0.00% Impervious, Inflow Depth = 3.62" for 100 yr event
Inflow = 4.46 cfs @ 12.09 hrs, Volume= 13,815 cf
Outflow = 4.46 cfs @ 12.09 hrs, Volume= 13,815 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-4: SOUTH EAST WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.00		0.00
8.00	0.00		0.00
9.00	0.02		0.02
10.00	0.06		0.06
11.00	0.16		0.16
12.00	**2.54**		**2.54**
13.00	**0.46**		**0.46**
14.00	0.30		0.30
15.00	0.23		0.23
16.00	0.16		0.16
17.00	0.13		0.13
18.00	0.10		0.10
19.00	0.09		0.09
20.00	0.08		0.08
21.00	0.07		0.07
22.00	0.07		0.07
23.00	0.06		0.06
24.00	0.05		0.05
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Reach POA-5: CHAMPNEY STREET

Inflow Area = 13,090 sf, 33.90% Impervious, Inflow Depth = 5.03" for 100 yr event
Inflow = 1.74 cfs @ 12.09 hrs, Volume= 5,484 cf
Outflow = 1.74 cfs @ 12.09 hrs, Volume= 5,484 cf, Atten= 0%, Lag= 0.0 min

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

Hydrograph for Reach POA-5: CHAMPNEY STREET

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00		0.00
1.00	0.00		0.00
2.00	0.00		0.00
3.00	0.00		0.00
4.00	0.00		0.00
5.00	0.00		0.00
6.00	0.00		0.00
7.00	0.01		0.01
8.00	0.02		0.02
9.00	0.03		0.03
10.00	0.05		0.05
11.00	0.09		0.09
12.00	**1.05**		**1.05**
13.00	**0.16**		**0.16**
14.00	0.10		0.10
15.00	0.08		0.08
16.00	0.05		0.05
17.00	0.04		0.04
18.00	0.03		0.03
19.00	0.03		0.03
20.00	0.03		0.03
21.00	0.02		0.02
22.00	0.02		0.02
23.00	0.02		0.02
24.00	0.02		0.02
25.00	0.00		0.00
26.00	0.00		0.00
27.00	0.00		0.00
28.00	0.00		0.00
29.00	0.00		0.00
30.00	0.00		0.00
31.00	0.00		0.00
32.00	0.00		0.00
33.00	0.00		0.00
34.00	0.00		0.00
35.00	0.00		0.00
36.00	0.00		0.00
37.00	0.00		0.00
38.00	0.00		0.00
39.00	0.00		0.00
40.00	0.00		0.00
41.00	0.00		0.00
42.00	0.00		0.00
43.00	0.00		0.00
44.00	0.00		0.00
45.00	0.00		0.00
46.00	0.00		0.00
47.00	0.00		0.00
48.00	0.00		0.00
49.00	0.00		0.00
50.00	0.00		0.00
51.00	0.00		0.00
52.00	0.00		0.00
53.00	0.00		0.00
54.00	0.00		0.00
55.00	0.00		0.00
56.00	0.00		0.00
57.00	0.00		0.00
58.00	0.00		0.00
59.00	0.00		0.00
60.00	0.00		0.00
61.00	0.00		0.00
62.00	0.00		0.00
63.00	0.00		0.00
64.00	0.00		0.00
65.00	0.00		0.00
66.00	0.00		0.00
67.00	0.00		0.00
68.00	0.00		0.00
69.00	0.00		0.00
70.00	0.00		0.00
71.00	0.00		0.00
72.00	0.00		0.00

Summary for Pond #1A: INF#1A

Inflow Area = 135,366 sf, 88.03% Impervious, Inflow Depth = 6.46" for 100 yr event
Inflow = 19.77 cfs @ 12.08 hrs, Volume= 72,857 cf
Outflow = 16.67 cfs @ 12.06 hrs, Volume= 72,857 cf, Atten= 16%, Lag= 0.0 min
Discarded = 0.05 cfs @ 2.70 hrs, Volume= 7,775 cf
Primary = 16.62 cfs @ 12.06 hrs, Volume= 65,082 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 326.19' @ 12.16 hrs Surf.Area= 2,119 sf Storage= 7,353 cf
Flood Elev= 327.75' Surf.Area= 2,119 sf Storage= 8,726 cf

Plug-Flow detention time= 89.7 min calculated for 72,847 cf (100% of inflow)
Center-of-Mass det. time= 89.8 min (847.1 - 757.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.00'	3,720 cf	**30.50'W x 69.49'L x 6.75'H Field A** 14,307 cf Overall - 5,006 cf Embedded = 9,300 cf x 40.0% Voids
#2A	321.75'	5,006 cf	**ADS_StormTech MC-4500 +Cap** x 45 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 45 Chambers in 3 Rows Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,726 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.90'	**24.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 321.90' / 321.86' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#3	Device 2	325.00'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	323.50'	**15.0" W x 12.0" H Vert. Orifice/Grate** X 2 rows with 6.0" cc spacing C= 0.600

Discarded OutFlow Max=0.05 cfs @ 2.70 hrs HW=321.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=15.79 cfs @ 12.06 hrs HW=325.45' TW=323.70' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 15.79 cfs @ 5.03 fps)
  ├**3=Broad-Crested Rectangular Weir** (Passes < 4.39 cfs potential flow)
  └**4=Orifice/Grate** (Passes < 12.93 cfs potential flow)

Pond #1A: INF#1A - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

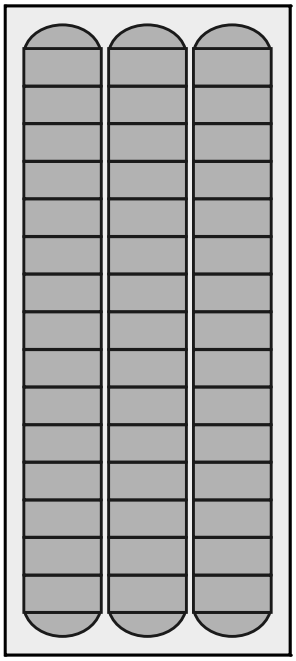
15 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 65.49' Row Length +24.0" End Stone x 2 = 69.49' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 24.0" Side Stone x 2 = 30.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

45 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 5,006.3 cf Chamber Storage

14,306.6 cf Field - 5,006.3 cf Chambers = 9,300.3 cf Stone x 40.0% Voids = 3,720.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,726.4 cf = 0.200 af
Overall Storage Efficiency = 61.0%
Overall System Size = 69.49' x 30.50' x 6.75'

45 Chambers
529.9 cy Field
344.5 cy Stone



Hydrograph for Pond #1A: INF#1A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.00	0.00	0.00	0.00
2.00	0.06	2	321.00	0.05	**0.05**	0.00
4.00	0.15	382	321.45	0.05	**0.05**	0.00
6.00	0.23	1,406	322.20	0.05	0.05	0.00
8.00	0.43	3,397	323.41	0.05	0.05	0.00
10.00	0.97	4,127	323.87	0.94	0.05	0.89
12.00	**12.79**	**5,875**	**325.03**	**10.36**	0.05	**10.31**
14.00	**0.99**	**4,224**	**323.93**	**1.17**	0.05	**1.12**
16.00	0.52	3,981	323.77	0.62	0.05	0.57
18.00	0.32	3,846	323.69	0.38	0.05	0.33
20.00	0.25	3,792	323.65	0.29	0.05	0.24
22.00	0.21	3,756	323.63	0.24	0.05	0.19
24.00	0.17	3,719	323.61	0.19	0.05	0.14
26.00	0.00	3,300	323.35	0.05	0.05	0.00
28.00	0.00	2,939	323.13	0.05	0.05	0.00
30.00	0.00	2,579	322.91	0.05	0.05	0.00
32.00	0.00	2,219	322.69	0.05	0.05	0.00
34.00	0.00	1,858	322.47	0.05	0.05	0.00
36.00	0.00	1,498	322.26	0.05	0.05	0.00
38.00	0.00	1,138	322.05	0.05	0.05	0.00
40.00	0.00	777	321.83	0.05	0.05	0.00
42.00	0.00	417	321.49	0.05	0.05	0.00
44.00	0.00	57	321.07	0.05	0.05	0.00
46.00	0.00	0	321.00	0.00	0.00	0.00
48.00	0.00	0	321.00	0.00	0.00	0.00
50.00	0.00	0	321.00	0.00	0.00	0.00
52.00	0.00	0	321.00	0.00	0.00	0.00
54.00	0.00	0	321.00	0.00	0.00	0.00
56.00	0.00	0	321.00	0.00	0.00	0.00
58.00	0.00	0	321.00	0.00	0.00	0.00
60.00	0.00	0	321.00	0.00	0.00	0.00
62.00	0.00	0	321.00	0.00	0.00	0.00
64.00	0.00	0	321.00	0.00	0.00	0.00
66.00	0.00	0	321.00	0.00	0.00	0.00
68.00	0.00	0	321.00	0.00	0.00	0.00
70.00	0.00	0	321.00	0.00	0.00	0.00
72.00	0.00	0	321.00	0.00	0.00	0.00

Stage-Area-Storage for Pond #1A: INF#1A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.00	**2,119**	0
321.10	2,119	85
321.20	2,119	170
321.30	2,119	254
321.40	2,119	339
321.50	2,119	424
321.60	2,119	509
321.70	2,119	593
321.80	2,119	721
321.90	2,119	891
322.00	2,119	1,061
322.10	2,119	1,230
322.20	2,119	1,399
322.30	2,119	1,567
322.40	2,119	1,735
322.50	2,119	1,903
322.60	2,119	2,070
322.70	2,119	2,237
322.80	2,119	2,402
322.90	2,119	2,568
323.00	2,119	2,732
323.10	2,119	2,897
323.20	2,119	3,060
323.30	2,119	3,222
323.40	2,119	3,384
323.50	2,119	3,545
323.60	2,119	3,705
323.70	2,119	3,864
323.80	2,119	4,023
323.90	2,119	4,180
324.00	2,119	4,336
324.10	2,119	4,491
324.20	2,119	4,645
324.30	2,119	4,798
324.40	2,119	4,950
324.50	2,119	5,100
324.60	2,119	5,249
324.70	2,119	5,396
324.80	2,119	5,542
324.90	2,119	5,687
325.00	2,119	5,830
325.10	2,119	5,971
325.20	2,119	6,110
325.30	2,119	6,247
325.40	2,119	6,382
325.50	2,119	6,515
325.60	2,119	6,646
325.70	2,119	6,774
325.80	2,119	6,899
325.90	2,119	7,021
326.00	2,119	7,140
326.10	2,119	7,255
326.20	2,119	7,366
326.30	2,119	7,469
326.40	2,119	7,566
326.50	2,119	7,658
326.60	2,119	7,748
326.70	2,119	7,836
326.80	2,119	7,921
326.90	2,119	8,006
327.00	2,119	8,091
327.10	2,119	8,175
327.20	2,119	8,260
327.30	2,119	8,345
327.40	2,119	8,430
327.50	2,119	8,514
327.60	2,119	8,599
327.70	2,119	**8,684**

Summary for Pond #1B: INF#1B

Inflow Area = 135,366 sf, 88.03% Impervious, Inflow Depth = 5.77" for 100 yr event
Inflow = 16.62 cfs @ 12.06 hrs, Volume= 65,082 cf
Outflow = 12.15 cfs @ 12.21 hrs, Volume= 65,083 cf, Atten= 27%, Lag= 9.2 min
Discarded = 0.05 cfs @ 8.33 hrs, Volume= 3,167 cf
Primary = 12.10 cfs @ 12.21 hrs, Volume= 61,916 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 325.00' @ 12.21 hrs Surf.Area= 1,997 sf Storage= 5,472 cf
Flood Elev= 327.75' Surf.Area= 1,997 sf Storage= 8,203 cf

Plug-Flow detention time= 10.2 min calculated for 65,074 cf (100% of inflow)
Center-of-Mass det. time= 10.2 min (795.6 - 785.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.00'	3,516 cf	**30.50'W x 65.47'L x 6.75'H Field A** 13,478 cf Overall - 4,687 cf Embedded = 8,791 cf x 40.0% Voids
#2A	321.75'	4,687 cf	**ADS_StormTech MC-4500 +Cap** x 42 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 42 Chambers in 3 Rows Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		8,203 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.00'	**18.0" Round Culvert** L= 8.0' Ke= 0.900 Inlet / Outlet Invert= 321.00' / 320.44' S= 0.0700 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#3	Device 2	321.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 8.33 hrs HW=321.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=12.10 cfs @ 12.21 hrs HW=324.99' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 12.10 cfs @ 6.85 fps)
└**3=Broad-Crested Rectangular Weir** (Passes 12.10 cfs of 108.45 cfs potential flow)

Pond #1B: INF#1B - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

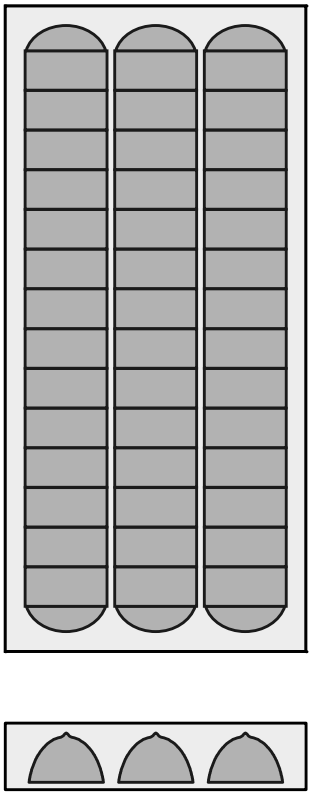
14 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 61.47' Row Length +24.0" End Stone x 2 = 65.47' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 24.0" Side Stone x 2 = 30.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

42 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,686.8 cf Chamber Storage

13,478.0 cf Field - 4,686.8 cf Chambers = 8,791.2 cf Stone x 40.0% Voids = 3,516.5 cf Stone Storage

Chamber Storage + Stone Storage = 8,203.3 cf = 0.188 af
Overall Storage Efficiency = 60.9%
Overall System Size = 65.47' x 30.50' x 6.75'

42 Chambers
499.2 cy Field
325.6 cy Stone



Hydrograph for Pond #1B: INF#1B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.00	0.00	0.00	0.00
2.00	0.00	0	321.00	0.00	0.00	0.00
4.00	0.00	0	321.00	0.00	0.00	0.00
6.00	0.00	0	321.00	0.00	0.00	0.00
8.00	0.00	0	321.00	0.00	**0.00**	0.00
10.00	0.89	521	321.65	0.88	**0.05**	0.83
12.00	**10.31**	**2,471**	**322.94**	**7.37**	0.05	**7.32**
14.00	**1.12**	**545**	**321.68**	**1.14**	0.05	**1.09**
16.00	0.57	490	321.61	0.58	0.05	0.54
18.00	0.33	459	321.57	0.33	0.05	0.28
20.00	0.24	446	321.56	0.24	0.05	0.20
22.00	0.19	437	321.55	0.19	0.05	0.15
24.00	0.14	428	321.54	0.14	0.05	0.10
26.00	0.00	136	321.17	0.05	0.05	0.00
28.00	0.00	0	321.00	0.00	0.00	0.00
30.00	0.00	0	321.00	0.00	0.00	0.00
32.00	0.00	0	321.00	0.00	0.00	0.00
34.00	0.00	0	321.00	0.00	0.00	0.00
36.00	0.00	0	321.00	0.00	0.00	0.00
38.00	0.00	0	321.00	0.00	0.00	0.00
40.00	0.00	0	321.00	0.00	0.00	0.00
42.00	0.00	0	321.00	0.00	0.00	0.00
44.00	0.00	0	321.00	0.00	0.00	0.00
46.00	0.00	0	321.00	0.00	0.00	0.00
48.00	0.00	0	321.00	0.00	0.00	0.00
50.00	0.00	0	321.00	0.00	0.00	0.00
52.00	0.00	0	321.00	0.00	0.00	0.00
54.00	0.00	0	321.00	0.00	0.00	0.00
56.00	0.00	0	321.00	0.00	0.00	0.00
58.00	0.00	0	321.00	0.00	0.00	0.00
60.00	0.00	0	321.00	0.00	0.00	0.00
62.00	0.00	0	321.00	0.00	0.00	0.00
64.00	0.00	0	321.00	0.00	0.00	0.00
66.00	0.00	0	321.00	0.00	0.00	0.00
68.00	0.00	0	321.00	0.00	0.00	0.00
70.00	0.00	0	321.00	0.00	0.00	0.00
72.00	0.00	0	321.00	0.00	0.00	0.00

Stage-Area-Storage for Pond #1B: INF#1B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.00	**1,997**	0
321.10	1,997	80
321.20	1,997	160
321.30	1,997	240
321.40	1,997	319
321.50	1,997	399
321.60	1,997	479
321.70	1,997	559
321.80	1,997	679
321.90	1,997	839
322.00	1,997	998
322.10	1,997	1,157
322.20	1,997	1,316
322.30	1,997	1,474
322.40	1,997	1,632
322.50	1,997	1,789
322.60	1,997	1,946
322.70	1,997	2,102
322.80	1,997	2,258
322.90	1,997	2,413
323.00	1,997	2,568
323.10	1,997	2,722
323.20	1,997	2,876
323.30	1,997	3,028
323.40	1,997	3,180
323.50	1,997	3,331
323.60	1,997	3,482
323.70	1,997	3,631
323.80	1,997	3,780
323.90	1,997	3,928
324.00	1,997	4,074
324.10	1,997	4,220
324.20	1,997	4,365
324.30	1,997	4,508
324.40	1,997	4,651
324.50	1,997	4,792
324.60	1,997	4,932
324.70	1,997	5,070
324.80	1,997	5,208
324.90	1,997	5,343
325.00	1,997	5,478
325.10	1,997	5,610
325.20	1,997	5,741
325.30	1,997	5,870
325.40	1,997	5,997
325.50	1,997	6,122
325.60	1,997	6,245
325.70	1,997	6,365
325.80	1,997	6,483
325.90	1,997	6,598
326.00	1,997	6,710
326.10	1,997	6,818
326.20	1,997	6,922
326.30	1,997	7,019
326.40	1,997	7,110
326.50	1,997	7,197
326.60	1,997	7,282
326.70	1,997	7,364
326.80	1,997	7,445
326.90	1,997	7,524
327.00	1,997	7,604
327.10	1,997	7,684
327.20	1,997	7,764
327.30	1,997	7,844
327.40	1,997	7,924
327.50	1,997	8,004
327.60	1,997	8,083
327.70	1,997	**8,163**

Summary for Pond Forebay #1: Sediment Forebay #1

Inflow Area = 15,164 sf, 79.13% Impervious, Inflow Depth = 6.29" for 100 yr event
Inflow = 2.34 cfs @ 12.08 hrs, Volume= 7,946 cf
Outflow = 2.32 cfs @ 12.09 hrs, Volume= 7,372 cf, Atten= 1%, Lag= 0.5 min
Primary = 2.32 cfs @ 12.09 hrs, Volume= 7,372 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 332.71' @ 12.09 hrs Surf.Area= 537 sf Storage= 683 cf

Plug-Flow detention time= 68.4 min calculated for 7,372 cf (93% of inflow)
Center-of-Mass det. time= 29.7 min (794.2 - 764.6)

Volume	Invert	Avail.Storage	Storage Description
#1	330.00'	848 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
330.00	0	0	0
331.00	179	90	90
332.00	365	272	362
333.00	607	486	848

Device	Routing	Invert	Outlet Devices
#1	Primary	332.50'	**10.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=2.32 cfs @ 12.09 hrs HW=332.71' TW=331.50' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.32 cfs @ 1.09 fps)

Hydrograph for Pond Forebay #1: Sediment Forebay #1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	330.00	0.00
2.00	0.00	0	330.03	0.00
4.00	0.01	43	330.69	0.00
6.00	0.02	169	331.37	0.00
8.00	0.05	418	332.15	0.00
10.00	0.10	587	332.53	0.10
12.00	**1.46**	**649**	**332.65**	**1.35**
14.00	**0.12**	**589**	**332.53**	**0.13**
16.00	0.07	584	332.52	0.07
18.00	0.04	581	332.51	0.04
20.00	0.03	580	332.51	0.03
22.00	0.03	580	332.51	0.03
24.00	0.02	579	332.51	0.02
26.00	0.00	574	332.50	0.00
28.00	0.00	574	332.50	0.00
30.00	0.00	574	332.50	0.00
32.00	0.00	574	332.50	0.00
34.00	0.00	574	332.50	0.00
36.00	0.00	574	332.50	0.00
38.00	0.00	574	332.50	0.00
40.00	0.00	574	332.50	0.00
42.00	0.00	574	332.50	0.00
44.00	0.00	574	332.50	0.00
46.00	0.00	574	332.50	0.00
48.00	0.00	574	332.50	0.00
50.00	0.00	574	332.50	0.00
52.00	0.00	574	332.50	0.00
54.00	0.00	574	332.50	0.00
56.00	0.00	574	332.50	0.00
58.00	0.00	574	332.50	0.00
60.00	0.00	574	332.50	0.00
62.00	0.00	574	332.50	0.00
64.00	0.00	574	332.50	0.00
66.00	0.00	574	332.50	0.00
68.00	0.00	574	332.50	0.00
70.00	0.00	574	332.50	0.00
72.00	0.00	574	332.50	0.00

Stage-Area-Storage for Pond Forebay #1: Sediment Forebay #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
330.00	0	0
330.05	9	0
330.10	18	1
330.15	27	2
330.20	36	4
330.25	45	6
330.30	54	8
330.35	63	11
330.40	72	14
330.45	81	18
330.50	90	22
330.55	98	27
330.60	107	32
330.65	116	38
330.70	125	44
330.75	134	50
330.80	143	57
330.85	152	65
330.90	161	72
330.95	170	81
331.00	179	90
331.05	188	99
331.10	198	108
331.15	207	118
331.20	216	129
331.25	226	140
331.30	235	152
331.35	244	164
331.40	253	176
331.45	263	189
331.50	272	202
331.55	281	216
331.60	291	230
331.65	300	245
331.70	309	260
331.75	319	276
331.80	328	292
331.85	337	309
331.90	346	326
331.95	356	343
332.00	365	362
332.05	377	380
332.10	389	399
332.15	401	419
332.20	413	439
332.25	426	460
332.30	438	482
332.35	450	504
332.40	462	527
332.45	474	550
332.50	486	574
332.55	498	599
332.60	510	624
332.65	522	650
332.70	534	676
332.75	547	703
332.80	559	731
332.85	571	759
332.90	583	788
332.95	595	817
333.00	**607**	**848**

Summary for Pond Inf-2: Inf-2

Inflow Area = 120,105 sf, 40.62% Impervious, Inflow Depth = 5.48" for 100 yr event
Inflow = 15.98 cfs @ 12.11 hrs, Volume= 54,841 cf
Outflow = 6.65 cfs @ 12.35 hrs, Volume= 54,843 cf, Atten= 58%, Lag= 14.4 min
Discarded = 0.14 cfs @ 8.22 hrs, Volume= 31,490 cf
Primary = 6.51 cfs @ 12.35 hrs, Volume= 23,352 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 322.59' @ 12.35 hrs Surf.Area= 5,967 sf Storage= 24,132 cf
Flood Elev= 323.33' Surf.Area= 5,967 sf Storage= 25,910 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 843.5 min (1,634.6 - 791.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	316.58'	9,579 cf	**46.67'W x 127.87'L x 6.75'H Field A** 40,278 cf Overall - 16,331 cf Embedded = 23,947 cf x 40.0% Voids
#2A	317.33'	16,331 cf	**ADS_StormTech MC-4500 +Cap** x 150 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 150 Chambers in 5 Rows Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf
		25,910 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	316.58'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	317.33'	**12.0" Round Culvert** L= 18.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 317.33' / 316.33' S= 0.0556 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#3	Device 2	321.83'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.14 cfs @ 8.22 hrs HW=316.65' (Free Discharge)
↑ **1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=6.51 cfs @ 12.35 hrs HW=322.59' TW=0.00' (Dynamic Tailwater)
↑ **2=Culvert** (Inlet Controls 6.51 cfs @ 8.29 fps)
↑ **3=Broad-Crested Rectangular Weir** (Passes 6.51 cfs of 10.67 cfs potential flow)

Pond Inf-2: Inf-2 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 5 rows = 357.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

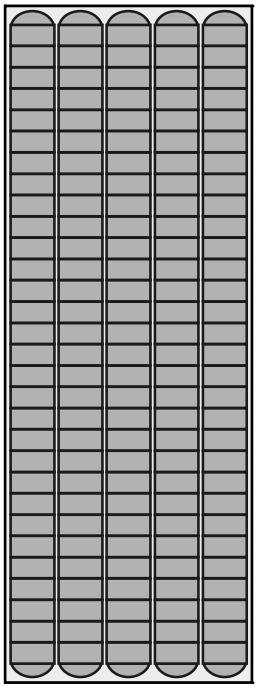
30 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 125.87' Row Length +12.0" End Stone x 2 = 127.87' Base Length
5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

150 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 5 Rows = 16,330.6 cf Chamber Storage

40,278.0 cf Field - 16,330.6 cf Chambers = 23,947.4 cf Stone x 40.0% Voids = 9,579.0 cf Stone Storage

Chamber Storage + Stone Storage = 25,909.5 cf = 0.595 af
Overall Storage Efficiency = 64.3%
Overall System Size = 127.87' x 46.67' x 6.75'

150 Chambers
1,491.8 cy Field
886.9 cy Stone



Hydrograph for Pond Inf-2: Inf-2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	316.58	0.00	0.00	0.00
2.00	0.00	0	316.58	0.00	0.00	0.00
4.00	0.00	0	316.58	0.00	0.00	0.00
6.00	0.07	0	316.58	0.07	0.07	0.00
8.00	0.21	99	316.62	0.14	**0.14**	0.00
10.00	0.59	1,833	317.34	0.14	**0.14**	0.00
12.00	**8.85**	**13,130**	**319.61**	**0.14**	0.14	**0.00**
14.00	**0.96**	**22,649**	**321.99**	**1.00**	0.14	**0.86**
16.00	0.51	22,478	321.92	0.54	0.14	0.40
18.00	0.31	22,374	321.89	0.33	0.14	0.18
20.00	0.25	22,329	321.87	0.25	0.14	0.11
22.00	0.20	22,296	321.86	0.21	0.14	0.07
24.00	0.16	22,258	321.85	0.17	0.14	0.03
26.00	0.00	21,302	321.55	0.14	0.14	0.00
28.00	0.00	20,287	321.27	0.14	0.14	0.00
30.00	0.00	19,273	321.01	0.14	0.14	0.00
32.00	0.00	18,258	320.76	0.14	0.14	0.00
34.00	0.00	17,244	320.52	0.14	0.14	0.00
36.00	0.00	16,229	320.29	0.14	0.14	0.00
38.00	0.00	15,215	320.06	0.14	0.14	0.00
40.00	0.00	14,201	319.84	0.14	0.14	0.00
42.00	0.00	13,186	319.62	0.14	0.14	0.00
44.00	0.00	12,172	319.40	0.14	0.14	0.00
46.00	0.00	11,157	319.19	0.14	0.14	0.00
48.00	0.00	10,143	318.98	0.14	0.14	0.00
50.00	0.00	9,129	318.78	0.14	0.14	0.00
52.00	0.00	8,114	318.57	0.14	0.14	0.00
54.00	0.00	7,100	318.37	0.14	0.14	0.00
56.00	0.00	6,085	318.17	0.14	0.14	0.00
58.00	0.00	5,071	317.97	0.14	0.14	0.00
60.00	0.00	4,057	317.77	0.14	0.14	0.00
62.00	0.00	3,042	317.57	0.14	0.14	0.00
64.00	0.00	2,028	317.38	0.14	0.14	0.00
66.00	0.00	1,013	317.00	0.14	0.14	0.00
68.00	0.00	0	316.58	0.08	0.08	0.00
70.00	0.00	0	316.58	0.00	0.00	0.00
72.00	0.00	0	316.58	0.00	0.00	0.00

Stage-Area-Storage for Pond Inf-2: Inf-2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
316.58	**5,967**	0
316.68	5,967	239
316.78	5,967	477
316.88	5,967	716
316.98	5,967	955
317.08	5,967	1,193
317.18	5,967	1,432
317.28	5,967	1,671
317.38	5,967	2,049
317.48	5,967	2,566
317.58	5,967	3,081
317.68	5,967	3,596
317.78	5,967	4,109
317.88	5,967	4,621
317.98	5,967	5,131
318.08	5,967	5,639
318.18	5,967	6,146
318.28	5,967	6,652
318.38	5,967	7,155
318.48	5,967	7,657
318.58	5,967	8,156
318.68	5,967	8,653
318.78	5,967	9,148
318.88	5,967	9,641
318.98	5,967	10,130
319.08	5,967	10,618
319.18	5,967	11,102
319.28	5,967	11,583
319.38	5,967	12,062
319.48	5,967	12,537
319.58	5,967	13,008
319.68	5,967	13,477
319.78	5,967	13,941
319.88	5,967	14,402
319.98	5,967	14,858
320.08	5,967	15,311
320.18	5,967	15,758
320.28	5,967	16,202
320.38	5,967	16,640
320.48	5,967	17,073
320.58	5,967	17,501
320.68	5,967	17,924
320.78	5,967	18,340
320.88	5,967	18,749
320.98	5,967	19,152
321.08	5,967	19,548
321.18	5,967	19,936
321.28	5,967	20,316
321.38	5,967	20,687
321.48	5,967	21,048
321.58	5,967	21,399
321.68	5,967	21,736
321.78	5,967	22,058
321.88	5,967	22,358
321.98	5,967	22,634
322.08	5,967	22,897
322.18	5,967	23,153
322.28	5,967	23,402
322.38	5,967	23,642
322.48	5,967	23,881
322.58	5,967	24,119
322.68	5,967	24,358
322.78	5,967	24,597
322.88	5,967	24,835
322.98	5,967	25,074
323.08	5,967	25,313
323.18	5,967	25,552
323.28	5,967	**25,790**

Summary for Pond Inf-3: INF#3

Inflow Area = 60,887 sf, 66.57% Impervious, Inflow Depth = 6.05" for 100 yr event
Inflow = 9.21 cfs @ 12.08 hrs, Volume= 30,721 cf
Outflow = 8.66 cfs @ 12.11 hrs, Volume= 30,722 cf, Atten= 6%, Lag= 1.7 min
Discarded = 0.01 cfs @ 3.76 hrs, Volume= 1,409 cf
Primary = 8.64 cfs @ 12.11 hrs, Volume= 29,312 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 323.91' @ 12.11 hrs Surf.Area= 588 sf Storage= 918 cf
Flood Elev= 325.00' Surf.Area= 588 sf Storage= 1,209 cf

Plug-Flow detention time= 16.4 min calculated for 30,717 cf (100% of inflow)
Center-of-Mass det. time= 16.4 min (789.1 - 772.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	321.50'	566 cf	**11.00'W x 53.46'L x 3.50'H Field A** 2,058 cf Overall - 643 cf Embedded = 1,415 cf x 40.0% Voids
#2A	322.00'	643 cf	**ADS_StormTech SC-740 +Cap** x 14 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 14 Chambers in 2 Rows
		1,209 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	321.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	321.50'	**18.0" Round Culvert** L= 5.0' Ke= 0.900 Inlet / Outlet Invert= 321.50' / 321.45' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 1.77 sf
#3	Device 2	322.50'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.01 cfs @ 3.76 hrs HW=321.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=8.64 cfs @ 12.11 hrs HW=323.90' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 8.64 cfs @ 4.89 fps)
↑—**3=Broad-Crested Rectangular Weir** (Passes 8.64 cfs of 27.57 cfs potential flow)

Pond Inf-3: INF#3 - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

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

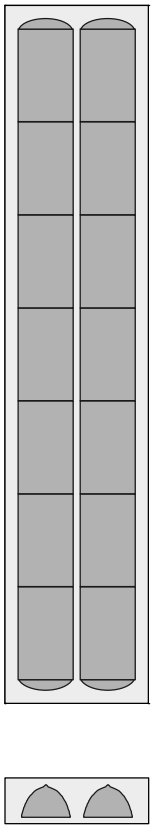
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

14 Chambers x 45.9 cf = 643.2 cf Chamber Storage

2,058.1 cf Field - 643.2 cf Chambers = 1,414.9 cf Stone x 40.0% Voids = 566.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,209.1 cf = 0.028 af
Overall Storage Efficiency = 58.8%
Overall System Size = 53.46' x 11.00' x 3.50'

14 Chambers
76.2 cy Field
52.4 cy Stone



Hydrograph for Pond Inf-3: INF#3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	321.50	0.00	0.00	0.00
2.00	0.00	0	321.50	0.00	**0.00**	0.00
4.00	0.03	19	321.58	0.01	**0.01**	0.00
6.00	0.07	283	322.36	0.01	0.01	0.00
8.00	0.16	366	322.55	0.16	0.01	0.15
10.00	0.38	383	322.59	0.38	0.01	0.37
12.00	**5.74**	**565**	**323.01**	**5.39**	0.01	**5.38**
14.00	**0.50**	**391**	**322.61**	**0.50**	0.01	**0.49**
16.00	0.26	375	322.57	0.27	0.01	0.25
18.00	0.16	366	322.55	0.16	0.01	0.15
20.00	0.13	362	322.54	0.13	0.01	0.11
22.00	0.11	360	322.54	0.11	0.01	0.09
24.00	0.08	357	322.53	0.08	0.01	0.07
26.00	0.00	256	322.30	0.01	0.01	0.00
28.00	0.00	156	322.08	0.01	0.01	0.00
30.00	0.00	56	321.74	0.01	0.01	0.00
32.00	0.00	0	321.50	0.00	0.00	0.00
34.00	0.00	0	321.50	0.00	0.00	0.00
36.00	0.00	0	321.50	0.00	0.00	0.00
38.00	0.00	0	321.50	0.00	0.00	0.00
40.00	0.00	0	321.50	0.00	0.00	0.00
42.00	0.00	0	321.50	0.00	0.00	0.00
44.00	0.00	0	321.50	0.00	0.00	0.00
46.00	0.00	0	321.50	0.00	0.00	0.00
48.00	0.00	0	321.50	0.00	0.00	0.00
50.00	0.00	0	321.50	0.00	0.00	0.00
52.00	0.00	0	321.50	0.00	0.00	0.00
54.00	0.00	0	321.50	0.00	0.00	0.00
56.00	0.00	0	321.50	0.00	0.00	0.00
58.00	0.00	0	321.50	0.00	0.00	0.00
60.00	0.00	0	321.50	0.00	0.00	0.00
62.00	0.00	0	321.50	0.00	0.00	0.00
64.00	0.00	0	321.50	0.00	0.00	0.00
66.00	0.00	0	321.50	0.00	0.00	0.00
68.00	0.00	0	321.50	0.00	0.00	0.00
70.00	0.00	0	321.50	0.00	0.00	0.00
72.00	0.00	0	321.50	0.00	0.00	0.00

Stage-Area-Storage for Pond Inf-3: INF#3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
321.50	**588**	0
321.55	588	12
321.60	588	24
321.65	588	35
321.70	588	47
321.75	588	59
321.80	588	71
321.85	588	82
321.90	588	94
321.95	588	106
322.00	588	118
322.05	588	140
322.10	588	163
322.15	588	186
322.20	588	209
322.25	588	232
322.30	588	254
322.35	588	277
322.40	588	299
322.45	588	322
322.50	588	344
322.55	588	366
322.60	588	389
322.65	588	411
322.70	588	433
322.75	588	454
322.80	588	476
322.85	588	498
322.90	588	519
322.95	588	541
323.00	588	562
323.05	588	583
323.10	588	604
323.15	588	625
323.20	588	646
323.25	588	666
323.30	588	687
323.35	588	707
323.40	588	727
323.45	588	747
323.50	588	766
323.55	588	786
323.60	588	805
323.65	588	824
323.70	588	843
323.75	588	861
323.80	588	880
323.85	588	898
323.90	588	915
323.95	588	933
324.00	588	950
324.05	588	966
324.10	588	983
324.15	588	998
324.20	588	1,014
324.25	588	1,028
324.30	588	1,042
324.35	588	1,055
324.40	588	1,067
324.45	588	1,080
324.50	588	1,092
324.55	588	1,103
324.60	588	1,115
324.65	588	1,127
324.70	588	1,139
324.75	588	1,150
324.80	588	1,162
324.85	588	1,174
324.90	588	1,186
324.95	588	1,197
325.00	588	**1,209**

Summary for Pond RG #1: Rain Garden #1

Inflow Area = 15,164 sf, 79.13% Impervious, Inflow Depth = 5.83" for 100 yr event
Inflow = 2.32 cfs @ 12.09 hrs, Volume= 7,372 cf
Outflow = 1.02 cfs @ 11.99 hrs, Volume= 7,378 cf, Atten= 56%, Lag= 0.0 min
Primary = 1.02 cfs @ 11.99 hrs, Volume= 7,378 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 331.97' @ 12.28 hrs Surf.Area= 897 sf Storage= 710 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.7 min (796.9 - 794.2)

Volume	Invert	Avail.Storage	Storage Description
#1	331.00'	2,551 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
331.00	570	0	0
332.00	908	739	739
333.00	1,303	1,106	1,845
333.50	1,521	706	2,551

Device	Routing	Invert	Outlet Devices
#1	Device 2	331.00'	**1.02 cfs Exfiltration at all elevations**
#2	Primary	328.50'	**6.0" Round Culvert** L= 75.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 328.50' / 328.13' S= 0.0049 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 2	332.50'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.02 cfs @ 11.99 hrs HW=331.03' TW=324.97' (Dynamic Tailwater)
↑└─**2=Culvert** (Passes 1.02 cfs of 1.05 cfs potential flow)
↑ ├─**1=Exfiltration** (Exfiltration Controls 1.02 cfs)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

Hydrograph for Pond RG #1: Rain Garden #1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	331.00	0.00
2.00	0.00	0	331.00	0.00
4.00	0.00	0	331.00	0.00
6.00	0.00	0	331.00	0.00
8.00	0.00	0	331.00	0.00
10.00	0.10	0	331.00	**0.10**
12.00	**1.35**	**25**	**331.04**	**1.02**
14.00	**0.13**	**0**	**331.00**	0.00
16.00	0.07	0	331.00	0.00
18.00	0.04	0	331.00	0.00
20.00	0.03	0	331.00	0.00
22.00	0.03	0	331.00	0.00
24.00	0.02	0	331.00	0.00
26.00	0.00	0	331.00	0.00
28.00	0.00	0	331.00	0.00
30.00	0.00	0	331.00	0.00
32.00	0.00	0	331.00	0.00
34.00	0.00	0	331.00	0.00
36.00	0.00	0	331.00	0.00
38.00	0.00	0	331.00	0.00
40.00	0.00	0	331.00	0.00
42.00	0.00	0	331.00	0.00
44.00	0.00	0	331.00	0.00
46.00	0.00	0	331.00	0.00
48.00	0.00	0	331.00	0.00
50.00	0.00	0	331.00	0.00
52.00	0.00	0	331.00	0.00
54.00	0.00	0	331.00	0.00
56.00	0.00	0	331.00	0.00
58.00	0.00	0	331.00	0.00
60.00	0.00	0	331.00	0.00
62.00	0.00	0	331.00	0.00
64.00	0.00	0	331.00	0.00
66.00	0.00	0	331.00	0.00
68.00	0.00	0	331.00	0.00
70.00	0.00	0	331.00	0.00
72.00	0.00	0	331.00	0.00

Stage-Area-Storage for Pond RG #1: Rain Garden #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
331.00	570	0
331.05	587	29
331.10	604	59
331.15	621	89
331.20	638	121
331.25	655	153
331.30	671	186
331.35	688	220
331.40	705	255
331.45	722	291
331.50	739	327
331.55	756	365
331.60	773	403
331.65	790	442
331.70	807	482
331.75	824	523
331.80	840	564
331.85	857	607
331.90	874	650
331.95	891	694
332.00	908	739
332.05	928	785
332.10	948	832
332.15	967	880
332.20	987	928
332.25	1,007	978
332.30	1,027	1,029
332.35	1,046	1,081
332.40	1,066	1,134
332.45	1,086	1,188
332.50	1,106	1,242
332.55	1,125	1,298
332.60	1,145	1,355
332.65	1,165	1,413
332.70	1,184	1,471
332.75	1,204	1,531
332.80	1,224	1,592
332.85	1,244	1,653
332.90	1,263	1,716
332.95	1,283	1,780
333.00	1,303	1,845
333.05	1,325	1,910
333.10	1,347	1,977
333.15	1,368	2,045
333.20	1,390	2,114
333.25	1,412	2,184
333.30	1,434	2,255
333.35	1,456	2,327
333.40	1,477	2,401
333.45	1,499	2,475
333.50	**1,521**	**2,551**

Summary for Pond UGS#4: UGS#4

Inflow Area = 220,543 sf, 26.64% Impervious, Inflow Depth = 5.14" for 100 yr event
Inflow = 27.19 cfs @ 12.12 hrs, Volume= 94,465 cf
Outflow = 14.02 cfs @ 12.30 hrs, Volume= 94,465 cf, Atten= 48%, Lag= 11.0 min
Primary = 14.02 cfs @ 12.30 hrs, Volume= 94,465 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 321.90' @ 12.30 hrs Surf.Area= 5,330 sf Storage= 16,484 cf
Flood Elev= 322.50' Surf.Area= 5,330 sf Storage= 17,771 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 15.3 min (815.6 - 800.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	317.00'	7,697 cf	**46.25'W x 115.25'L x 5.50'H Field A** 29,317 cf Overall - 10,074 cf Embedded = 19,242 cf x 40.0% Voids
#2A	317.75'	10,074 cf	**ADS_StormTech MC-3500 d +Cap** x 90 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 90 Chambers in 6 Rows Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf
		17,771 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	316.90'	**18.0" Round Culvert** L= 73.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 316.90' / 314.90' S= 0.0274 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Primary	317.00'	**12.0" W x 0.2" H Vert. Orifice/Grate** X 6 rows with 86.0" cc spacing C= 0.600

Primary OutFlow Max=14.02 cfs @ 12.30 hrs HW=321.90' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 13.84 cfs @ 7.83 fps)
2=Orifice/Grate (Orifice Controls 0.18 cfs @ 10.64 fps)

Pond UGS#4: UGS#4 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

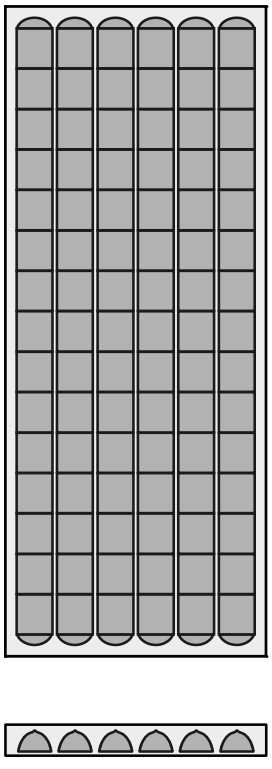
15 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 111.25' Row Length +24.0" End Stone x 2 = 115.25' Base Length
6 Rows x 77.0" Wide + 9.0" Spacing x 5 + 24.0" Side Stone x 2 = 46.25' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

90 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 6 Rows = 10,074.5 cf Chamber Storage

29,316.7 cf Field - 10,074.5 cf Chambers = 19,242.2 cf Stone x 40.0% Voids = 7,696.9 cf Stone Storage

Chamber Storage + Stone Storage = 17,771.4 cf = 0.408 af
Overall Storage Efficiency = 60.6%
Overall System Size = 115.25' x 46.25' x 5.50'

90 Chambers
1,085.8 cy Field
712.7 cy Stone



Hydrograph for Pond UGS#4: UGS#4

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	317.00	0.00
2.00	0.00	0	317.00	0.00
4.00	0.00	0	317.00	0.00
6.00	0.06	7	317.00	0.05
8.00	0.28	264	317.12	0.24
10.00	0.91	740	317.35	0.84
12.00	**14.40**	**6,025**	**318.77**	**7.20**
14.00	**1.73**	**1,262**	**317.59**	**1.84**
16.00	0.92	826	317.39	0.98
18.00	0.56	575	317.27	0.60
20.00	0.45	470	317.22	0.46
22.00	0.37	403	317.19	0.38
24.00	0.29	333	317.16	0.30
26.00	0.00	0	317.00	0.00
28.00	0.00	0	317.00	0.00
30.00	0.00	0	317.00	0.00
32.00	0.00	0	317.00	0.00
34.00	0.00	0	317.00	0.00
36.00	0.00	0	317.00	0.00
38.00	0.00	0	317.00	0.00
40.00	0.00	0	317.00	0.00
42.00	0.00	0	317.00	0.00
44.00	0.00	0	317.00	0.00
46.00	0.00	0	317.00	0.00
48.00	0.00	0	317.00	0.00
50.00	0.00	0	317.00	0.00
52.00	0.00	0	317.00	0.00
54.00	0.00	0	317.00	0.00
56.00	0.00	0	317.00	0.00
58.00	0.00	0	317.00	0.00
60.00	0.00	0	317.00	0.00
62.00	0.00	0	317.00	0.00
64.00	0.00	0	317.00	0.00
66.00	0.00	0	317.00	0.00
68.00	0.00	0	317.00	0.00
70.00	0.00	0	317.00	0.00
72.00	0.00	0	317.00	0.00

Stage-Area-Storage for Pond UGS#4: UGS#4

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
317.00	0	337.80	17,771
317.40	853	338.20	17,771
317.80	1,821	338.60	17,771
318.20	3,584	339.00	17,771
318.60	5,317	339.40	17,771
319.00	7,013	339.80	17,771
319.40	8,662	340.20	17,771
319.80	10,250	340.60	17,771
320.20	11,760	341.00	17,771
320.60	13,167	341.40	17,771
321.00	14,425	341.80	17,771
321.40	15,421	342.20	17,771
321.80	16,279	342.60	17,771
322.20	**17,132**	343.00	17,771
322.60	**17,771**	343.40	17,771
323.00	17,771	343.80	17,771
323.40	17,771	344.20	17,771
323.80	17,771	344.60	17,771
324.20	17,771	345.00	17,771
324.60	17,771	345.40	17,771
325.00	17,771	345.80	17,771
325.40	17,771	346.20	17,771
325.80	17,771	346.60	17,771
326.20	17,771	347.00	17,771
326.60	17,771	347.40	17,771
327.00	17,771	347.80	17,771
327.40	17,771	348.20	17,771
327.80	17,771	348.60	17,771
328.20	17,771	349.00	17,771
328.60	17,771	349.40	17,771
329.00	17,771	349.80	17,771
329.40	17,771	350.20	17,771
329.80	17,771	350.60	17,771
330.20	17,771	351.00	17,771
330.60	17,771	351.40	17,771
331.00	17,771	351.80	17,771
331.40	17,771	352.20	17,771
331.80	17,771	352.60	17,771
332.20	17,771		
332.60	17,771		
333.00	17,771		
333.40	17,771		
333.80	17,771		
334.20	17,771		
334.60	17,771		
335.00	17,771		
335.40	17,771		
335.80	17,771		
336.20	17,771		
336.60	17,771		
337.00	17,771		
337.40	17,771		

APPENDIX 4:
MOUNDING ANALYSIS

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

inch/hour	**feet/day**
0.67	1.33
2.00	4.00

hours	**days**
36	1.50

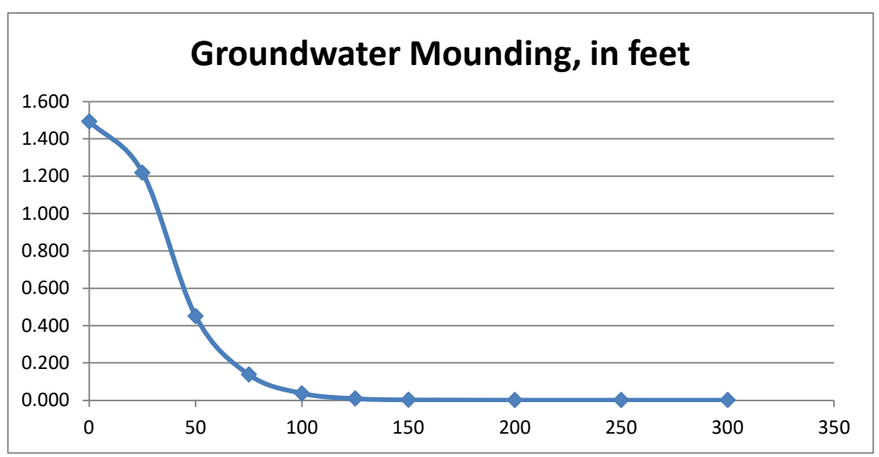
In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Input Values		
2.0400	***R***	**Recharge (infiltration) rate (feet/day)**
0.385	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
9.80	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
34.740	**x**	**1/2 length of basin (x direction, in feet)**
15.250	**y**	**1/2 width of basin (y direction, in feet)**
0.820	**t**	**duration of infiltration period (days)**
50.000	**hi(0)**	**initial thickness of saturated zone (feet)**

51.494	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.494	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
1.494	**0**
1.219	**25**
0.451	**50**
0.138	**75**
0.037	**100**
0.009	**125**
0.003	**150**
0.001	**200**
0.001	**250**
0.001	**300**

Re-Calculate Now



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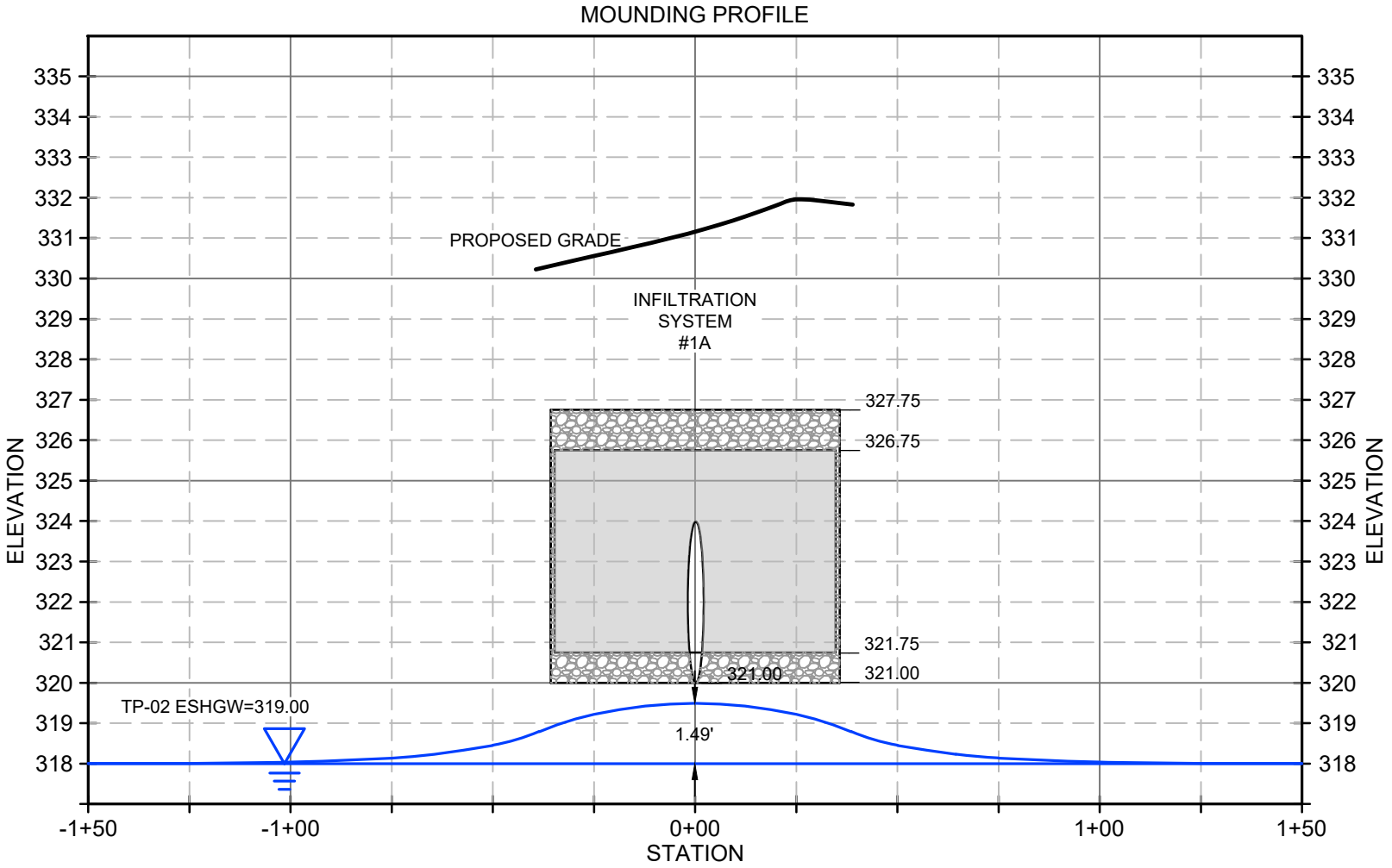

Sketch No.	SKCE-006
Reference Drawing	-

Job #:	19088.00
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This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

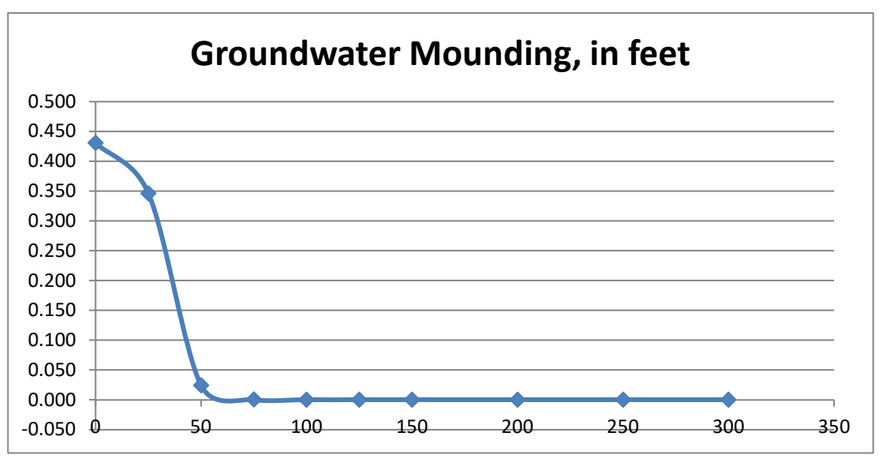
Input Values

2.0400	***R***	**Recharge (infiltration) rate (feet/day)**
0.385	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
9.80	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
32.740	**x**	**1/2 length of basin (x direction, in feet)**
15.250	**y**	**1/2 width of basin (y direction, in feet)**
0.098	**t**	**duration of infiltration period (days)**
50.000	**hi(0)**	**initial thickness of saturated zone (feet)**

50.431	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.431	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.431	0
0.346	25
0.024	50
0.000	75
0.000	100
0.000	125
0.000	150
0.000	200
0.000	250
0.000	300

Re-Calculate Now



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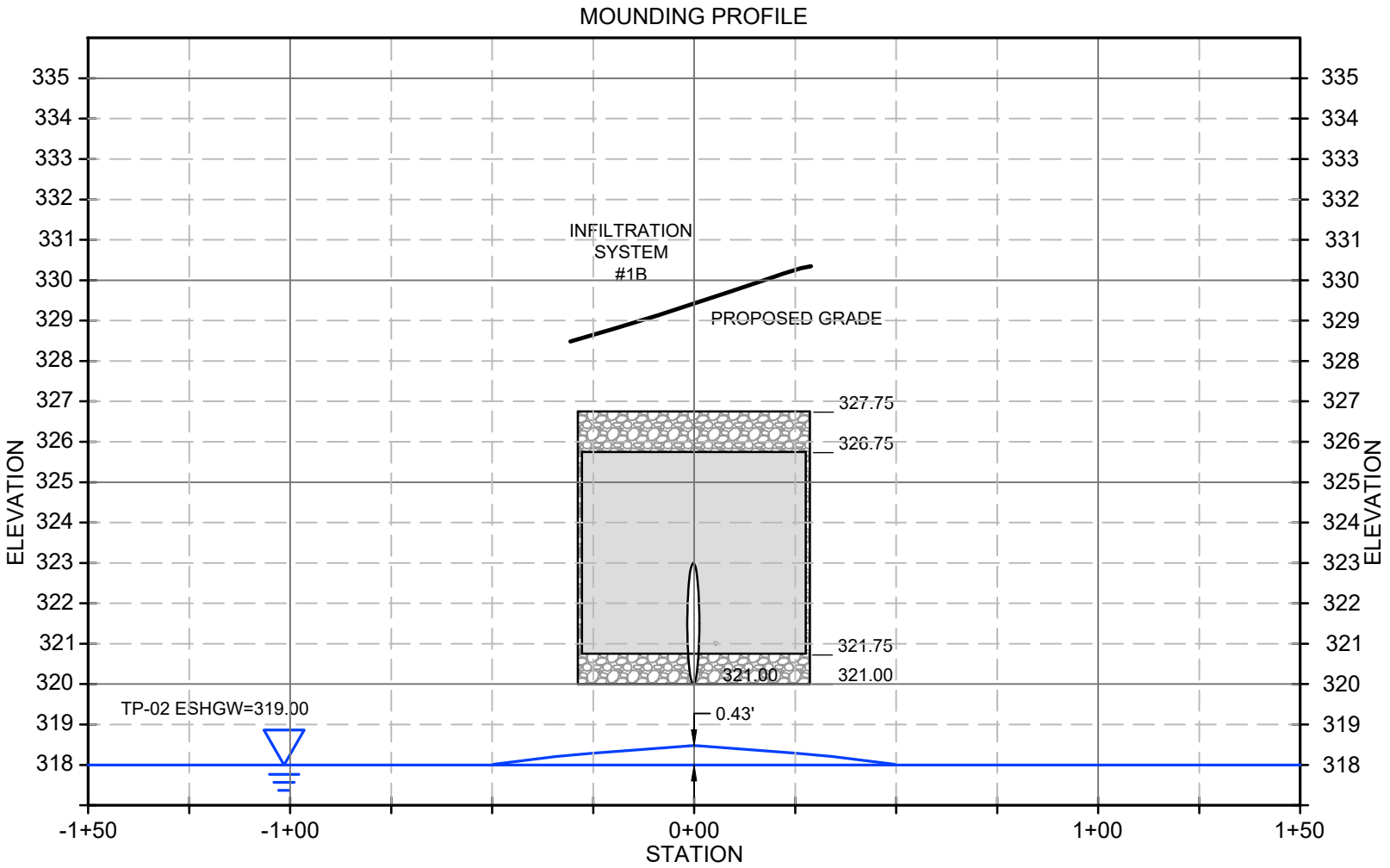

Sketch No.
SKCE-007

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This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

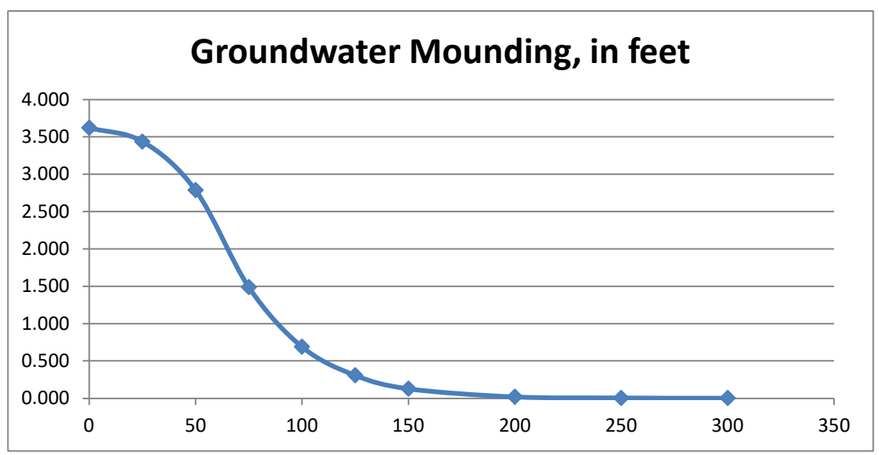
Input Values

2.0400	***R***	**Recharge (infiltration) rate (feet/day)**
0.385	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
9.80	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
63.940	**x**	**1/2 length of basin (x direction, in feet)**
23.340	**y**	**1/2 width of basin (y direction, in feet)**
1.820	**t**	**duration of infiltration period (days)**
50.000	**hi(0)**	**initial thickness of saturated zone (feet)**

53.622	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
3.622	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
3.622	0
3.439	25
2.787	50
1.488	75
0.689	100
0.307	125
0.129	150
0.020	200
0.005	250
0.003	300

Re-Calculate Now



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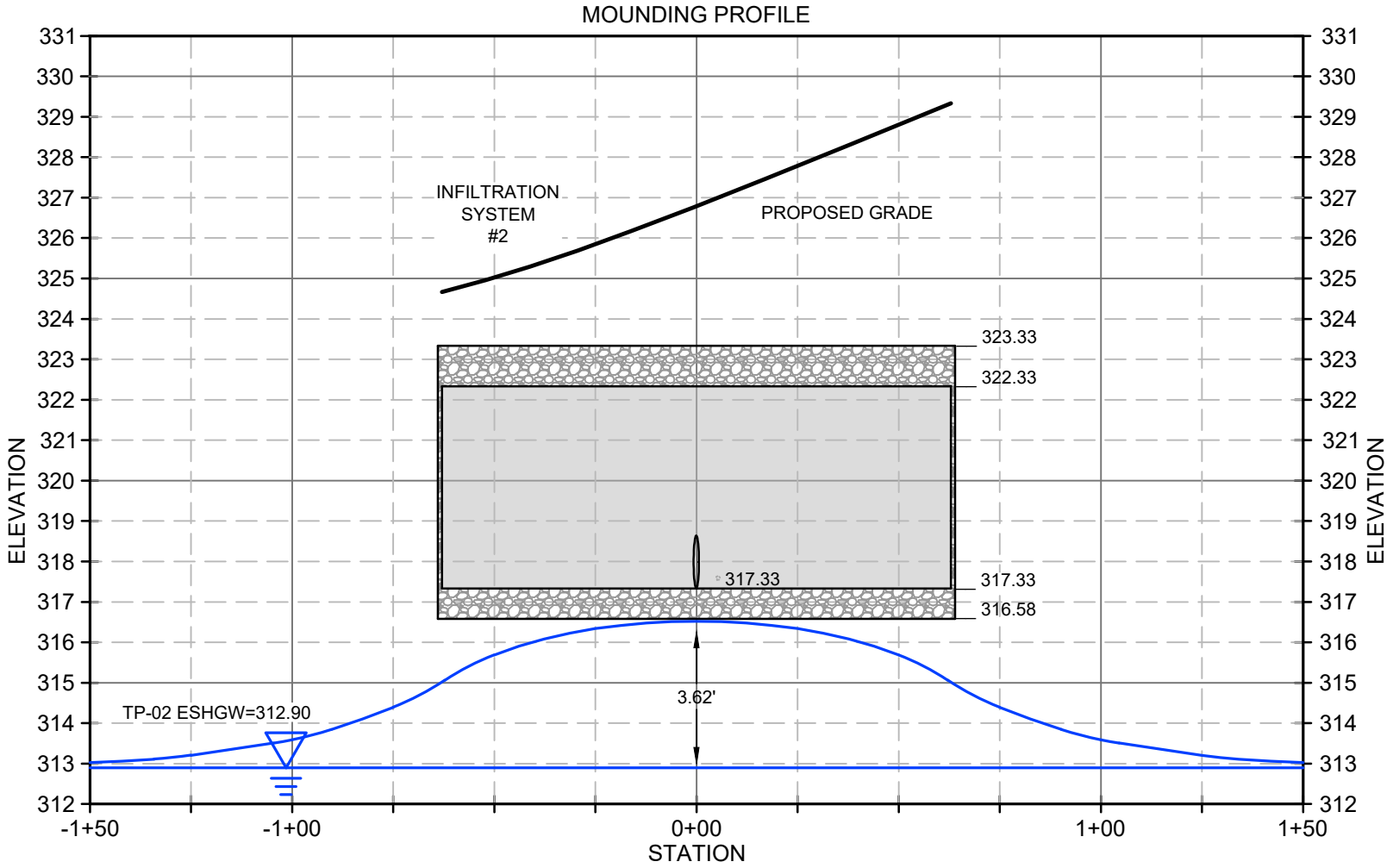

Sketch No.
SKCE-008

Reference Drawing
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Job #:	19088.00
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Title: GROUNDWATER MOUNDING SKETCH INF#2

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This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

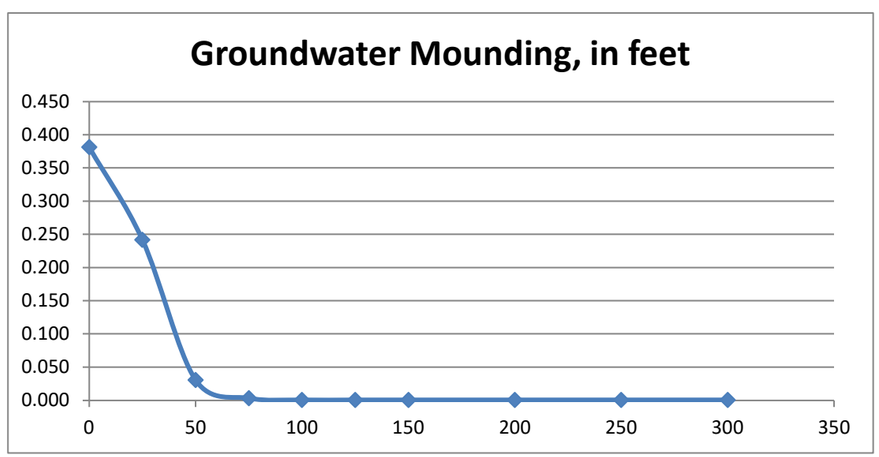
Input Values

2.0400	***R***	**Recharge (infiltration) rate (feet/day)**
0.385	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
9.80	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
26.730	**x**	**1/2 length of basin (x direction, in feet)**
5.500	**y**	**1/2 width of basin (y direction, in feet)**
0.278	**t**	**duration of infiltration period (days)**
50.000	**hi(0)**	**initial thickness of saturated zone (feet)**

50.381	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.381	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.381	0
0.242	25
0.031	50
0.003	75
0.001	100
0.000	125
0.000	150
0.000	200
0.000	250
0.000	300

Re-Calculate Now



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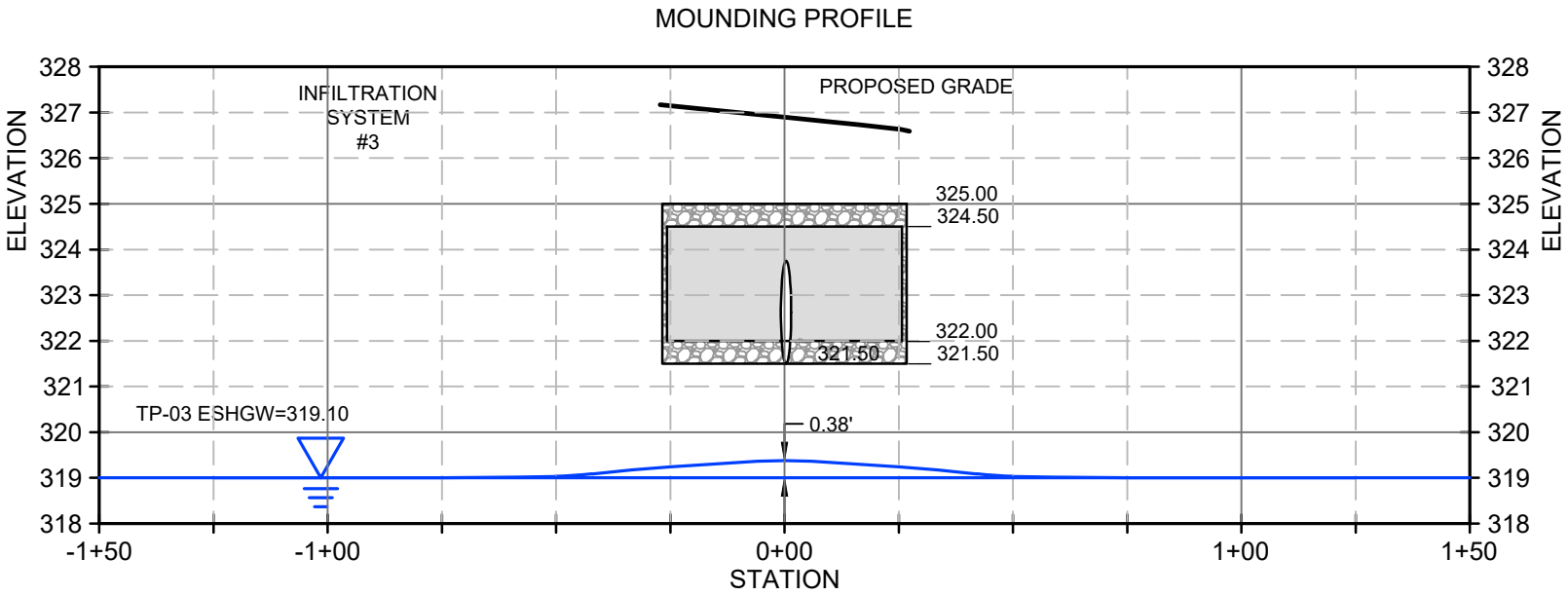

Sketch No.	SKCE-009
Reference Drawing	-

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This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

	inch/hour	**feet/day**
	0.67	1.33
	2.00	4.00
hours		**days**
	36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

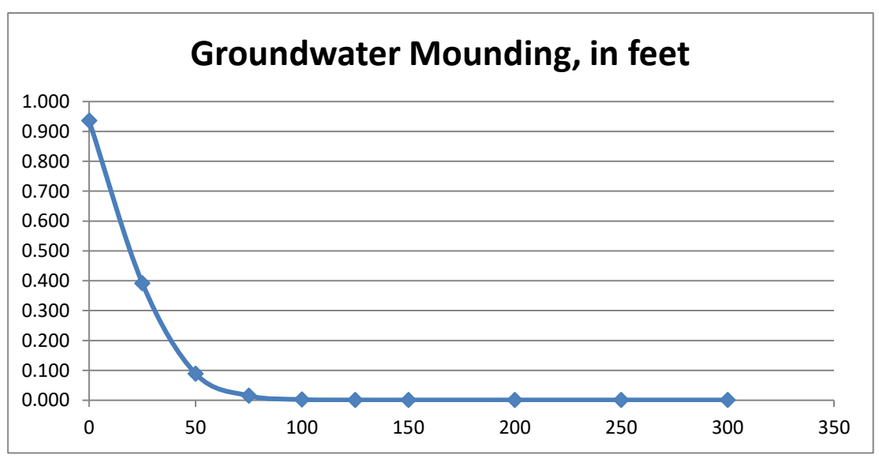
Input Values

2.0400	***R***	**Recharge (infiltration) rate (feet/day)**
0.385	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
9.80	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
13.400	**x**	**1/2 length of basin (x direction, in feet)**
24.880	**y**	**1/2 width of basin (y direction, in feet)**
0.470	**t**	**duration of infiltration period (days)**
50.000	**hi(0)**	**initial thickness of saturated zone (feet)**

50.936	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.936	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

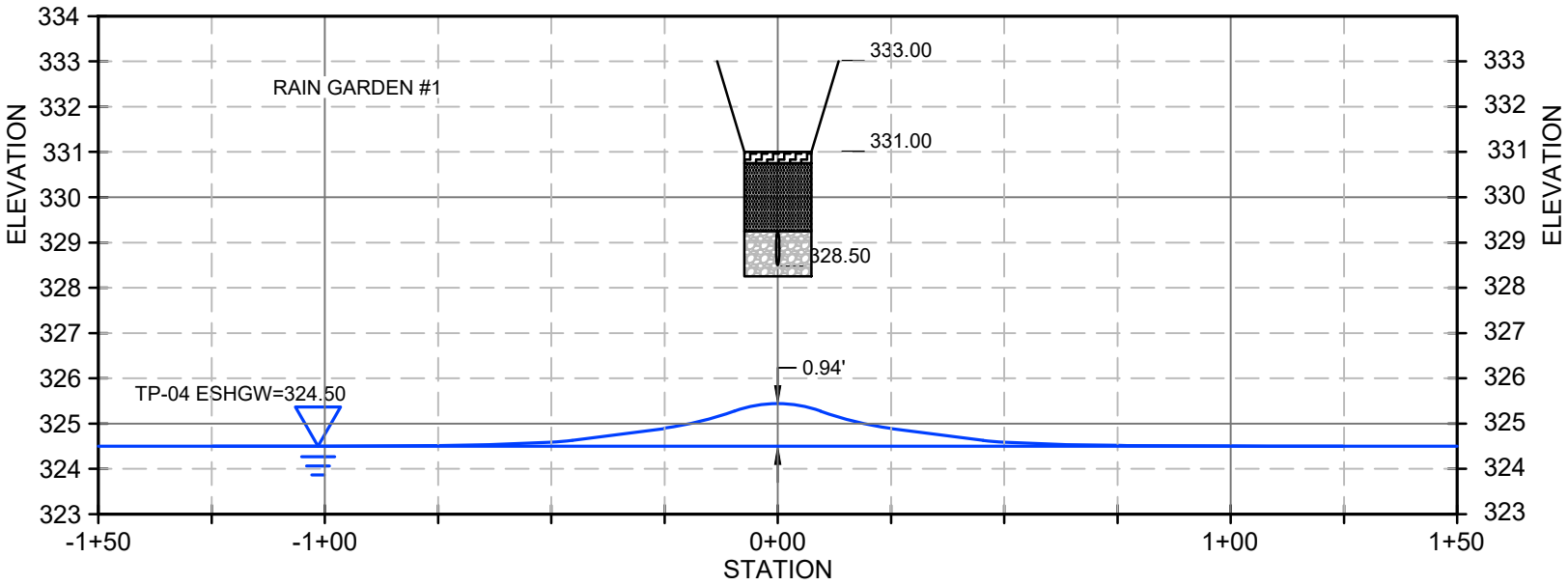
Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
0.936	**0**
0.392	**25**
0.089	**50**
0.015	**75**
0.002	**100**
0.001	**125**
0.001	**150**
0.001	**200**
0.001	**250**
0.001	**300**

Re-Calculate Now



Disclaimer

MOUNDING PROFILE



Sketch No.	SKCE-009
Reference Drawing	-
Job #:	19088.00
Drawn by:	DJS
Scale:	VARIES
Date:	01/31/22

Project: FLORENCE ROCHE ELEMENTARY SCHOOL

Title: GROUNDWATER MOUNDING SKETCH RG#1

Samiotes Consultants Inc.
Civil Engineers + Land Surveyors

20 A Street
Framingham, MA 01701

T 508.877.6688
F 508.877.8349

www.samiotes.com

APPENDIX 5:
WATER QUALITY UNIT SIZING CALCULTATIONS

Project Name: Florence Roche
SCI # 19088.00
WQU #1

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	12,274
ft^2/mi^2	0.000000035870
CN	98
Tc	0.1
I_a/P**	0.034
q_u	774
WQV	1

Q_1=	0.341 CFS

Project Name: Florence Roche
SCI # 19088.00
WQU #2

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	5,202
ft^2/mi^2	0.000000035870
CN	98
Tc	0.1
I_a/P**	0.034
q_u	774
WQV	1

Q_1=	0.144 CFS

Project Name: Florence Roche
SCI # 19088.00
WQU #3

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	14,001
ft^2/mi^2	0.000000035870
CN	98
Tc	0.1
I_a/P**	0.058
q_u	774
WQV	1

Q_1=	0.389 CFS

Project Name: Florence Roche
SCI # 19088.00
WQU #4

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	23,188
ft^2/mi^2	0.000000035870
CN	98
Tc	0.1
I_a/P**	0.034
q_u	774
WQV	1

Q_1=	0.644 CFS

Project Name: Florence Roche
SCI # 19088.00
WQU #5

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	119,162
ft^2/mi^2	0.000000035870
CN	98
Tc	0.1
I_a/P**	0.034
q_u	774
WQV	1

Q_1=	3.308 CFS

**I_a/P = 0.058 for 1/2-inch runoff OR 0.034 for 1-inch of runoff

Coversion Rate: 1 ft^2=$3.587x10^{-8}$

Project Name: Florence Roche
SCI # 19088.00
WQU #6

Equation:

$$Q_{0.5\ or\ 1} = (q_u)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with the first 1/2 -inch of runoff

Q_1 = flow rate associated with the first 1 -inch of runoff

q_u = the unit peak discharge, in csm/in

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1/2-inch or 1-inch*)

* use 1-inch if in/near critical resource area

Variable	Value
A (ft^2)	51,104
ft^2/mi^2	0.000000035870
CN	98
Tc	0.1
I_a/P**	0.034
q_u	774
WQV	1

Q_1=	1.419 CFS

APPENDIX 6:
SEDIMENT LOADING & FOREBAY SIZING CALCULATIONS

Project Name: Florence Roche
SCI # 19088.00
WQU #1 - Annual Sediment Load

Equation:

$$\boldsymbol{Area\ to\ be\ sanded\ (acres)\ x\ 500\ pounds/Acre - Storm\ \div\ 90\ pounds/ft3\ x\ 10\ storms/year\ =\ cubic\ feet\ of\ sediment/year}$$

Where:

Area to be sanded = 12,274 sf = 0.28 acres

* 1 acre = 43560 square feet

Annual Sediment Load =	15.65	ft^3 of sediment/yr

Project Name: Florence Roche
SCI # 19088.00
WQU #2 - Annual Sediment Load

Equation:

$$\textbf{\textit{Area to be sanded}}\ (\textbf{\textit{acres}})\ \textbf{\textit{x}}\ \mathbf{500}\ \textbf{\textit{pounds/Acre}} - \textbf{\textit{Storm}}\ \div\ \mathbf{90}\ \textbf{\textit{pounds/ft}}^{\mathbf{3}}\ \textbf{\textit{x}}\ \mathbf{10}\ \textbf{\textit{storms/year}}\ =\ \textbf{\textit{cubic feet of sediment/year}}$$

Where:

Area to be sanded = 5,202 ft^3 = 0.12 acres

* 1 acre = 43560 square feet

Annual Sediment Load =	6.63	ft^3 of sediment/yr

Project Name: Florence Roche
SCI # 19088.00
WQU #3 - Annual Sediment Load

Equation:

$$\boldsymbol{Area\ to\ be\ sanded\ (acres)\ x\ 500\ pounds/Acre - Storm\ \div\ 90\ pounds/ft^3\ x\ 10\ storms/year\ =\ cubic\ feet\ of\ sediment/year}$$

Where:

Area to be sanded = 14,001 ft^2 = 0.32 acres

* 1 acre = 43560 square feet

Annual Sediment Load =	17.86	ft^3 of sediment/yr

Project Name: Florence Roche
SCI # 19088.00
WQU #4 - Annual Sediment Load

Equation:

$$\textbf{\textit{Area to be sanded}}\ (\textit{acres})\ x\ 500\ \textit{pounds/Acre} - \textit{Storm}\ \div\ 90\ \textit{pounds/ft}^3\ x\ 10\ \textit{storms/year}\ =\ \textit{cubic feet of sediment/year}$$

Where:

Area to be sanded = 23,188 ft^3 = 0.53 acres

* 1 acre = 43560 square feet

Annual Sediment Load =	29.57	ft^3 of sediment/yr

Project Name: Florence Roche
SCI # 19088.00
WQU #5 - Annual Sediment Load

Equation:

$$Area\ to\ be\ sanded\ (acres)\ x\ 500\ pounds/Acre - Storm\ \div\ 90\ pounds/ft3\ x\ 10\ storms/year\ =\ cubic\ feet\ of\ sediment/year$$

Where:

Area to be sanded = 55,940 sf = 1.28 acres

* 1 acre = 43560 square feet

Annual Sediment Load =	71.34	ft^3 of sediment/yr

Project Name: Florence Roche
SCI # 19088.00
WQU #6 - Annual Sediment Load

Equation:

$$\textbf{\textit{Area to be sanded}}\ (\textit{acres})\ \textit{x}\ \mathbf{500}\ \textit{pounds/Acre} - \textit{Storm}\ \div\ \mathbf{90}\ \textit{pounds/ft}^3\ \textit{x}\ \mathbf{10}\ \textit{storms/year}\ =\ \textit{cubic feet of sediment/year}$$

Where:

Area to be sanded = 51,104 ft^2 = 1.17 acres

* 1 acre = 43560 square feet

Annual Sediment Load =	65.18	ft^3 of sediment/yr

SAMIOTES CONSULTANTS, INC

SEDIMENT FOREBAY SIZING CALCULATION

Client:	Studio G	Job No.	19088
Project:	Florence Roche	Date:	2/2/2022
Location:	342 Main Street Groton MA	Design by:	David Scharlacken

REQUIRED SEDIMENT FOREBAY SIZING

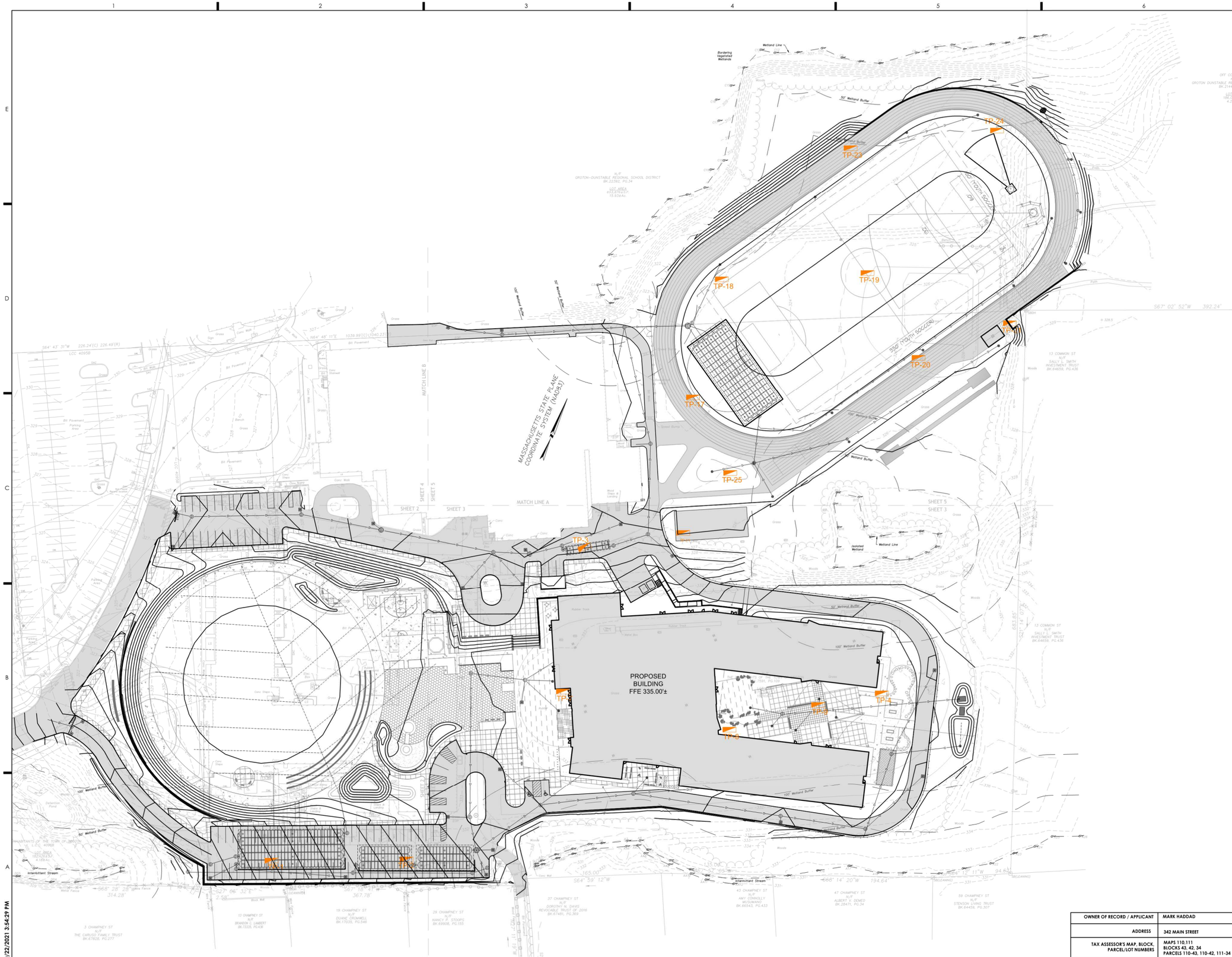
TOTAL CONTRIBUTING IMPERVIOUS AREA (acre) =	0.27548209
MINIMUM FOREBAY SIZE (in. per acre) =	0.10
FOREBAY REQUIRED CAPACITY (cu. ft.) =	100

AVAILABLE VOLUME CALCULATION

ELEV (ft.)	AREA (s.f.)	VOL (cu.ft.)	CUM. VOL (cu.ft.)	CUM. VOL (ac.ft.)
331	179.0	0.0	0.0	0.000
332.0	365.0	272.0	272.0	0.006
332.5	479.0	211.0	483.0	0.011

FOREBAY VOLUME PROVIDED =	483	OK
TOTAL FOREBAY VOLUME REQUIRED =	100	
VOLUME REQUIRED PER FOREBAY=	50.000	

APPENDIX 7:
SOILS REPORT



OWNER OF RECORD / APPLICANT	MARK HADDAD
ADDRESS	342 MAIN STREET
TAX ASSESSOR'S MAP, BLOCK, PARCEL/LOT NUMBERS	MAPS 110,111 BLOCKS 43, 42, 34 PARCELS 110-43, 110-42, 111-34

studio g ARCHITECTS
building sustainable communities
The Brewery
179 Boylston Street
Jamaica Plain, MA 02130
T 617-524-5558

STAMP

CONSULTANT
Samiotes Consultants Inc.
Civil Engineers • Land Surveyors
20 A Street
Framingham, MA 01701
T 508.877.6688
F 508.877.8349
www.samiotes.com

CLIENT
Groton-Dunstable
Regional School District
& Town of Groton
344 Main Street
Groton, MA 01450

NOT FOR CONSTRUCTION
DESIGN DEVELOPMENT
PERMIT SET

KEY PLAN

PROJECT TITLE
FLORENCE ROCHE
ELEMENTARY SCHOOL
342 Main Street
Groton, MA 01450

NO.	DESCRIPTION	DATE
1.	SWMP REV.	02/01/22

PROJECT NO	19088.00
DRAWN BY	WJP
CHECKED BY	SP
SCALE	AS SHOWN
DATE	01/10/2022

SHEET TITLE
CIVIL TEST
PIT PLAN

SHEET NO
PR-TP

10/22/2021 3:54:29 PM

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Groton
Owner Name

342 Main Street
Street Address

110/42
Map/Lot #

Groton
City

MA
State

01450
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 405B/256B (Soil Map Unit)

Fine Sandy Loam/Deerfield Fine Loamy Sand
Soil Name

Soil Limitations

Coarse Loamy Melt-Out Till/Sandy Outwash
Soil Parent material

Ground Moraines/Outwash Plains
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/Stone & Cohen (Year Published/Source) Inland Dune Deposits (Map Unit)

Fine to medium well-sorted sand in transverse, parabolic, and hummocky dunes as much as 60 ft thick.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 06/25/20 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-1 (Hole #) | 07-07-20 (Date) | 8:00 (Time) | Sunny 70's (Weather) | _____ (Latitude) | _____ (Longitude:)

1. Land Use: Pavement (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3% (Slope (%))

Description of Location: _____

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Ground Morraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	Fill										Asphalt
4-16	Fill										Base Material
16- 72	C1	Sandy Loam	10 YR 5/4				3%	3%	Massive	Friable	
72-120	C2	Sandy Loam	10YR 5/4	120"	10YR 5/6	2%	1%	20%	Massive	Friable	

Additional Notes:
NRCS Soil Group: B, ESHGW=312.90

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-2 (Hole #) | 07-07-20 (Date) | 8:45 (Time) | Sunny 70's (Weather) | _____ (Latitude) | _____ (Longitude:)

1. Land Use: Pavement (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | NA (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 4% (Slope (%))

Description of Location: Southern Parking Lot

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Morraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	Fill										Asphalt
4-16	Fill										Base Material
16-72	C1	Sandy Loam	10YR 5/4				3%	3%	Massive	Friable	
72-120"	C2	Sandy Loam	10YR 5/4	120"	10YR 5/6	2%	2%	20%	Massive	Friable	

Additional Notes:
NRCS Soil Group: B, ESHGW= 319.00

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #TP#1	Obs. Hole #TP#2
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	120 inches	120 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number _____ Reading Date _____

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 120 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 16 inches Lower boundary: 120 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Daniel Schedler
Signature of Soil Evaluator

07-07-2020
Date

SE14279
Typed or Printed Name of Soil Evaluator / License #

12-01-21
Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Groton
Owner Name

342 Main Street
Street Address

110/42
Map/Lot #

Groton
City

MA
State

01450
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 654 (Soil Map Unit)

Udorthents
Soil Name

Soil Limitations

Loamy alluvium / sandy glaciofluvial deposits
Soil Parent material

Outwash Plains
Landform

3. Surficial Geological Report Available? ☐ Yes ☐ No If yes: 2018/Stone & Cohen (Year Published/Source) Inland Dune Deposits (Map Unit)

Fine to medium well-sorted sand in transverse, parabolic, and hummocky dunes as much as 60 ft thick.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 06/25/20 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3 (Hole #) | 07-07-2020 (Date) | 9:30 (Time) | Sunny 70's (Weather) | (Latitude) | (Longitude:)

1. Land Use: Pavement (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 2% (Slope (%))

Description of Location:

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet | Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 104" Depth Weeping from Pit 120" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	Fill										Asphalt
4-32	Fill										Base Material
32-48	Fill										Sub base
48-72	C1	Sandy Loam	10YR 5/4				3%	3%	Massive	Friable	
72-120	C2	Sandy Loam	10YR 5/4	84	10YR 5/6	2%	3%	20%	Massive	Friable	

Additional Notes:
NRCS Soil Group: B, ESHGW=319.10

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-4 (Hole #) | 7-7-2020 (Date) | 10:30 (Time) | Sunny 70's (Weather) | _____ (Latitude) | _____ (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | NA (Surface Stones (e.g., cobbles, stones, boulders, etc.) | 0 (Slope (%)

Description of Location: Southern Parking Lot

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | SU (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16	A	Loam	10YR 3/2						Granular	Friable	
16-28	C1	Sandy Loam	10YR 5/4				3%	3%	Massive	Friable	
28-114	C2	Sandy Loam	10YR 5/4				3%	50%	Massive	Friable	Shale

Additional Notes:
NRCS Soil Group: B, ESHGW not observed.

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole #3	Obs. Hole #4
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	84" inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number _____ Reading Date _____

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 84" inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☒ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	TP3-48 inches	Lower boundary:	TP3-120 inches
c. If no, at what depth was impervious material observed?	Upper boundary:	TP4-28 inches	Lower boundary:	TP4-108 inches

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Daniel Schedler
Signature of Soil Evaluator

07-07-2020
Date

SE14279
Typed or Printed Name of Soil Evaluator / License #

12-01-21
Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Groton
Owner Name

342 Main Street
Street Address

110/42
Map/Lot #

Groton
City

MA
State

01450
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 654 (Soil Map Unit)

Udorthents
Soil Name

Soil Limitations

Loamy alluvium / sandy glaciofluvial deposits
Soil Parent material

Outwash Plains
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/Stone & Cohen (Year Published/Source) Inland Dune Deposits (Map Unit)

Fine to medium well-sorted sand in transverse, parabolic, and hummocky dunes as much as 60 ft thick.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 11/2/21 (Month/Day/ Year) Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7 (Hole #) | 11/2/21 (Date) | 1:30 pm (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location:

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet | Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 72" Depth Weeping from Pit | 72" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-15	A	Loam	10YR 3/2						Granular	Friable	
15-21	Fill										
21-72	C	Sandy Loam	2.5Y 5/4				3%	10%	Massive	Friable	
72+	Cr										Refusal at 72"

Additional Notes:
NRCS Soil Group: B, ESHGW=327.30

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-8 (Hole #) | 11/2/21 (Date) | 1:00 (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | NA (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location: Middle of sports field at Florence Roche

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | SU (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 60" Depth Weeping from Pit 75" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	Loam	10YR 3/2						Granular	Friable	
12-24	Fill										
24-75	C	Sandy Loam	2.5Y 5/4				3%	10%	Massive	Friable	

Additional Notes:
NRCS Soil Group: B, ESHGW 328.50.

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole #7	Obs. Hole #8
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☒ Depth weeping from side of observation hole	72 inches	60 inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 60 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	Varies inches	Lower boundary:	Varies inches
c. If no, at what depth was impervious material observed?	Upper boundary:	_____ inches	Lower boundary:	_____ inches

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

David Scharlacken — Signature of Soil Evaluator

11-03-21 — Date

David Scharlacken SE14279 — Typed or Printed Name of Soil Evaluator / License #

6-30-24 — Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Groton
Owner Name

342 Main Street
Street Address

110/42
Map/Lot #

Groton
City

MA
State

01450
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 654 (Soil Map Unit)

Udorthents
Soil Name

Soil Limitations

Loamy alluvium / sandy glaciofluvial deposits
Soil Parent material

Outwash Plains
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/Stone & Cohen (Year Published/Source) Inland Dune Deposits (Map Unit)

Fine to medium well-sorted sand in transverse, parabolic, and hummocky dunes as much as 60 ft thick.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 11/2/21 (Month/Day/ Year) Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-9 (Hole #) | 11/2/21 (Date) | 12:30 pm (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location:

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet | Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 72" Depth Weeping from Pit | 76" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-18	A	Loam	10YR 3/2						Granular	Friable	
18-30	Fill	Loamy Sand	10YR 5/6						Massive	Friable	
30-76	C	Sandy Loam	2.5Y 5/6				3%	10%	Massive	Friable	
76+	Cr										Refusal at 76"

Additional Notes:
NRCS Soil Group: B, ESHGW=327.90

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-11 (Hole #) | 11/1/21 (Date) | 10:00 (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | NA (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location: South edge of field at Groton Dunstable MS

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | TS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 63" Depth Weeping from Pit | 90" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	Loam	10YR 3/2						Granular	Friable	
6-24	Fill										
24-90	C	Loamy Sand	10YR 5/4				3%	10%	Massive	Friable	
90+	Cr										Refusal at 90"

Additional Notes:
NRCS Soil Group: A, ESHGW 320.65.

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole # 9	Obs. Hole # 11
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☒ Depth weeping from side of observation hole	72 inches	63 inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: Varies inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☒ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: TP-11 24 Lower boundary: TP-11 90 inches

c. If no, at what depth was impervious material observed? Upper boundary: TP-9 30 inches Lower boundary: TP-9 76 inches

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

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David Scharlacken — Signature of Soil Evaluator

11-03-21 — Date

David Scharlacken SE14279 — Typed or Printed Name of Soil Evaluator / License #

6-30-24 — Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Groton
Owner Name

342 Main Street
Street Address

110/42
Map/Lot #

Groton
City

MA
State

01450
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 654/405B (Soil Map Unit)

Udorthents/Charlton Fine Sandy Loam
Soil Name

Soil Limitations

Loamy alluvium / sandy glaciofluvial deposits
Soil Parent material

Outwash Plains
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/Stone & Cohen (Year Published/Source) Thin Till / Inland Dune Deposits (Map Unit)

Fine to medium well-sorted sand in transverse, parabolic, and hummocky dunes as much as 60 ft thick.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 11/2/21 (Month/Day/ Year) Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-17 (Hole #) | 11/2/21 (Date) | 11:30 pm (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location:

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet | Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 84" Depth Weeping from Pit | 84" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	Loam	10YR 3/2						Granular	Friable	
12-36	C1	Sandy Loam	10YR 5/4						Massive	Friable	
36-84	C2	Fine Loamy Sand	2.5Y 5/4	84"	10YR 5/6	2%	3%	10%	Massive	Friable	
84"	Cr										Refusal at 84"

Additional Notes:
NRCS Soil Group: B, ESHGW=316.60

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-18 (Hole #) | 11/2/21 (Date) | 9:00am (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | NA (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location: In soccer field at Groton Dunstable MS

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | TS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 78" Depth Weeping from Pit | 87" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-15	A	Loam	10YR 3/2						Granular	Friable	
15-37	B	Sandy Loam	10YR 5/4						Massive	Friable	
37-87	C	Sandy Loam	2.5Y 5/4				3%	10%	Massive	Friable	
87+	Cr										Refusal at 87"

Additional Notes:
NRCS Soil Group: A, ESHGW 316.50.

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole #17	Obs. Hole #18
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☒ Depth weeping from side of observation hole	_____ inches	78 inches
☒ Depth to soil redoximorphic features (mottles)	84 inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: Varies inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	Varies inches	Lower boundary:	Varies inches
c. If no, at what depth was impervious material observed?	Upper boundary:	_____ inches	Lower boundary:	_____ inches

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

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David Scharlacken — Signature of Soil Evaluator

11-03-21 — Date

David Scharlacken SE14279 — Typed or Printed Name of Soil Evaluator / License #

6-30-24 — Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Groton
Owner Name

342 Main Street
Street Address

110/42
Map/Lot #

Groton
City

MA
State

01450
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 654/405B (Soil Map Unit)

Udorthents/Charlton Fine Sandy Loam
Soil Name

Soil Limitations

Loamy alluvium / sandy glaciofluvial deposits
Soil Parent material

Outwash Plains
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/Stone & Cohen (Year Published/Source) Thin Till / Inland Dune Deposits (Map Unit)

Fine to medium well-sorted sand in transverse, parabolic, and hummocky dunes as much as 60 ft thick.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 11/2/21 (Month/Day/ Year) Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-19 (Hole #) | 11/1/21 (Date) | 2:00 pm (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location:

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet | Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 108" Depth Weeping from Pit 120" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-24	A	Loam	10YR 3/2						Granular	Friable	
24-120	C	Sandy Loam	10YR 5/4				5%	10%	Massive	Friable	

Additional Notes:
NRCS Soil Group: B, ESHGW=316.20

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-20 (Hole #) | 11/2/21 (Date) | 8:00 am (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | NA (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location: In baseball field at Groton Dunstable MS

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | TS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 84" Depth Weeping from Pit | 114" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	Fill	Clay	10YR 5/4						Massive	Friable	
8-37	Fill	Sand	2.5Y 5/4						Massive	Friable	
37-114	C	Loamy Sand	2.5Y 5/4				3%	10%	Massive	Friable	Perched wt redox above rock 37-55" deep
114+	Cr										Refusal at 114"

Additional Notes:
NRCS Soil Group: B, ESHGW 318.90.

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole # 19	Obs. Hole # 20
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☒ Depth weeping from side of observation hole	108 inches	84 inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: Varies inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	Varies inches	Lower boundary:	Varies inches
c. If no, at what depth was impervious material observed?	Upper boundary:	_____ inches	Lower boundary:	_____ inches

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

David Scharlacken — Signature of Soil Evaluator

11-03-21 — Date

David Scharlacken SE14279 — Typed or Printed Name of Soil Evaluator / License #

6-30-24 — Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Groton
Owner Name

342 Main Street
Street Address

110/42
Map/Lot #

Groton
City

MA
State

01450
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 654/405B (Soil Map Unit)

Udorthents/Charlton Fine Sandy Loam
Soil Name

Soil Limitations

Loamy alluvium / sandy glaciofluvial deposits
Soil Parent material

Outwash Plains
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/Stone & Cohen (Year Published/Source) Thin Till / Inland Dune Deposits (Map Unit)

Fine to medium well-sorted sand in transverse, parabolic, and hummocky dunes as much as 60 ft thick.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 11/2/21 (Month/Day/ Year) Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-21 (Hole #) | 11/2/21 (Date) | 7:00 am (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location:

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet | Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	A	Loam	10YR 3/2						Granular	Friable	
9-52	C	Sandy Loam	10YR 5/4				3%	10%	Massive	Friable	
52	Cr										Refusal at 52"

Additional Notes:
NRCS Soil Group: B, ESHGW=Not observed

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-23 (Hole #) | 11/1/21 (Date) | 8:00 am (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | NA (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location: North field at Groton Dunstable

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | TS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 54" Depth Weeping from Pit | 60" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-20	A	Loam	10YR 3/2						Granular	Friable	
20-32	B	Sandy Loam	10YR 5/4						Massive	Friable	
32-66	C	Sandy Loam	2.5Y 5/4				3%	5%	Massive	Friable	
66+	Cr										Refusal at 64"

Additional Notes:
NRCS Soil Group: B, ESHGW 312.75.

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole # 21	Obs. Hole # 23
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☒ Depth weeping from side of observation hole	_____ inches	54 inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: Varies inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☒ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	_____ inches	Lower boundary:	_____ inches
c. If no, at what depth was impervious material observed?	Upper boundary:	Varies inches	Lower boundary:	Varies inches

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

David Scharlacken — Signature of Soil Evaluator

11-03-21 — Date

David Scharlacken SE14279 — Typed or Printed Name of Soil Evaluator / License #

6-30-24 — Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Groton
Owner Name

342 Main Street
Street Address

110/42
Map/Lot #

Groton
City

MA
State

01450
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS (Source) 654/405B (Soil Map Unit)

Udorthents/Charlton Fine Sandy Loam
Soil Name

Soil Limitations

Loamy alluvium / sandy glaciofluvial deposits
Soil Parent material

Outwash Plains
Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: 2018/Stone & Cohen (Year Published/Source) Thin Till / Inland Dune Deposits (Map Unit)

Fine to medium well-sorted sand in transverse, parabolic, and hummocky dunes as much as 60 ft thick.
Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 11/2/21 (Month/Day/ Year) Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-24 (Hole #) | 11/1/21 (Date) | 7:00 am (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | N/A (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location:

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet | Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	Loam	10YR 3/2						Granular	Friable	
12-66	C	Sandy Loam	10YR 5/4				3%	10%	Massive	Friable	
66+	Cr										Refusal at 66"

Additional Notes:
NRCS Soil Group: B, ESHGW=Not observed

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-25 (Hole #) | 11/1/21 (Date) | 10:00 am (Time) | Sunny 50's (Weather) | 42.61586 (Latitude) | -71.57865 (Longitude:)

1. Land Use: Sports Field (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | NA (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-2% (Slope (%))

Description of Location: South field at Groton Dunstable

2. Soil Parent Material: Coarse Loamy Melt-Out Till | Moraine (Landform) | TS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 100'+ feet | Drainage Way 100'+ feet | Wetlands 100'+ feet
Property Line 20'+ feet | Drinking Water Well 100'+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☒ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 70" Depth Weeping from Pit | 120" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-15	A	Loam	10YR 3/2						Granular	Friable	
15-60	C1	Sandy Loam	10YR 5/4				5%	5%	Massive	Friable	
60-120	C2	Fine Sand	2.5Y 5/3						Massive	Friable	

Additional Notes:
NRCS Soil Group: A, ESHGW 319.16.

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole #24	Obs. Hole #25
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☒ Depth weeping from side of observation hole	_____ inches	70 inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: Varies inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	Varies inches	Lower boundary:	Varies inches
c. If no, at what depth was impervious material observed?	Upper boundary:	_____ inches	Lower boundary:	_____ inches

Commonwealth of Massachusetts
City/Town of Groton

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

David Scharlacken — Signature of Soil Evaluator

11-03-21 — Date

David Scharlacken SE14279 — Typed or Printed Name of Soil Evaluator / License #

6-30-24 — Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Middlesex County, Massachusetts

December 21, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

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 21, Sep 2, 2021

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

Date(s) aerial images were photographed: May 22, 2015—Jun 14, 2017

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
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	3.1	6.4%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	0.1	0.3%
73B	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	0.1	0.2%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	4.0	8.4%
255B	Windsor loamy sand, 3 to 8 percent slopes	1.3	2.7%
256B	Deerfield loamy fine sand, 3 to 8 percent slopes	4.6	9.7%
405B	Charlton fine sandy loam, 3 to 8 percent slopes	23.3	48.6%
654	Udorthents, loamy	11.3	23.7%
Totals for Area of Interest		**47.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the

scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Middlesex County, Massachusetts

6A—Scarboro mucky fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svky
Elevation: 0 to 1,320 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Scarboro

Setting

Landform: Drainageways, outwash deltas, outwash terraces, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy glaciofluvial deposits derived from schist and/or sandy glaciofluvial deposits derived from gneiss and/or sandy glaciofluvial deposits derived from granite

Typical profile

Oe - 0 to 3 inches: mucky peat
A - 3 to 11 inches: mucky fine sandy loam
Cg1 - 11 to 21 inches: sand
Cg2 - 21 to 65 inches: gravelly coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (1.42 to 14.17 in/hr)
Depth to water table: About 0 to 2 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Ecological site: F144AY031MA - Very Wet Outwash
Hydric soil rating: Yes

Minor Components

Swansea

Percent of map unit: 10 percent
Landform: Bogs, swamps
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Wareham

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

Walpole

Percent of map unit: 5 percent
Landform: Deltas, depressions, outwash terraces, depressions, outwash plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

71B—Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w69c
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Drumlins, depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Footslope, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Whitman, extremely stony

Percent of map unit: 8 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Paxton, extremely stony

Percent of map unit: 2 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

73B—Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w695
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Whitman, extremely stony, and similar soils: 81 percent
Minor components: 19 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Whitman, Extremely Stony

Setting

Landform: Drumlins, ground moraines, hills, drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 1 inches: peat
A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam
Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D

Ecological site: F144AY041MA - Very Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Ridgebury, extremely stony
Percent of map unit: 10 percent
Landform: Drumlins, depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro
Percent of map unit: 5 percent
Landform: Drainageways, depressions, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea
Percent of map unit: 3 percent
Landform: Marshes, bogs, swamps
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Woodbridge, extremely stony
Percent of map unit: 1 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

103C—Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 2wzp1
Elevation: 0 to 1,390 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Charlton, extremely stony, and similar soils: 50 percent
Hollis, extremely stony, and similar soils: 20 percent

Rock outcrop: 10 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Hollis, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam

2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Ridges, hills
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Woodbridge, extremely stony

Percent of map unit: 8 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Canton, extremely stony

Percent of map unit: 5 percent
Landform: Moraines, hills, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, extremely stony

Percent of map unit: 5 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 2 percent
Landform: Hills, drainageways, drumlins, depressions, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

255B—Windsor loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svkf
Elevation: 0 to 1,210 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Windsor, Loamy Sand

Setting

Landform: Dunes, outwash plains, deltas, outwash terraces
Landform position (three-dimensional): Tread, riser

Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley, loamy sand

Percent of map unit: 10 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Deerfield, loamy sand

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

256B—Deerfield loamy fine sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2xfg9
Elevation: 0 to 1,190 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Deerfield

Setting

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

Typical profile

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

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Windsor

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

Wareham

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

Sudbury

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

Ninigret

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

405B—Charlton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2wh0n
Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Charlton

Setting

Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Sutton

Percent of map unit: 8 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Paxton

Percent of map unit: 5 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Leicester

Percent of map unit: 1 percent
Landform: Depressions, drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Chatfield

Percent of map unit: 1 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

654—Udorthents, loamy

Map Unit Setting

National map unit symbol: vr1l
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Udorthents, Loamy

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities

Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Minor Components

Udorthents, sandy

Percent of map unit: 10 percent
Hydric soil rating: No

Urban land

Percent of map unit: 5 percent
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear

Udorthents, wet substratum

Percent of map unit: 5 percent
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX 8:
OPERATION AND MAINTENANCE PLAN

FLORENCE ROCHE SCHOOL
CONSTRUCTION PERIOD POLLUTION PREVENTION PLAN AND EROSION CONTROL OPERATION AND MAINTENANCE PLAN
FEBRUARY 2022

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

1. ***Erosion Control***

   Erosion control barriers will be placed along down-gradient portion of the site as indicated on the project plans. Additional erosion control barriers will be placed at the limit of work as shown in the civil plans.

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

2. ***Site Access***

   Site access, for construction equipment will be from Champney Street as shown on the Site Preparation Plan C101, and a construction entrance will be installed at the onset of the project.

3. ***Construction Staging***

   A construction staging area will be established outside of the 100' wetland buffer zone.

4. ***Site Grading/Site Work***

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

5. ***Slope Stabilization***

   All surfaces and slopes shall be checked after each major storm event and at *least once every (7 calendar days or once every 14 calendar days and within 24 hours of the occurrence of a storm event 0.25 inches or greater*) to see that vegetation is in good condition. Any rills or damage from erosion shall be repaired immediately to avoid further damage. If seeps develop on the slopes, the area will be evaluated to determine if the seep will cause an unstable condition and shall be stabilized immediately if necessary. Problems found during the inspections by the General Contractor shall be repaired promptly. Areas requiring re-vegetation shall be replanted immediately or stabilized in a manner acceptable to the Conservation Commission if it is outside of the growing season. Slopes and other exposed surfaces receiving vegetation will be maintained as necessary to support healthy vegetation. If stabilization is required during the non-growing season, straw mulch, or a commercially manufactured blanket must be employed to prevent erosion.

6. ***Permanent Stabilization***

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

7. ***Drainage Structures (Area Drains, Catch Basins, Drain Manholes (DMH), DMH Junction Boxes, Drywells, Outlet Control Structures & WQU's)***

   All structures shall be inspected on a bi-weekly basis and/or after every rain storm and repairs made as necessary. Sediment shall be removed from the sump after the sediment has reached a maximum of one half the depth of the sump. The sediment shall be removed from the site and properly disposed of. Drainage structures/sumps shall be cleaned completely at the end of construction. See attached manufacture requirements for infiltration structures and WQU Operation & Maintenance.

8. ***Dust and Sediment Control***

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

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

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

   Silt fence shall be installed with a 6 in. by 6 in. trench on the contour with 6 ft. extending up slope at the ends to prevent silt laden runoff from escaping. Set the posts to the depth specified on the Drawings. The fabric shall be attached to the posts on the upstream side and shall extend 2 ft. above the normal water level and at least 10 in. shall extend horizontally along the soil at the bottom. Soil shall be backfilled over the bottom 10 in. of the fabric around the inside of the trench.

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

   The Construction entrance shall be a minimum of 50-feet in length and 10-feet wide, unless otherwise stated on drawings.

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

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

<u>Pollution Prevention Measures</u>

1. Before, during, and after construction, functional erosion and sedimentation controls shall be implemented to prevent the silting of the wetland areas down-gradient of the site. Straw wattles, crushed stone, temporary stabilization and other controls shall be properly maintained and are not to be removed until the site is

permanently stabilized. Other controls shall be added as warranted during construction to protect environmentally-sensitive areas. Sufficient extra materials (e.g. straw wattles, silt fencing and other control materials) shall be stored on site for emergencies.

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

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

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

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

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

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

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

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

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

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

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

Other Control Measures

Waste Materials. All trash and construction debris from the site will be hauled to an approved landfill or recycling facility. No construction waste material will be buried on the site. All personnel will receive instructions regarding the correct procedure for waste disposal. Notices describing these practices will be posted in the construction office. The site superintendent will be responsible for seeing that these procedures

are followed. Employee waste and other loose materials will be collected so as to prevent the release of floatables during rainfall events.

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

After Construction Town of Groton/GDRSD (the Owner) shall be responsible for the following:

General Land Grading and Slopes Stabilization

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

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

Erosion Controls

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

Street Sweeping

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

Stormwater Management System

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

Infiltration Chambers:
Infiltration-Chambers Systems may incorporate Inspection Ports, Maintenance Ports, and/or adjoining manholes. Each of these features are easily accessed by removing the lid at the surface. With the cover removed, a visual inspection can be performed to identify sediment deposits within the structure. Using a flashlight, ALL access points should be examined to complete a thorough inspection.

Inspection Ports:

These perforated columns are designed to give the user a base-line sediment depth across the system floor. After inspecting the bottom of the structure, use a mirror on a pole (or some other device) to check for sediment or debris in the pipe connecting to the Infiltration Chambers.

If sediment or debris is observed in any of these structures, you should determine the depth of the material. This is typically accomplished with a stadia rod, but you should determine the best way to obtain the measurement. All observations and measurements should be recorded on an Inspection Log kept on file.

The Infiltration-Chambers System should be back-flushed once sediment accumulation has reached 6" or 15% of the total system height.

If sediment accumulation reaches 6" or 15% of the total system height:

Before any maintenance is performed on your system, be sure to plug the outlet pipe to prevent contamination of the adjacent systems. To back-flush the Infiltration Chambers, water is pumped into the system through the Maintenance Ports as rapidly as possible. Water should be pumped into ALL Maintenance Ports. The turbulent action of the water moving through the Infiltration Chamber(s) will suspend sediments which may then be pumped out. If your system includes an Outlet Structure, this will be the ideal location to pump contaminated water out of the system. However, removal of back-flush water may be accomplished through the Maintenance Ports, as well. For systems with large footprints that would require extensive volumes of water to properly flush the system, you should consider performing your maintenance within 24 hours of a rain event. Stormwater entering the system will aid in the suspension of sediments and reduce the volume of water required to properly flush the system.

Water Quality Unit (WQU):
Water Quality Unit shall be as follows per manufacturer's recommendations:

- Units should be inspected post-construction, prior to being put into service.
- Inspect every six months for the first year of operation to determine the oil and sediment accumulation rate. In subsequent years, inspections can be based on first-year observations
- Cleaning is required once the sediment depth reaches 15% of storage capacity, (generally taking one year or longer).
- Inspect the unit immediately after an oil, fuel or chemical spill.
- A licensed waste management company should remove captured petroleum waste products from any oil, chemical or fuel spills and dispose responsibly

Bioretention/Rain Garden:
The work applies to all areas within the designated bioretention/rain garden areas, its connective culvert system and adjacent naturalization plantings. The work shall consist of invasive plant species control, debris collection, mowing and vegetative maintenance, inlet/outlet structure inspection, and other remediation measures as described in the post construction monitoring report.

Qualifications: The contractor shall be experienced in this type of work. The contractor shall have a working knowledge of wetland and invasive plants and be able to identify key species. The contractor must provide a description of two current contracts or similar work and two reference contacts or have been contracted by the Client previously.

A. Invasive and Nuisance Plant Species Control Inspection and Evaluation
    1. ***Four times annually***, inspect the perimeter and interior of the bioretention/rain garden for the establishment of invasive or nuisance plant species. Inspection shall be conducted in early spring (as soon

as weather permits), spring (early June), summer (August) and fall (October). All inspections shall be done on foot and vehicular access to the bioretention/rain garden areas are prohibited.

2. After each ***quarterly*** seasonal Inspection, the Contractor is to provide a site report to the Property Manager that indicates areas of invasive plant materials that require removal prior to conducting any work.

3. Manually extract all visible shoots and stems including root system of:
   a. Purple Loosestife; *Lythrum salicaria*
   b. Common Reed; *Phragmites australis*
   c. Japanese Knotweed; *Fallopia japonica var. japonica*
   d. Black Locust; *Robina pseudoacacia*
   e. Bittersweet Nightshade; *Solanum dulcamara*
   f. Poison Ivy; *Toxicodendron radicans*
   g. Common Dodder; *Cuscuta gronovii*
   h. Wild Grape Vine; *Vitis vinifera*
   i. Bittersweet Vine; Celastrus orbiculatus

4. Avoid all mowing or mechanized cutting, or the application of herbicides to control invasive species except for the application of systemic herbicides via painting cut stems or injection methods, except in areas approved by the Property Manager.

B. Debris Collection
   1. In conjunction with the regular lawn care maintenance schedule, remove and haul away all debris from wetlands area. Avoid removal of tree branches, logs or stumps.

C. Inlet/Outlet Structure Inspection and Evaluation
   1. In conjunction with the schedule of site inspection for invasive or nuisance plant species, visually inspect the culverts, inlet structures and vertical outflow structure.

   2. Remove and accumulated debris or sediment, or other obstructions which impede the flow of surface water through the culvert.

   3. The contractor shall notify the Client regarding the maintenance of any culvert damage or failure.

D. Mowing/Vegetation Management
   1. Mowing within the wetland management area is prohibited. Additionally, no mowers or other vehicles shall enter the upland slope area of the mitigation areas, except in areas approved by the Property Manager.

E. Replacement
   1. The contractor shall notify the Client in writing of any tree or shrub materials that are more than 50% damaged or dead. Replacement may be needed and shall be specified in the management report.

F. Schedule:

Month	April				May				June				July				August				September				October				November			
Weeks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Invasive Species Review & Report		X	X							X	X							X	X							X	X					
Debris Collection			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X		X		X
Inlet/Outlet Inspection		X	X							X	X							X	X							X	X					

Athletic Track Maintenance:
Athletic Track shall be per manufacturer's recommendations, including:

- Avoid salting or sanding track during winter.

INSPECTION REPORT FORM FOR STORM WATER SYSTEM

Project: Florence Roche School - Groton, MA
342 Main Street, Groton MA

INSPECTOR: _____ ***DATE:*** _____

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

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

Additional Observations: _____

_____

_____

Action Required: _____

_____

_____

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

APPENDIX 9:
SKETCHES

LEGEND:

HYDROLOGICAL WATERSHED BORDER

HYDROLOGICAL TIME OF CONCENTRATION LINE

396 MAIN ST
N/F
ROBERT K. COOKE &
KATRINA M. ROMANOFF
BK.34846, PG.199

386 MAIN ST
N/F
FREDERICK C. & HELENE BOND
BK.12277, PG.475

368 MAIN ST
N/F
DAVID W. GILSON
BK.30314, PG.342

356 MAIN ST
N/F
JASON M. & KATHERINE CONQUEST
CERT. 274475

N/F
GROTON-DUNSTABLE REGIONAL SCHOOL DISTRICT
BK.22392, PG.34

LOT AREA
693,876±S.F.
15.93±A.C.

N/F
THE INHABITANTS OF THE TOWN OF GROTON
BK.7591, PG.109

LOT AREA
675,713±S.F.
15.51±A.C.

N/F
THE INHABITANTS OF THE TOWN OF GROTON
L.C.C. 409

LOT AREA
1,000±S.F.
0.02±A.C.

13 COMMON ST
N/F
SALLY L. SMITH
INVESTMENT TRUST
BK.64659, PG.436

3 CHAMPNEY ST
N/F
THE CARUSO FAMILY TRUST
BK.67828, PG.277

13 CHAMPNEY ST
N/F
BRANDON C. LAMBERT
BK.73335, PG.436

19 CHAMPNEY ST
N/F
DUANE CROMWELL
BK.17035, PG.546

37 CHAMPNEY ST
N/F
DOROTHY N. DAVIS
REVOCABLE TRUST OF 2016
BK.67481, PG.369

43 CHAMPNEY ST
N/F
ALBERT V. DEMEO
BK.28471, PG.34

47 CHAMPNEY ST
N/F
STENSON LIVING TRUST
BK.64459, PG.307

59 CHAMPNEY ST
N/F
MAIN STREET (AKA ROUTE 111 S.H.I.L.O 690)

CHAMPNEY STREET

POA-1

POA-2

POA-3

POA-4

POA-5

EX-WS1

EX-WS2

EX-WS3

EX-WS4

EX-WS5

EX-WS6

EX-WS7

EX-WS8

EX-BLDG

MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (NAD83)

50 25 0 50 100

1 inch = 50 feet

10/22/2021 3:54:29 PM

NOT FOR CONSTRUCTION

studio g ARCHITECTS
building sustainable communities
The Brewery
179 Boylston Street
Jamaica Plain, MA 02130
T 617-524-5558

STAMP

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Samiotes Consultants Inc.
Civil Engineers + Land Surveyors
20 A Street
Framingham, MA 01701
T 508.877.6688
F 508.877.8349
www.samiotes.com

CLIENT
Groton-Dunstable
Regional School District
& Town of Groton
344 Main Street
Groton, MA 01450

NOT FOR CONSTRUCTION
DESIGN DEVELOPMENT

KEY PLAN

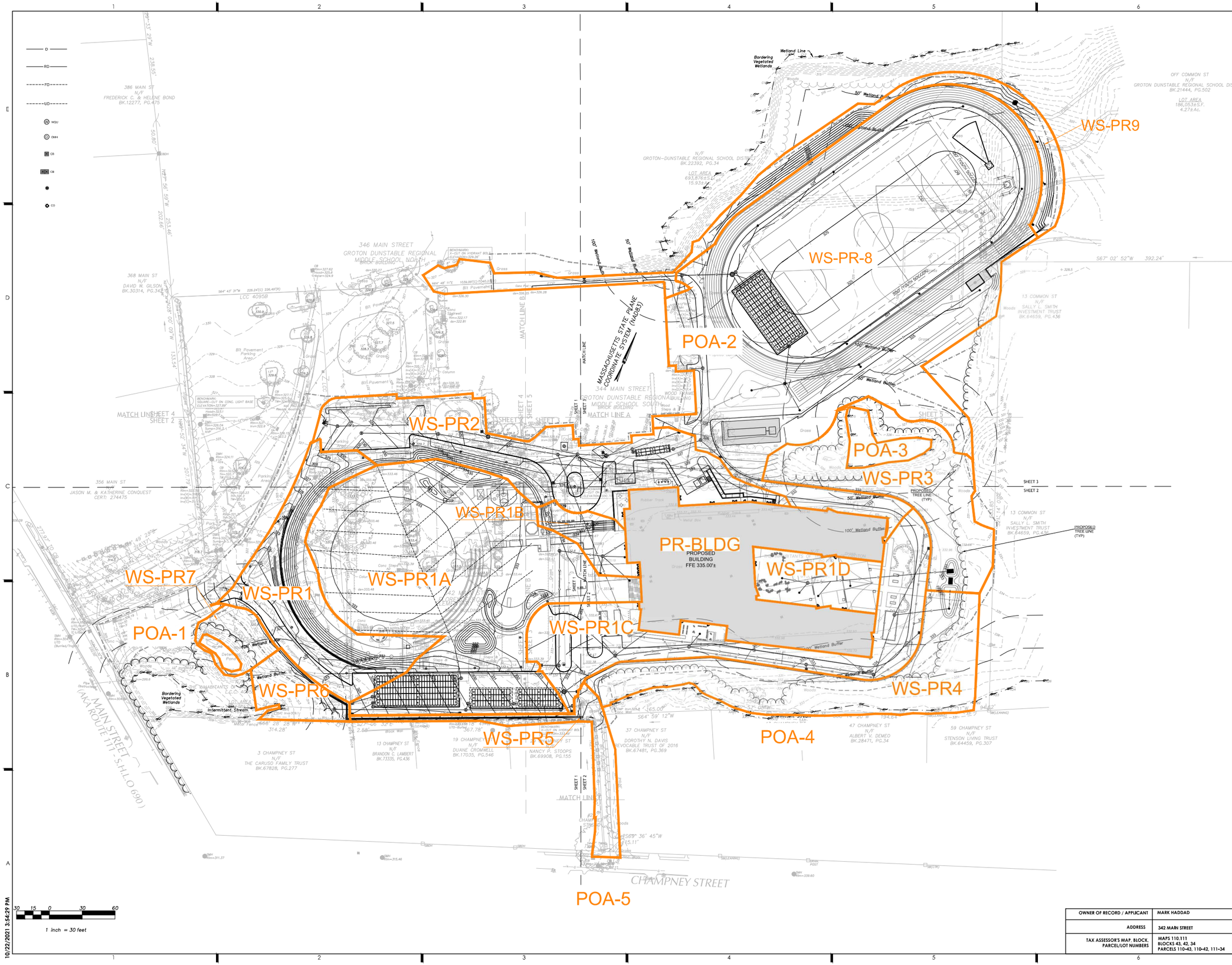
PROJECT TITLE
FLORENCE ROCHE
ELEMENTARY SCHOOL
342 Main Street
Groton, MA 01450

NO.	DESCRIPTION	DATE

PROJECT NO	19088.00
DRAWN BY	WJP
CHECKED BY	SP
SCALE	1" = 30'-0"
DATE	11/05/2021

SHEET TITLE
EXISTING
HYDROLOGY

SHEET NO
EX-HYD



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CLIENT
Groton-Dunstable Regional School District & Town of Groton
344 Main Street
Groton, MA 01450

NOT FOR CONSTRUCTION
DESIGN DEVELOPMENT PERMIT SET

KEY PLAN

PROJECT TITLE
FLORENCE ROCHE ELEMENTARY SCHOOL
342 Main Street
Groton, MA 01450

NO.	DESCRIPTION	DATE
1.	SWMP REV.	02/01/22

PROJECT NO	19088.00
DRAWN BY	WJP
CHECKED BY	SP
SCALE	AS SHOWN
DATE	01/10/2022

SHEET TITLE
PROPOSED HYDROLOGY

OWNER OF RECORD / APPLICANT	MARK HADDAD
ADDRESS	342 MAIN STREET
TAX ASSESSOR'S MAP, BLOCK, PARCEL/LOT NUMBERS	MAPS 110,111 BLOCKS 43, 42, 34 PARCELS 110-43, 110-42, 111-34

SHEET NO
PR-HYD

10/22/2021 3:54:29 PM

APPENDIX 10:
WAIVER LETTER

February 4, 2022

Earth Removal Stormwater Advisory Committee
ATTN: Michelle Collette, AICP
Stormwater Inspector/ADA Coordinator
173 Main St.
Groton, MA 01450

Re: Non-Roof Runoff Recharge Waiver Request SCI # 19088.00
Florence Roche Elementary School

Dear Michelle:

We hereby request a waiver from the Groton Earth Removal Stormwater Advisory Committee Code Section 352-11. C. (10) regarding runoff from other surfaces than rooftops discharging to underground recharge systems. The revised stormwater submission now includes new water quality units to provide 80% TSS removal of non-roof runoff discharge prior to each underground recharge system.

We believe that these proposed improvements to the design will further enhance stormwater quality treatment for runoff entering the infiltration systems and further support future operation and maintenance of the overall site stormwater management.

If you have any questions, or require further information, please do not hesitate to call Stephen Powers (508) 877-6688 x14 or myself at x23.

Sincerely,

Jeffrey Pilat
Project Manager

cc: Meryl Nistler - Studio G Architects, Inc.
David Saindon – Leftfield, Inc.

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Civil Engineers + Land Surveyors

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APPENDIX 11:
ILLICIT DISCHARGE COMPLIANCE STATEMENT

ILLICIT DISCHARGE COMPLIANCE STATEMENT

SITE ADDRESS: 342 Main Street, Groton, MA 01450

OWNER: Groton-Dunstable Regional School District

PLAN REFERENCE: Florence Roche Elementary School C501-C503 Civil Drainage Plans

DATE: 1/4/2022

As required by Standard 10 of the Massachusetts Stormwater Standards, I, the undersigned, being the authorized owner/responsible party of the above referenced property do hereby certify that no illicit discharges exist on the site and that the stormwater management system, as shown on the above referenced plan, does not contain or permit any illicit discharges to enter the stormwater management system.

Through the implementation of the Long-Term Pollution Prevention Plan and Operation and Maintenance Plan, measures are set forth to prevent illicit discharges from entering the stormwater management drainage system. Further, I certify that the stormwater management system as shown on the referenced plan will be maintained in accordance with the conditions of the Long-Term Pollution Prevention Plan.

NAME: Dr. Laura Chesson; CEO, Groton-Dunstable Regional School District

DocuSigned by:

SIGNED: Laura Chesson

7BED7ABE73414DF...

DATE: 1/4/2022