Review of Large Site SESC Plan Performance Criteria

February 12, 2015

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RIDEM RIPDES Stormwater Program

THE UNIVERSITY OF RHODE ISLAND COOPERATIVE EXTENSION RI NEMO


11/12/2014


6-27-2007

Soil Erosion and Sediment Control Performance Criteria

1. Avoid and Protect Sensitive Areas and Natural Features
2. Minimize Area of Disturbance
3. Minimize the Disturbance of Steep Slopes
4. Preserve Topsoil
5. Stabilize Soils
6. Protect Storm Drain Inlets
7. Protect Storm Drain Outlets
8. Establish Temporary Controls for the Protection of Post-Construction Stormwater Treatment Practices
9. Establish Perimeter Controls and Sediment Barriers
10. Divert or Manage Run-on from Up-gradient Areas
11. Properly Design Construction Stormwater Conveyance Channels
12. Retain Sediment Onsite
13. Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
14. Construction Activity Pollution Prevention Control Measures
15. Control Measure Installation, Inspections, Maintenance, and Corrective Actions

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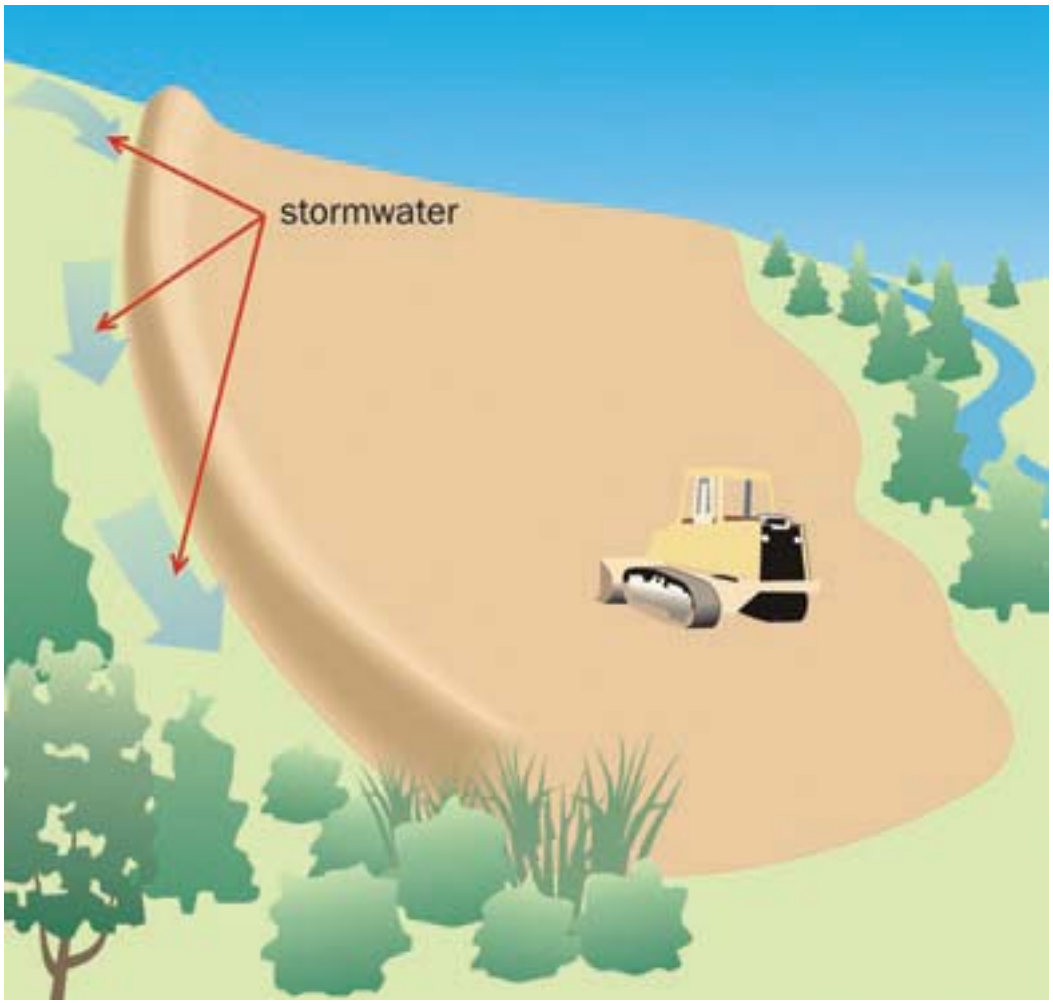
Performance Criteria No. 10

Divert or Manage Run-on from Up-gradient Areas



Source: USEPA-833-R-06-004 May 2007

Foundry Parking Lots Construction Project

Source: RIDEM – RIPDES Permitting Program

Foundry Parking Lots Construction Project

Foundry Parking Lots Construction Project

RIDOT I-95 Viaduct Project

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RIDOT I-95 Viaduct Project

RIDOT I-95 Viaduct Project

RIDOT I-95 Viaduct Project

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Diversion Installed – Problem Alleviated

Source: RIDEM – RIPDES Permitting Program

Diversion Installed – Pipe Slope Drain

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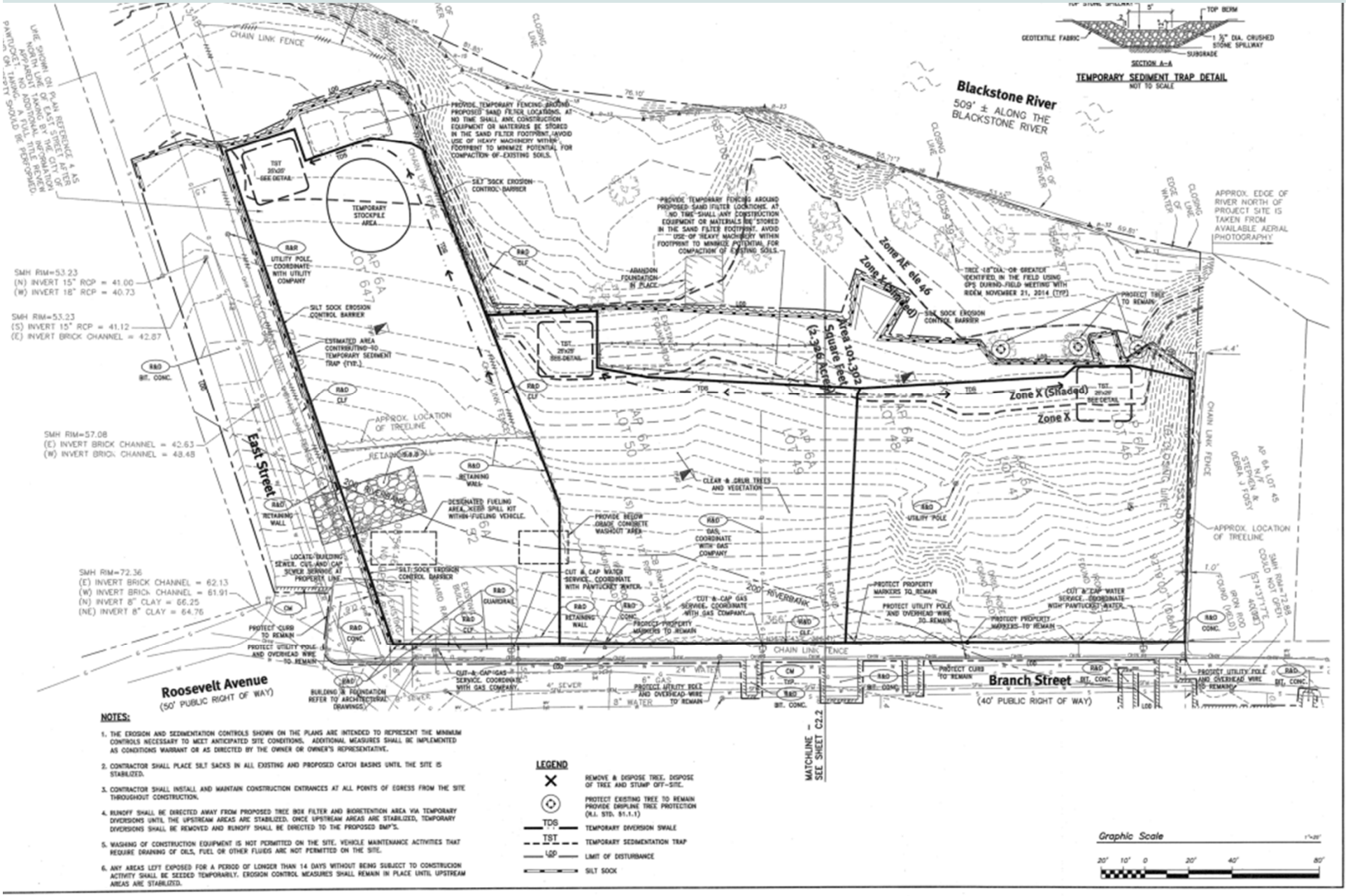
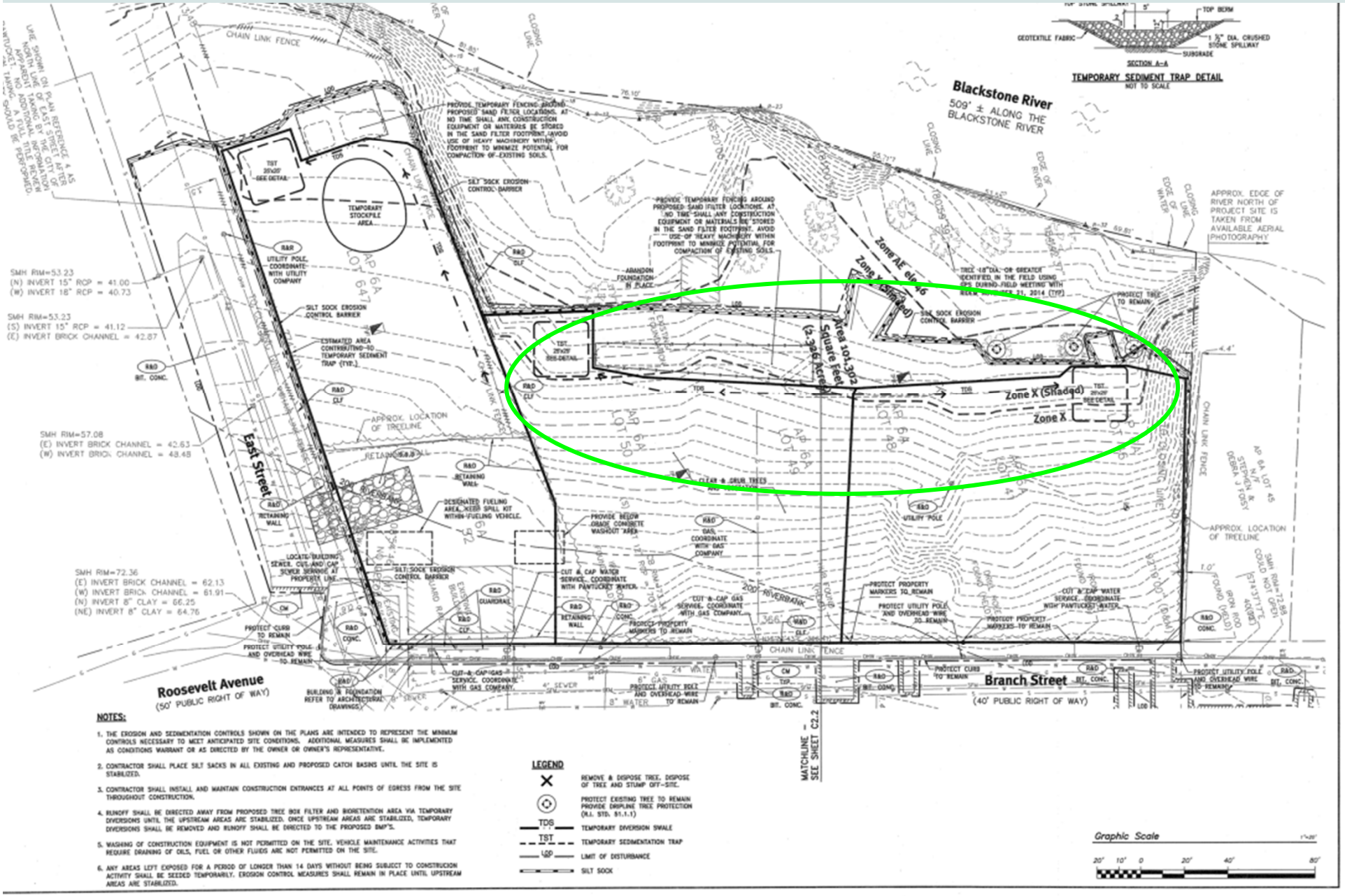
Performance Criteria No. 11
Properly Design Constructed Stormwater Conveyance Channels

Example: Temporary Diversion Swale



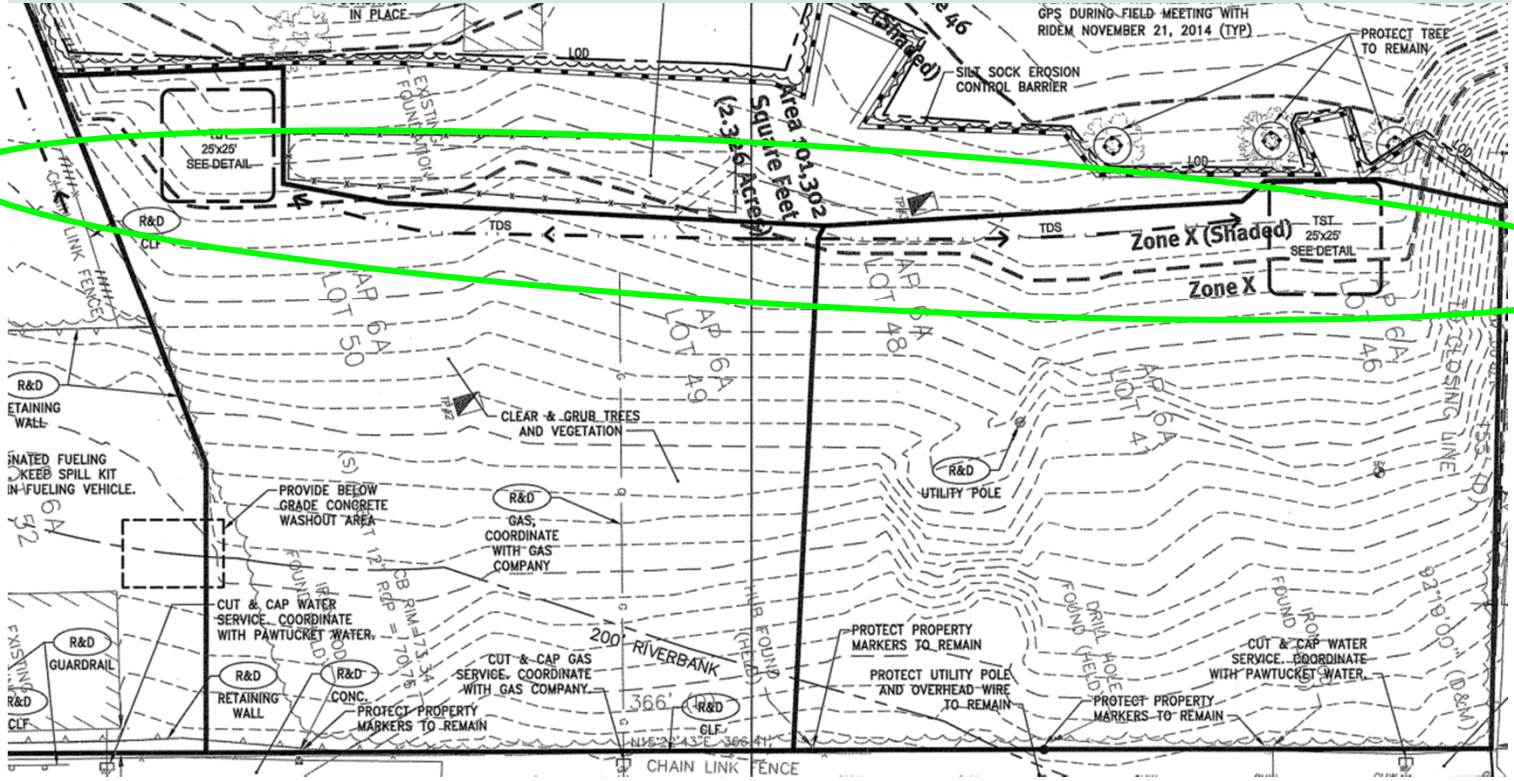
Example: Temporary Diversion Swale



- **Temporary Conveyance Channels must be designed to handle the 10 Year, 24 Hour Type III Design Storm.**

- **SESC Site Plans must contain details and specifications demonstrating this design requirement has been satisfied.**

Example: Temporary Diversion Swale



Performance Criteria No. 12
Retain Sediment Onsite

Retain Sediment Onsite:
Common Drainage Locations Serving <1 Acre of Disturbance

A combination of phasing, stabilization, and conveyances that provide run-off control will be sufficient.

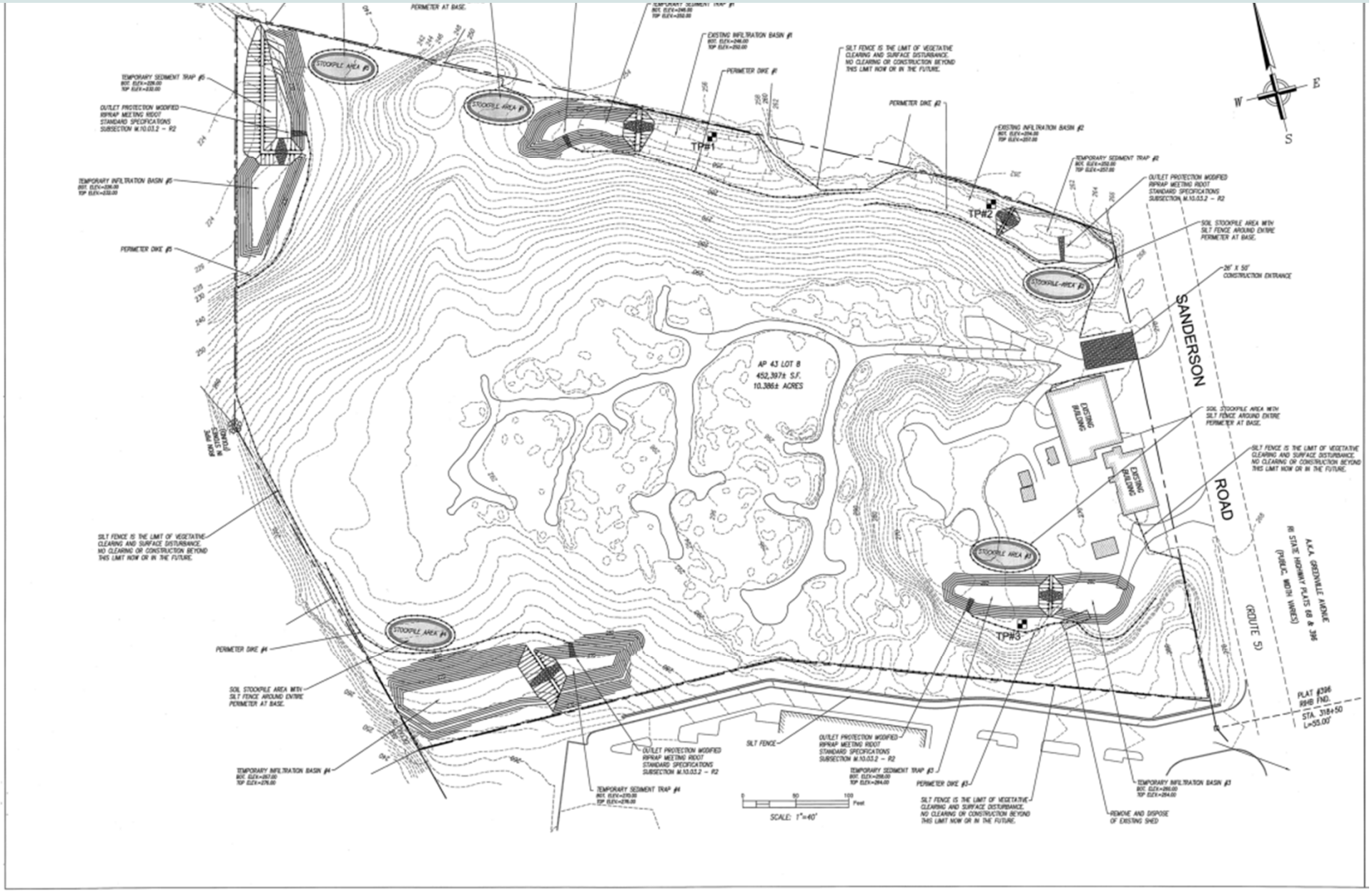
Note: In some cases, additional control measures may be required where site conditions warrant or a specific requirement exists in State regulations or Local ordinance. Refer to Performance Criteria No. 13 for additional information.

Retain Sediment Onsite:
Temporary Sediment Traps

Sediment Traps are Mandatory for Common Drainage Locations Where 1-5 Acres of Land Will Be Disturbed

Note: If period of disturbance will be greater than six (6) months, a sediment basin would be required.

Example: Temporary Sediment Trap



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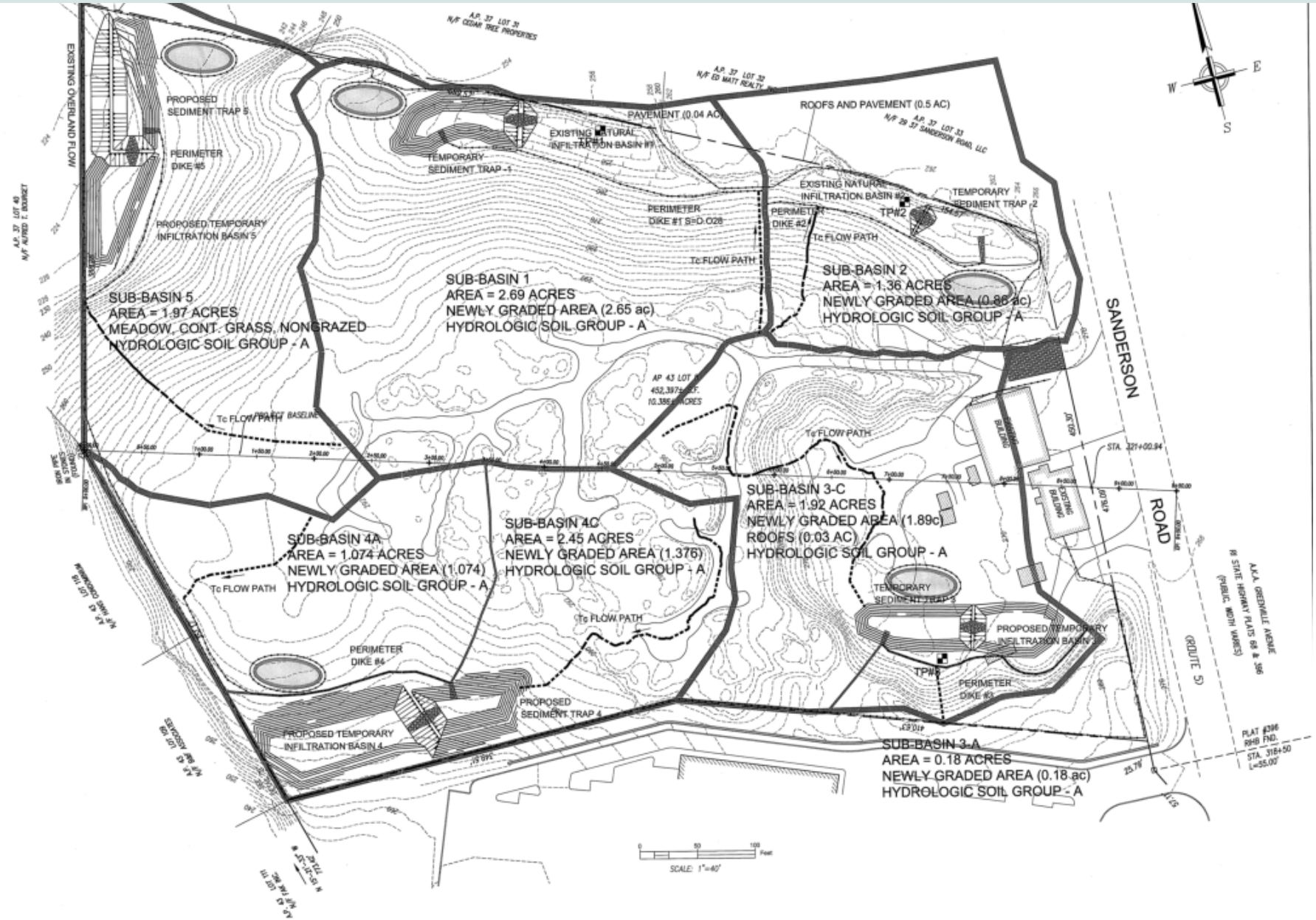
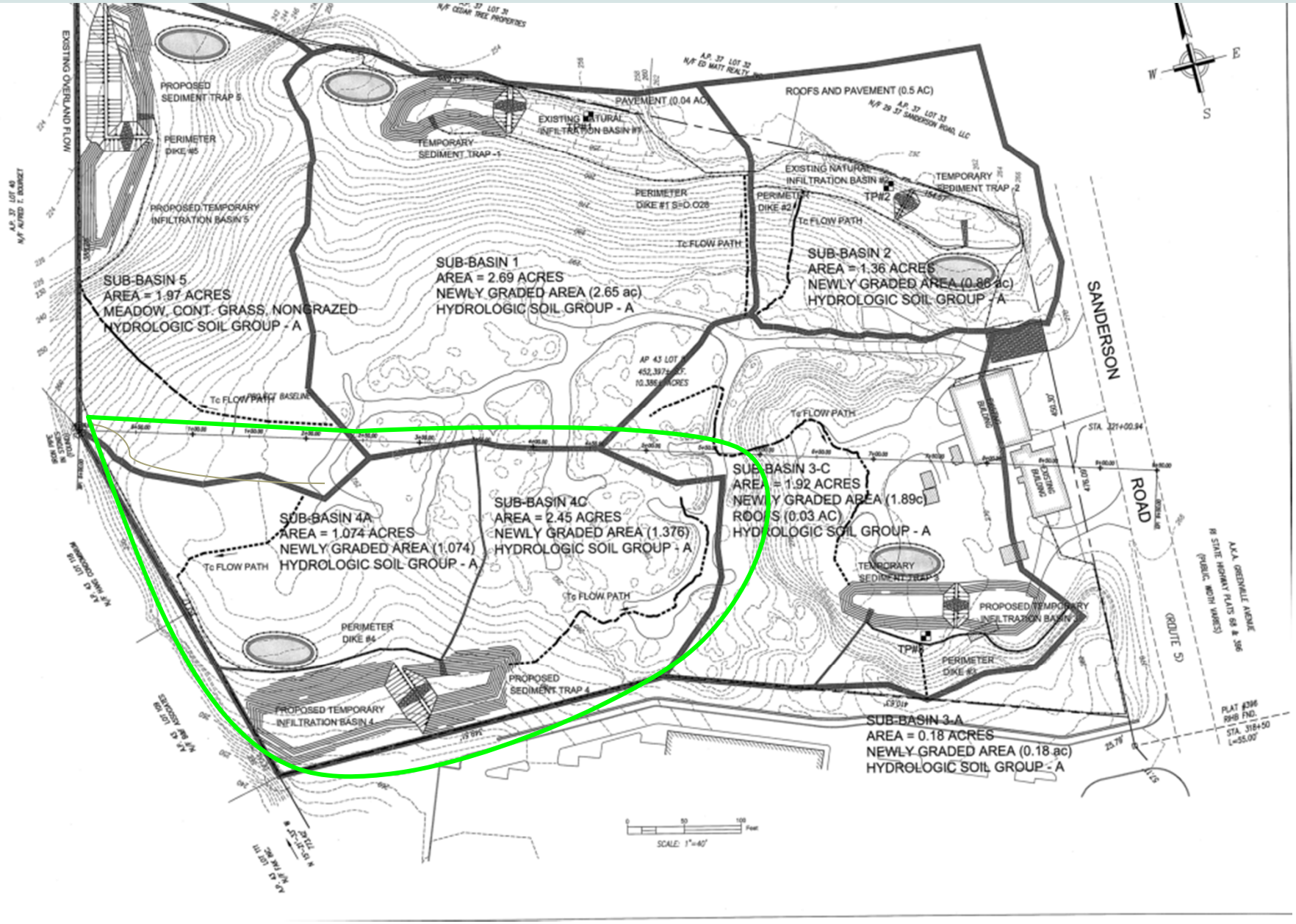


Example: Temporary Sediment Trap



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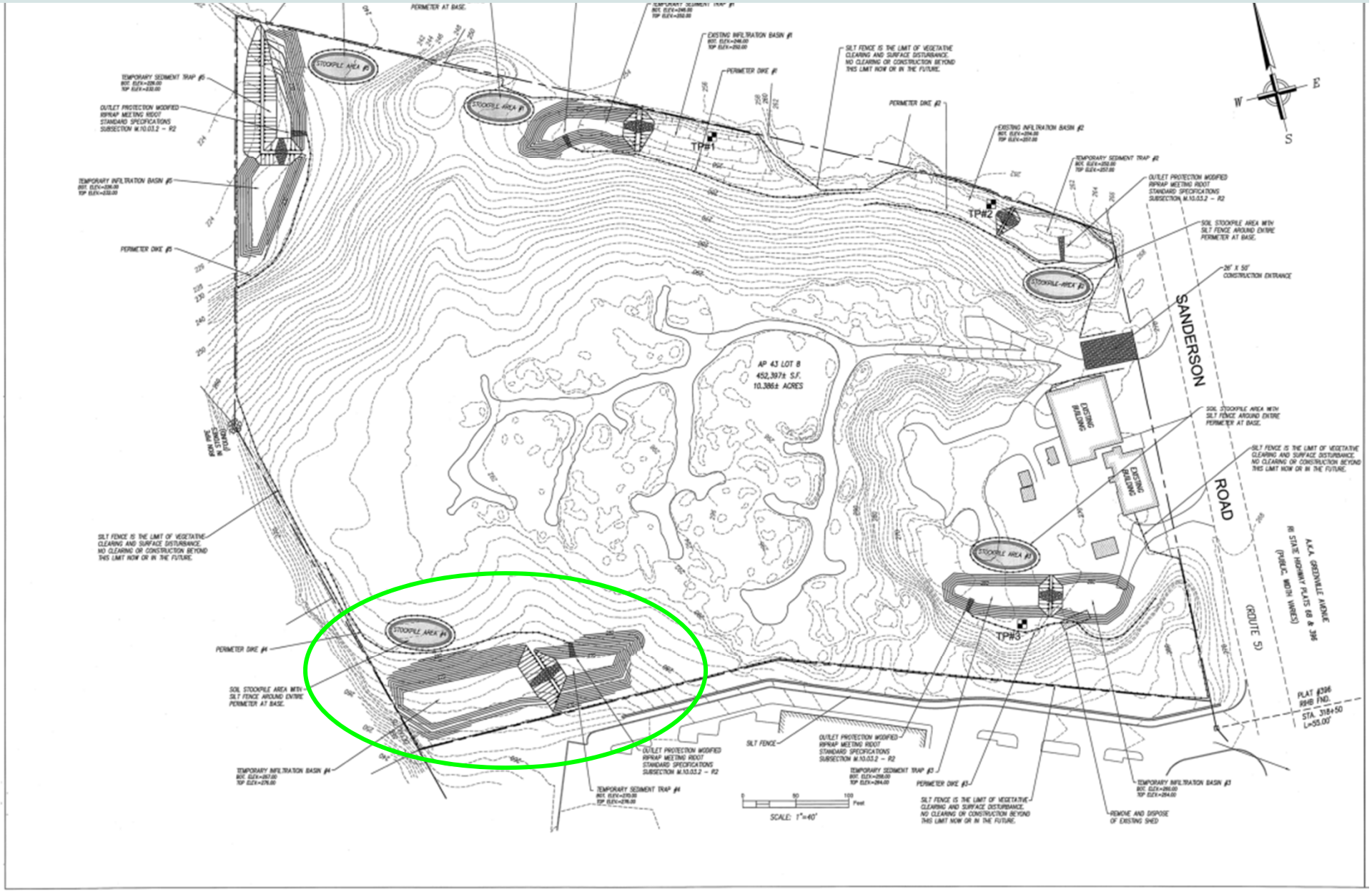

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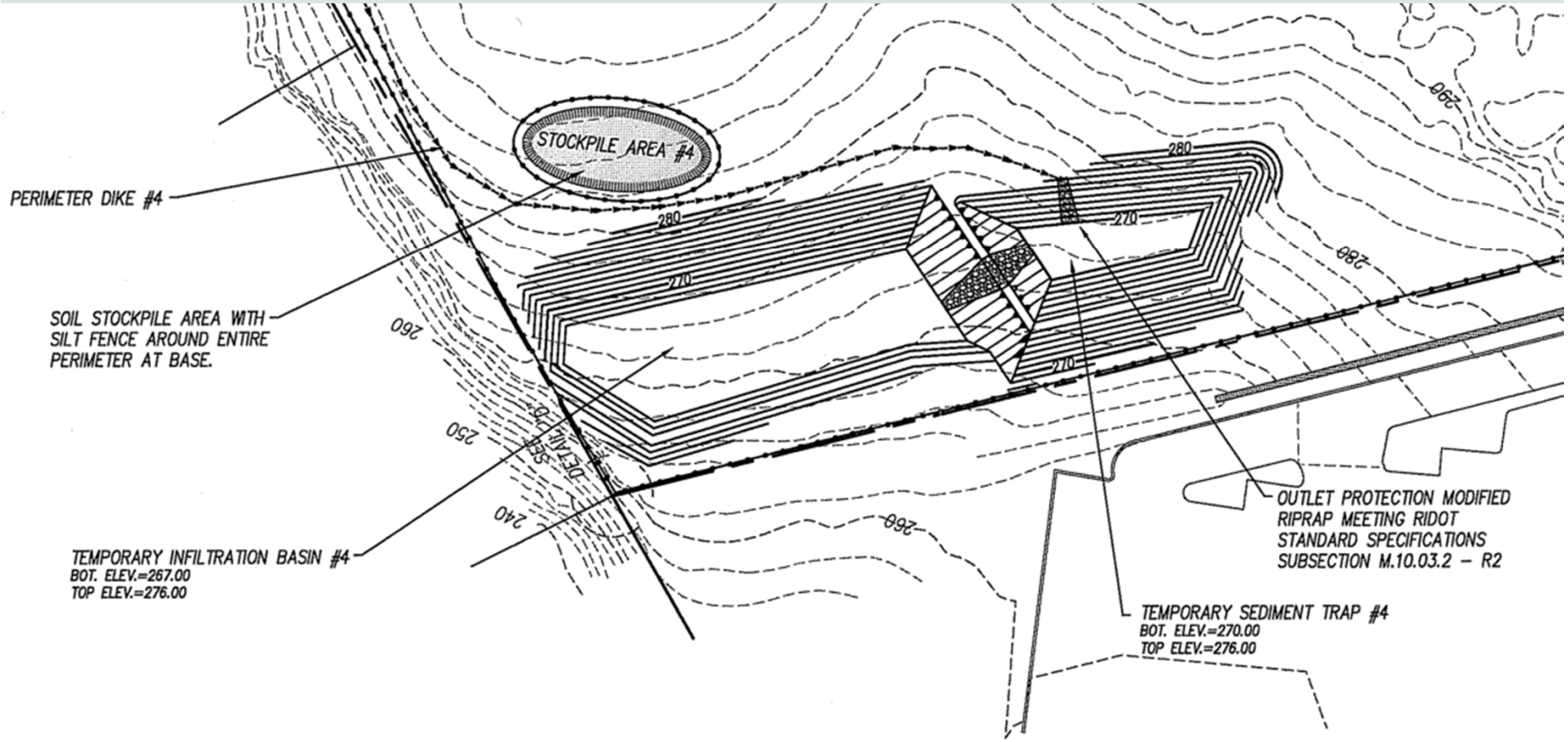

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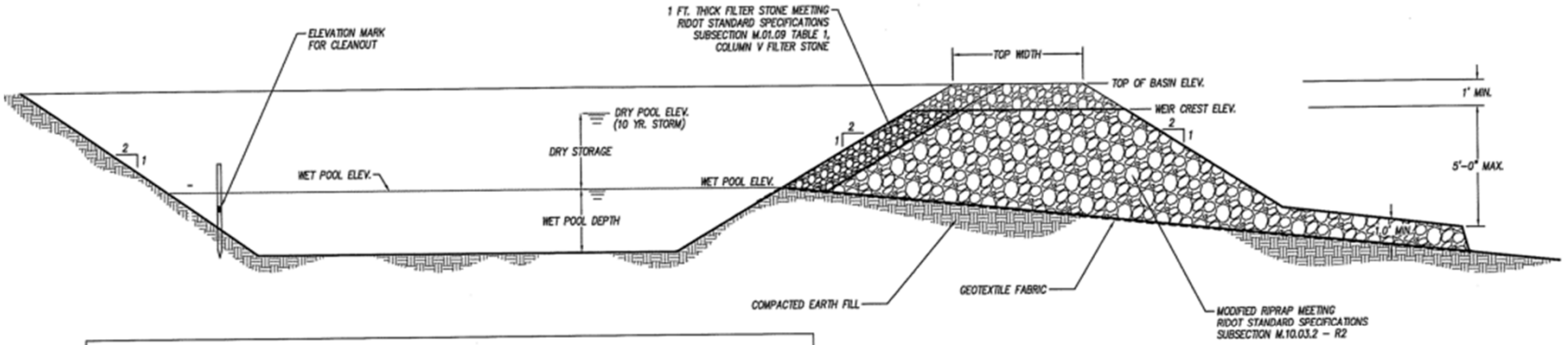
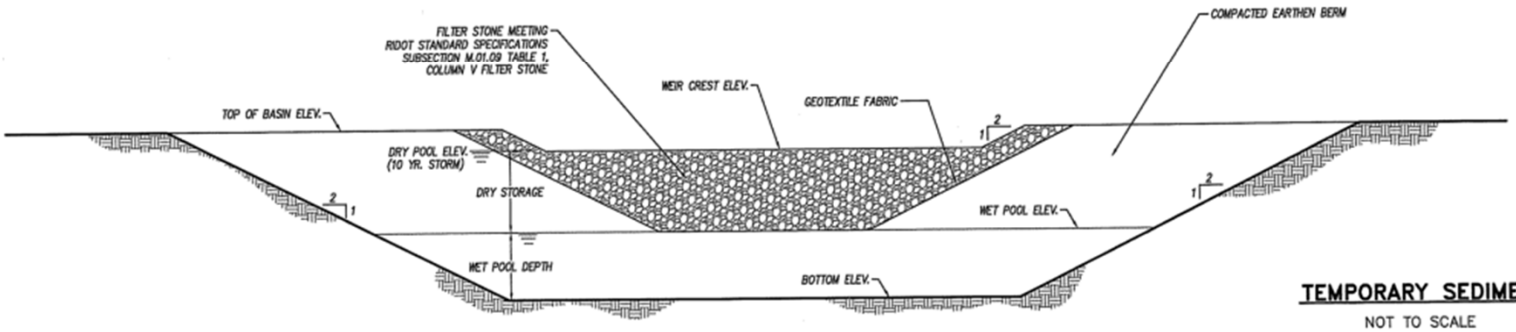


LONGITUDINAL CROSS SECTION

NOT TO SCALE

SEDIMENT TRAP DIMENSIONS

SEDIMENT TRAP #	BOTTOM ELEV.	CLEANOUT MARK ELEV.	WET POOL ELEV.	WEIR CREST ELEV.	DRY POOL MAX. ELEV.	TOP OF BASIN ELEV.	TOP WIDTH
1	246.00	247.8	249.00	251.00	251.46	252.00	2.5'
2	252.00	253.4	254.00	256.50	256.82	257.50	3.0'
3	259.00	260.2	261.00	263.00	263.35	264.00	2.5'
4	270.00	272.8	273.00	275.00	275.47	276.00	2.5'
5	226.000	227.3	229.00	231.00	231.36	232.00	2.5'



TRANSVERSE CROSS SECTION

NOT TO SCALE

TEMPORARY SEDIMENT TRAP DETAIL

NOT TO SCALE

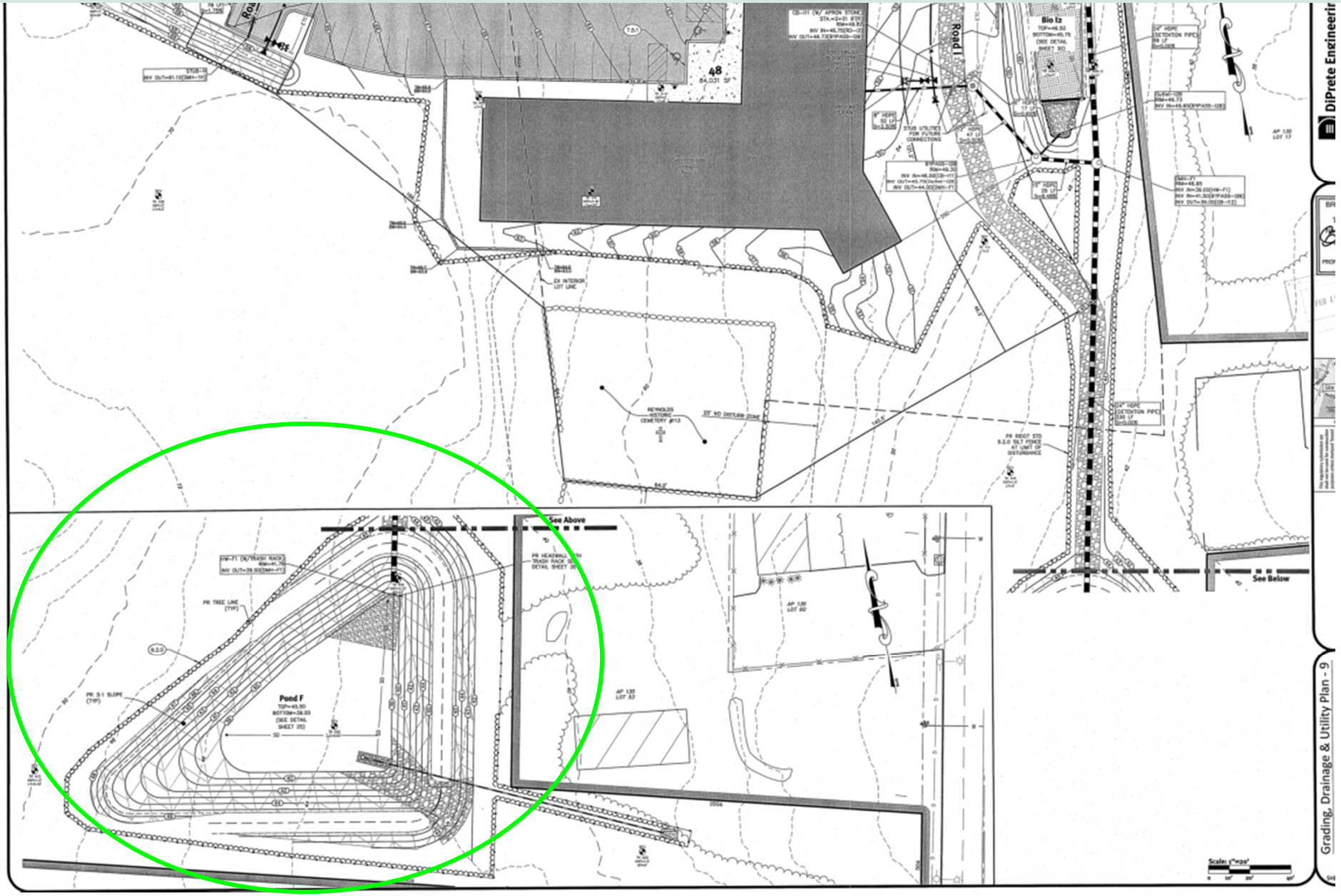
Retain Sediment Onsite:
Temporary Sediment Basins

- Required for Common Drainage Locations Where >5 Acres of Land Will Be Disturbed

- Designs Must Utilize Surface Outlets When Discharging From Temporary Sediment Basins to Maximize Sediment Removal

- Required for Common Drainage Locations where 1-5 Acres of Land Will Be Disturbed for Lengths of Time > Six (6) Months.

Example: Temporary Sediment Basin



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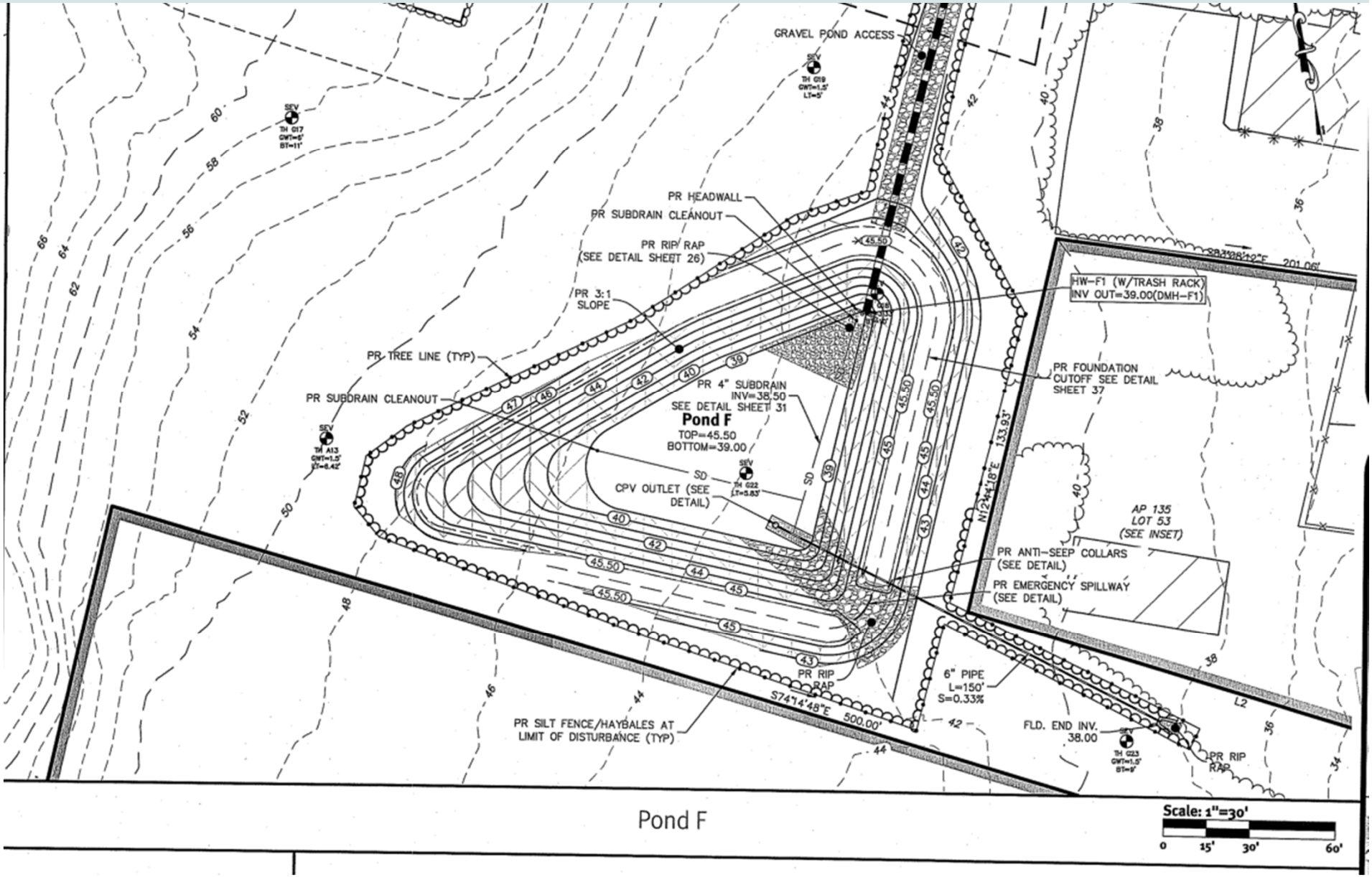
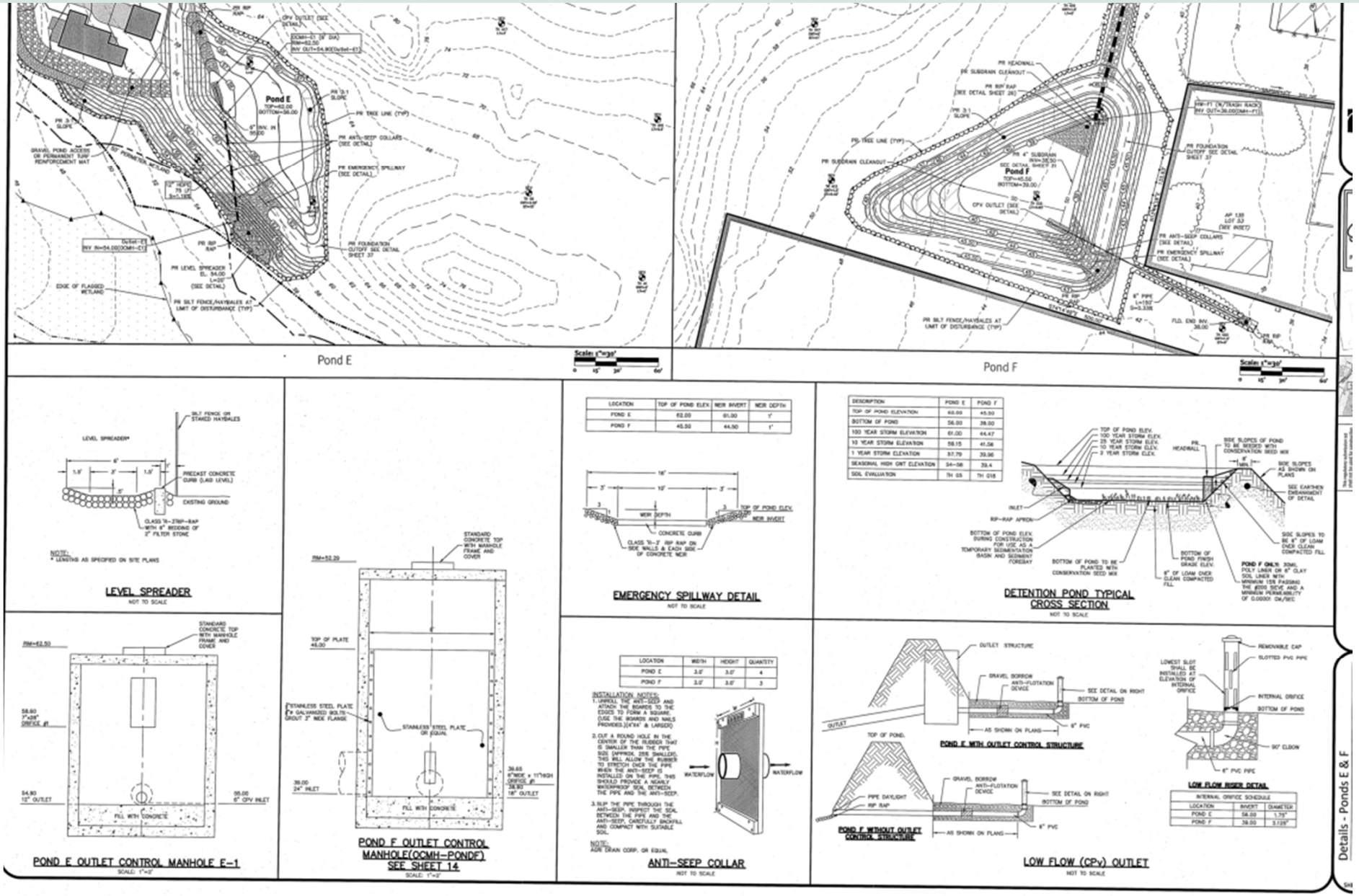
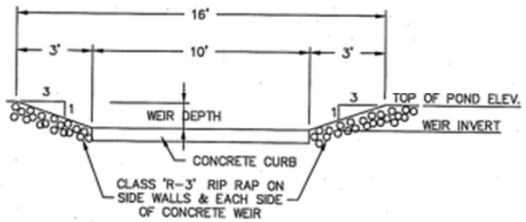


Example: Temporary Sediment Basin



Example: Temporary Sediment Basin

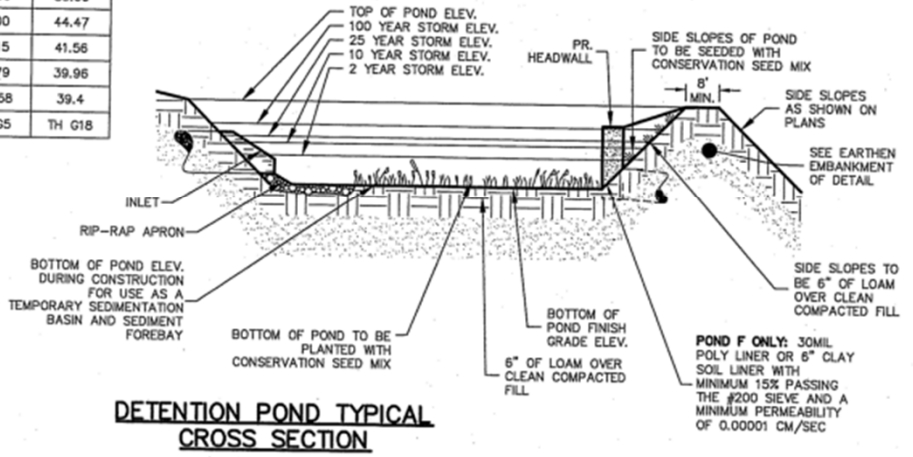
LOCATION	TOP OF POND ELEV.	WEIR INVERT	WEIR DEPTH
POND E	62.00	61.00	1'
POND F	45.50	44.50	1'



EMERGENCY SPILLWAY DETAIL

NOT TO SCALE

DESCRIPTION	POND E	POND F
TOP OF POND ELEVATION	62.00	45.50
BOTTOM OF POND	56.00	39.00
100 YEAR STORM ELEVATION	61.00	44.47
10 YEAR STORM ELEVATION	59.15	41.56
1 YEAR STORM ELEVATION	57.79	39.96
SEASONAL HIGH GWT ELEVATION	54-58	39.4
SOIL EVALUATION	TH G5	TH G18



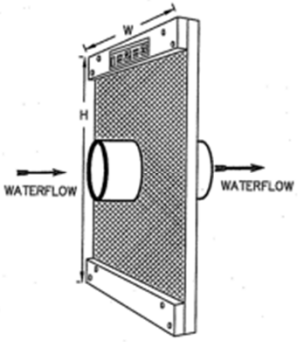
DETENTION POND TYPICAL CROSS SECTION

NOT TO SCALE

LOCATION	WIDTH	HEIGHT	QUANTITY
POND E	3.0'	3.0'	4
POND F	3.0'	3.0'	3

INSTALLATION NOTES:

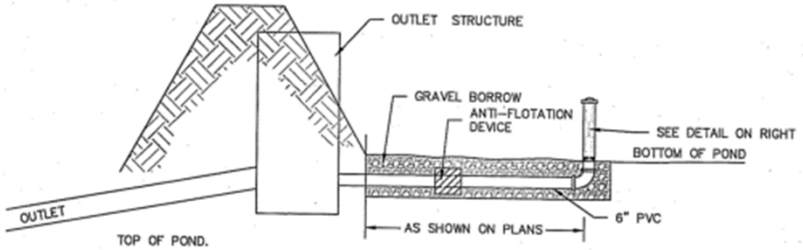
1. UNROLL THE ANTI-SEEP AND ATTACH THE BOARDS TO THE EDGES TO FORM A SQUARE. (USE THE BOARDS AND NAILS PROVIDED.)(4'X4' & LARGER)
2. CUT A ROUND HOLE IN THE CENTER OF THE RUBBER THAT IS SMALLER THAN THE PIPE SIZE (APPROX. 25% SMALLER). THIS WILL ALLOW THE RUBBER TO STRETCH OVER THE PIPE WHEN THE ANTI-SEEP IS INSTALLED ON THE PIPE. THIS SHOULD PROVIDE A NEARLY WATERPROOF SEAL BETWEEN THE PIPE AND THE ANTI-SEEP.
3. SLIP THE PIPE THROUGH THE ANTI-SEEP. INSPECT THE SEAL BETWEEN THE PIPE AND THE ANTI-SEEP, CAREFULLY BACKFILL AND COMPACT WITH SUITABLE SOIL.



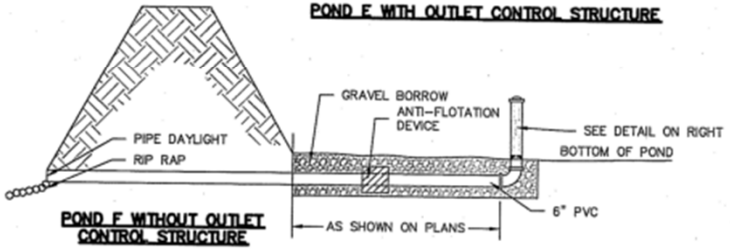
NOTE:
AGRI DRAIN CORP. OR EQUAL

ANTI-SEEP COLLAR

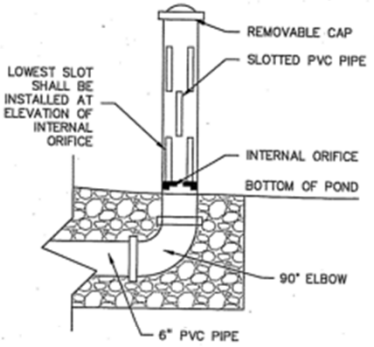
NOT TO SCALE



POND E WITH OUTLET CONTROL STRUCTURE



POND F WITHOUT OUTLET CONTROL STRUCTURE



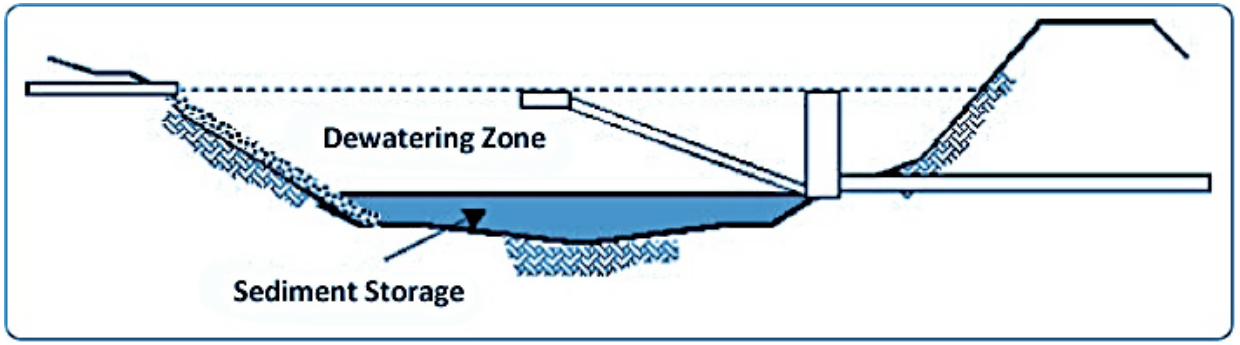
LOW FLOW RISER DETAIL

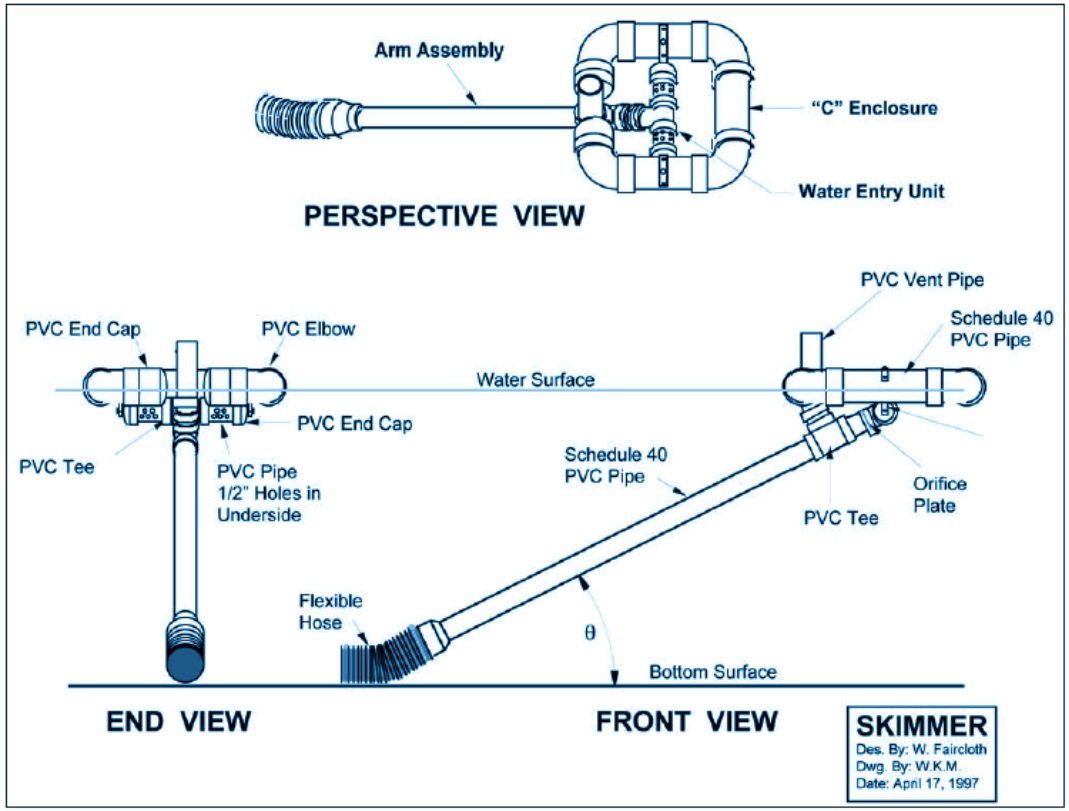
INTERNAL ORIFICE SCHEDULE		
LOCATION	INVERT	DIAMETER
POND E	56.00	1.75"
POND F	39.00	2.125"

LOW FLOW (CPv) OUTLET

NOT TO SCALE

Example: Surface Outlet





Performance Criteria No. 13
Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows

Goal: Minimize Impacts In the Vicinity of All Points of Discharge:

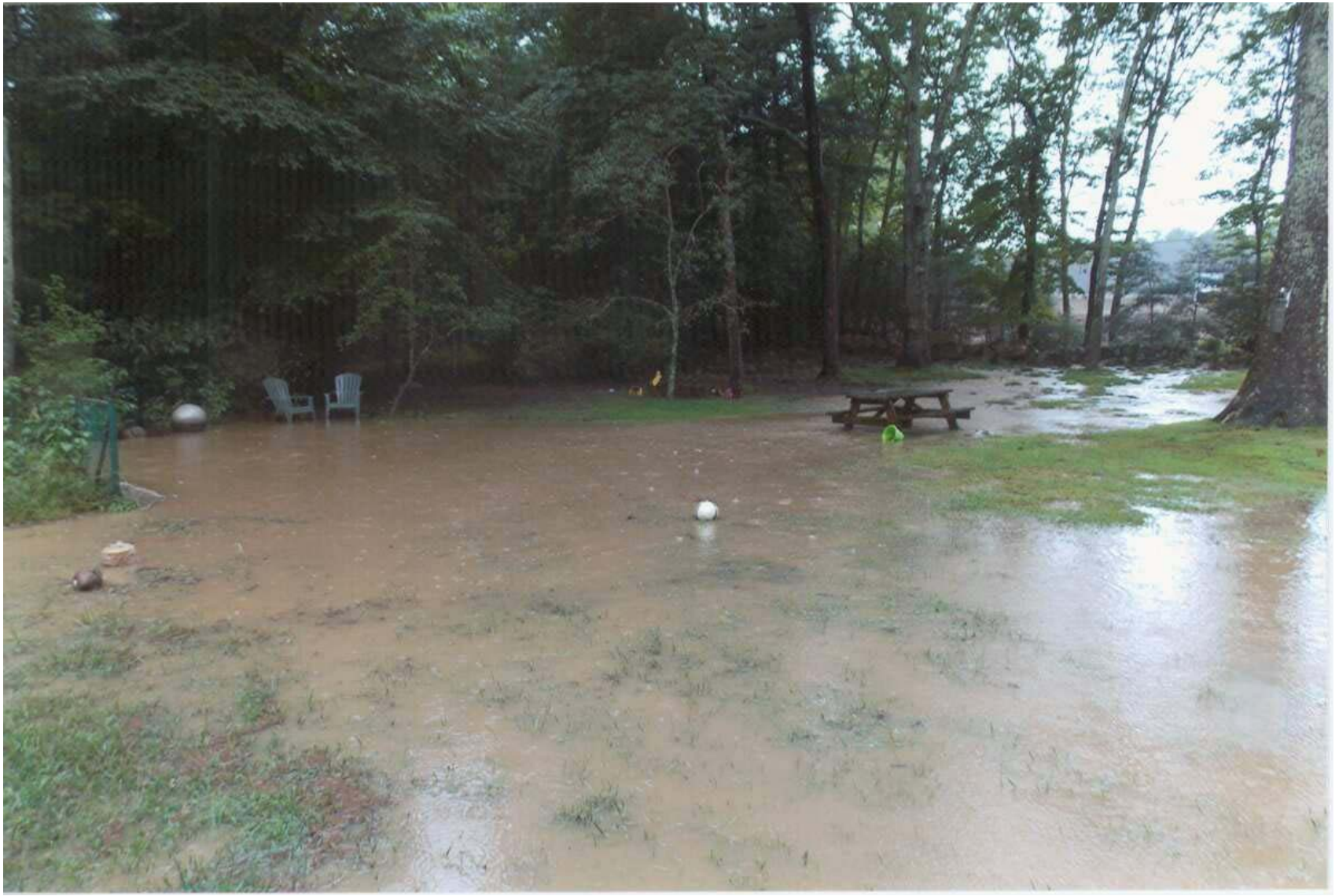
- Channel Erosion/Scouring means Controlling velocities
- Natural Streambank Erosion means controlling smaller storms
- Flooding (ex. Overbank, Drainage System)

The Combination of All Other Performance Criteria Will Be Adequate In the Majority of Cases

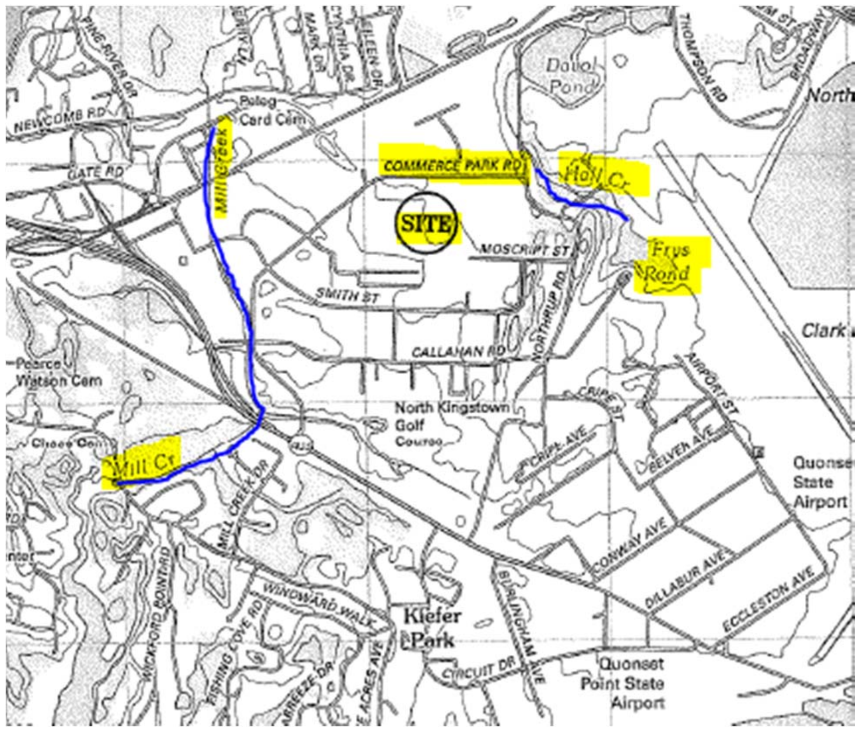
- Construction Sequencing/Phasing
- Minimize Area of Disturbance
- Stabilize Soils
- Establish Perimeter Controls and Sediment Barriers
- Divert of Manage Run-on from Upgradient Areas
- Retain Sediment Onsite
  - <1 Acre of Disturbance - No Trap or Basin Required
  - 1- 5 Acres of Disturbance - Sediment Trap
  - >5 Acres of Disturbance - Sediment Basin

Example No. 1
Overbank Flooding Concerns


CAT



Example No. 2
Flooding of Downstream Collection System



SITE
COMMERCE PARK RD
Hall Cr
Frys Pond
Davol Pond
Mill Creek
Mill Cr
MOSCRIPT ST
SMITH ST
CALLAHAN RD
NORTHRUP RD
THOMPSON RD
NEWCOMB RD
GATE RD
North Kingstown Golf Course
Pearce Watson Cem
Kiefer Park
CIRCUIT DR
BURLINGAME AVE
Quonset Point State Airport
Quonset State Airport
CONWAY AVE
DILLABUR AVE
ECCLESTON AVE
AIRPORT ST
MILL CREEK DR
WICKFORD POINT RD
WINDWARD WALK
FISHING COVE RD
Clark

Pre-Development Analysis

Design Storms

The hydrologic analysis was performed using HydroCAD software for a 24-hour, Type III rainfall event for Washington County (1-year: 2.8 inches, 10-year: 4.9 inches, 100-year: 8.5 inches). Two (2) Design Points were analyzed:

- Design Point 1: RVW Closed Drainage System to Hall Creek
- Design Point 2: CPR Closed Drainage System to Mill Creek

PRE-DEVELOPMENT ANALYSIS

Under pre-development conditions, the Site was divided into three (3) sub-watersheds contributing to the two (2) Design Points, where peak discharge rates and volumes were evaluated for the 10-year and 100-year storm events. (See Appendix F for "Pre-development Drainage Area Plan" and Appendix C for HydroCAD calculations):

- Sub-watershed "HC-3A" is comprised of 12.6± acres of pasture/grass and some pavement. Runoff from this area flows overland northeasterly into the closed drainage system in Romano Vineyard Way (Design Point 1), where stormwater is conveyed via closed pipe in a southerly direction to an outfall at Hall Creek.
- Sub-watershed "HC-3B" (Pre-2004) is comprised of 3.6± acres of pasture/grass and some pavement. Runoff from this area flows overland northeasterly into the closed drainage system in Romano Vineyard Way (Design Point 1), where stormwater is conveyed via closed pipe in a southerly direction to an outfall at Hall Creek.
- Sub-watershed "MC-2B-2" (Post-2004) is comprised of 9.5± acres of Phase I roof, Pond 3, and landscape areas adjacent to Pond 3. Pond 3 contains an outlet control structure (OCS) along the western banks of the basin. The OCS controls peak runoff out of Pond 3 with a 12-inch pipe from the OCS to the closed drainage system in Commerce Park Road (Design Point 2), where it is conveyed in a southerly direction to Mill Creek.

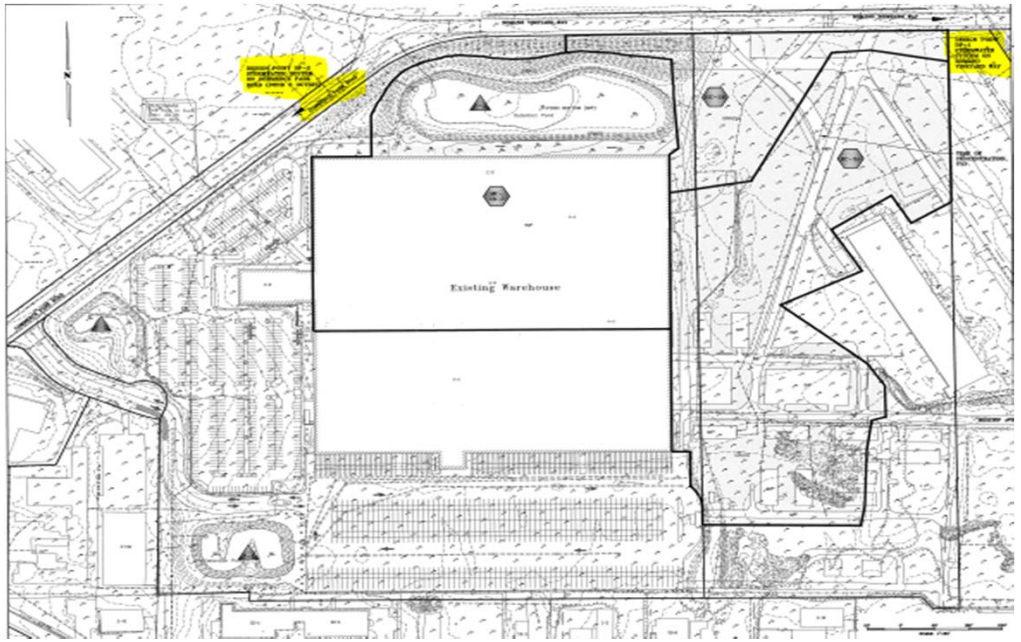
POST-DEVELOPMENT ANALYSIS

Under post-development conditions, the Site was divided into eight (8) sub-watersheds contributing to the two (2) previously-described Design Points, where peak discharge rates and volumes were evaluated for the 10-year and 100-year storm events. Four (4) of these sub-watersheds are conveyed to Pond 4 prior to entering Pond 3 and three (3) of these sub-watersheds are conveyed directly to Pond 3. (See Appendix F for "Post-development Drainage Area Plan" and Appendix C for HydroCAD calculations).

To Pond 4:

- Sub-watershed "PR-4A" is comprised of 4.6± acres of truck loading and trailer parking and some grass that is conveyed via closed drainage piping to a sediment forebay and bioretention area in Pond 4 then to Pond 3 through a box culvert.
- Sub-watershed "PR-4B" is the 4.4± acre proposed building roof that is conveyed via closed drainage piping to a sediment forebay in Pond 4 then conveyed to Pond 3 through a box culvert.

Two Design Points



Designer identifies points of discharge and evaluates potential for impacts

Post-Development Analysis

5. HYDROLOGIC ANALYSIS

The hydrologic analysis was performed using HydroCAD software for a 24-hour, Type III rainfall event for Washington County (1-year: 2.8 inches, 10-year: 4.9 inches, 100-year: 8.5 inches). Two (2) Design Points were analyzed:

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PRE-DEVELOPMENT ANALYSIS

Under pre-development conditions, the Site was divided into three (3) sub-watersheds contributing to the two (2) Design Points, where peak discharge rates and volumes were evaluated for the 10-year and 100-year storm events. (See Appendix F for "Pre-development Drainage Area Plan" and Appendix C for HydroCAD calculations):

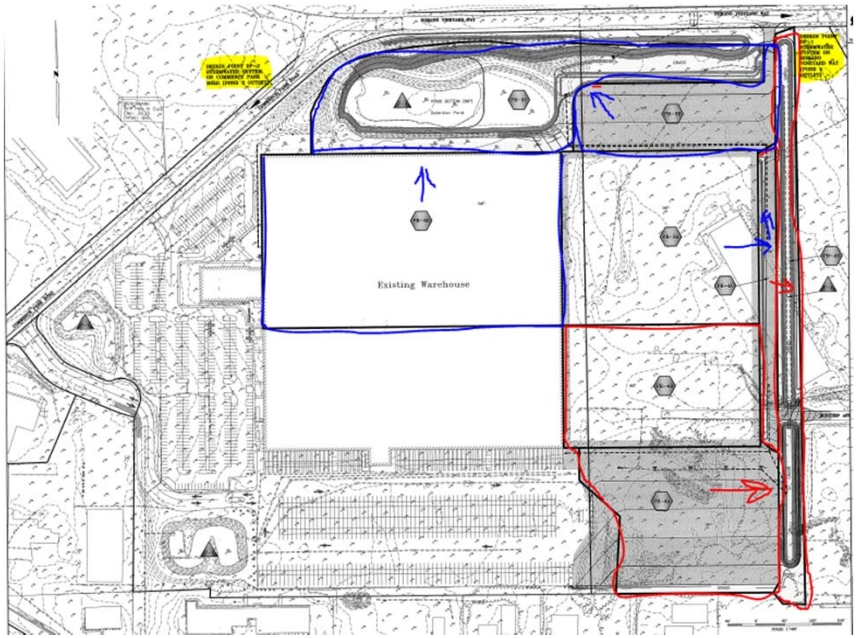
- Sub-watershed "HC-3A" is comprised of 12.6± acres of pasture/grass and some pavement. Runoff from this area flows overland northeasterly into the closed drainage system in Romano Vineyard Way (Design Point 1), where stormwater is conveyed via closed pipe in a southerly direction to an outfall at Hall Creek.
- Sub-watershed "HC-3B" (Pre-2004) is comprised of 3.6± acres of pasture/grass and some pavement. Runoff from this area flows overland northeasterly into the closed drainage system in Romano Vineyard Way (Design Point 1), where stormwater is conveyed via closed pipe in a southerly direction to an outfall at Hall Creek.
- Sub-watershed "MC-2B-2" (Post-2004) is comprised of 9.5± acres of Phase I roof, Pond 3, and landscape areas adjacent to Pond 3. Pond 3 contains an outlet control structure (OCS) along the western banks of the basin. The OCS controls peak runoff out of Pond 3 with a 12-inch pipe from the OCS to the closed drainage system in Commerce Park Road (Design Point 2), where it is conveyed in a southerly direction to Mill Creek.

POST-DEVELOPMENT ANALYSIS

Under post-development conditions, the Site was divided into eight (8) sub-watersheds contributing to the two (2) previously-described Design Points, where peak discharge rates and volumes were evaluated for the 10-year and 100-year storm events. Four (4) of these sub-watersheds are conveyed to Pond 4 prior to entering Pond 3 and three (3) of these sub-watersheds are conveyed directly to Pond 3. (See Appendix F for "Post-development Drainage Area Plan" and Appendix C for HydroCAD calculations).

To Pond 4:

- Sub-watershed "PR-4A" is comprised of 4.6± acres of truck loading and trailer parking and some grass that is conveyed via closed drainage piping to a sediment forebay and bioretention area in Pond 4 then to Pond 3 through a box culvert.
- Sub-watershed "PR-4B" is the 4.4± acre proposed building roof that is conveyed via closed drainage piping to a sediment forebay in Pond 4 then conveyed to Pond 3 through a box culvert.



Closed Collection System and Conveyances at capacity, history of flooding in area

Post-Development Analysis

- Sub-watershed "PR-4C" is comprised of 1.0± acre of mostly paved access drive and some grass that is conveyed across a filter strip directly into Pond 4 then to Pond 3 through a box culvert.
- Sub-watershed "PR-4D" is comprised of 2.4± acres of grass/landscape areas associated with Pond 4.

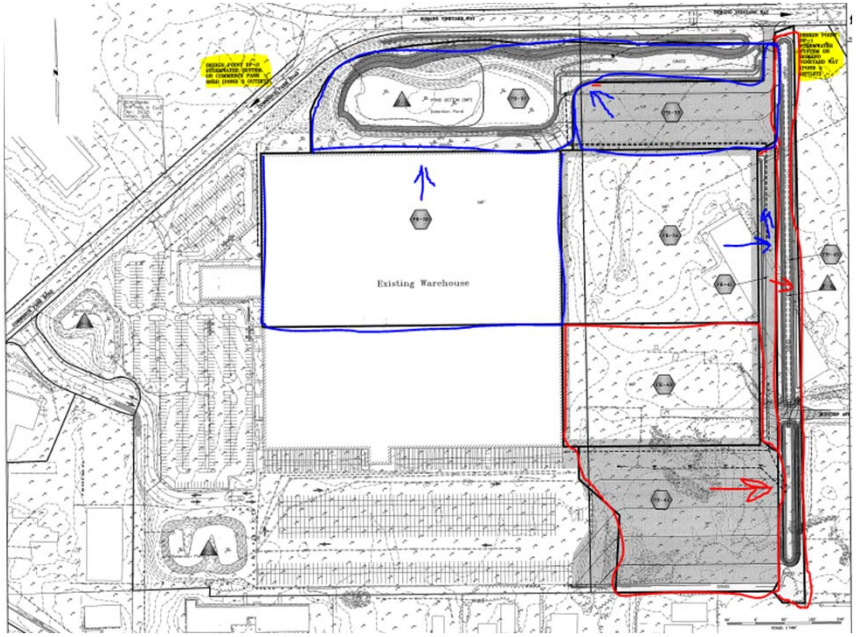
To Pond 3:

- Sub-watershed "PR-3C" is comprised of 6.2± acres of mostly existing and proposed Pond 3 and the landscape areas and emergency access drive surrounding Pond 3. Two outlet control structures in Pond 3 convey stormwater from this area to Design Point 1 (Romano Vineyard Way) and Design Point 2 (Commerce Park Road).
- Sub-watershed "PR-3B" is comprised of 2.5± acres of truck loading and trailer parking with some grass that is conveyed via closed drainage piping to a sediment forebay in Pond 3. Two outlet control structures in Pond 3 convey stormwater from this area to Design Point 1 (Romano Vineyard Way) and Design Point 2 (Commerce Park Road).
- Sub-watershed "PR-3A" is the 6.2± acre proposed building roof that is conveyed via closed drainage piping to a sediment forebay in Pond 3. Two outlet control structures in Pond 3 convey stormwater from this area to Design Point 1 (Romano Vineyard Way) and Design Point 2 (Commerce Park Road).
- Sub-watershed "PR-3D" is comprised of 9.5± acres of existing roof directly discharging into Pond 3. Two outlet control structures in Pond 3 convey stormwater from this area to Design Point 1 (Romano Vineyard Way) and Design Point 2 (Commerce Park Road).

Table 1: Hydrologic Analysis Summary (See additional details in Appendix C)

Design Point	Description	DESIGN STORM	Peak Flow (cfs)		Volume (Ac-ft)	
			EX	PR	EX	PR
1	Romano Vineyard Way Hall Creek	10-YEAR	24.5	6.7	4.4	5.9
		100-YEAR	49.2	10.7	9.0	13.4
2	Commerce Park Road Mill Creek	10-YEAR	2.6	2.7	4.6	6.7
		100-YEAR	6.0	5.6	8.7	9.9

The analysis shows that post-development peak discharge rates are significantly less than pre-development peak discharge rates to Romano Vineyard Way and Design Point 1. Post-development peak discharge rates are roughly equivalent to pre-development peak discharge rates to Commerce Park Road and Design Point 2. These results are conservative, as they negate any infiltration that might occur in the bioretention portions of the basins or the basin sidewalls.



Peak Rates are managed for the 10 yr and 100 yr storms

Control Velocities and Volumes

1.2 *Nature and Sequence of Construction Activity*

- The Project is estimated to commence in November 2013 (or upon receipt of all necessary permits) with the placement of perimeter erosion and sedimentation controls around the active construction area, followed by minor clearing and grubbing within the limit of disturbance. Anticipated erosion controls at the onset of construction include a construction entrance, placement of silt fence along all down-gradient slopes within the subject property, silt sack sediment traps in existing catch basins in the vicinity of the project, and hay bales at the existing inlets and outlets to Pond 3.
- If construction activities are temporarily halted for more than 14 days, the disturbed areas will be stabilized with temporary seed.
- Earthwork associated with building pad preparation and truck loading and trailer parking is anticipated immediately following placement of erosion controls. Installation of the stormwater management system will be coordinated with these earthwork activities to ensure that stormwater quality and quantity is managed throughout construction activities. Temporary sediment basins and phased construction within Pond 3 are required to achieve these goals.
- As each bioretention area is completed, silt fence will be installed around the perimeter of each immediately after completion of construction to protect them from sediment transport from construction runoff and compaction from construction equipment.
- Paving of parking and loading areas and access drives and placement of loam, seed, and landscaping is expected to be completed by June 2014. The construction of the building itself is not anticipated at this time or in the near future.

Sequencing

- Phase II – DURING EARTHWORK

  ☐ Describe phase:
  Immediately following the placement of the erosion controls, minor clearing and grubbing within the proposed limit of disturbance is anticipated, as most of this area was already cleared during previous permitting of the Site. Construction will commence with the installation of the utilities infrastructure and the re-grading of Pond 3. A binder course in pavement areas is anticipated to be completed during this phase.

  The Contractor shall employ a phased approach to re-grading Pond 3 and re-installing/lowering its outlet control structure, as existing roof runoff directed to Pond 3 must continue throughout construction. Phasing may include temporary sediment basins near Pond 3, sheeting or other methodologies for isolating the construction work zone from the active stormwater system, and erosion control devices (gabions, stone check dams, or haybales) to prevent sediments from exiting Pond 3 during construction.

Phasing

Control Velocities and Volumes

2.12 Retain Sediment On-Site and Control Dewatering Practices

Sediment traps, basins, and barriers are used to retain sediment on the site to protect streams, lakes, drainage systems, and adjacent property. These devices are used at the outlets of channels, diversions, and other runoff conveyance measures to allow sediment-filled water to pool and sediment to settle. These measures are often used as the last line of defense to stop sediment from leaving the site.

A sediment trap or basin shall be installed, and maintained, as depicted on the approved plan set and in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook (as amended) or the RI Department of Transportation Standard Specifications for Road and Bridge Construction (as amended).

The dewatering of non-contaminated non-stormwater (i.e. groundwater) or accumulated precipitation discharge of sediment-laden water into storm drains, streams, lakes or wetlands prior to sediment removal is prohibited. A sediment trap or basin shall be installed, and maintained, as depicted on the approved plan set and in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook (as amended) or the RI Department of Transportation Standard Specifications for Road and Bridge Construction (as amended).

The dewatering of contaminated non-stormwater cannot be discharged without obtaining a Rhode Island Department of Environmental Management RIPDES discharge permit to do so. If dewatering of contaminated water is anticipated at the site, appropriate permits must be obtained in advance.

- Sediment trap(s) may be installed in Pond 3 to retain sediment during construction. Because Pond 3 must remain operational throughout construction and the contractor will need to modify Pond 3 in phases, no single location for these sediment traps can be identified on the plan set, but rather, it is left to the discretion of the contractor. A sediment trap detail is provided in the plan set and designed in accordance with the RI Soil Erosion and Sedimentation Control Handbook.
- Visible floating solids or foam shall not be discharged.
- Velocity dissipation devices shall be used at all points where dewatering water is discharged.

Control Velocities and Volumes

2.6 *Control Stormwater Flowing Onto and Through the Project*

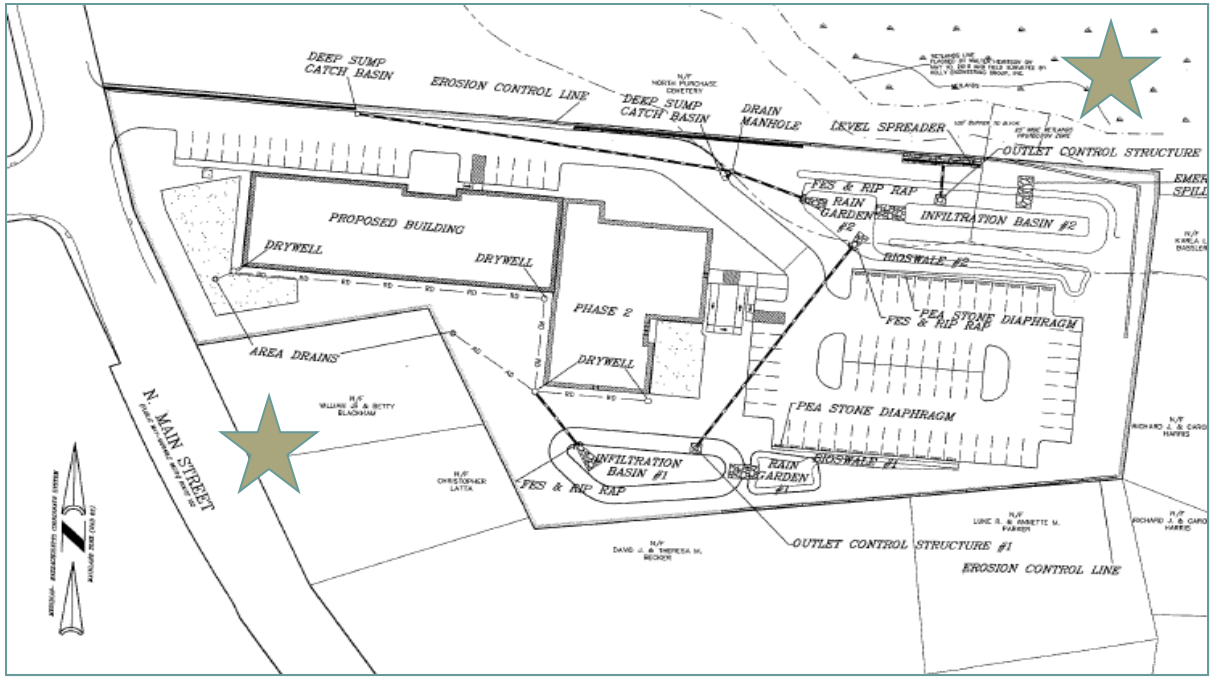
Structural BMPs are used to divert flows from exposed soils, retain or detain flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site.

BMPs shall be installed as depicted on the approved plan set and in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook (as amended) or the RI Department of Transportation Standard Specifications for Road and Bridge Construction.

- Structural practices, such as temporary sediment basins and diversion dikes are anticipated to be required during construction to modify Pond 3, because roof drain connections into Pond 3 (installed in 2004) will continue to discharge runoff into Pond 3 throughout construction. Pond 3 changes include excavation of two feet of material and widening to increase storage capacity and accommodate the anticipated increase in the 100-year storm event.

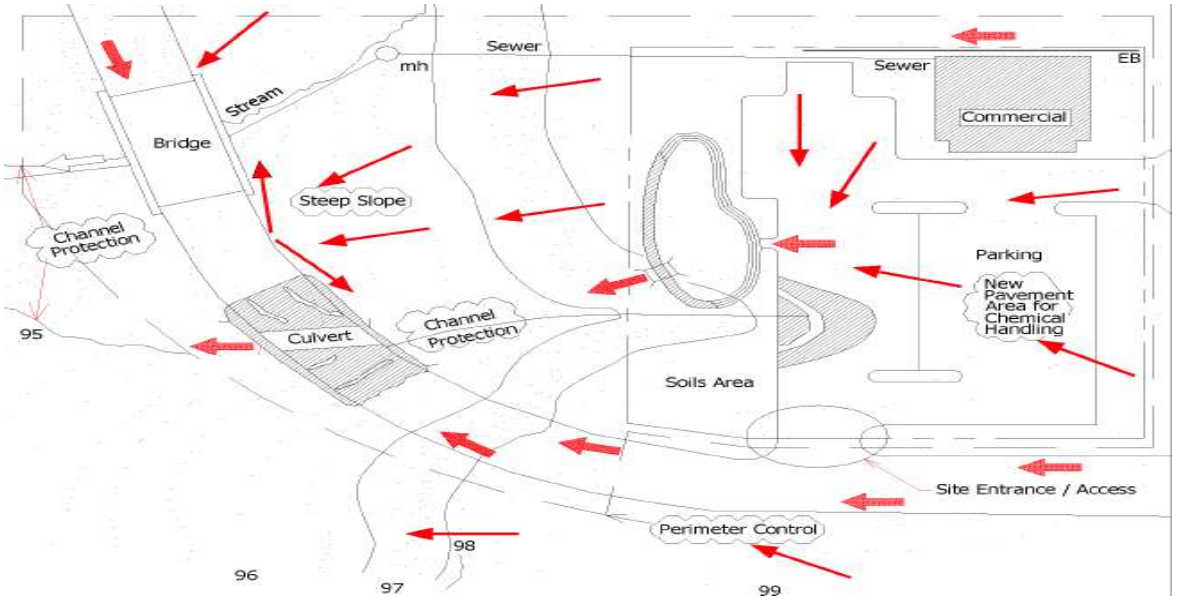
What Must the Design Professional Demonstrate?

- Clearly Identify All Discharge Locations
- Determine Whether or Not Conditions Warrant Temporary Detention Measures to Protect Receiving Waters and Downstream Conveyances in the Vicinity of Discharge Locations.



For areas > 5 acres the Department may require engineering analysis of design storms and controls

The Design Professional is Responsible for Evaluating the Need for Additional Controls.



Next Steps

- Further Training Sessions Planned
  - Design Professionals
  - Municipalities
  - RIDOT
  - Contractors

Next Steps

- Update Toolbox
  - Internal SESC Plan Review Checklist
  - Appendix A Checklist Revision
  - RI Model SESC Plan
  - RI Stormwater Management Guidance for Individual Single-Family Residential Lot Development


Questions?