APPENDIX D

STORMWATER POLLUTION PREVENTION PLAN

Stormwater Pollution Prevention Plan Hudson River PCBs Superfund Site Processing Facility Site Work Construction

General Electric Company
Albany, New York

January 26, 2007

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Attachments

1. Introduction

1.1 General

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared in accordance with the guidelines presented in the New York State Department of Environmental Conservation (NYSDEC) document titled, *Instruction Manual for Stormwater Construction Permit* (NYSDEC, 2004) and the NYSDEC document titled, *New York Standards and Specifications for Erosion and Sediment Control* (NYSDEC, 2005) (NYSDEC Standards and Specifications). Sections 2, 3,5,6,7 and Attachments B & D of this SWPPP were compiled by Arcadis BBL from information provided by D.A Collins Construction Corp. Sections 1,4,8 and Attachment A & C of this SWPPP, were prepared by Arcadis BBL (Syracuse, New York) and HDR (Boston, Mass.). Contact information for this SWPPP is listed below:

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1.2 Site Locations

The area of proposed site development consists of two separate properties; one for the Processing Facility being located at the Energy Park/Longe/New York State Canal Corporation Site off East Street in the Village of Fort Edward, New York; and the second for the Work Support Marina located off West River Road in the Town of Moreau, New York. Sediment material processing is planned for the Processing Facility Site, which is located approximately 1 mile northeast of Fort Edward, New York and approximately 46 miles north of Albany, New York in Washington County. River access and worker support access associated with river dredging operations are planned for the Work Support Marina, which is located in Saratoga County, New York on the western shore of the Hudson River approximately 2 miles southwest of the Processing Facility Site. See Figure 1 in Attachment A for the Site Location Map.

1.3 Site Stormwater Management Objectives

The following stormwater management objectives have been established for the sites:

- Minimize the potential for erosion of disturbed and undisturbed soils.
- Minimize the potential for transport of suspended soil/sediment within surface water runoff during construction.
- Minimize accumulation of surface water and groundwater in active excavation areas to facilitate dry working conditions.

- Minimize the potential for discharge of sediments and/or sediment-laden waters into adjacent surface water bodies.

- Protect, to the extent practicable, existing wetland areas.

1.4 Existing Conditions

1.4.1 Processing Facility Site

The Processing Facility Site consists of approximately 100 acres of cultivated agricultural land and wooded areas. Topographically, the site slopes gently to the southeast, toward the Champlain Canal (the Canal), at gradients of approximately 0.5% to 1%. Existing surface water runoff generally occurs as a combination of sheet flow and shallow-concentrated flow. The area where the majority of the Processing Facility Site work construction will be performed is bordered by railroad tracks to the northwest; an unnamed tributary of Bond Creek to the north and northeast; agricultural land and residential properties to the south and southwest; and a Lock Diversion Channel, Bond Creek, the Champlain Canal, and an approximately 7.4-acre wetland area (bordering Bond Creek) to the southeast and east.

The majority of the soils at the site are classified as Claverack and Wallington series soils according to the Washington County Soil Survey. These soils are included in Hydrologic Soil Group C. The Claverack series consists of very deep, moderately well drained soils formed in sandy deposits that overlie clayey lacustrine sediments. They are nearly level to sloping soils in shallow deltas on lake plains. Slopes typically range from 0 to 15 percent. The potential for surface runoff is low to very high. Saturated hydraulic conductivity in the mineral surface layer and subsoil is high to very high and moderately high to low in the clayey substratum. The Wallington Series consists of very deep, somewhat poorly drained soils formed in silty lacustrine deposits. They are nearly level or gently sloping soils on lacustrine plains or basins. Permeability is moderate above the fragipan and slow in the fragipan and substratum.

Refer to the maps included in Attachment A for additional information related to existing Processing Facility Site conditions and proposed Project limits.

1.4.2 Work Support Marina

The marina will be located on the western shore of the Hudson River and presently consists of approximately 3.4 acres of wooded and meadow areas. Topographically, the site slopes gently to the east and south and drains to the Hudson River. Existing surface water runoff generally occurs as a combination of sheet flow and shallow-concentrated flow. Based on the subsurface soil sampling data collected at the site, the existing soils are generally composed of 0-2 feet of dredge spoil material overlying a silty sand/sandy silt layer. In order to minimize excavation of the dredge spoil material, imported fill will be used to develop the site.

The majority of the soils at the site are classified as Udipsamments (dredged material) according to the Saratoga County Soil Survey. These soils are included in Hydrologic Soil Group A.

Refer to the maps included in Attachment A for additional information related to existing Work Support Marina Site conditions and proposed Project limits.

1.5 Proposed Conditions

1.5.1 Processing Facility Site

The proposed development consists of the construction of a sediment processing facility that will be used to unload, dewater, and stockpile sediments dredged from the Hudson River prior to loading and transport off site, by rail, for disposal. The Processing Facility operations (following completion of construction) will include delivery of dredged sediments to the facility by barge via the Champlain Canal, and the offloading, handling, separation/segregation, hauling, temporary stockpiling and loading of these materials into rail cars for offsite disposal. Processing Facility features will include a waterfront receiving area along the Champlain Canal, a size separation area, a temporary debris and coarse material staging area, haul roads for moving materials throughout the site, coarse material staging/storage pads, fine material staging/storage buildings, rail yard, sediment dewatering facility, water treatment facility, stormwater basins for managing site surface water runoff, and various ancillary facilities (e.g., parking lots, rail car loading platform, contractor staging areas, office trailers, site access roads).

1.5.2 Work Support Marina

This facility will support the marine operations, and will provide parking for project personnel and dockage for support vessels such as survey, sampling, and oversight boats. This facility will include 550 feet of floating dock with approximately 30 boat slips. The property will be developed beginning with construction of an access road, earthwork to clear and grub the property, grading, installation of a stormwater basin for managing stormwater runoff, preparation of parking areas, and installation of trailers. Electric and telephone utilities will be brought to the property and a floating dock system will be constructed. A draft Cultural and Archaeological Resources Assessment (CARA), dated July 2006, was prepared for the site. The assessment recommended that the fenced area that contains the ruins of the former Roger's Estate remain undisturbed and no construction activities be permitted within the area. New fencing will be erected around the existing fence prior to construction to keep construction activities outside the ruins.

1.6 Maps

Refer to the maps and drawings included in Attachment A for additional information related to existing and proposed conditions for the Processing Facility and Work Support Marina Sites.

2. Site Work Construction Sequencing

2.1 General Construction Sequence

The project schedule divides the site into to six (6) primary areas of work. The schedule dictates that work be started in three of the areas upon the notice of award. Two additional areas will be started simultaneously due to the necessity of fill from these areas for the first three areas. The final area, the Work Support Marina, is located away from the main site and is not a critical work area.

The six primary areas are as follows:

1. North Access Road
2. Rail Yard Area
3. Process and Administrative Area
4. Wharf Area
5. Materials Storage Area
6. Work Support Marina Area

North Access Road

This work area starts on the south side of Route 196 and follows the Champlain Canal south to the administrative area located at the Processing Facility Site. The work in this area consists of the construction of a two-lane road and the installation of a bridge across the Feeder Canal. Work will start simultaneously from both ends. The following general construction sequence will be followed:

a. Clearing and grubbing the area.
b. Excavating and filling for road subgrade.
c. Establishment and the installation of roadway subbase.
d. Installation of asphalt pavement. (Traffic will run on the subbase until the Construction Manager has determined that the remainder of the roadway structure can be constructed. At that time, asphalt pavement will be placed.)

Simultaneously, the structure over The Feeder Canal and the Culvert over Bond Creek will be built. The following general sequence will be followed for construction of the bridge and culvert:

a. A temporary bridge will be installed at the existing abutments for construction traffic.
b. Cofferdams will be constructed and piles driven at the abutment locations.
c. The abutments will be built and the cofferdams removed.
d. The superstructure will be placed and structural backfill completed to allow traffic across.
e. The temporary construction bridge will then be removed.
f. The culvert will be installed in the creek and fill brought up to roadway level.

Rail Yard

This work area runs parallel to the existing CPR tracks on the northwest side of the Processing Facility Site. The work in this area will follow the following general sequence:

a. Clear and grub the area.
b. Excavation and place embankment to subgrade elevation.
c. Installation of drainage.
d. Installation of Geomembrane Liner and geotextile in the area of Track 7; install Geogrid in other portions of the rail yard.
e. Placement of fill to subgrade elevation under track 7; installation of 6”- 18” of various select fills the other portions of the rail yard.
f. Asphalt and concrete paving. (Placement of these items will occur after installation of ballast and tracks by the Rail Contractor.)

Process and Administrative Area

This work area is in the center of the site and is necessary to facilitate the construction of the Process Facility buildings under a future contract. The work involved is sequenced as follows:

a. Clear and grub the area.
b. Excavation and placement of embankment to subgrade level,
c. Installation of Geomembrane Liner and geotextiles.
d. Drainage installation.
e. Placement of select fills as required by the Contract Documents.
f. Site paving, final grading, and placement of topsoil. (Placement of these items will occur after completion of the buildings by the Building Contractor.)

Wharf Area

This work area is located on the southwest side of the site and is bordered by the Champlain Canal and Bond Creek. The work sequence is as follows:

a. Clear and grub the area.
b. Partial removal of the existing revetment a (After the North Access road is completed and access to the Lock 8 area is provided).
c. Excavation as needed for installation of piles in the new Wharf area.
d. Installation of the required piles
e. Excavation and stone installation will take place.
f. Retaining wall excavation, placement and backfill. (Concurrently with piles)
g. Excavation of the remainder of the berm in the area of the existing Canal revetment and Access Road.

Simultaneously, work in the Size Separation area will take place as follows:

a. Clear and grub the area.
b. Excavation to subgrade will be completed.
c. Installation of geomembrane liner and geotextiles.
d. Placement of select fills to subgrade elevation.
e. Installation of new utilities.
f. Placement of subbase and asphalt paving. (This work will be done after the Building Contractor completes work in this area.)

Materials Storage Area

This work area is located on the west side of the site and makes up the remainder of the site. The work involved will be sequenced as follows:

a. Clear and grub the area.
b. Excavation of stormwater basins (Excavated material from his area will support the fill requirements of the other areas on the site.)
c. Excavation, construction, and backfill of retaining walls and foundations.
d. Excavation and fill to subgrade.
e. Installation of geomembrane liner and geotextiles.
f. Drainage installation.
g. Placement of select fill to subgrade elevation.
h. Placement of subbase and topsoil in required areas.
i. Final paving.

Work Support Marina Area

This area is located south of the Processing Facility Site on the Hudson River below Lock 7. Construction will be generally sequenced as follows:

a. Clear and grub the area.
b. Installation of fencing around historic area.
c. Excavation and placement of embankment, including the stormwater basin.
d. Place fill for access road from West River Road from the tie-in point to the parking lot area.
e. Installation of drainage.
f. Placement of geotextile in the required areas.
g. Placement of general and select fills to subgrade elevation.
h. Waterfront excavation for the installation of dock system anchors.
i. Placement of final pavement courses for the access road and parking lots.

3. Erosion and Sediment Control

3.1 General

Prior to initiating site clearing and construction activities, certain temporary erosion and sediment control measures will be established to protect critical onsite and adjacent offsite areas. All erosion and sediment controls will be constructed in accordance with the related details. Erosion and sediment controls measures will be regularly inspected to ensure that they are operating correctly. Repairs will be made as necessary to maintain all erosion and sediment controls throughout the duration of the project until project acceptance. Refer to the Erosion and Sediment Control Drawings included in Attachment B for the locations and details of the proposed temporary erosion and sediment control measures

Throughout project construction, new or supplemental temporary erosion and sediment control measures will be added as needed, or as directed by the Construction Manager. This SWPPP will be continually updated for the inclusion of any new and/or additional erosion and sediment control measures. Submittals required for the use of any new or additional erosion and sediment control measures will be submitted to the Construction Manager for approval. The submittals for such features shall, at a minimum, include the plan location and alignment of the required feature, anticipated flow direction(s), minimum dimensions/sizes, inlet and outlet conditions, armoring or lining requirements, and estimated design flow rates (if applicable).

3.2 Good Housekeeping

The following good housekeeping practices will be observed during construction:

- Site cleanup will be a daily requirement. Dumpsters and garbage cans will be provided at the parking areas staging areas and at onsite sanitary facilities. All employees will be instructed on a “bring it in, bring it out” philosophy.

- Construction materials and waste will be handled at the designated staging areas as shown on contract documents. Covered dumpsters will be carefully monitored and emptied on a monthly basis unless work requires more frequent intervals. Waste materials include but are not limited to; lumber or plywood cutoffs or scraps, bags from dry materials such as grout and sandblast sand, empty caulk tubes, used banding materials, coffee cups, lunch bags, etc...

- All “small containerized materials” will be stored in walk-in containers at the staging areas and returned to same after use at other areas on the site. These materials include but are not limited to caulk, curing compound, sand blast sand, grouting materials form oil, pipe grease, saw blades nails form ties etc…

- Toilet facilities will be located throughout the project and will be maintained on a weekly basis.

- Concrete truck cleanout locations will be within the staging areas shown on the contract plans. Trucks will wash out into a fabric and hay-bale basin. The basins will be disposed of on a regular basis as concrete accumulates.

- Two 500 gallon double walled fuel tanks will be used onsite to store diesel fuel at the Contract 1 Staging Area. In addition some pickup trucks will be equipped with 100 gallon double walled tanks for emergency fill-ups. All equipment will be fueled where it is being used by means of a 1000 gal fuel delivery vehicle. The onsite equipment fueling operations will never be unattended; equipment operator and delivery truck driver will observe fueling and correct any problems. The delivery vehicle will only be onsite while fueling the equipment and will not be stored at the site. All vehicles with fuel tanks will be equipped with the proper "Spill Kits" to handle any potential spillage. Additional spill kits will be stored at the staging area for use while fueling in the staging area and for replacing kits on field equipment. Should a large spill occur the New York State Spill Response Program will be contacted at 1-800-457-7362.

Prohibited construction procedures include, but are not limited to:

- Indiscriminate, arbitrary, or capricious operation of equipment in any stream corridors, wetlands, or surface waters.

- Pumping of silt-laden water from trenches or other excavations into any surface waters, stream corridors, or wetlands.

- Damaging vegetation beyond the extent necessary for construction of the facilities.

- Disposal of trees, brush, and other debris in any stream corridors, wetlands, surface waters, or at unspecified locations.

- Permanent or unspecified alteration of the flow line of the stream.

- Placing of wet concrete so it comes in contact with stream water.

3.3 Temporary Erosion and Sediment Control Measures

3.3.1 General

During construction of the facility, work will be progressing in several different areas. Erosion and sediment controls will be installed during the site preparation phase and must be completed prior to clearing activities. Initial measures will be set up on the perimeter of the project as shown on the Erosion and Sediment Control (E&SC) drawings. This initial installation is to control the deposition of suspended sediments from leaving the site and entering offsite properties, the designated wetlands, Bond Creek, the Canal Bypass and the Canal.

As work progresses various areas of the project will be completed prior to others. Uncompleted areas that will be inactive for a period greater than 14 days will be stabilized with temporary seeding and mulch. In addition, undisturbed and inactive areas of the site that are susceptible to erosion will also be stabilized with temporary seeding and mulch. To prevent sediment from leaving the uncompleted areas and entering the completed areas, temporary swales and ditches will be installed at the edge of the uncompleted areas. Check dams will be installed in the ditches and the ditches will be outlet into completed portions of the site storm drainage systems.

The permanent site storm drainage system will be used to carry water to the stormwater basins. As portions of this system are completed, runoff flows from other areas will be directed or pumped into the completed portion. The water will be sent to the stormwater basins by gravity flow through direct piping or pumping from the end of the completed portions.

The placement of topsoil and seed will be performed immediately following the completion of the areas that require topsoil and seeding. Should completed areas not require topsoil, erosion matting will be installed on slopes as determined by the Contractor and the Construction Manager.

3.3.2 Erosion and Sediment Control Plans

Erosion and Sediment Control Drawings indicating the plan locations of the temporary erosion and sediment control measures are included in Attachment B. (Note: All Arcadis BBL and HDR drawings included with Attachment B are provided for reference purposes only.) The location of the perimeter controls will be laid out in the field prior to the start of clearing and grubbing and earthwork activities. The location of all controls shown on the drawings is approximate. Control measures will be installed as required in areas bordering or up gradient of the installed liner areas. Due to the required progress of the site work it is impractical to show where and when each measure will be installed, other than perimeter silt fence or silt fence on the access road and rail yard areas. The actual locations will be determined in the field as the work progresses on the site.

3.3.3 Description of Temporary Erosion and Sediment Control Measures

Temporary Seeding and Mulching

Uncompleted areas and temporary that will be inactive for a period greater than 14 days will be stabilized with temporary seeding and mulch. In addition, undisturbed and inactive areas of the site that are susceptible to erosion will also be stabilized with temporary seeding and mulch.

Silt Fence

Silt fence will be used up-gradient of active work areas to reduce the velocity of surface water run-on, and down-gradient of active Work areas to intercept sediment-laden runoff and promote deposition of suspended sediments. Silt fence will be installed at locations shown on the E&SC Drawings, in accordance with the materials and methods prescribed in the NYSDEC Standards and Specifications, or as otherwise shown on the E&SC Drawings.

Straw Bale / Reinforced Silt Fence

Straw bale / reinforced silt fence will be used similarly to the reinforced silt fence, in locations shown on the E&SC Drawings; where more significant surface water buildup may be expected due to topography; or where the distance to the next upgradient silt fence or contributing drainage area exceeds the maximum limits prescribed in the NYSDEC Standards and Specifications.

Temporary Check Dams

Temporary check dams will consist of stone check dams, and will be used within minor drainage swales and ditches to reduce the velocity of runoff and to encourage the deposition of suspended sediments. Temporary check dams will be installed at locations indicated on the E&SC drawings, and/or other locations where there is determined to be a need for them. Temporary check dams will be installed in accordance with the materials and methods prescribed in the NYSDEC Standards and Specifications or as otherwise shown on the E&SC Drawings.

Temporary Access Roads / Stabilized Construction Entrance

Temporary access roads and stabilized construction entrances will be constructed, as shown on the E&SC Drawings. The need for and locations of additional temporary access roads and stabilized construction entrance(s) will be determined prior to the start of construction.

Temporary Stormwater Sediment Basins

If needed, temporary stormwater sediment basins will be installed across minor concentrated flow paths during construction to intercept sediment-laden runoff and encourage the deposition of suspended sediments. The location of and need for temporary stormwater sediment basins will be determined based on site-specific conditions encountered in the field at the time of construction. If utilized, temporary stormwater sediment basins will be designed and constructed in accordance with the NYSDEC Standards and Specifications.

Temporary Ditches and Swales

Temporary ditches and swales will primarily be used to divert surface water runon from upgradient (onsite or offsite) areas around active work areas. Temporary ditches and swales will also be used to convey discharge flows from temporary sediment basins (if utilized) to receiving water bodies. Temporary ditches and swales will be installed at locations shown on the E&SC Drawings, or at locations otherwise deemed necessary based on site-specific conditions encountered in the field at the time of construction.

Temporary Bypass Systems

As identified on the E&SC Drawings, and various Drawings, the proposed Energy Park Site work includes the installation of permanent culvert crossings across Bond Creek, the Lock Diversion Channel, and the Unnamed Tributary. During the installation of these culverts, in-stream flow will be diverted around the active work area to promote dry working conditions. The design of these temporary bypass systems will be the responsibility of the Contractor, subject to review by the Construction Manager.

Rock Inlet/Outlet Protection

Rock inlet/outlet protection will be provided at the outlet end of concentrated flow paths (e.g., temporary ditches, bypass piping, etc.); at the inlet and outlet ends of temporary/permanent culvert crossings; at locations shown on the E&SC Drawings; and at any other locations specified by the Construction Manager to minimize the potential for scour at these locations. .

Erosion Control Matting

Temporary erosion control matting will be utilized in lieu of seed and mulch on steep slopes (i.e., in excess of 3H:1V), in channels and areas of concentrated flow, and in any other critical areas requested by the Construction Manager. Temporary erosion control matting will be installed in accordance with the manufacturer's recommendations.

Turbidity (Silt) Curtain

A turbidity curtain is to be installed along the edge of the waterway prior to and during the excavation and construction of the concrete anchor blocks at the Work Support Marina Site. In addition, if any other work activities are observed to be causing the release of excessive suspended sediments to the Champlain Canal (i.e., at the Energy Park Site) and/or to the Hudson River (i.e., at the Work Support Marina Site), the Contractor will be required to install a turbidity curtain along the edge of the waterway to contain the suspended sediments.

Work activities initiating the need for a turbidity curtain will be immediately suspended until the turbidity curtain is installed. The work activity and source generating the excessive suspended sediments will be corrected immediately upon identification. Requirements for the type of turbidity curtain(s) will be determined by the contractor based on site-specific conditions for each location. Details and specifications for each proposed turbidity curtain will be submitted to the Construction Manager for review and approval prior to the start of construction. Where a turbidity curtain is required, it will be installed in accordance with the manufacturer's specifications/recommendations.

3.4 Dust Control

Refer to the approved Dust Prevention and Control Plan for dust control measures.

4. Stormwater Management

4.1 General

For the purposes of this project, post-construction stormwater runoff has been divided into three basic categories depending on the source area of the stormwater runoff. These three types of stormwater are identified as follows:

- Type I stormwater is surface water runoff that originates from areas within the limits of the Processing Facility Site "exclusion zone" (i.e., the zone within which PCB-impacted materials will be actively managed). Type I stormwater does not apply to the Work Support Marina since there will be no handling of PCB-impacted materials at that site. All Type I stormwater will undergo treatment at the Processing Facility Site water treatment facility prior to discharge to the Champlain Canal.

- Type II stormwater applies to both sites and consists of surface water runoff that originates from paved and gravel-covered surfaces outside of any site exclusion zone. Type II stormwater will be managed for water quality, to the extent practicable, via a combination of extended detention basins, check dams, dry swales, and filter strips.

- Type III stormwater runoff applies to both sites and consists of surface water runoff from pervious (i.e., grass-covered) surfaces outside of any site exclusion zone. Type III stormwater runoff will be allowed to discharge directly to nearby water courses (i.e., Hudson River [for the Work Support Marina], Bond Creek, Unnamed Tributary, Lock Diversion Channel, etc.). This manner of discharge is consistent with pre-development conditions.

4.2 Water Quality Control

4.2.1 Processing Facility Site

Since Type I stormwater runoff from approximately 48 acres of the Processing Facility Site will be captured and undergo treatment at the Processing Facility Site water treatment facility, only Type II stormwater areas were considered for water quality treatment. The rail yard area on the west side of the site, the water treatment plant area and the administrative area are Type II areas that will contain gravel and paved surfaces after the site is developed. Stormwater runoff from the rail yard area will be treated by means of extended detention stormwater basins, Stormwater Basin A and Stormwater Basin B, located on the south and north sides of the site, respectively. The stormwater runoff from the water treatment plant area will be treated by means of extended detention storage provided by a permanent stone check dam in the outlet swale located downstream from culvert C-2. Similarly, the stormwater runoff from the administrative area will be treated by means of extended detention storage provided by a permanent stone check dam in the outlet swale located downstream from culvert C-4. Stormwater runoff from the remaining Type II areas of the site will be treated in dry swales, the existing wetland area and adjacent vegetated areas. Calculations for the structural water quality controls are included in Attachment C.

4.2.2 Work Support Marina Site

Following development, approximately 2.10 acres of this site will consist of paved areas (i.e. parking, driveway). The parking area will accommodate approximately 150 light trucks and passenger vehicles, administrative trailers, storage, and access to a river-based floating dock system. An auxiliary 0.50 acre vegetated parking area will be developed for the storage of boat trailers. The remaining area of the site will consist of approximately 0.35 acres of paved access road, and a 0.45 acre stormwater pond.

A stormwater pond will be constructed immediately west of the paved parking area. The stormwater pond will manage stormwater runoff mainly from the paved parking area. The pond will be graded and vegetated in a manner that promotes conveyance of runoff towards the pond outlet via a pilot channel lined with riprap. The pond will serve as a means for improving water quality from the contributing watershed areas prior to discharging to the Hudson River. Calculations for the stormwater pond are included in Attachment C.

4.2.3 North Rail Yard

A detention swale system will be constructed alongside Yard Track 5 per the construction documents. The system is comprised of a detention swale and a variable stage outlet structure.

Detention Swale and Outlet Structure

The detention swale and outlet structure provides both water quantity and water quality control. During low rainfall events, the detention swale practice conveys water from the proposed track area (post-developed area) to an outlet structure which releases the water into the Unnamed Tributary leading to Bond Creek. Because of the relatively flat slope of the swale (less than 0.5%), some of the water is infiltrated into the ground and is ultimately carried by ground water forces to the canal. During high flow events, the detention swale practice also serves as a sedimentation basin.

4.3 Water Quantity Control

4.3.1 Processing Facility Site

The area of the Processing Facility site to be developed is approximately 92 Acres. Type I stormwater runoff from approximately 48 acres of the Energy Park Site will be routed to stormwater storage basins via a series of aboveground swales, ditches and subsurface piping prior to treatment. The Type I stormwater storage basins (the Type I Basins) are collectively sized to contain the total runoff volume from the entire Processing Facility Site exclusion zone during a 100-year, 24-hour storm event. Accumulated water within the Type I Basins will be pumped to the Processing Facility Site water treatment facility for treatment before being discharged to the Champlain Canal. The maximum anticipated water treatment facility effluent discharge rate to the Champlain Canal is anticipated to be approximately 1,500 gallons per minute (gpm) (i.e., approximately 3.3 cubic feet per second [cfs]) During dry-weather periods, the water treatment facility will continue to discharge treated waters generated from sediment dewatering activities.

A hydrologic analysis was performed for a drainage study point located immediately downstream of the site for the pre-development and post-development conditions. The results are summarized in Table 4-1 and Table 4-2 below.

Table 4-1 – Watershed Input Parameters

Condition	Drainage Area (Acres)	Curve Number CN	Time of Concentration Tc (Hrs)
Pre-developed	87.4	83	1.15
Post-developed	53.7	76	0.40

Table 4-2 – Site Stormwater Runoff

Condition	Q_1 (cfs)	Q_{10} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)
Pre-developed	38	96	139	172
Post-developed	27	88	136	173

The analysis shows that the pre-developed stormwater runoff from the site is less than or approximately equal to the post-developed stormwater runoff for the 1-year to 100-year storm events. This is due to the exclusion of the Type I drainage areas and the reduction in the Runoff Curve Number, CN, for the site. Since there will be no significant increase in peak flows at the site, water quantity control requirements were not considered for stormwater management. However, extended detention basins, dry swales, and filter strips will provide varying degrees of peak flow attenuation from Type II areas prior to discharge to downgradient water courses.

4.3.2 Work Support Marina Site

Stormwater runoff from this site will drain to the Hudson River which is a fourth order or higher stream. Based on the *New York State Stormwater Management Design Manual,* watersheds which directly discharge to this stream category do not need to meet the design requirements for Stream Channel Protection Volume, Overbank Flood Control, and Extreme Flood Control. Therefore, water quantity control requirements were not considered for the Work Support Marina site.

4.3.3 North Rail Yard

Detention Swale and Variable Stage Outlet Structure

The outlet structure for the detention swale shall be constructed at the end of the swale (See RS-0037 in Attachment C). The inlet pipe of the outlet structure shown on the drainage details sheet for the rail yard is designed to discharge the water quality volume over a time span between 24 – 36 hours. Control measures are in place to contain both the 10-year and 100-year design storm events. The 10-year storm is controlled at the outlet structure using a manhole grate feeding into an 18”, 35 ft pipe with a flared end section outlet. The 100-year design storm event flow is also controlled at this location using a sharp crested weir that discharges onto a riprap apron. The discharge is then carried to the Unnamed Tributary which outlets to Bond Creek.

A hydrologic analysis was performed for a drainage study point located downstream from the outlet structure along the Unnamed Tributary. This study analyzes the impact that the North Rail Yard (Post-development condition) will have on the tributary that feeds into Bond Creek. Most of the Drainage Area is converted from pervious to impervious in the post-developed condition. The results of the hydrologic study are summarized in Table 4-3 and Table 4-4 below.

Table 4-3 – Watershed Input Parameters-Upper Rail Yard Area

Condition	**Drainage Area** (Acres)	**Curve Number CN**	**Time of Concentration Tc** (min.)
Pre-developed	10.7	81	20.7
Post-developed	10.7	89	83.8

Table 4-4 – Site Stormwater Runoff-Upper Rail Yard Area

Condition	**Q_1** (cfs)	**Q_2** (cfs)	**Q_{10}** (cfs)	**Q_{100}** (cfs)
Pre-developed	9.0	10.7	23.4	38.4
Post-developed	0.2	0.2	7.5	14.2

The analysis shows that the pre-developed stormwater runoff from the site is less than the post-developed stormwater runoff for the 1-year to 100-year storm events. The decrease is largely due to the peak flow attenuation exercised by the detention swale and variable stage outlet structure prior to discharge to the Unnamed Tributary.

5. SWPPP Responsibilities

D.A. Collins Construction Corp. – Responsible for implementation of SWPPP, as described in this document, for site work construction; responsible for installation and maintenance of temporary erosion and sediment control measures.

Site Work Subcontractors (employed by D.A. Collins Construction Corp for site work construction) – D.A. Collins will implement SWPPP and coordinate with subcontractors as needed; D.A. Collins will install and maintain temporary erosion and sediment control measures found necessary for work activities by site work subcontractors.

Other Contractors (i.e., Rail and Building Contractors) - Other contractors performing work on site under separate contracts will be responsible for following the provisions of this SWPPP unless they provide their own approved site-specific SWPPP. Any temporary erosion and sediment control measures installed by other contractors will be maintained, inspected, and monitored by the installing contractor. Any temporary erosion and sediment control measures installed by D.A. Collins and subsequently damaged or altered by another contractor will be repaired and maintained by the contractor responsible for the damage/alteration unless otherwise determined by the Construction Manager and D.A. Collins.

6. Inspection and Maintenance

Erosion and sediment control will be an agenda topic at weekly meetings. Project staff will complete weekly inspection reports. Kevin Chandler, the General Superintendent for D.A. Collins, shall perform all site assessments and inspections of the site sediment and erosion control measures as the designated on-site competent person. (NYSDOT Certification included in Attachment D.) Where a deficiency is found in the erosion and sediment control measures, the crew working in the area will make the corrections as needed prior to resuming work.

Additional inspections will be performed within 24 hours of the end of a ½ inch rain event or at other occurrences.

An implementation schedule for the proposed erosion and sediment control measures is included on the following page.

Table 6-1 – Implementation Schedule

TEMPORARY CONTROL	INITIAL PLACEMENT	DURATION OR REMOVAL INITIATION ACTIVITY
Silt Fence	After clearing, prior to stripping of topsoil.	Remove once final amenities topsoil and seed have taken root.
Straw Bale/Reinforced Silt Fence	After clearing, prior to stripping of topsoil.	Remove once final amenities topsoil and seed have taken root.
Temporary Check Dams	After the installation of drainage swales during interim stages.	Once liner is installed in area and witness pipes are installed for removal of liner surface water.
Temporary Access Roads/ Stabilized Construction Entrances	Prior to any site construction at site entrances.	End of project, once traffic is running on paved surfaces.
Temporary Sediment Basin	If flows from swales or pumping operations require.	Once flows are sufficiently diminished or once water is diverted to on-site drainage.
Temporary Ditches And Swales	After liner installation or completion of work in areas.	When advancing work from one completed area to another.
Temporary Bypass System	As the first step in construction of the culverts on the project.	Once culvert is completed and flow restored.
Rock Inlet/Outlet Protection	As ditches, swales, and bypass pumping are installed.	As ditches, swales, and bypass pumping are removed.
Erosion Control Mat	In areas, as determined by the Construction Manager and contractor, that are not seeded.	Material is biodegradable and will be left in place.
Turbidity Curtain	If directed by Construction Manager, during mooring installation, revetment activity or marina work.	Once water work is completed and soil disturbance subsides.
Permanent Stormwater Basins	Installed as part of permanent facilities and will be used for temporary stormwater control.	Pumped and cleaned as needed during construction. Final cleaning following paving and prior to facility operation.
Closed Drainage System (Pipes, Manholes, Etc.)	Installed as part of permanent facilities and will be used for temporary stormwater control.	Pumped and cleaned as needed during construction. Final cleaning following paving and prior to facility operation.

Note: All features will be maintained on a weekly basis. Accumulated sediment will be removed from sediment basins and check dams at the depths recommended by the stormwater and erosion control details.

7. Monitoring and Reporting

Inspection and maintenance records shall be updated as required and whenever any additional erosion and sediment control practices are implemented. Inspections will be completed using the form included in Attachment D.

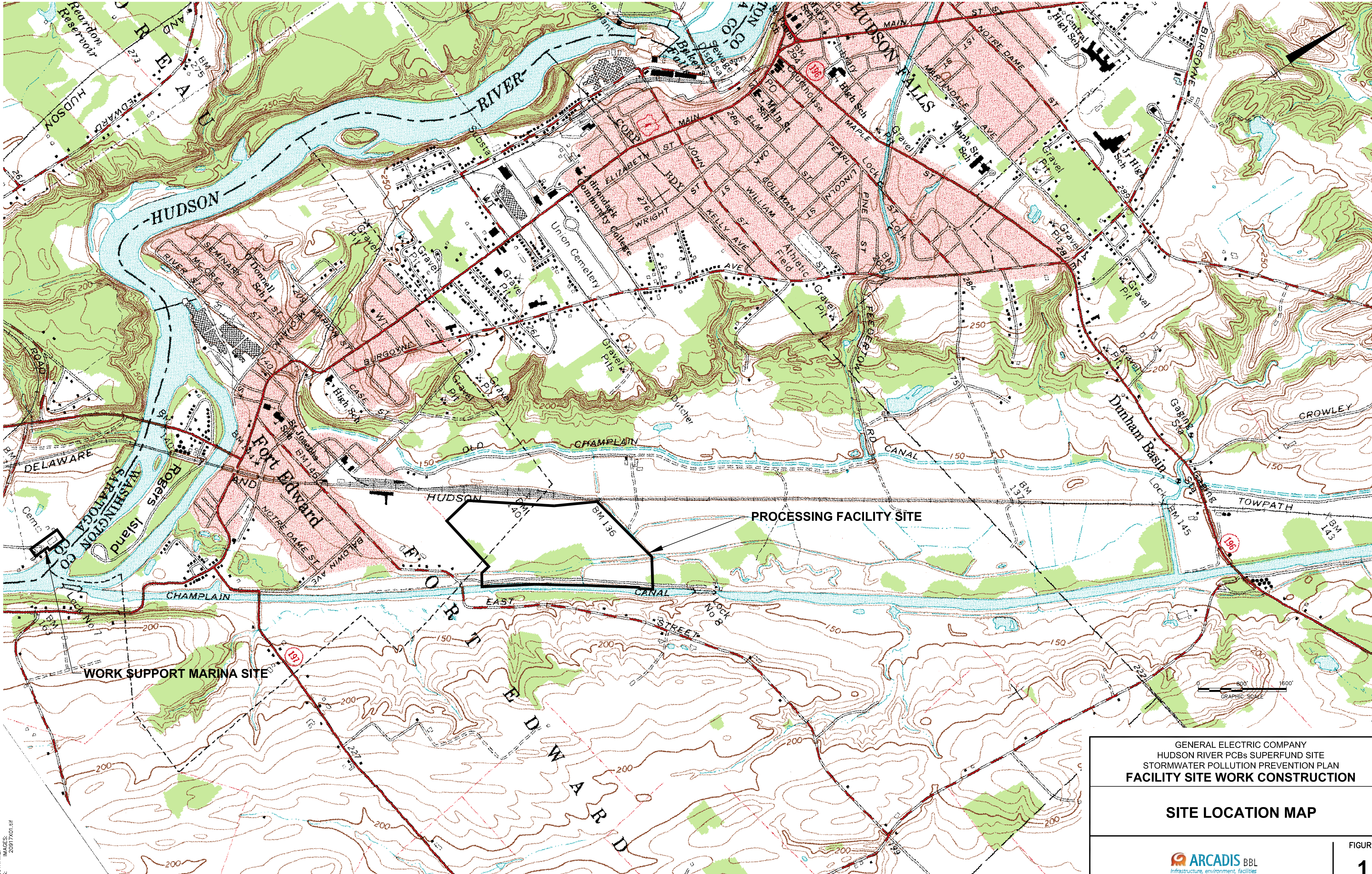
8. References

NYSDEC. 2005. *New York Standards and Specifications for Erosion and Sediment Control*. April 2005.

NYSDEC. 2004. *Instruction Manual for Stormwater Construction Permit*. July 2004.

Attachment A

Maps

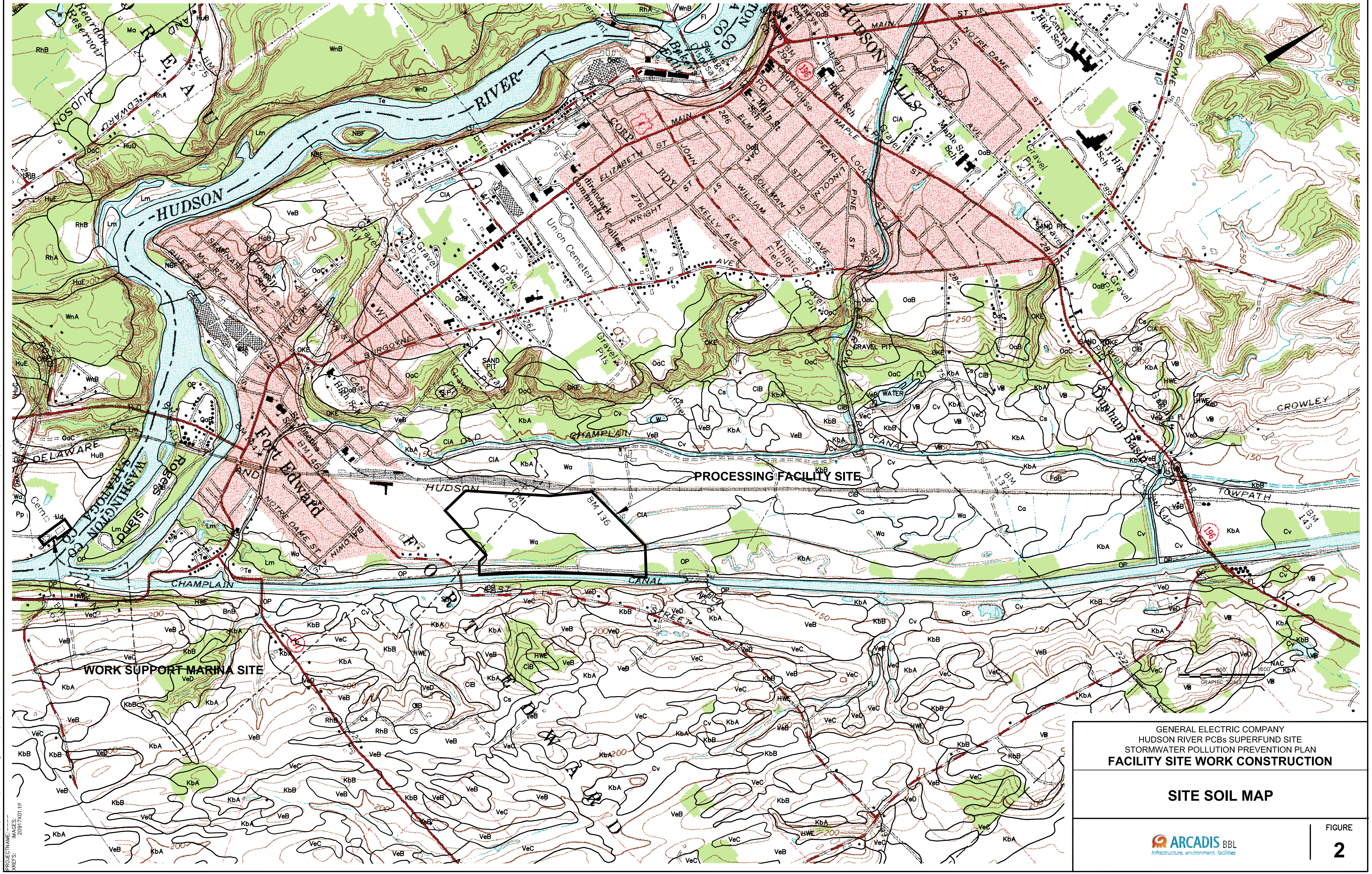


GENERAL ELECTRIC COMPANY
HUDSON RIVER PCBs SUPERFUND SITE
STORMWATER POLLUTION PREVENTION PLAN
FACILITY SITE WORK CONSTRUCTION

SITE LOCATION MAP

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
1



GENERAL ELECTRIC COMPANY
HUDSON RIVER PCBs SUPERFUND SITE
STORMWATER POLLUTION PREVENTION PLAN

FACILITY SITE WORK CONSTRUCTION

SITE SOIL MAP

ARCADIS BBL
Infrastructure, environment, facilities

FIGURE
2

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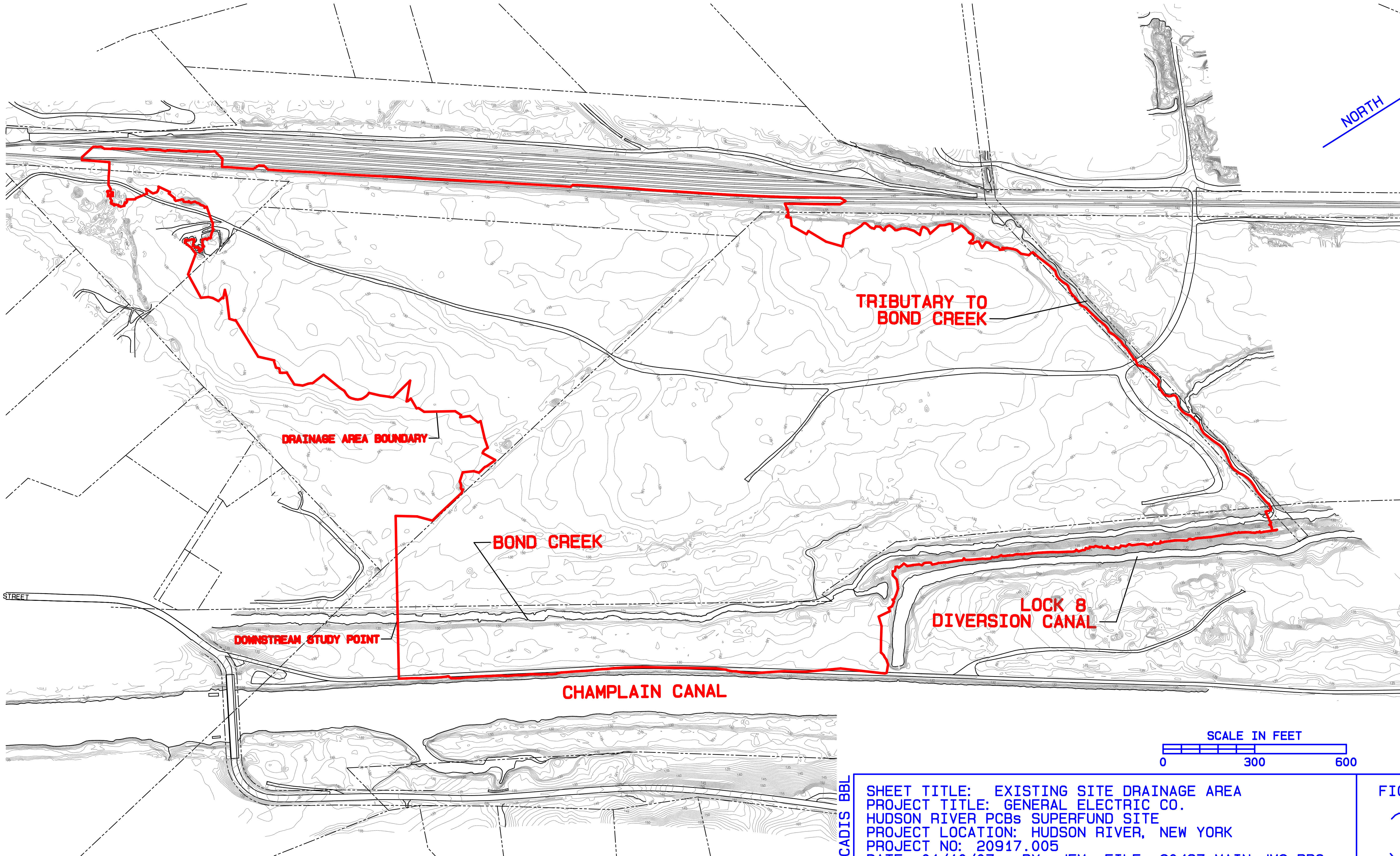
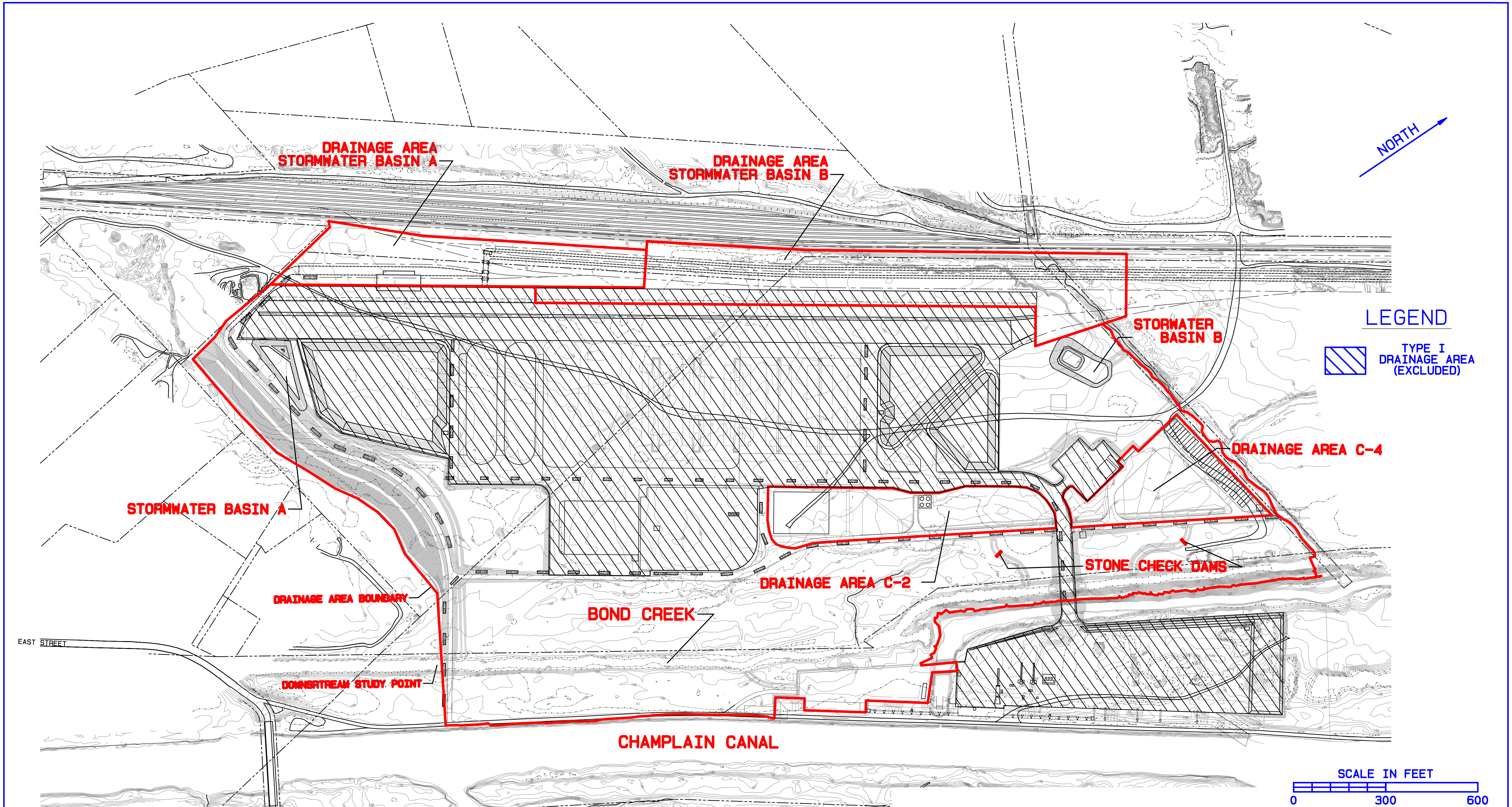


ARCADIS BBL

SHEET TITLE: EXISTING SITE DRAINAGE AREA
PROJECT TITLE: GENERAL ELECTRIC CO.
HUDSON RIVER PCBs SUPERFUND SITE
PROJECT LOCATION: HUDSON RIVER, NEW YORK
PROJECT NO: 20917.005
DATE: 01/10/07 BY: JEM FILE: 20437_MAIN_JM2.PRO

FIGURE 3

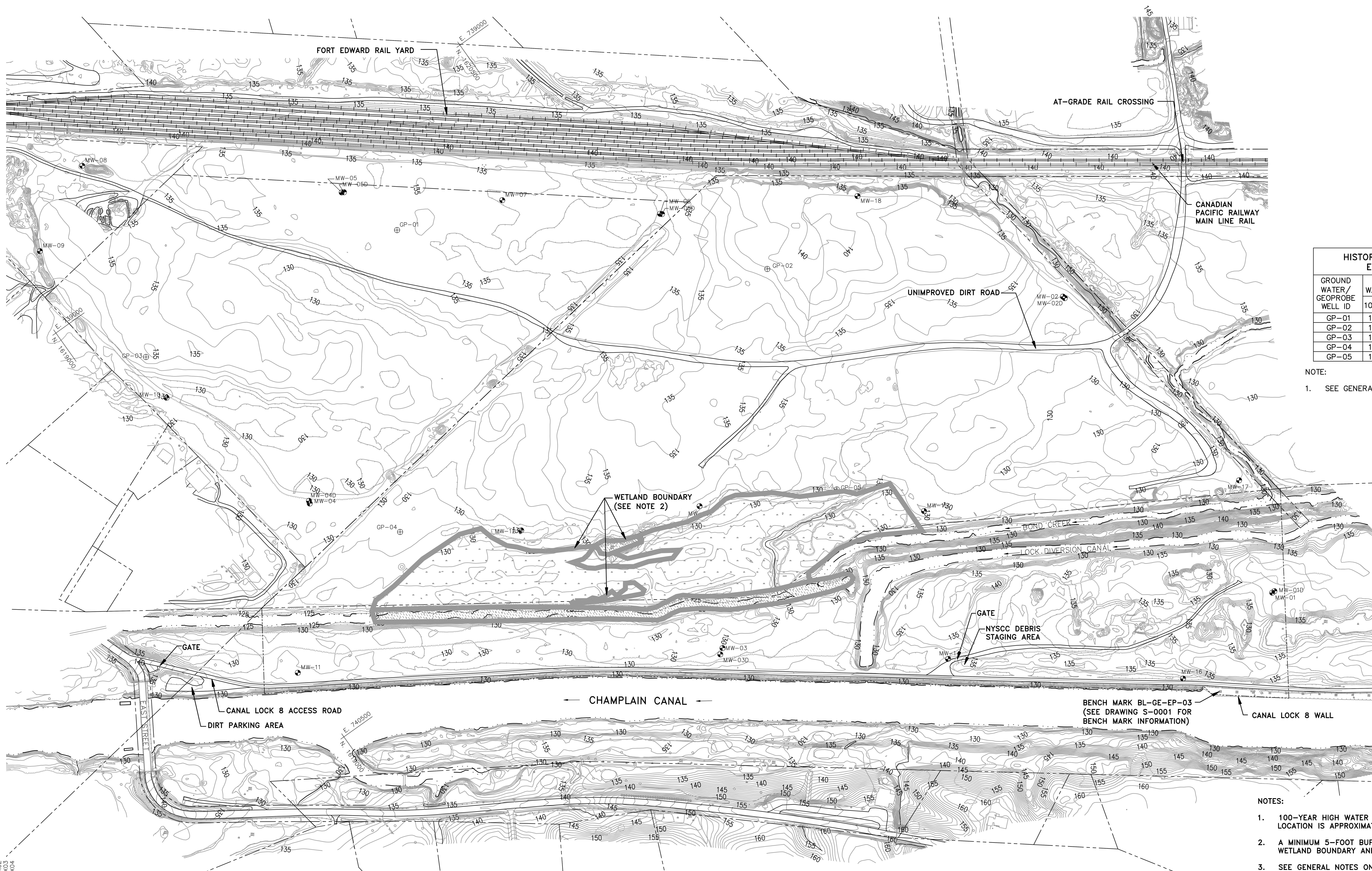


ARCADIS BBL

SHEET TITLE: PROPOSED SITE DRAINAGE AREAS
PROJECT TITLE: GENERAL ELECTRIC CO.
HUDSON RIVER PCBs SUPERFUND SITE
PROJECT LOCATION: HUDSON RIVER, NEW YORK
PROJECT NO: 20917.005
DATE: 01/10/07 BY: JEM FILE: 20437_MAIN_JM..PRO

FIGURE

4



HISTORICAL GROUNDWATER ELEVATION DATA

GROUND WATER/ GEOPROBE WELL ID	WATER ELEVATIONS (FT. AMSL) 10/16/03	10/23/03	11/6/03
GP-01	128.08	127.94	129.37
GP-02	127.63	127.50	128.52
GP-03	126.89	126.82	127.75
GP-04	126.68	126.55	127.23
GP-05	127.05	126.91	127.50

NOTE:

1. SEE GENERAL NOTES ON DRAWING S-0001.

MONITORING WELL DATA (9/28/05)

WELL ID	WATER TABLE ELEVATION
MW-01	127.02
MW-01D	134.02
MW-02	127.07
MW-02D	127.08
MW-03	124.60
MW-03D	124.95
MW-04	125.70
MW-04D	98.74
MW-05	126.51
MW-05D	98.69
MW-06	126.59
MW-06D	83.47
MW-07	126.53
MW-08	126.36
MW-09	126.05
MW-10	125.69
MW-11	125.88
MW-12	125.91
MW-13	126.18
MW-14	127.70
MW-15	126.26
MW-16	127.41
MW-17	127.25
MW-18	126.93

NOTES:

1. 100-YEAR HIGH WATER ELEVATION FOR BOND CREEK AT SITE LOCATION IS APPROXIMATELY 131.5 FEET AMSL.
2. A MINIMUM 5-FOOT BUFFER IS TO BE MAINTAINED BETWEEN THE WETLAND BOUNDARY AND THE LIMITS OF CONSTRUCTION ACTIVITY.
3. SEE GENERAL NOTES ON DRAWING S-0001 FOR GROUNDWATER MONITORING WELL AND GEOPROBE DATA REFERENCES.

CONFORMED REVIEW SET – NOT FOR CONSTRUCTION

ORIGINAL SCALE APPLIES TO 22"X34" DRAWING

150' 0 150' 300'

THIS DRAWING WAS PREPARED AT THE SCALE(S) INDICATED. INACCURACIES IN THE STATED SCALE(S) MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED. **USE THE GRAPHIC SCALE BAR(S) TO DETERMINE THE ACTUAL SCALE(S) OF THIS DRAWING.**

No.	Date	Revisions	Init

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

Professional Engineer's Name: JOHN PAUL DOODY
Professional Engineer's No.: 067405
State: NY
Date Signed:
Project Mgr. | Designed by | Drawn by

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engineers, scientists, economists

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

SITE EXISTING CONDITIONS PLAN

CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION

BBL Project No. 20435.700
Date DECEMBER 15, 2006

Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

S-0002

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XREFS: XGN-EX01 XGN-TB01 XGN-EX02 XGN-EX03 XGN-EX04 IMAGES:

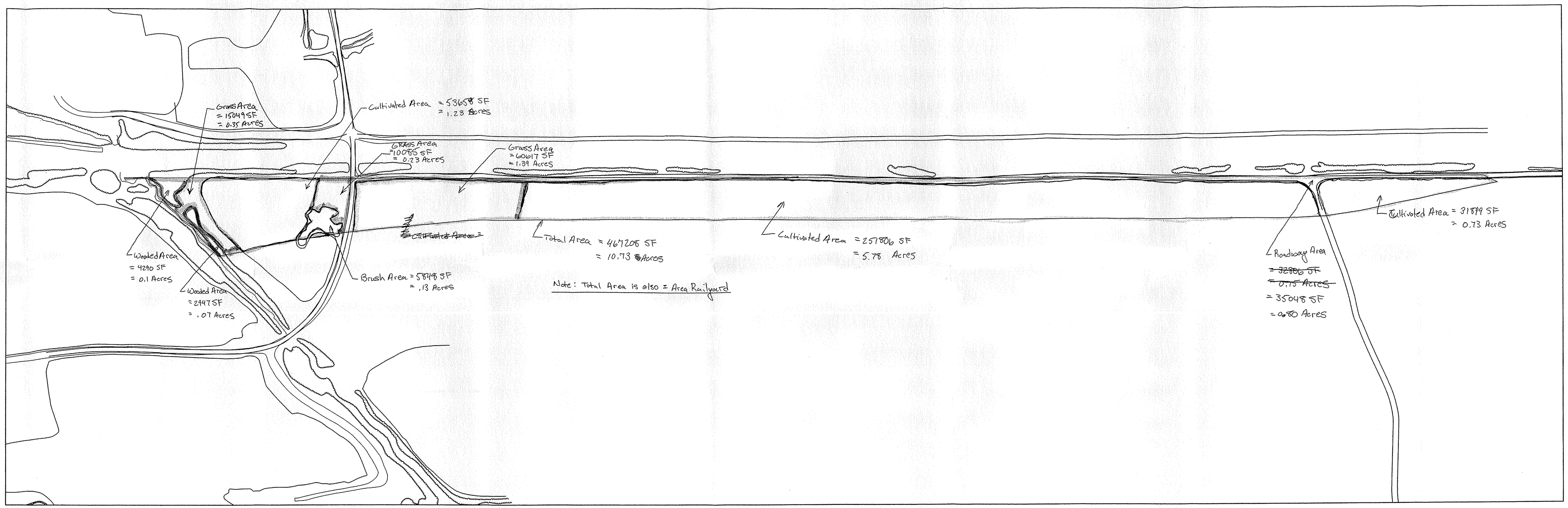
HDR

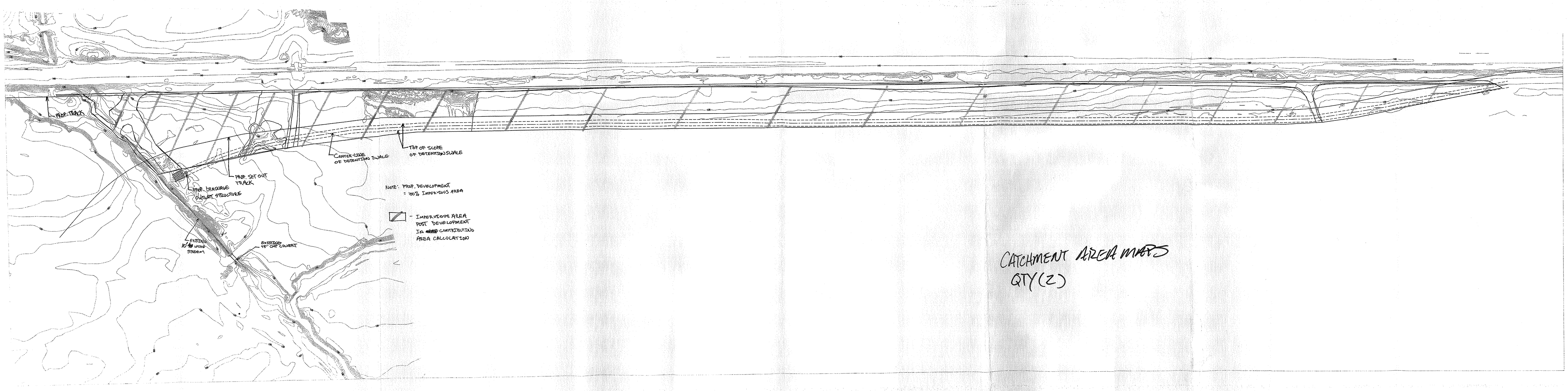
Maps

Hydrology Area Calculations
GE - Set Out Track Trench Nov. 14, 2005

GE HUDSON RIVER
Sent Backup Calcs. in June 2006

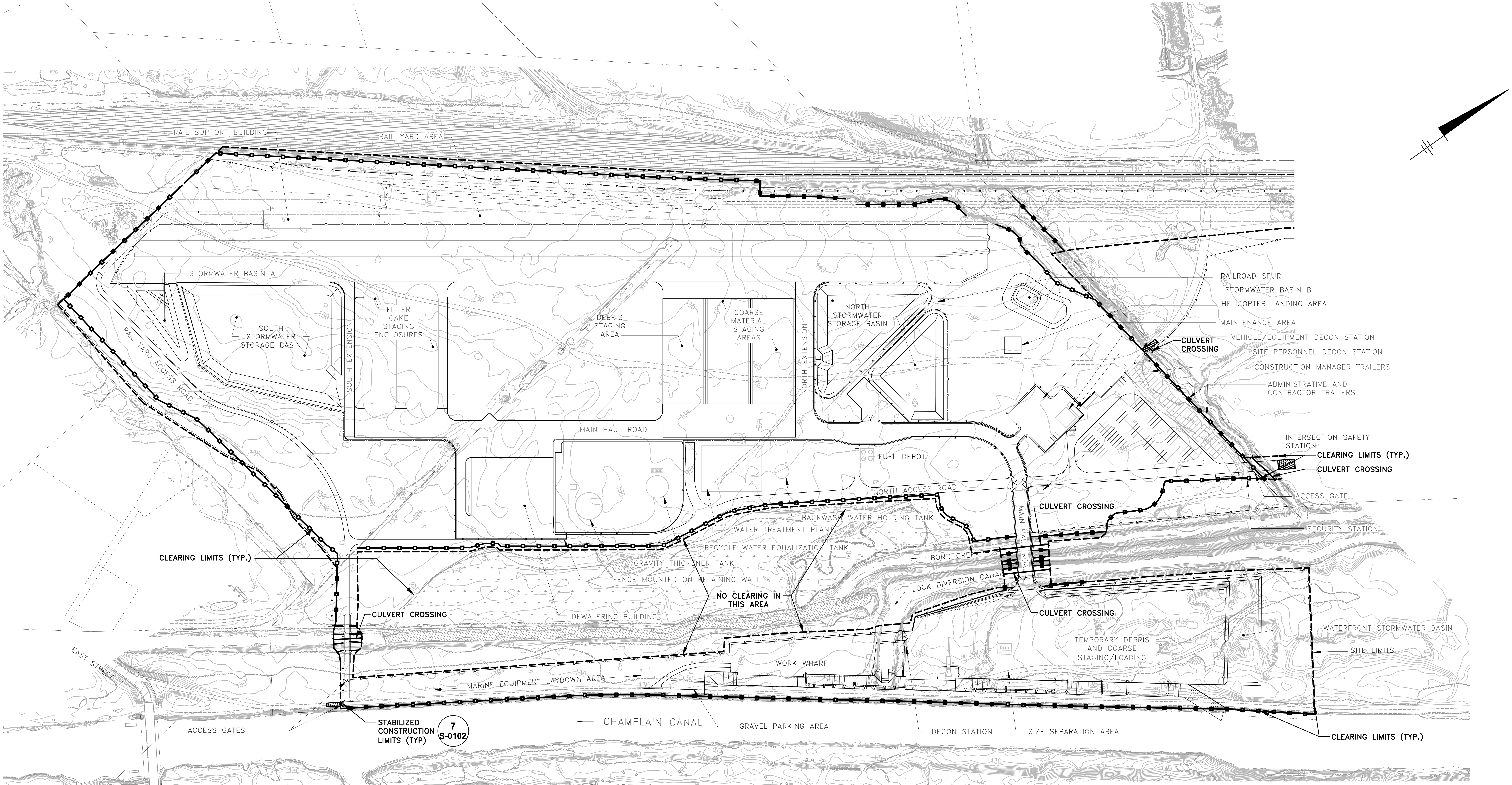
Drainage Area Pre and Post Development




PROP. TRACK
PROP. SET OUT TRACK
CENTER LINE OF DETENTION SWALE
TOP OF SLOPE OF DETENTION SWALE
PROP. DRAINAGE OUTLET STRUCTURE
EXISTING 10' WIDE STREAM
EXISTING 48" CMP CULVERT
NOTE: PROP. DEVELOPMENT = 100% IMPERVIOUS AREA
- IMPERVIOUS AREA POST DEVELOPMENT IN CONTRIBUTING AREA CALCULATION
CATCHMENT AREA MAPS
QTY (2)

Attachment B

Erosion and Sediment Control Plan and Details



LEGEND:

REINFORCED SILT FENCE (3 / S-0102)

STRAW BALE/SILT FENCE (5 / S-0102)

NOTE:

1. TYPICAL DETAILS AND NOTES ARE PROVIDED ON DRAWING S-0102.

CONFORMED REVIEW SET – NOT FOR CONSTRUCTION

ORIGINAL SCALE APPLIES TO 22"X34" DRAWING

150' 0 150' 300'

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No.	Date	Revisions	Init

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Professional Engineer's Name: JOHN PAUL DOODY
Professional Engineer's No.: 067405
State: NY
Date Signed:
Project Mgr.: | Designed by: . | Drawn by: .

BBL®
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engineers, scientists, economists

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

SITE EROSION AND SEDIMENT CONTROL PLAN

CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION

BBL Project No. 20435.700

Date DECEMBER 15, 2006

Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

S-0100

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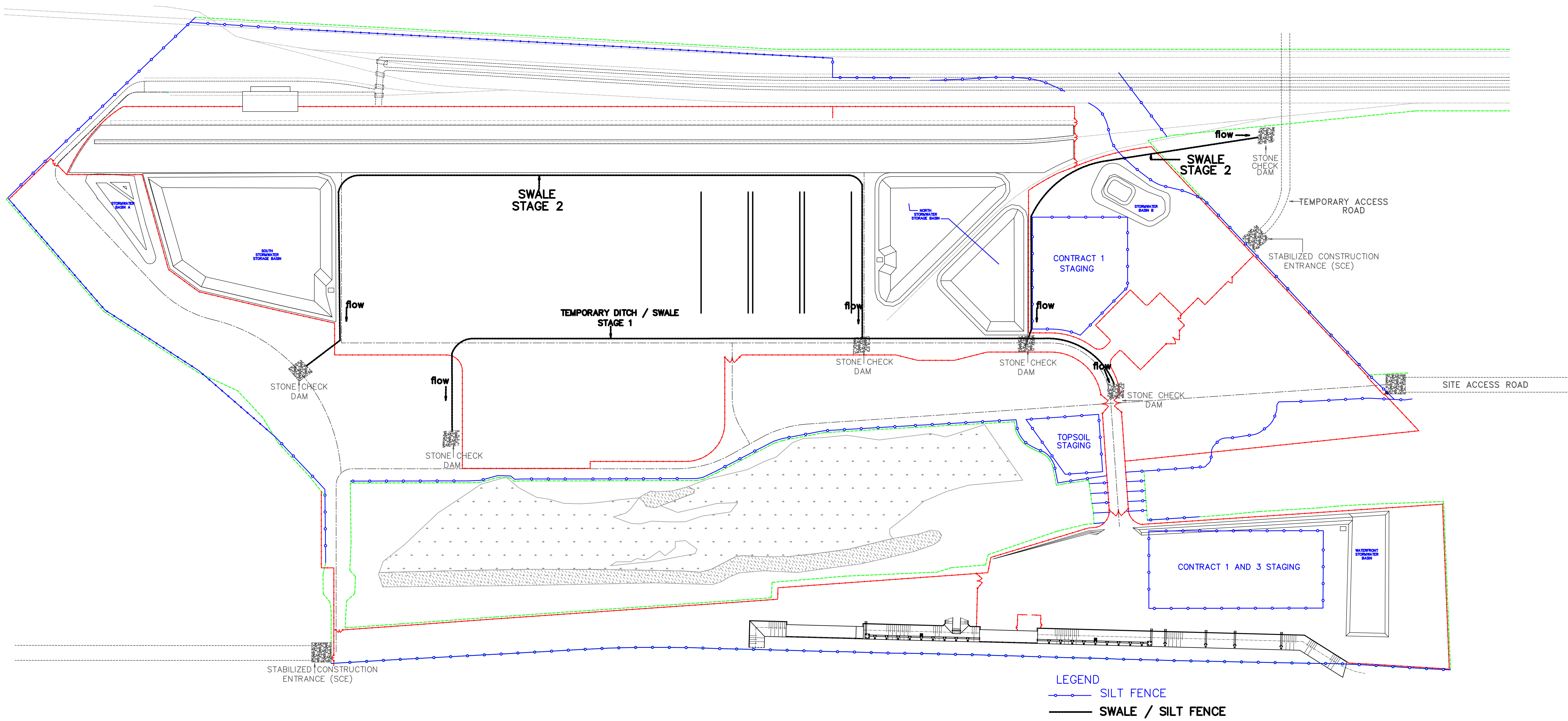
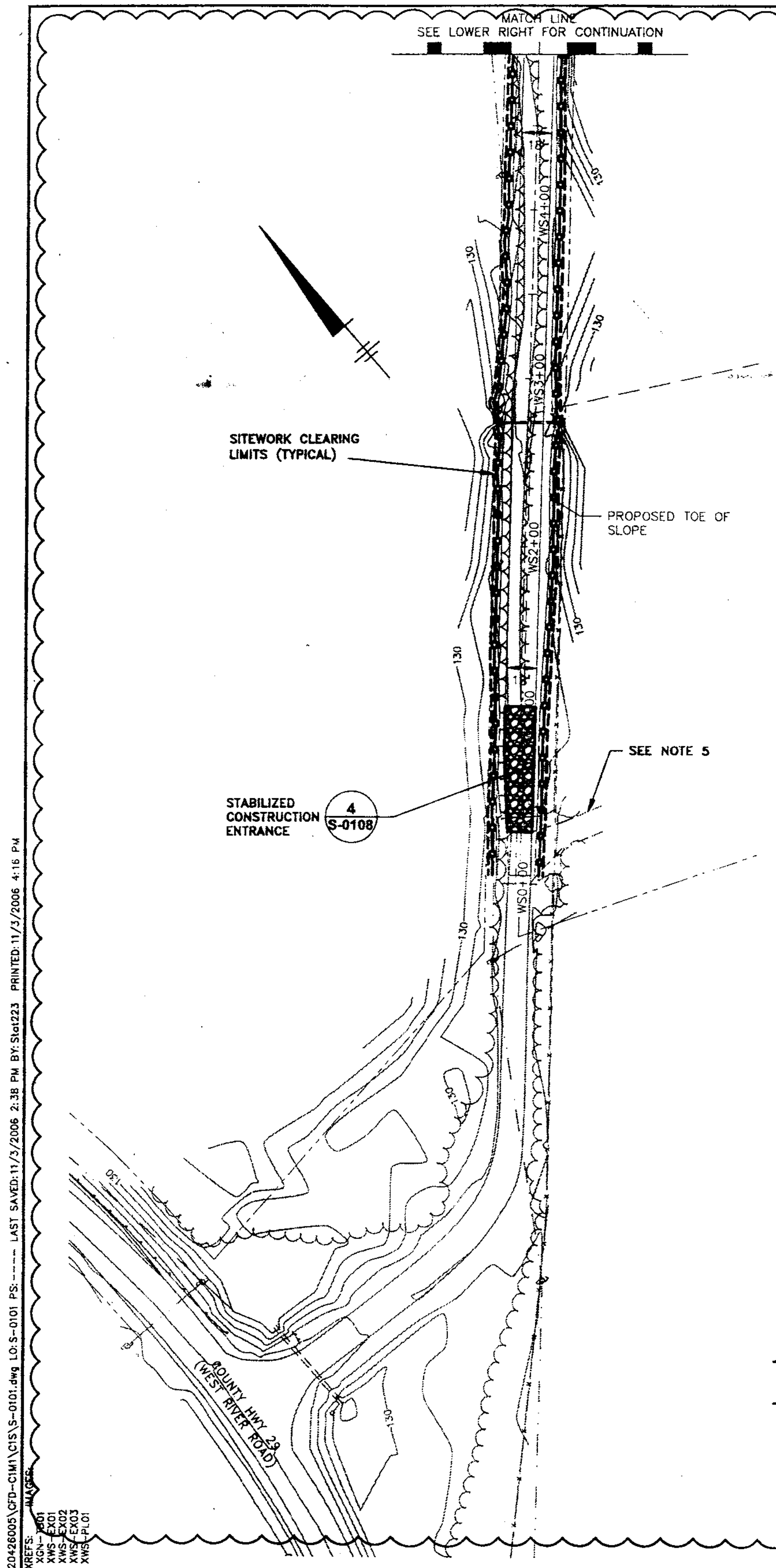


NOTE
flow from ditches and swales will be directed through stone check dams to permanent ditch lines and or completed storm drainage systmes



NOTES:

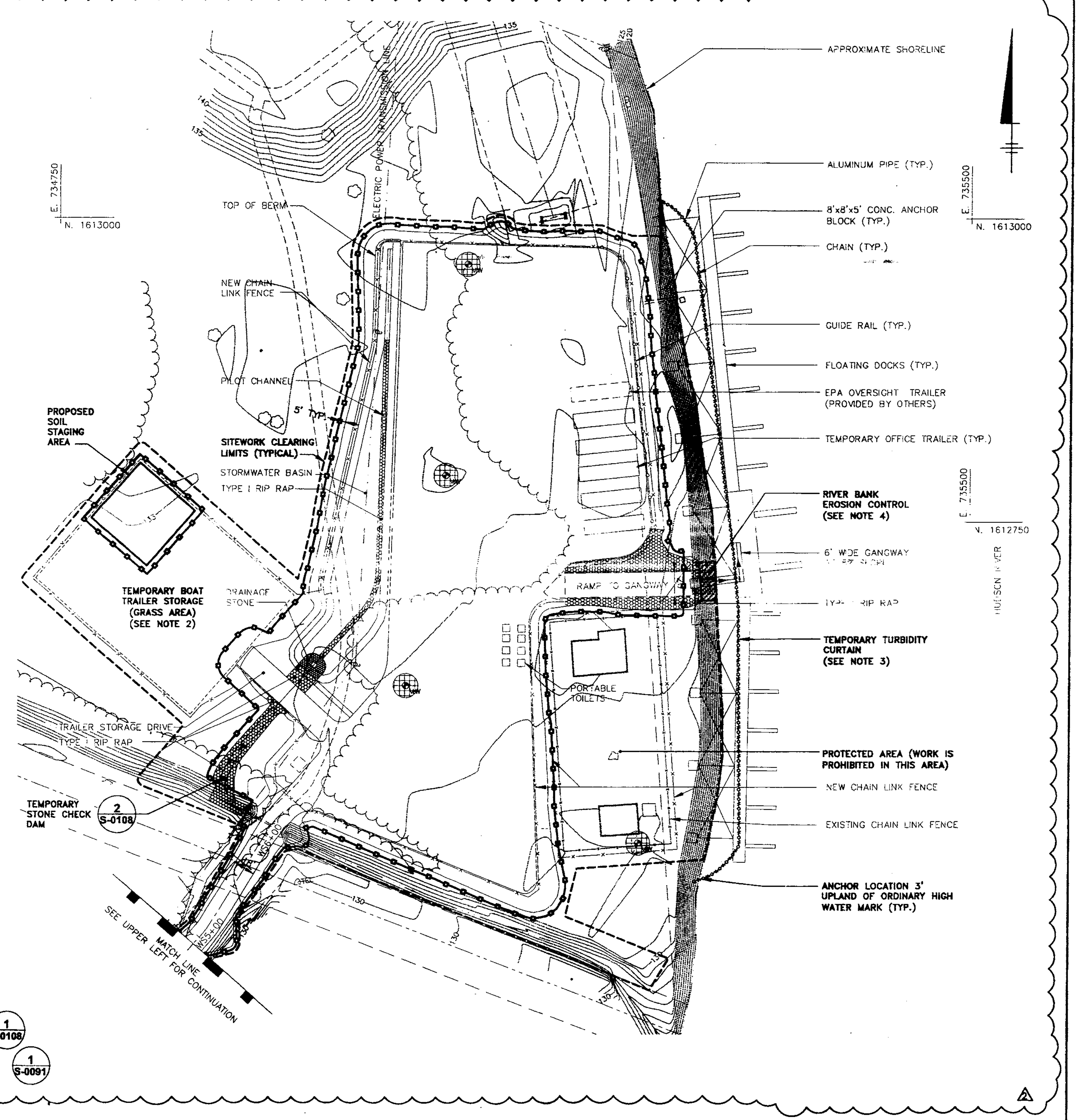
1. THE CONTRACTOR SHALL BE AWARE THAT SITE CLEARING WILL BE DONE IN THE IMMEDIATE VICINITY OF A FORMER DREDGE SPOIL SITE AND IT IS ANTICIPATED THAT PCB CONTAMINATED SOILS WILL BE ENCOUNTERED DURING THESE ACTIVITIES. SITE CLEARING SHALL BE PERFORMED IN A MANNER TO MINIMIZE DISTURBANCE OF EXISTING SOILS. STRIPPING OF TOPSOIL FROM THE SITE SHALL NOT BE PERMITTED UNLESS EXCAVATION IS REQUIRED AS SHOWN ON THE DRAWINGS. SMALL TREES (LESS THAN 12" DIAMETER) AND BRUSH SHALL BE CUT FLUSH TO THE GROUND SURFACE AND LEFT IN PLACE. LARGER TREES (GREATER THAN 12" DIAMETER) TO BE CLEARED SHALL HAVE STUMPS GROUND FLUSH WITH THE EXISTING SURFACE.
2. BOAT TRAILER STORAGE AREA TO BE CLEARED OF BRUSH AND TREES. STUMPS, AS DESIGNATED BY THE CONSTRUCTION MANAGER. STUMPS MAY BE GRUBBED IN THE STORAGE AREA TO OBTAIN A SMOOTH PARKING SURFACE. ALL STUMPS SHALL BE MANAGED PER THE SOIL MANAGEMENT NOTES ON THIS DRAWING. REMAINING VEGETATION (I.E., GRASS) SHALL BE MOWED TO A HEIGHT OF 3 INCHES (MAX.) PRIOR TO CONTRACT COMPLETION.
3. TURBIDITY CURTAIN MAY BE DEPLOYED IN PHASES WHEN CONSTRUCTION ACTIVITIES ARE LIMITED TO SPECIFIC AREAS UPON APPROVAL BY THE CONSTRUCTION MANAGER.
4. CONTRACTOR SHALL DETERMINE TYPE AND ESTABLISH PERMANENT EROSION CONTROL MEASURES ON RIVER BANK SUFFICIENT TO PREVENT SLOPE EROSION DOWN GRADIENT OF PAVED RAMP TO GANGWAY. EROSION CONTROL MEASURES DETERMINED BY CONTRACTOR SHALL BE SUBMITTED TO THE CONSTRUCTION MANAGER FOR REVIEW AND APPROVAL PRIOR TO ORDERING OF MATERIALS.
5. CONTRACTOR SHALL MAINTAIN ACCESS TO EXISTING DRIVEWAY AT ALL TIMES.

SOIL MANAGEMENT REQUIREMENTS

1. THE CONTRACTOR SHALL BE AWARE THAT CONSTRUCTION WILL BE PERFORMED IN THE VICINITY OF A DREDGE SPOIL SITE AND MAY ENCOUNTER SOILS CONTAINING PCBS DURING EXCAVATION. ALL EXCAVATED MATERIAL FROM THE MARINA SITE SHALL BE TRANSPORTED DIRECTLY TO THE PROPOSED STAGING AREA DESIGNATED ON THIS PLAN.
2. THE CONTRACTOR HEALTH AND SAFETY PLAN SHALL PROVIDE FOR THE SAFE HANDLING OF SOILS CONTAINING PCBS.
3. THE CONTRACTOR SHALL COMPLY WITH THE SUBSTANTIVE REQUIREMENTS OF APPLICABLE REGULATIONS FOR EXCAVATING AND HANDLING MATERIAL CONTAINING PCBS INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:
   A. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA), INCLUDING TITLE 40, CODE OF FEDERAL REGULATIONS.
   B. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), INCLUDING TITLE 29, CODE OF FEDERAL REGULATIONS, AND PARTS 1910 AND 1926, OSHA, U.S. DEPARTMENT OF LABOR.
4. THE STOCKPILE IN THE STAGING AREA SHALL BE TARPED AT TIMES THAT EXCAVATION IS NOT OCCURRING. THE CONTRACTOR SHALL MAINTAIN TARPS THAT ARE COVERING THE STOCKPILE AND SILT FENCING SURROUNDING THE STOCKPILE.
5. CHARACTERIZATION OF THE PCB CONCENTRATION IN THE EXCAVATED SOIL WILL BE PERFORMED BY OTHERS.

LEGEND:

- LIMITS OF CLEARING
- STRAW BALE / SILT FENCE (3 / S-0108)
- TEMPORARY TURBIDITY CURTAIN/FLOATING BOOM (1 / S-0108)
- GROUNDWATER MONITORING WELL TO BE PROTECTED (1 / S-0091)



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	No.	Date	Revisions	Init
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	1	8/4/06	CONFORMED SET THROUGH ADDENDUM NO. 5	JPD

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Professional Engineer's Name	
JOHN PAUL DOODY	
Professional Engineer's No.	
067405	
State	Date Signed
NY	
Project Mgr.	Designed by / Drawn by

BBL
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

EROSION AND SEDIMENT CONTROL PLAN FOR WORK SUPPORT MARINA

CONTRACT 1 - FACILITY SITE WORK CONSTRUCTION

BBL Project No. 20435.700
Date AUGUST 4, 2006
Blasland, Bouck & Lee, Inc. Corporate Headquarters 6723 Towpath Road Syracuse, NY 13214 315-446-9120

S-0101

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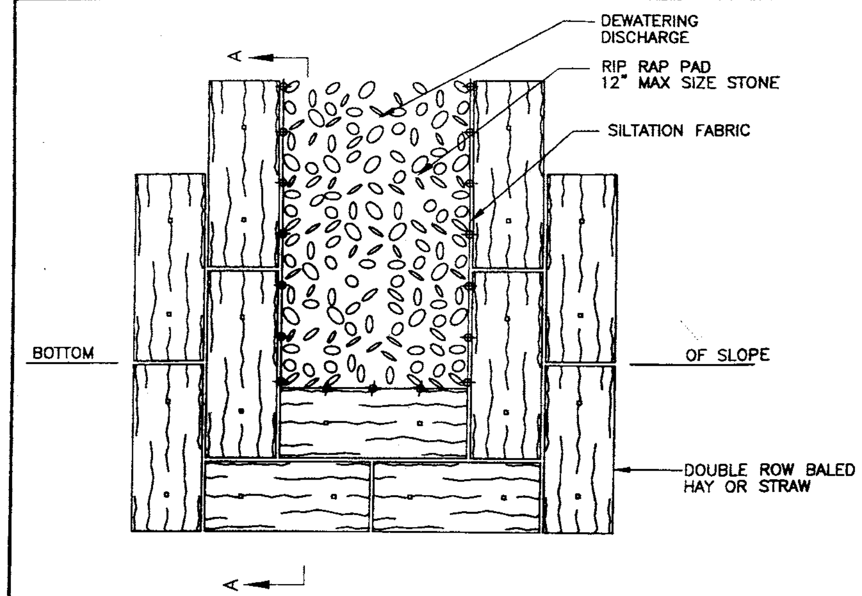
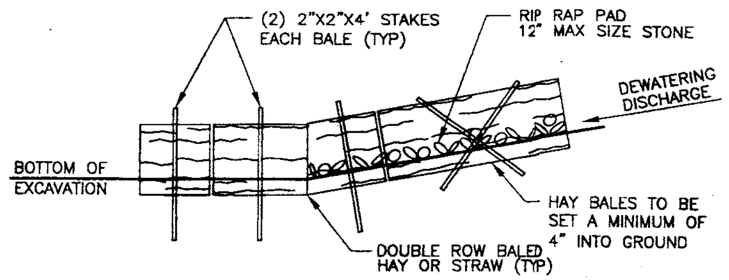
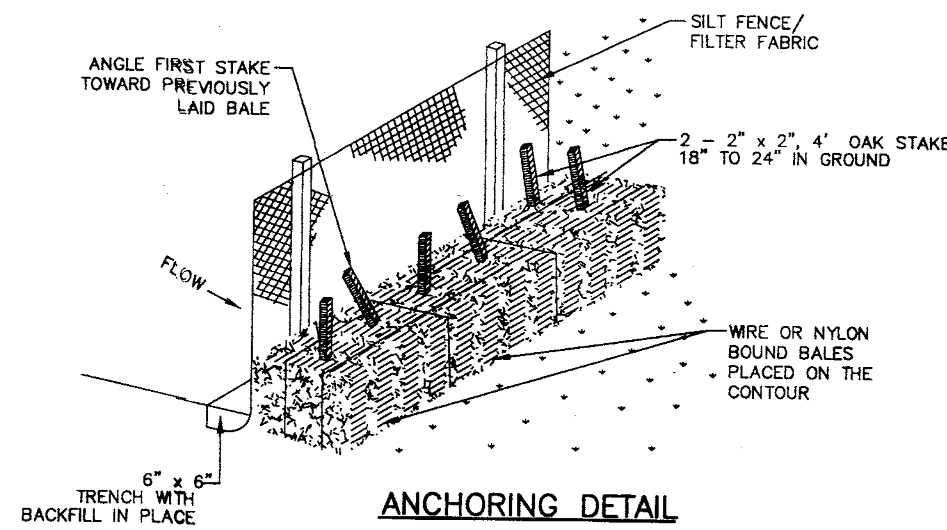


TEMPORARY SEDIMENT TRAP PLAN
N. T. S.



SECTION A–A
N. T. S.



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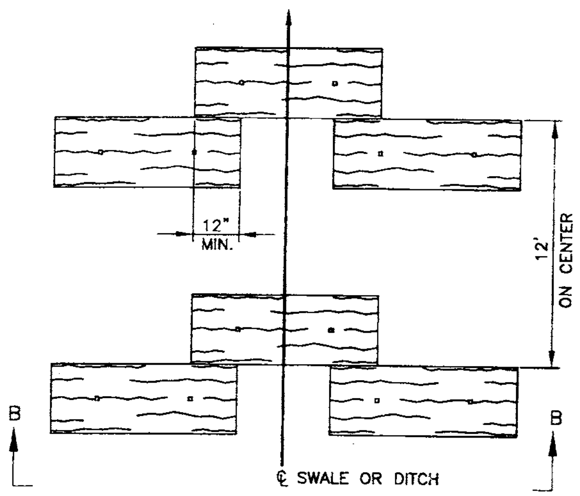
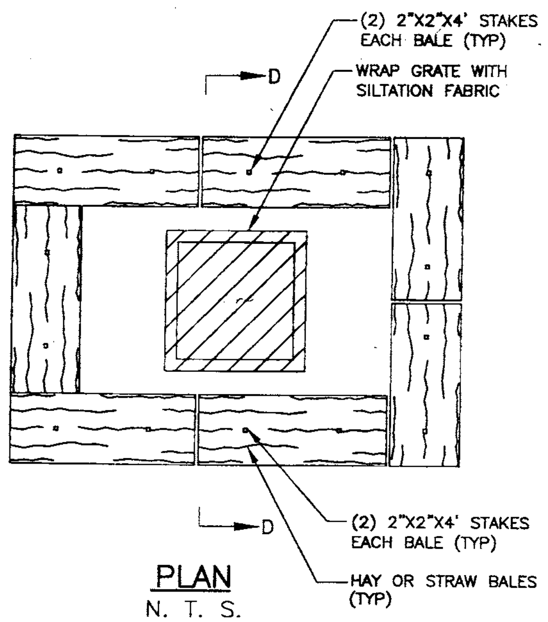
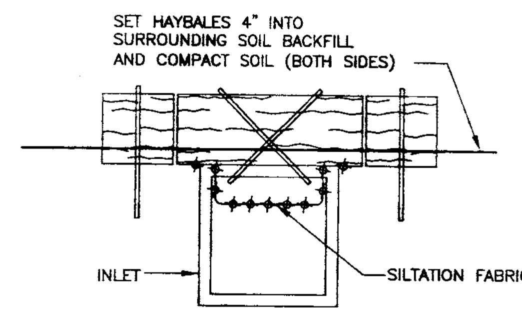


PLAN
N. T. S.

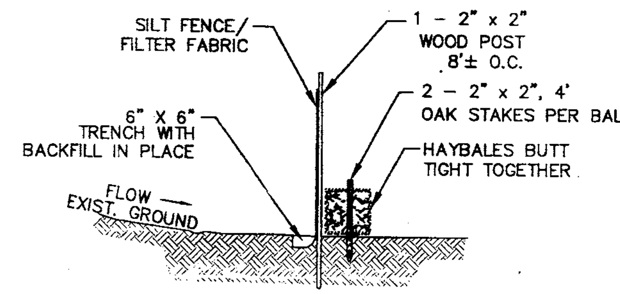


PLAN
N. T. S.



SECTION D–D
N. T. S.

CATCH BASIN SILTATION PROTECTION
N. T. S.

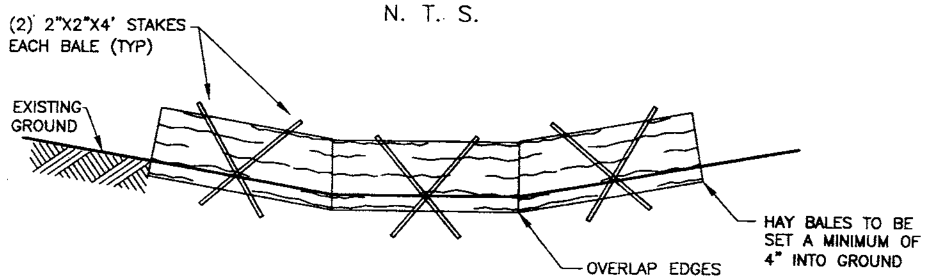


EMBEDDING DETAIL

CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR REBARS DRIVEN THOUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARDS PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
3. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
5. CRUSHED STONE TO BE PLACED OVER FILTER FABRIC.

DETAIL FOR EROSION CONTROL BARRIER
NOT TO SCALE



SECTION B–B
N. T. S.

NOTES:
1. TO BE USED WHERE THE EXISTING GROUND SLOPES TOWARD THE EMBANKMENT AND IN PROPOSED DITCHES AND SWALES.

DRAINAGE SWALE OR DITCH EROSION CHECKS

ENGINEER OF RECORD
HENNINGSON, DURHAM, AND RICHARDSON ARCHITECTURE AND ENGINEERING, P.C.

ORIGINAL SCALE APPLIES TO 22"X34" DRAWING

THIS DRAWING WAS PREPARED AT THE SCALE(S) INDICATED. INACCURACIES IN THE STATED SCALE(S) MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED. USE THE GRAPHIC SCALE BAR(S) TO DETERMINE THE ACTUAL SCALE(S) OF THIS DRAWING.

No.	Date	Revisions	Init

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

Professional Engineer's Name: THOMAS C. MCLAUGHLIN
Professional Engineer's No.: 075823
State: NY | Date Signed: AUGUST 4, 2006
Project Mgr.: KFB | Designed by: RDK | Drawn by: GFK

HDR Henningson, Durham and Richardson
Architecture and Engineering, P.C.
711 WESTCHESTER AVE WHITE PLAINS, NY 10604-3504 (914) 993-2000

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

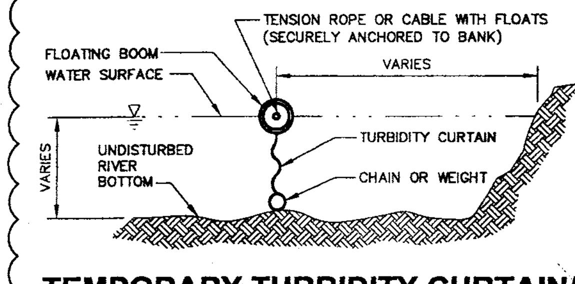
EROSION & SEDIMENT CONTROL DETAILS

CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION – ACCESS ROAD CONSTRUCTION

BBL Project No. 20435.700
Date APRIL 19, 2006
Blasland, Bouck & Lee, Inc. Corporate Headquarters 6723 Towpath Road Syracuse, NY 13214 315-446-9120

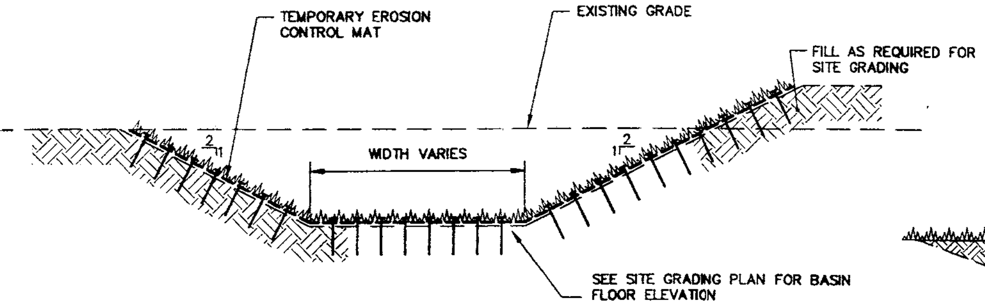
A-0022

HDR S:\New Folder Organization\000171_General_Electric\00000035969_GE_Access_Rd\dwg\A-0022 Civil Details.dwg LO:A-0022 PS:---- LAST SAVED:11/3/2006 11:29 AM BY:---- PRINTED:11/3/2006 1:55 PM



TEMPORARY TURBIDITY CURTAIN/ FLOATING BOOM (1)

NOT TO SCALE

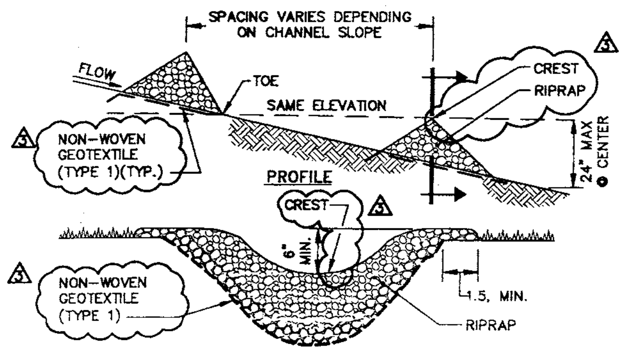


NOTES:

1. SURFACE AREA UNDERNEATH EROSION CONTROL MAT SHALL BE SEEDED ACCORDING TO PROJECT SPECIFICATIONS PRIOR TO PLACEMENT OF THE EROSION CONTROL MAT.
2. EROSION CONTROL MAT SHALL BE PINNED AT A MAXIMUM SPACING OF 1 FOOT ALONG TOP EDGES. TOP EDGES OF EROSION CONTROL MAT SHALL NOT BE BURIED. REMAINDER OF EROSION CONTROL MAT SHALL BE INSTALLED AND PINNED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS AND THE MANUFACTURER'S RECOMMENDATIONS.

TEMPORARY STORMWATER SEDIMENT BASIN (4)

NOT TO SCALE

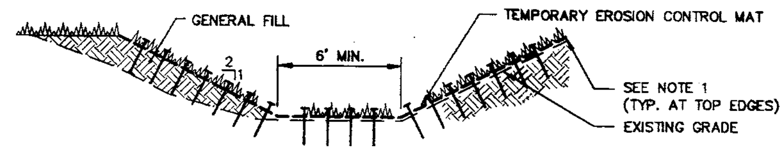


NOTES:

1. SET SPACING OF CHECK DAMS TO ASSUME THAT THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION AS THE TOE OF THE UPSTREAM DAM.
2. EXTEND STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO REDUCE THE POTENTIAL FOR SCOUR ALONG THE SIDES.
3. PROTECT CHANNEL DOWNSTREAM OF THE LOWER MOST CHECK DAM FROM SCOUR AND EROSION WITH GEOTEXTILE OR STONE MATERIAL AS APPROPRIATE.
4. PLACE CHECK DAMS SUCH THAT CHANNEL APPURTENANCES (eg. CULVERT ENTRANCES) BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONES.
5. ACCUMULATED SEDIMENTS SHALL BE REMOVED FROM BEHIND CHECK DAM WHEN SEDIMENT HAS ACCUMULATED TO 1/2 THE HEIGHT OF THE CHECK DAM CREST. STONE MATERIAL SHALL BE REPLACED AND CHECK DAM RESTORED TO ITS ORIGINAL DIMENSIONS AFTER REMOVAL OF SEDIMENT.

TEMPORARY STONE CHECK DAM (2)

NOT TO SCALE



NOTES:

1. EROSION CONTROL MAT SHALL BE PINNED AT A MAXIMUM SPACING OF 1 FOOT ALONG TOP EDGES. TOP EDGES OF EROSION CONTROL MAT SHALL NOT BE BURIED. REMAINDER OF EROSION CONTROL MAT SHALL BE INSTALLED AND PINNED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS AND THE MANUFACTURER'S RECOMMENDATIONS.
2. ACTUAL LOCATIONS OF TEMPORARY SWALES TO BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE CONSTRUCTION MANAGER AT THE TIME OF CONSTRUCTION.
3. AREA UNDERNEATH EROSION CONTROL MAT, INCLUDING BOTH DISTURBED AND UNDISTURBED GROUND, SHALL BE SEEDED ACCORDING TO THE PROJECT SPECIFICATIONS PRIOR TO PLACEMENT OF EROSION CONTROL MAT.

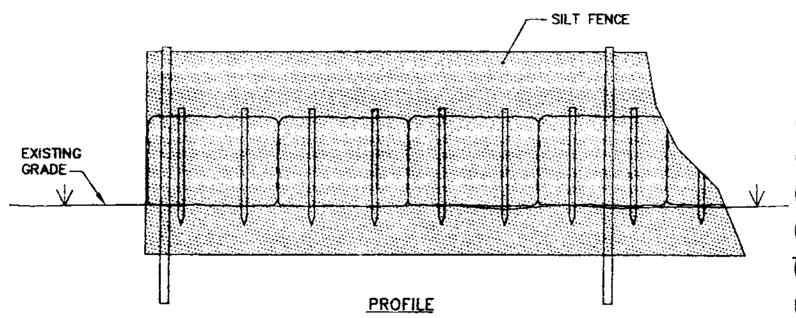
TEMPORARY SWALE (6)

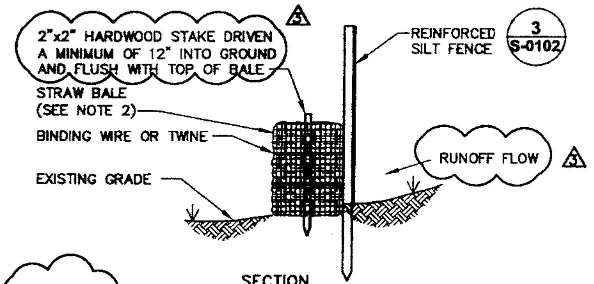
NOT TO SCALE

NOTES:

1. ACTUAL LOCATIONS OF EROSION AND SEDIMENT CONTROL FEATURES MAY VARY BASED ON ACTUAL SITE CONDITIONS ENCOUNTERED AT TIME OF CONSTRUCTION.
2. EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED PRIOR TO DISTURBANCE OF EXISTING SITE SOILS AND VEGETATION.
3. ALL WORK SHALL BE LIMITED TO WITHIN THE DESIGNATED PROPERTY, RIGHT OF WAY, EASEMENT, OR PROJECT WORK LIMITS.
4. ALL NECESSARY PRECAUTIONS SHALL BE TAKEN TO PREVENT MIGRATION OF CONSTRUCTION RELATED SILT, SEDIMENT, FUELS, SOLVENTS, LUBRICANTS, CONCRETE, LEACHATE, OR ANY OTHER POLLUTANT BEYOND THE WORK LIMITS.
5. ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE MAINTAINED THROUGHOUT THE COURSE OF CONSTR... ACTIVITIES. EROSION AND SEDIMENT CONTROL MEA... SHALL BE REMOVED ONLY AFTER ESTABLISHMENT ... DURABLE AND MAINTAINABLE COVER.
6. ANY CONSTRUCTION-RELATED DEBRIS OR EXCESS MATERIALS SHALL BE REMOVED IMMEDIATELY/CO... FROM THE BED AND/OR BANKS OF ALL WATERBO... WETLANDS TO AN APPROPRIATE UPLAND SITE AR... PROPER STOCKING OR DISPOSAL.
7. EXISTING VEGETATION WILL BE LEFT IN PLACE TC... FULLEST EXTENT PRACTICABLE IN AREAS THAT ... IMMEDIATELY (I.E., 24 HOURS) UNDERGO CONSTR... ACTIVITIES.
8. THE CONTRACTOR SHALL INITIATE STABILIZATION MEASURES SUCH AS TEMPORARY SEEDING, MUL... AND/OR EROSION CONTROL MATTING PRACTICES AS PRACTICABLE IN PORTIONS OF THE SITE WH... CONSTRUCTION ACTIVITIES HAVE TEMPORARILY ... PERMANENTLY CEASED, BUT IN NO CASE MORE ... DAYS AFTER THE CONSTRUCTION ACTIVITY IN T... PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED.
9. BACKFILL SILT FENCE ANCHOR TRENCH WITH GE... FILL AT LOCATIONS SHOWN ON PLAN.
10. IF REQUIRED BASED ON CONSTRUCTION ACTIVITI... FLOATING BOOM AND TURBIDITY CURTAIN SHAL... MAINTAINED AT A DISTANCE OF APPROXIMATEL... FROM THE WATER'S EDGE IN SUFFICIENT DEPT... AS RECOMMENDED BY THE MANUFACTURER, UN... OTHERWISE DIRECTED BY THE CONSTRUCTION ... FLOATING BOOM SHALL NOT EXTEND OUT INTO NAVIGATION CORRIDOR DURING THE NAVIGATIO...
11. CONTRACTOR TO MAINTAIN/REPLACE FLOATING ... NECESSARY. CONTRACTOR TO REMOVE FLOATIN... JUST PRIOR TO THE BOOM FREEZING INTO CA...
12. ENDS OF FLOATING BOOM SHALL BE SECURELY TO BANKS IN ACCORDANCE WITH MANUFACTUR... RECOMMENDATIONS/SPECIFICATIONS. CONTRAC... UTILIZE REDUNDANT AND/OR INTERMEDIATE AN... POINTS IF NECESSARY.
13. CONTROL OF SUSPENDED SOLIDS GENERATED ... PROJECT SHALL BE THE RESPONSIBILITY OF TH... CONTRACTOR. IF REQUESTED BY THE CONSTR... MANAGER, THE CONTRACTOR SHALL PROVIDE ... A SILT (TURBIDITY) CURTAIN ALONG THE RIVER CONTAIN EXCESSIVE SUSPENDED SOLIDS. WORK THAT INITIATED THE NEED FOR THE SILT CURT... SUSPENDED UNTIL THE SILT CURTAIN IS INSTA... SOURCE OF ANY EXCESSIVE SUSPENDED SOLIC... CORRECTED IMMEDIATELY UPON IDENTIFICATION.
14. LOCATION AND PLACEMENT OF ALL EROSION A... SEDIMENT CONTROL FEATURES SHALL BE DETE... THE CONTRACTOR AND APPROVED BY THE CON... MANAGER. AT THE DISCRETION OF THE CONSTR... MANAGER, ADDITIONAL EROSION AND SEDIMENT MEASURES MAY BE REQUIRED.

10. The Contractor shall initiate stabilization measures such as temporary seeding, mulching and/or erosion control matting practices as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.



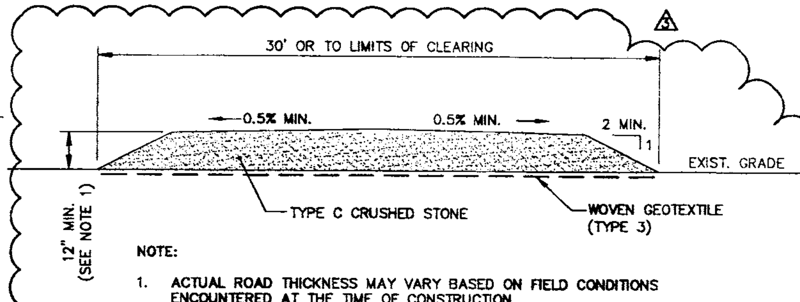


NOTES:

1. SEDIMENT DEPOSITS SHALL BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY ONE-HALF OF THE HEIGHT OF THE SILT FENCE (OR LESSER HEIGHT IF SILT FENCE FILTER FABRIC IS OVER STRESSED).
2. STRAW BALES SHALL BE OATS, WHEAT, RYE GRAIN, BROOMSAGE OR OTHER STRAW, OR NATIVE GRASS HAY.
3. BALES SHALL BE SOUND WITH BALE TIES INTACT.

STRAW BALE/SILT FENCE (5)

NOT TO SCALE

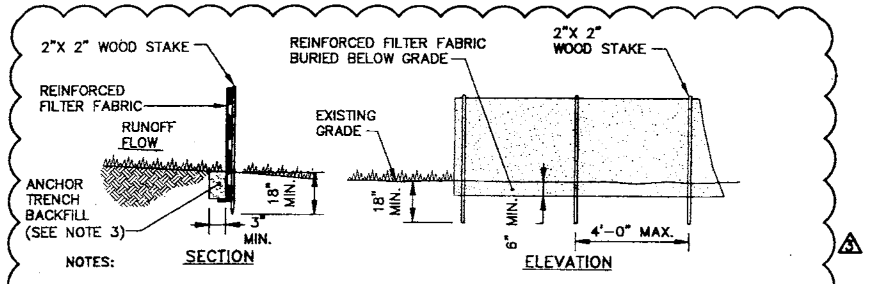


NOTE:

1. ACTUAL ROAD THICKNESS MAY VARY BASED ON FIELD CONDITIONS ENCOUNTERED AT THE TIME OF CONSTRUCTION.

TEMPORARY ACCESS ROAD/ STABILIZED CONSTRUCTION ENTRANCE AREA (7)

NOT TO SCALE

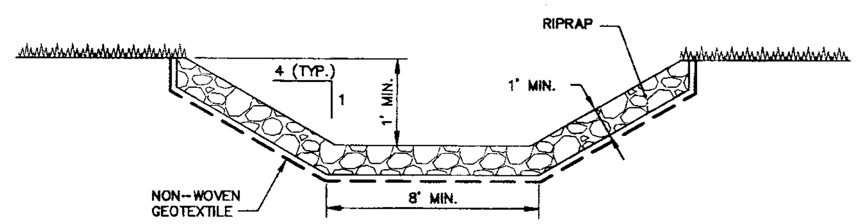


NOTES:

1. FILTER FABRIC TO BE FASTENED SECURELY TO UPGRADIENT FACE OF WOOD STAKES WITH STAPLES.
2. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED A MINIMUM OF 6 INCHES.
3. ANCHOR TRENCH BACKFILL SHALL BE IMPORTED GENERAL FILL. EXCAVATED ANCHOR TRENCH MATERIAL TO BE HANDLED IN ACCORDANCE WITH THE SOIL MANAGEMENT REQUIREMENTS GIVEN ON DRAWING S-0103.

REINFORCED SILT FENCE (3)

NOT TO SCALE



TEMPORARY DITCH (8)

NOT TO SCALE

ORIGINAL SCALE APPLIES TO 22"X34" DRAWING				
	3	11/6/06	REVISED DETAILS	JPD
	2	8/4/06	CONFORMED SET THROUGH ADDENDUM NO. 5	JPD
THIS DRAWING WAS PREPARED AT THE SCALE(S) INDICATED. INACCURACIES IN THE STATED SCALE(S) MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED. USE THE GRAPHIC SCALE BAR(S) TO DETERMINE THE ACTUAL SCALE(S) OF THIS DRAWING.	1	5/19/06	CONTRACT 1, ADDENDUM NO. 5	JPD
	No.	Date	Revisions	Init
	NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW			

Professional Engineer's Name: JOHN PAUL DOODY
Professional Engineer's No.: 067405
State: NY | Date Signed:
Project Mgr. | Designed by | Drawn by

BBL
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

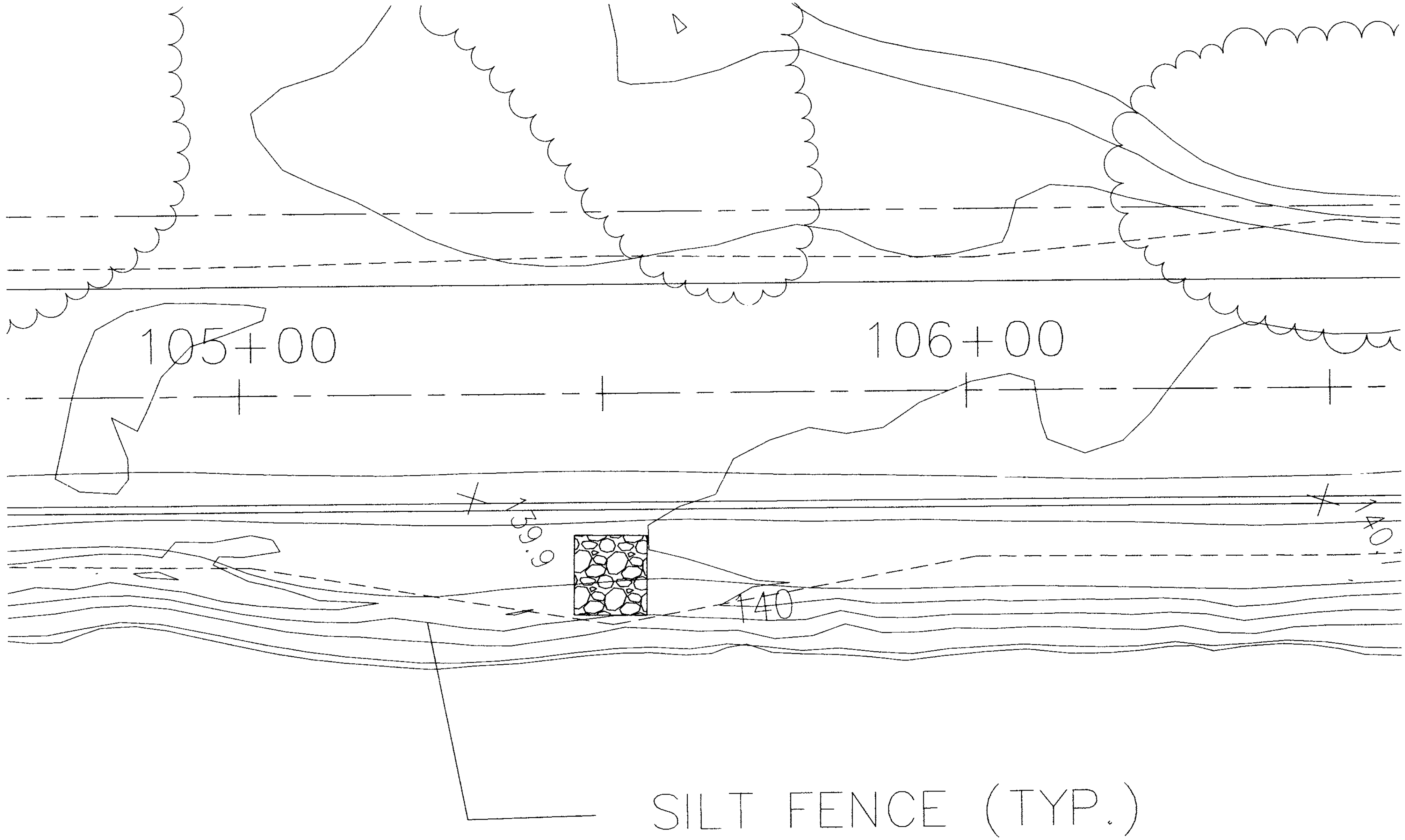
SITE EROSION AND SEDIMENT CONTROL DETAILS

CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION

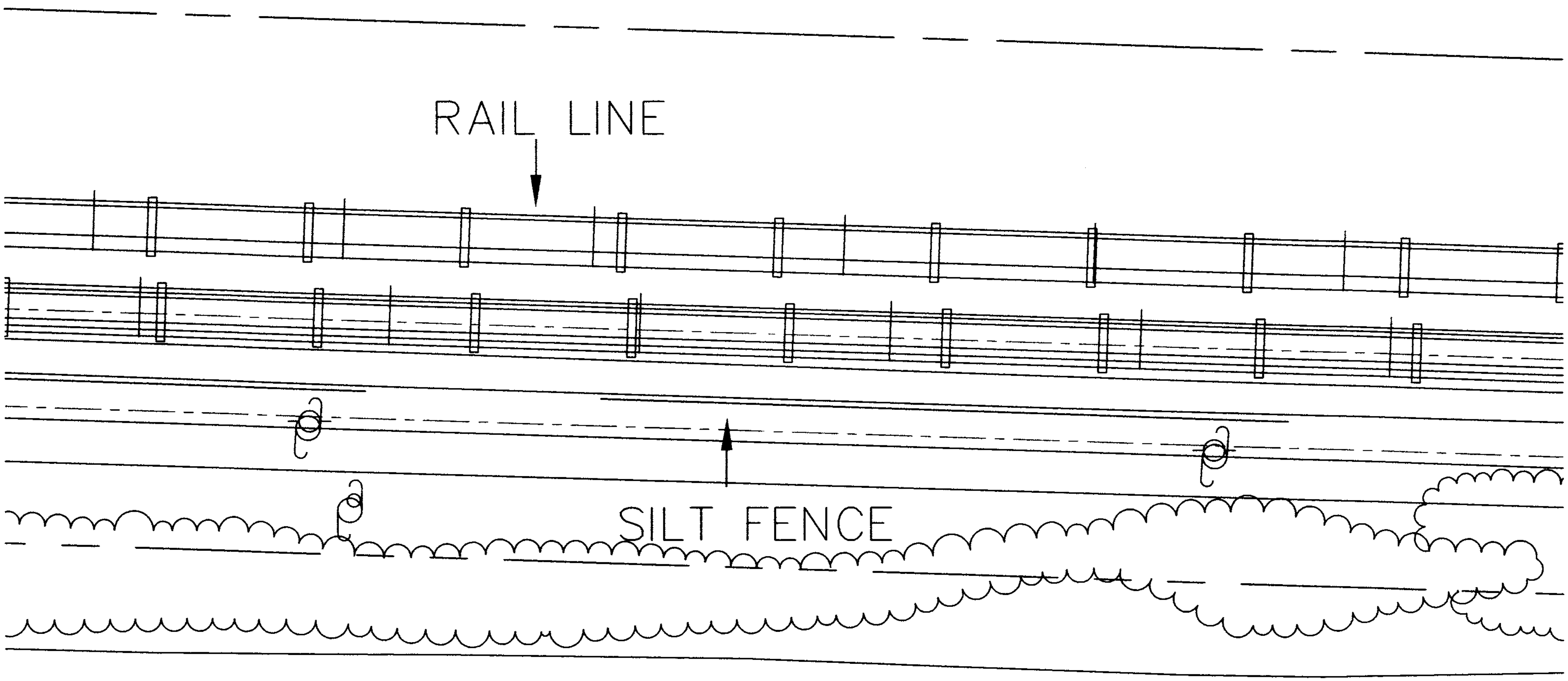
BBL Project No. 20435.700
Date: AUGUST 4, 2006
Blasland, Bouck & Lee, Inc. Corporate Headquarters 6723 Towpath Road Syracuse, NY 13214 315-446-9120

S-0102

SYR-85 G:\GE_ACTIVE\N\20426003\CFD-CIM1\C1S\S-0102.dwg LO:S-0102 PS:---- LAST SAVED:11/2/2006 3:01 PM BY:---- PRINTED:11/2/2006 4:17 PM XREFS: XGN- IMAGES:



SILT FENCE TYPICAL FOR ACCESS ROAD



SILT FENCE TYPICAL FOR RAIL LINE

Attachment C

Stormwater Controls Calculations and Details

OBJECTIVE:

Determine the required water quality treatment volume (WQv), forebay, permanent pool, and extended detention volumes for Stormwater Basins A and B. In addition, determine the design conditions for the basin spillway (outlet check dam) that releases the extended detention volume over a period of 24 hours. Verify that the basin spillways can safely pass the 100 year, 24 hour storm event.

REFERENCES:

1. *New York State Stormwater Management Design Manual, Phase I Final Design.* New York State Department of Environmental Conservation, 2003.
2. Drawing S-0020 entitled "Site Final Grading Plan – Area 1," Blasland, Bouck, & Lee, Inc. (BBL), March 2006.
3. Drawing S-0021 entitled "Site Final Grading Plan – Area 2," BBL, March 2006
4. Drawing S-0051 entitled "Stormwater and Grading Details," BBL, March 2006
5. Drawing S-0053 entitled "Stormwater and Grading Details," BBL, March 2006
6. Holtz, R.D., and Kovacs, W.D. 1981. *Introduction to Geotechnical Engineering.* Prentice Hall (attached)

ASSUMPTIONS:

1. Stormwater Basins A and B have a single 2-foot diameter inlet pipe which collected drainage from within the Type II rail yard area. Basin A has a catchment area of approximately 4.1 acres and consists entirely of impervious cover (e.g., buildings, pavement, railroad ballast, etc.). Basin B has a catchment area of approximately 7.5 acres that consists of 5.5 Acres of impervious cover and 2.0 Acres of generally pervious (bare soil, vegetated) cover.

OVERVIEW:

Stormwater Basins A and B were modeled based on the guidelines for a P-5 Pocket Pond as defined in Reference 1. Treatment of the WQv is provided by a combination permanent pool and extended detention within the forebay and basin. The breakdown of the forebay, permanent pool, and extended detention volume requirements for a P-5 Pocket Pond are as follows:

- A minimum 10% of the WQv shall be held in the forebay;
- A minimum 50% of the WQv shall be held in a permanent pool; and
- A maximum 50% of the WQv shall be provided in extended detention.

Refer to Reference 4 for a typical section through the Stormwater Basins.

Based on the required volumes for the forebay, permanent pool, and extended detention, the outlet check dams (located within the outlet channels (see References 2 and 3) were designed to release the extend detention volume over a period of 24 hours. The outlet check dam consists of 4-inch diameter outlet pipe, with a perforated inlet end segment covered by underdrain filter stone and fine stone (Type I) riprap. The perforated pipe is provided to control the discharge release rate from the basin. Underdrain filter stone is used to protect the perforated pipe inlet and prevent fine particles from entering the pipe (Detail 2, Reference 5).

CALCULATIONS:

1. Determine the WQv:

Stormwater Basin A

WQv = [(P)(Rv)(A)]/12 = [(0.99)(0.95)(4.1)]/12 = 0.32 ac-ft, where

P = 90% Rainfall Event Number = 0.99 (Figure 4.1, Reference 1);
A = the site area = 4.1 acres;
I = Percent Impervious = 100%; and
Rv = Runoff coefficient = 0.05 + 0.009(I) = 0.05+0.009(100) = 0.95

Stormwater Basin B

WQv = [(P) (Rv) (A)]/12 = [(0.99) (0.716) (7.5)]/12 = 0.44 ac-ft, where

P = 90% Rainfall Event Number = 0.99 (Figure 4.1, Reference 1);
A = the site area = 4.1 acres;
I = Percent Impervious = 74%; and
Rv = 0.05 + 0.009(I) = 0.05+0.009(74) = 0.716

2. Verify the forebay volume requirements have been met:

Stormwater Basin A

Required Storage = 10% of the WQv = (0.10) (0.32 acre-feet) = 0.032 acre-feet

At elevation 129.5 (i.e., crest elevation of the stone separating the forebay from the rest of the pond) the volume of the forebay is 0.048 ac-ft. An elevation-storage volume table of the Basin A forebay has been provided in Attachment A. Therefore, since, 0.032 < 0.048 acre-feet, the required forebay volume has been met.

Stormwater Basin B

Minimum Storage = 10% of the WQv = (0.10) (0.44 acre-feet) = 0.044 acre-feet

At elevation 128.5 (i.e., crest elevation of the stone separating the forebay from the rest of the pond) the volume of the forebay is 0.257 ac-ft. An elevation-storage volume table for the Basin B forebay has been provided in Attachment A. Therefore, since, 0.257 < 0.048 acre-feet, the minimum forebay volume requirement has been met.

3. Verify the permanent pool volume requirements have been met:

Stormwater Basin A

Required permanent pool storage volume = minimum 50% of the WQv = 0.50 (0.32 acre-feet) = 0.16 acre-feet.

At elevation 129.3 (i.e., maximum water surface elevation of the permanent pool) the permanent pool volume is 0.21

acre-feet. An elevation-storage volume table for Basin A, including the forebay, has been provided in Attachment A.

Therefore, since, 0.16< 0.21 acre-feet, the minimum permanent volume requirement has been met.

Stormwater Basin B

Required permanent pool storage volume = minimum 50%of the WQv = 0.50 (0.44 acre-feet) = 0.22 acre-feet.

At elevation 128.3 (i.e., water surface elevation of the permanent pool) the permanent pool volume is 0.258 acre-feet. An elevation-storage table for Basin B, including the forebay, has been provided in Attachment A. Therefore, since, 0.22 < 0.258 acre-feet, the minimum permanent pool volume requirement has been met.

4. Verify extended detention volume requirements have been met:

Stormwater Basin A

Required extended detention volume = 0.32 acre-feet - 0.21 acre-feet (i.e., WQv - Permanent Pool) = 0.11 acre-feet (which is <50% of the WQv).

The volume of storage above the permanent pool and below the top of the outlet check dam is the extended detention volume. The maximum water surface of the permanent pool and the top of the outlet check dam are at elevations 129.3 and 130.3, respectively. From the basin elevation-storage volume table provided in Attachment A, the volume between these two elevations is approximately 0.207 acre-feet. Therefore, since, 0.11 < 0.207 acre-feet, the extended detention volume has been achieved.

Stormwater Basin B

Required extended detention volume = 0.44 acre-feet - 0.258 acre-feet (i.e., WQv-Permanent Pool) = 0.182 acre-feet (which is <50% of the WQv).

The maximum water surface of the permanent pool and the top of the outlet check dam elevations are 128.3 and 129.3, respectively. From the basin elevation-storage table, provided in Attachment A, the volume between these two elevations is approximately 0.271 acre-feet. Therefore, since, 0.182 < 0.271 acre-feet, the extended detention volume has been achieved.

5. Calculate the average extended detention release rate from the outlet check dams:

Based on the example given in Section 8-1 of Reference 1, the average extended detention release rates for basins A and B are as follows:

Basin A

Q = [Extended Detention Volume (acre-feet) * 43, 560 (ft^2/acre)]/ [24 (hours) * 3,600 (sec/hr)]
Q = (0.11*43,560)/ (24*3,600) = 0.06 ft^3/sec

Basin A

Q = [Extended Detention Volume (acre-feet) * 43,560 (ft^2/acre)]/ [24 (hours) * 3,600 (sec/hr)]
Q = (0.182*43,560)/ (24*3,600) = 0.09 ft^3/sec

6. Determine the outlet pipe size and required length of perforated pipe required to meet the average extended detention release rate calculated above:

A 4-inch diameter pipe was selected as the outlet pipe for the check dams at Basins A and B. From Manning's equation, a 4-inch pipe with a slope of 0.2% has a full flow capacity of 0.09 ft^3/sec which is the average release rate for Stormwater Basin B. (See Attachment B for pipe flow calculation.)

Use the orifice equation, $Q = C\,A\,(2gH)^{0.5}$ to determine the flow rate into the perforated pipe.

<u>Basin A</u>

Q = discharge
C = orifice coefficient = 0.60
A = cross sectional area (in^2) of perforations/ft = 1.0 in^2/ft (from ADS N-12 Product Note 3.106 – See Attachment B)
g = gravimetric constant = 32.2 ft /s^2
H= height of water above perforation, head, = 1.0 ft.

Solve for Q,

$Q = 0.60*(1.0\ in^2/ft/144\ in^2/ft)*(2*32.2*1.0)^{0.5} = 0.03\ ft^3/sec/ft$ of perforated pipe.

Determine the length of perforated pipe segment required to achieve a release rate of 0.06 ft3/sec.

Length = 0.06 ft3/sec/0.03 ft^3/sec/ft = 2.0 ft.

<u>Basin B</u>

Solve for Q,

$Q = 0.60*(1.0\ in^2/ft/144\ in^2/ft)*(2*32.2*1.0)^{0.5} = 0.03\ ft^3/sec/ft$ of perforated pipe.

Determine the length of perforated pipe required to achieve a release rate of 0.09 ft3/sec.

Length = 0.09 ft3/sec/0.03 ft^3/sec/ft = 3.0 ft

7. Verify basin spillway will safely pass the 100 year, 24 hour storm event:

The 100 year, 24 hour storm event was routed through Stormwater Basin A and Stormwater Basin B and their associated spillways using Haestad Methods Pond Pack Version 9 software to determine the design high water surface elevations for this event. The results of the stormwater routing indicate that the 100 year elevation for Stormwater Basin A is 131.46 and is below the minimum basin crest elevation of 133.0. For Basin B, the 100 year water surface elevation is 130.93 and is below the minimum basin crest elevation of approximately 132.0. (See Attachment C for Spillway Analysis and Pond Pack data.)

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

PROJECT NO.: 050.27

CLIENT: General Electric PROJECT: Hudson River PCB's Superfund Site Prepared By: MBH/ACB Date: May 2006
TITLE: Phase I Final Design Reviewed By: PHB Date: May 2006
SUBJECT: Type II Stormwater Retention Basins A & B Design

SUMMARY:

The design of Stormwater Basins A and B were based on the Pocket Pond (P-5) design from Reference 1. The required Water Quality treatment volumes were calculated to determine the sizes segment of the forebay and permanent pool components of the basins. An orifice type control (pipe outlet with a perforated inlet end), was selected to control the outflow from the basins and obtain the 24 hour extended detention. An extended detention volume and an average release rate were calculated to determine the outlet pipe size and length of perforated pipe necessary to achieve outflow rates that allow for extended detention. Based on hydrologic modeling of Stormwater Basin A and Basin B, the basins and associated spillways have adequate capacity to safely pass the 100-year, 24 hour storm event.

Attachment A

Basin A & B Elevation Storage Volume Tables

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

File.... E:\PondPack\Type II Areas\STORMWATER BASINS A&B.PPW

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
125.50	-----	.0007	.0000	.000	.000
126.50	-----	.0041	.0065	.002	.002
127.50	-----	.0102	.0208	.007	.009
128.50	-----	.0191	.0433	.014	.024
129.50	-----	.0308	.0742	.025	.048

Basin A
FORBAY RATING Curve

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... E:\PondPack\Type II Areas\STORMWATER BASINS A&B.PPW

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
125.50	-----	.0007	.0000	.000	.000
126.50	-----	.0041	.0065	.002	.002
127.50	-----	.0102	.0208	.007	.009
128.50	-----	.1580	.2083	.069	.079
129.30	-----	.1707	.4929	.131	.210
130.30	-----	.2452	.6205	.207	.417

BASIN A
RATING CURVE
(INCLUDING FORBAY)

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... E:\PondPack\Type II Areas\STORMWATER BASINS A&B.PPW

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
125.00	-----	.0505	.0000	.000	.000
126.00	-----	.0634	.1705	.057	.057
127.00	-----	.0737	.2055	.068	.125
128.00	-----	.0929	.2493	.083	.208
128.50	-----	.1030	.2937	.049	.257

BASIN B
FORBAY RATING CURVE

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Name.... BASIN B

File.... E:\PondPack\Type II Areas\STORMWATER BASINS A&B.PPW

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
125.00	-----	.0505	.0000	.000	.000
126.00	-----	.0634	.1705	.057	.057
127.00	-----	.0736	.2053	.068	.125
128.00	-----	.0929	.2492	.083	.208
128.30	-----	.2520	.4979	.050	.258
129.30	-----	.2906	.8132	.271	.529

BASIN B
RATING CURVE
(INCLUDING FORBAY)

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Attachment B

Perforated Outlet Pipe Data

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

Product Notes

Product Note 3.106
Re: Standard Pipe Perforations (4"-60" N-12 Pipe)
Date: December 2003

Introduction
Perforated pipe plays an integral role in many applications of ADS HDPE pipe. Generally, perforated pipe is used to accelerate the removal of subsurface water in soils or to allow storm water to percolate into the soil. Currently, two classifications of perforations are specified in the AASHTO material specifications for HDPE pipe: Class I, and Class II. Class I perforations are commonly used in combination storm/underdrain systems while Class II incorporates subsurface drainage and detention/retention systems. Both classes are explained in more detail in the AASHTO materials specifications (M294 and M252) . AASHTO M252 covers pipe size 3 - 10 inch (75 - 250 mm) while M294 covers 12 – 60 inch (300 - 1500 mm). ADS manufactures pipe to meet the perforations specified for the project using the patterns indicated as follows.

ADS STANDARD PERFORATION PATTERN (AASHTO Class II Perforation)
The following terminology for perforations is derived from the applicable AASHTO specification. Differences between the specifications are covered in Table I. The perforations shall be circular and/or slotted. The perforations shall be located in the outside valleys of the corrugations. The water inlet area shall be no less than 0.945 in^2/ft (20 cm^2/m) for pipe sizes 4 - 10 inch (100 - 250mm), 1.42 in^2/ft (30 cm^2/m) for pipe sizes 12 - 18 inch (300 - 450 mm) and 1.89 in^2/ft (40 cm^2/m) for pipe sizes larger than and equal to 24 inches (450 mm). Table 1 and Figure A below represent ADS standard perforation patterns for AASHTO Class II. Patterns indicated with an asterisk are a made-to-order product and additional lead-time should be allowed when ordering.

Table I

Nominal I.D.		Perforation Type	Maximum Slot Length or Diameter		Maximum Slot Width		Perforation Config.	Minimum Inlet Area	
in	mm		in	mm	in	mm		in^2/ft	cm^2/m
*4	100	Slot	0.984	25	0.118	3	CD	1.0	20
*6	150	Slot	0.984	25	0.118	3	CD	1.0	20
*8	200	Slot	1.18	30	0.118	3	CD	1.0	20
*10	250	Slot	1.18	30	0.118	3	CD	1.0	20
12	300	Circular	0.394	10	-	-	E	1.5	30
15	375	Circular	0.394	10	-	-	E	1.5	30
18	450	Circular	0.394	10	-	-	E	1.5	30
24	600	Circular	0.394	10	-	-	F	2.0	40
30	750	Circular	0.394	10	-	-	H	2.0	40
36	900	Circular	0.394	10	-	-	H	2.0	40
42 Type S	1050	Circular	0.394	10	-	-	H	2.0	40
*42 Type D	1050	Circular	0.394	10	-	-	**F	2.0	40
48 Type S	1200	Circular	0.394	10	-	-	H	2.0	40
*48 Type D	1200	Circular	0.394	10	-	-	**F	2.0	40
60 Type S	1500	Circular	0.394	10	-	-	H	2.0	40
*60 Type D	1500	Circular	0.394	10	-	-	**F	2.0	40

* Denotes perforation pattern made to order
** Spaced at 5" longitudinally for 42" and 48" and 5.5" longitudinally for 60" diameter

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Description: Outlet Pipes Stormwater Basins

Solve For Full Flow Diameter

Given Constant Data;

Slope.............. 0.0020
Mannings n......... 0.012

Variable Input Data	Minimum	Maximum	Increment By
Discharge	0.01	0.10	0.01

COMPUTED Diameter ft	Channel Slope ft/ft	Mannings 'n'	VARIABLE Discharge cfs	COMPUTED Depth ft	COMPUTED Velocity fps	COMPUTED Capacity Full cfs
0.14	0.0020	0.012	0.01	0.14	0.61	0.01
0.19	0.0020	0.012	0.02	0.19	0.72	0.02
0.22	0.0020	0.012	0.03	0.22	0.80	0.03
0.24	0.0020	0.012	0.04	0.24	0.86	0.04
0.26	0.0020	0.012	0.05	0.26	0.91	0.05
0.28	0.0020	0.012	0.06	0.28	0.95	0.06
0.30	0.0020	0.012	0.07	0.30	0.99	0.07
0.32	0.0020	0.012	0.08	0.32	1.02	0.08
0.33	0.0020	0.012	0.09	0.33	1.05	0.09
0.34	0.0020	0.012	0.10	0.34	1.08	0.10
0.36	0.0020	0.012	0.11	0.36	1.10	0.11

Open Channel Flow Module, Version 3.43 (c)
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Attachment C

Spillway Analysis

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

Table of Contents

MASTER DESIGN STORM SUMMARY

Network Storm Collection: EP Site

Return Event	Total Depth in	Rainfall Type	RNF ID
100	5.6000	Synthetic Curve	TypeII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
BASIN-A	IN	POND	100	1.768		11.9200	30.78		
BASIN-A	OUT	POND	100	1.754		12.0100	23.73	131.46	.315
BASIN-B	IN	POND	100	2.971		11.9200	53.18		
BASIN-B	OUT	POND	100	2.946		12.0100	40.70	130.93	.528
CATCHMENT A		AREA	100	1.768		11.9200	30.78		
CATCHMENT B		AREA	100	2.971		11.9200	53.18		
*OUT 10		JCT	100	1.754		12.0100	23.73		
*OUT 20		JCT	100	2.946		12.0100	40.70		

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.6000 in
Rain Dir      = E:\PondPack\Type II Areas\
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = E:\PondPack\Type II Areas\
HYG File - ID =  - CATCHMENT A 100
Tc (Min. Tc)  = .0833 hrs
Drainage Area = 4.430 acres  Runoff CN= 93

============================================
Computational Time Increment   =   .01111 hrs
Computed Peak Time             =  11.9175 hrs
Computed Peak Flow             =    30.86 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    30.78 cfs
============================================

                DRAINAGE AREA
              -------------------
              ID:CATCHMENT A
              CN   =    93
              Area =       4.430 acres
              S    =    .7527 in
              0.2S =    .1505 in

               Cumulative Runoff
              -------------------
                      4.7881 in
                       1.768 ac-ft

HYG Volume...          1.768 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .08330 hrs (ID: CATCHMENT A)
Computational Incr, Tm =   .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =    .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =    60.26 cfs
Unit peak time      Tp =   .05553 hrs
Unit receding limb, Tr =   .22213 hrs
Total unit time,    Tb =   .27767 hrs
```

```
SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
Duration      = 24.0000 hrs     Rain Depth = 5.6000 in
Rain Dir      = E:\PondPack\Type II Areas\
Rain File -ID =  - TypeII  24hr
Unit Hyd Type = Default Curvilinear
HYG Dir       = E:\PondPack\Type II Areas\
HYG File - ID =  - CATCHMENT B 100
Tc (Min. Tc)  = .0833 hrs
Drainage Area = 8.000 acres  Runoff CN= 90

============================================
Computational Time Increment   =   .01111 hrs
Computed Peak Time             =  11.9175 hrs
Computed Peak Flow             =    53.30 cfs

Time Increment for HYG File    =    .0100 hrs
Peak Time, Interpolated Output =  11.9202 hrs
Peak Flow, Interpolated Output =    53.18 cfs
============================================

                 DRAINAGE AREA
              -------------------
              ID:CATCHMENT B
              CN   =   90
              Area =       8.000 acres
              S    =   1.1111 in
              0.2S =    .2222 in

               Cumulative Runoff
              -------------------
                      4.4569 in
                       2.971 ac-ft

HYG Volume...          2.971 ac-ft (area under HYG curve)

***** SCS UNIT HYDROGRAPH PARAMETERS *****

Time Concentration, Tc =   .08330 hrs (ID: CATCHMENT B)
Computational Incr, Tm =   .01111 hrs = 0.20000 Tp

Unit Hyd. Shape Factor =  483.432 (37.46% under rising limb)
K =  483.43/645.333,  K =     .7491 (also, K = 2/(1+(Tr/Tp))
Receding/Rising, Tr/Tp =   1.6698 (solved from K =    .7491)

Unit peak,          qp =   108.82 cfs
Unit peak time      Tp =   .05553 hrs
Unit receding limb, Tr =   .22213 hrs
Total unit time,    Tb =   .27767 hrs
```

File.... E:\PondPack\Type II Areas\100-YEAR.PPW

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 130.30 ft
Increment = .10 ft
Max. Elev.= 133.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Weir-XY Points	W1	--->	TW	130.300	133.000
TW SETUP, DS Channel					

File.... E:\PondPack\Type II Areas\100-YEAR.PPW

OUTLET STRUCTURE INPUT DATA

Structure ID = W1
Structure Type = Weir-XY Points

# of Openings = 1
WEIR X-Y GROUND POINTS

X, ft	Elev, ft
.00	133.00
2.12	132.30
5.33	132.30
11.39	130.30
16.07	130.30
22.13	132.30
25.32	132.30
27.46	133.00

Lowest Elev. = 130.30 ft

Weir Coeff. = 2.640000

Weir TW effects (Use adjustment equation)

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = TW
Structure Type     = TW SETUP, DS Channel
------------------------------------

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Trapz.
Channel ID:   Chn-Trapz - 1

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

```
USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Trapz.
Channel ID:   Chn-Trapz - 1


Solution to Mannings Open Channel Flow Equation
  (Computed values are based on normal depth.)

          TRAPEZOIDAL CROSS SECTION

           Slope          = .004000 ft/ft
           Mannings n = 0.03500
           Invert Elev.   =  129.00 ft
           Top of Channel =  133.00 ft
           Base width     =    5.00 ft
           Rt Side slope  =    3.000 horizontal :1 vert.
           Lt Side slope  =    3.000 horizontal :1 vert.
```

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 129.30 ft
Increment = .10 ft
Max. Elev.= 132.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Weir-XY Points	W2	--->	TW	129.300	132.000
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

Structure ID = W2
Structure Type = Weir-XY Points

# of Openings = 1
WEIR X-Y GROUND POINTS

X, ft	Elev, ft
.00	132.00
2.12	131.30
5.33	131.30
11.19	129.30
16.07	129.30
22.13	131.30
25.32	131.30
27.46	132.00

Lowest Elev. = 129.30 ft

Weir Coeff. = 2.640000

Weir TW effects (Use adjustment equation)

File.... E:\PondPack\Type II Areas\100-YEAR.PPW

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = TW
Structure Type     = TW SETUP, DS Channel
------------------------------------

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Trapz.
Channel ID:   Chn-Trapz - 2

CONVERGENCE TOLERANCES...
Maximum Iterations=    30
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .10 cfs
Max.  Q tolerance =    .10 cfs
```

File.... E:\PondPack\Type II Areas\100-YEAR.PPW

USE DOWNSTREAM CHANNEL NORMAL DEPTH FOR TW...
Channel Type: Chn-Trapz.
Channel ID: Chn-Trapz - 2

Solution to Mannings Open Channel Flow Equation
(Computed values are based on normal depth.)

TRAPEZOIDAL CROSS SECTION

```
Slope          = .001000 ft/ft
Mannings n = 0.03500
Invert Elev.   =  128.00 ft
Top of Channel =  132.00 ft
Base width     =    5.00 ft
Rt Side slope  =   3.000 horizontal :1 vert.
Lt Side slope  =   3.000 horizontal :1 vert.
```

Index of Starting Page Numbers for ID Names

CLIENT: General Electric **PROJECT:** Hudson River PCB's Superfund Site **Prepared By:** ACB **Date:** May 2006
TITLE: Phase I Final Design **Reviewed By:** PHB **Date:** May 2006
SUBJECT: Swale Calculations for the Bond Creek outlet swales for culverts C-2 and C-4

OBJECTIVE:

Determine the required water quality treatment volume (WQv) and required forebay volume for the Bond Creek outlet swales for culverts C-2 and C-4. In addition, determined the design conditions for a check dam at the outlet of each swale forebay that releases the WQv over a 30 minute duration.

REFERENCES:

1. New York State Department of Environmental Conservation (NYS DEC). 2003. *New York State Stormwater Management Design Manual.*
2. Drawing S-0021 entitled "Site Final Grading Plan – Area 2," Blasland, Bouck, & Lee, Inc., (BBL), March 2006
3. Drawing S-0023 entitled "Site Final Grading Plan – Area 4," BBL, March 2006.
4. Drawing S-0051 entitled "Stormwater and Grading Details," BBL, March 2006..
5. Drawing S-0053 entitled "Stormwater and Grading Details," BBL, March 2006.
6. Fischenich, Craig 2001. Stability Thresholds for Stream Restoration Materials. *EMRRP SR-29*

ASSUMPTIONS:

1. Culverts C-2 and C-4 are single 12-inch diameter HDPE pipes. Culvert C-2 has a drainage area of approximately 3.77 acres of which approximately 1.13 acres is impervious (building and pavement area) and 2.64 acres is generally pervious (grass covered). Culvert C-4 has a drainage area of approximately 1.76 acres, of which, 1.45 acres is impervious (surfaced parking area and pavement) and the remaining 0.31 acres is pervious (grass covered).

OVERVIEW:

The outlet swales to Bond Creek from culverts C-2 and C-4 were modeled based on the guidelines for a Wet Swale (O-2) presented in Reference 1. The Wet Swale design is a vegetated open channel with a check dam that is designed to capture and treat stormwater by the creation of a wet cell formed within the channel as a result of check dam or other similar type feature. The Wet Swale is used primarily for the treatment of stormwater for Water Quality. The Wet Swale application was selected since drainage areas are less than 5 acres, data indicates that the groundwater table will be in close proximity to the bottom of the swale, and overall site stormwater runoff volumes will be less than the pre-development condition. Treatment of the WQv is obtained by providing temporary storage within a forebay formed at the culvert outlets with check dams. A minimum of 10% of the WQv is to be held in the forebay for pre-treatment (refer to Reference 4 and 5 for a typical section through the outlet swales and check dam details). The Wet Swales will be grass lined and maintained as needed to retain their function during the facility operating period.

In addition to a pre-treatment forebay, the Wet Swale design requires the temporary storage of the WQv to be released over a period of 30 minutes for treatment. Outlet pipes, located at the base of the check dams, are sized to provide the required release rates.

CLIENT: General Electric PROJECT: Hudson River PCB's Superfund Site Prepared By: ACB Date: May 2006
TITLE: Phase I Final Design Reviewed By: PHB Date: May 2006
SUBJECT: Swale Calculations for the Bond Creek outlet swales for culverts C-2 and C-4

CALCULATIONS:

1. Determine the Water Quality Volume (WQv):

Swale C-2

WQv = [(P)(Rv)(A)]/12 = [(0.99)(0.32)(3.77)]/12 = 0.099 ac-ft, where

P = 90% Rainfall Event Number = 0.99 (Figure 4.1, Reference 1);
A = the site area = 3.77 acres;
I = Percent Impervious = 30%; and
Rv = Runoff coefficient = 0.05 + 0.009(I) = 0.05+0.009(30) = 0.32

Swale C-4

P = 90% Rainfall Event Number = 0.99 (Figure 4.1, Reference 1);
A = the site area = 1.76 acres;
I = Percent Impervious = 82%; and
Rv = Runoff coefficient = 0.05 + 0.009(I) = 0.05+0.009(82) = 0.79

WQv = [(P) (Rv) (A)]/12 = [(0.99) (0.79) (1.76)]/12 = 0.11 ac-ft

2. Verify the forebay volume requirements have been met:

The forebay will be constructed by placing a check dam in the swale at a distance from the culvert outlet that will allow for the required storage. A minimum 5 ft width and 1 ft height were used to calculate the cross sectional area of each swale, which is equal to 8 ft^2.

Swale C-2

Required Storage = 10% of the WQv = (0.10) (0.099 acre-feet) = 0.0099 acre-feet

By dividing the required storage by the cross sectional area, the length of channel required for the forebay is 54 ft.

Swale C-4

Required Storage = 10% of the WQv = (0.10) (0.11 acre-feet) = 0.011 acre-feet

By dividing the required storage by the cross sectional area, the length of channel required for the forebay is 60 ft.

3. Calculate the average release rate from the check dams:

The average release rate is equal to the release rate that is required to obtain a minimum 30 minute detention time in the forebay.

Based on the example given in Section 8-1 of Reference 1, the average release rate is as follows:

Swale C-2

$Q = [WQv \text{ (acre-feet)} * 43,560 \text{ (ft}^2\text{/acre)}] / [30 \text{ (min)} * 60 \text{ (sec/min)}]$
$Q = (0.099*43,560)/(30*60) = 2.4 \text{ ft}^3\text{/sec}$

Swale C-4

$Q = [WQv \text{ (acre-feet)} * 43,560 \text{ (ft}^2\text{/acre)}] / [30 \text{ (min)} * 60 \text{ (sec/min)}]$
$Q = (0.11*43,560)/(30*60) = 2.7 \text{ ft}^3\text{/sec}$

4. Determine the maximum pipe size to meet the average release rate calculated above:

The required pipe size was calculated using Manning's Equation in the Haestad Method's Flow Master. (See Attachments)

Swale C-2

Pipe size to provide minimum 30 minute detention time = 10" Diameter, where

Qav = average release rate = 2.4 ft^3/sec
n = 0.012 for a plastic pipe
S = 0.005 ft/ft

Swale C-4

Pipe size to provide minimum 30 minute detention time = 10" Diameter, where

Qav = average release rate = 2.70 ft^3/sec
n = 0.012 for a plastic pipe
S = 0.005 ft/ft

5. Verify that the swale conveyance requirements have been met.

Conveyance requirements include a non-erosive peak velocity of 3.5 to 5.0 ft/s for the 2 year, 24 hour storm event and a minimum 6 inch freeboard for the 10 year, 24 hour storm event. These values were obtained by using the Manning's equation and assuming a Class B turf. (See Attachments)

Swale C-2

Velocity for 2 year storm = 2.13 ft/s
Freeboard for 10 year storm = 0.53 ft.

Swale C-4

Velocity for 2 year storm = 2.05 ft/s
Freeboard for 10 year storm = 0.50 ft.

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

CLIENT: General Electric PROJECT: Hudson River PCB's Superfund Site Prepared By: ACB Date: May 2006
TITLE: Phase I Final Design Reviewed By: PHB Date: May 2006
SUBJECT: Swale Calculations for the Bond Creek outlet swales for culverts C-2 and C-4

SUMMARY:

The design of the Bond Creek outlet swales for culverts C-2 and C-4 is based on the Wet Swale (O-2) design from Reference 1. The required Water Quality treatment volumes were calculated to determine the sizes of the forebay. A check dam with a pipe outlet, is utilized to control the outflow from the forebay and obtain the 30 minute detention time. An average release rate was calculated to determine the outlet pipe size necessary to achieve the required outflow rates from the check dam structures. Hydrologic evaluation of the swales indicates that the swales meet the requirements for conveyance of the 2 year and 10 year, 24 hour storm events.

Attachments

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

Check Dam outlets

SWALEOUT

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name:

Description: Outlet Pipes for C-2 and C-4

Solve For Full Flow Diameter

Given Constant Data;

Slope.............. 0.0050
Mannings n......... 0.012

Variable Input Data	Minimum	Maximum	Increment By
Discharge	1.00	3.00	0.50

COMPUTED Diameter ft	Channel Slope ft/ft	Mannings 'n'	VARIABLE Discharge cfs	COMPUTED Depth ft	COMPUTED Velocity fps	COMPUTED Capacity Full cfs
0.69	0.0050	0.012	1.00	0.69	2.70	1.00
0.80	0.0050	0.012	1.50	0.80	2.99	1.50
0.89	0.0050	0.012	2.00	0.89	3.22	2.00
~~0.97~~	~~0.0050~~	~~0.012~~	~~2.50~~	~~0.97~~	~~3.40~~	~~2.50~~
1.04	0.0050	0.012	3.00	1.04	3.56	3.00

Use 10" pipe to get slightly > 30min detention

Open Channel Flow Module, Version 3.43 (c)
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Swale Evaluations

Project: Hudson River PCB's Superfund Site
Project No.:
Subject:

Prepared by: Anna Bergmark
Date: 5/22/06
Checked by: ______
Date: ______

Swale Outlet for C-2

Channel Design (Input)		
Flow Capacity (cfs)	6.00	2-year
Base Width (ft)	5.00	Reference 4
Left Side Slope (x:1)	3.00	Reference 4
Right Side Slope (x:1)	3.00	Reference 4
Bed Slope	0.005	Reference 2 and 3
Minimum Riprap D_{50} (in.)	6.4	
Maximum Allowable Shear Stress on Bed (psf)	2.10	Reference 7
Maximum Allowable Shear Stress on Sideslopes (psf)	2.10	
Manning "n"	0.025	Natural Channel - Good Conditions Reference 6

Flow Conditions (Output)		
Flowrate from Manning Equation (cfs)	6.00	
Required Flow Depth (ft)	0.44	
Resulting Flow Velocity (ft/s)	2.13	
Resulting Flow Width at Top (ft)	7.66	
Resulting Flow Area (ft^2)	2.81	
Resulting Wetted Perimeter (ft)	7.81	
Resulting Hydraulic Radius (ft)	0.36	
Resulting Shear Stress on Bed (psf)	0.14	
Resulting Shear Stress on Sideslopes (psf)	0.10	
Channel Dimensions		
Channel Depth (ft)	0.75	
Resulting Freeboard (ft)	0.31	
Shear Stress Factor of Safety (Bed)	15.15	1.00
Shear Stress Factor of Safety (Sideslope)	20.21	1.00

Project: Hudson River PCB's Superfund Site
Project No.:
Subject:

Prepared by: Anna Bergmark
Date: 5/22/06
Checked by:______
Date:______

Swale Outlet for C-2

Channel Design (Input)		
Flow Capacity (cfs)	8.24	10-year
Base Width (ft)	5.00	Reference 4
Left Side Slope (x:1)	3.00	Reference 4
Right Side Slope (x:1)	3.00	Reference 4
Bed Slope	0.005	Reference 2 and 3
Minimum Riprap D_{50} (in.)	6.4	
Maximum Allowable Shear Stress on Bed (psf)	2.10	Reference 7
Maximum Allowable Shear Stress on Sideslopes (psf)	2.10	
Manning "n"	0.025	Natural Channel - Good Conditions Reference 6

Flow Conditions (Output)		
Flowrate from Manning Equation (cfs)	8.24	
Required Flow Depth (ft)	0.53	
Resulting Flow Velocity (ft/s)	2.36	
Resulting Flow Width at Top (ft)	8.18	
Resulting Flow Area (ft^2)	3.50	
Resulting Wetted Perimeter (ft)	8.35	
Resulting Hydraulic Radius (ft)	0.42	
Resulting Shear Stress on Bed (psf)	0.17	
Resulting Shear Stress on Sideslopes (psf)	0.12	
Channel Dimensions		
Channel Depth (ft)	0.75	
Resulting Freeboard (ft)	0.22	
Shear Stress Factor of Safety (Bed)	12.69	1.00
Shear Stress Factor of Safety (Sideslope)	16.92	1.00

Project: Hudson River PCB's Superfund Site
Project No.:
Subject:

Prepared by: Anna Bergmark
Date: 5/22/06
Checked by:______
Date:______

Swale Outlet for C-4

Channel Design (Input)		
Flow Capacity (cfs)	5.30	2-year
Base Width (ft)	5.00	Reference 4
Left Side Slope (x:1)	3.00	Reference 4
Right Side Slope (x:1)	3.00	Reference 4
Bed Slope	0.005	Reference 2 and 3
Minimum Riprap D_{50} (in.)	6.4	
Maximum Allowable Shear Stress on Bed (psf)	2.10	Reference 7
Maximum Allowable Shear Stress on Sideslopes (psf)	2.10	
Manning "n"	0.025	Natural Channel - Good Conditions Reference 6

Flow Conditions (Output)		
Flowrate from Manning Equation (cfs)	5.30	
Required Flow Depth (ft)	0.41	
Resulting Flow Velocity (ft/s)	2.05	
Resulting Flow Width at Top (ft)	7.48	
Resulting Flow Area (ft^2)	2.59	
Resulting Wetted Perimeter (ft)	7.62	
Resulting Hydraulic Radius (ft)	0.34	
Resulting Shear Stress on Bed (psf)	0.13	
Resulting Shear Stress on Sideslopes (psf)	0.10	
Channel Dimensions		
Channel Depth (ft)	0.75	
Resulting Freeboard (ft)	0.34	
Shear Stress Factor of Safety (Bed)	16.25	1.00
Shear Stress Factor of Safety (Sideslope)	21.67	1.00

Project: Hudson River PCB's Superfund Site
Project No.:
Subject:

Prepared by: Anna Bergmark
Date: 5/22/06
Checked by:______
Date:______

Swale Outlet for C-4

Channel Design (Input)		
Flow Capacity (cfs)	7.31	10-year
Base Width (ft)	5.00	Reference 4
Left Side Slope (x:1)	3.00	Reference 4
Right Side Slope (x:1)	3.00	Reference 4
Bed Slope	0.005	Reference 2 and 3
Minimum Riprap D_{50} (in.)	6.4	
Maximum Allowable Shear Stress on Bed (psf)	2.10	Reference 7
Maximum Allowable Shear Stress on Sideslopes (psf)	2.10	
Manning "n"	0.025	Natural Channel - Good Conditions Reference 6

Flow Conditions (Output)		
Flowrate from Manning Equation (cfs)	7.31	
Required Flow Depth (ft)	0.50	
Resulting Flow Velocity (ft/s)	2.27	
Resulting Flow Width at Top (ft)	7.98	
Resulting Flow Area (ft^2)	3.22	
Resulting Wetted Perimeter (ft)	8.14	
Resulting Hydraulic Radius (ft)	0.40	
Resulting Shear Stress on Bed (psf)	0.15	
Resulting Shear Stress on Sideslopes (psf)	0.12	
Channel Dimensions		
Channel Depth (ft)	0.75	
Resulting Freeboard (ft)	0.25	
Shear Stress Factor of Safety (Bed)	13.57	1.00
Shear Stress Factor of Safety (Sideslope)	18.09	1.00

Stability Thresholds for Stream Restoration Materials

by Craig Fischenich[1]

May 2001

Complexity	***Value as a Planning Tool***	***Cost***
Low / Moderate / High	Low / Moderate / High	Low / Moderate / High

OVERVIEW

Stream restoration projects usually involve some modification to the channel or the banks. Designers of stabilization or restoration projects must ensure that the materials placed within the channel or on the banks will be stable for the full range of conditions expected during the design life of the project. Unfortunately, techniques to characterize stability thresholds are limited. Theoretical approaches do not exist and empirical data mainly consist of velocity limits, which are of limited value.

Empirical data for shear stress or stream power are generally lacking, but the existing body of information is summarized in this technical note. Whereas shear thresholds for soils found in channel beds and banks are quite low (generally < 0.25 lb/sf), those for vegetated soils (0.5 – 4 lb/sf), erosion control materials and bioengineering techniques (0.5 – 8 lb/sf), and hard armoring (< 13 lb/sf) offer options to provide stability.

STABILITY CRITERIA

The stability of a stream refers to how it accommodates itself to the inflowing water and sediment load. In general, stable streams may adjust their boundaries but do not exhibit trends in changes to their geometric character. One form of instability occurs when a stream is unable to transport its sediment load (i.e., sediments deposited within the channel), leading to the condition referred to as aggradation. When the ability of the stream to transport sediment exceeds the availability of sediments within the incoming flow, and stability thresholds for the material forming the boundary of the channel are exceeded, erosion occurs. This technical note deals with the latter case of instability and distinguishes the presence or absence of erosion (threshold condition) from the magnitude of erosion (volume).

Erosion occurs when the hydraulic forces in the flow exceed the resisting forces of the channel boundary. The amount of erosion is a function of the relative magnitude of these forces and the time over which they are applied. The interaction of flow with the boundary of open channels is only imperfectly understood. Adequate analytical expressions describing this interaction have not yet been developed for conditions associated with natural channels. Thus, means of characterizing erosion potential must rely heavily upon empiricism.

Traditional approaches for characterizing erosion potential can be placed in one of two categories: maximum permissible velocity, and tractive force (or critical shear stress). The former approach is advantageous in that velocity is a parameter that can be measured within the flow. Shear stress cannot be directly measured – it must be computed from other flow parameters. Shear stress is a better measure of the fluid force on the channel boundary than is velocity. Moreover, conventional guidelines, including ASTM standards, rely upon the shear stress as a

[1] USAE Research and Development Center, Environmental Laboratory, 3909 Halls Ferry Rd., Vicksburg MS 39180

Table 2. Permissible Shear and Velocity for Selected Lining Materials[1]

Boundary Category	Boundary Type	Permissible Shear Stress (lb/sq ft)	Permissible Velocity (ft/sec)	Citation(s)
Soils	Fine colloidal sand	0.02 - 0.03	1.5	A
	Sandy loam (noncolloidal)	0.03 - 0.04	1.75	A
	Alluvial silt (noncolloidal)	0.045 - 0.05	2	A
	Silty loam (noncolloidal)	0.045 - 0.05	1.75 – 2.25	A
	Firm loam	0.075	2.5	A
	Fine gravels	0.075	2.5	A
	Stiff clay	0.26	3 – 4.5	A, F
	Alluvial silt (colloidal)	0.26	3.75	A
	Graded loam to cobbles	0.38	3.75	A
	Graded silts to cobbles	0.43	4	A
	Shales and hardpan	0.67	6	A
Gravel/Cobble	1-in.	0.33	2.5 – 5	A
	2-in.	0.67	3 – 6	A
	6-in.	2.0	4 – 7.5	A
	12-in.	4.0	5.5 – 12	A
Vegetation	Class A turf	3.7	6 – 8	E, N
	Class B turf	2.1	4 - 7	E, N
	Class C turf	1.0	3.5	E, N
	Long native grasses	1.2 – 1.7	4 – 6	G, H, L, N
	Short native and bunch grass	0.7 - 0.95	3 – 4	G, H, L, N
	Reed plantings	0.1-0.6	N/A	E, N
	Hardwood tree plantings	0.41-2.5	N/A	E, N
Temporary Degradable RECPs	Jute net	0.45	1 – 2.5	E, H, M
	Straw with net	1.5 – 1.65	1 – 3	E, H, M
	Coconut fiber with net	2.25	3 – 4	E, M
	Fiberglass roving	2.00	2.5 – 7	E, H, M
Non-Degradable RECPs	Unvegetated	3.00	5 – 7	E, G, M
	Partially established	4.0-6.0	7.5 – 15	E, G, M
	Fully vegetated	8.00	8 – 21	F, L, M
Riprap	6 – in. d_{50}	2.5	5 – 10	H
	9 – in. d_{50}	3.8	7 – 11	H
	12 – in. d_{50}	5.1	10 – 13	H
	18 – in. d_{50}	7.6	12 – 16	H
	24 – in. d_{50}	10.1	14 – 18	E
Soil Bioengineering	Wattles	0.2 – 1.0	3	C, I, J, N
	Reed fascine	0.6-1.25	5	E
	Coir roll	3 - 5	8	E, M, N
	Vegetated coir mat	4 - 8	9.5	E, M, N
	Live brush mattress (initial)	0.4 – 4.1	4	B, E, I
	Live brush mattress (grown)	3.90-8.2	12	B, C, E, I, N
	Brush layering (initial/grown)	0.4 – 6.25	12	E, I, N
	Live fascine	1.25-3.10	6 – 8	C, E, I, J
	Live willow stakes	2.10-3.10	3 – 10	E, N, O
Hard Surfacing	Gabions	10	14 – 19	D
	Concrete	12.5	>18	H

[1] Ranges of values generally reflect multiple sources of data or different testing conditions.

A. Chang, H.H. (1988).
B. Florineth. (1982)
C. Gerstgraser, C. (1998).
D. Goff, K. (1999).
E. Gray, D.H., and Sotir, R.B. (1996).
F. Julien, P.Y. (1995).
G. Kouwen, N.; Li, R. M.; and Simons, D.B., (1980).
H. Norman, J. N. (1975).
I. Schiechtl, H. M. and R. Stern. (1996).
J. Schoklitsch, A. (1937).
K. Sprague, C.J. (1999).
L. Temple, D.M. (1980).
M. TXDOT (1999)
N. Data from Author (2001)
O. USACE (1997).

CLIENT: General Electric Company **PROJECT:** Hudson River PCB's Superfund Site **Prepared By:** JEM **Date:** October 2006
TITLE: Sediment Remediation Phase I :Work Support Marina **Checked By:** CAA **Date:** October 2006
SUBJECT: Stormwater Pond and Outlet Structure Calculations **Reviewed By:** PHB **Date:** October 2006

OBJECTIVE:

Determine the required water quality treatment volume (WQ_v) for the stormwater pond at the Work Support Marina Site. Verify that the permanent pool and extended detention volumes are achieved. Confirm that the pond outlet structure provides for discharge of the extended detention volume in a 24 hour period.

REFERENCES:

1. New York State Department of Environmental Conservation (NYS DEC), 2003. *New York State Stormwater Management Design Manual.*

2. Sediment Remediation Phase I Contract Drawing S-0103 entitled *Work Support Marina – Site Plan* prepared by Blasland, Bouck and Lee, Inc., October 2006.

3. Sediment Remediation Phase I Contract Drawing S-0104 entitled *Work Support Marina - Stormwater and Grading Plan* prepared by BBL, October 2006.

4. Sediment Remediation Phase I Contract Drawing S-0106 entitled *Work Support Marina - Site Details* prepared by BBL, October 2006.

5. Sediment Remediation Phase I Contract Drawing S-0107 entitled *Work Support Marina - Site Details* prepared by BBL, October 2006.

6. Ernest F. Brater and Horace W. King, 1996. *Handbook of Hydraulics.*

7. *Work Support Marina – Site Plan* (Reference 2) with Site Area Delineation.

OVERVIEW:

The site is a 3.40 acre area located in the Town of Moreau, New York adjacent to the Hudson River. Presently, stormwater runoff from the majority of the site drains to a ditch located adjacent to the south side of the site. Runoff collected by the ditch discharges directly to the Hudson River. The remainder of the site generally drains directly to the Hudson River via overland flow.

Based on the subsurface soil sampling data collected at the site, the existing soils are generally composed of 0-2 feet of dredge spoil material overlying a silty sand/sandy silt layer. In order to minimize excavation of the existing soils including dredge spoil material, imported fill will be used to develop the site.

Following development, approximately 2.10 acres will consist of paved areas (i.e. parking, driveway). The parking area will accommodate approximately 150 light trucks and passenger vehicles, administrative trailers, storage, and access to a river-based floating dock system. An auxiliary 0.50 acre vegetated parking area will be developed for the storage of boat trailers. The remaining area of the site will consist of approximately 0.35 acres of paved access road, and a 0.45 acre stormwater pond. (See Reference 7 for Site Area Delineation)

The stormwater pond will be constructed immediately west of the paved parking area. The stormwater pond will manage stormwater runoff mainly from the paved parking area. The pond will be graded and vegetated in a manner that promotes conveyance of runoff towards the pond outlet via a pilot channel lined with riprap. The pond will serve as a means for improving water quality from the contributing watershed areas prior to discharging to the Hudson River.

CLIENT: General Electric Company PROJECT: Hudson River PCB's Superfund Site Prepared By: JEM Date: October 2006
TITLE: Sediment Remediation Phase I :Work Support Marina Checked By: CAA Date: October 2006
SUBJECT: Stormwater Pond and Outlet Structure Calculations Reviewed By: PHB Date: October 2006

ASSUMPTIONS:

1. The extended detention volume retained by the stormwater pond must be released over a 24 hour period (Reference 1).

2. The Hudson River is a fourth order or higher stream. Based on Reference 1, watersheds which directly discharge to this stream category do not need to meet the design requirements for Stream Channel Protection Volume, Overbank Flood Control, and Extreme Flood Control. Therefore, these requirements are not considered for the Work Support Marina site stormwater pond.

3. Based on the pond drainage area guidance in Reference 1, and since the size of the entire site is less than 5 acres, the permanent pool and extended detention volume of a P-5 Pocket Pond must be attained. As stated in Table 6.1 of Reference 1, these volumes are as follows:

   - A minimum 50% of the WQ_v shall be held in a permanent pool; and
   - A maximum 50% of the WQ_v is provided in extended detention.

4. Based on Reference 1, the stormwater pond does not require construction of a forebay because there is no direct inflow point that provided more than 10% of the total stormwater flow to the pond. All stormwater enters the pond via surface flow from the paved parking area.

5. The stormwater pond outlet structure consists of a square precast concrete catch basin with an open top, having a top elevation of 134.45 feet, and four 1-inch-diameter orifices, having invert elevations of 134.00 feet (Reference 5). The orifices are surrounded with drainage stone to minimize clogging. The pond outlet structure drains to the ditch located along the south side of the site which, in turn, discharges directly to the Hudson River. Discharge from the precast concrete catch basin occurs via a 12-inch-diameter pipe and a stone lined ditch.

CALCULATIONS:

1. Determine the Percent Impervious Cover (I):

Total Site Area = 3.40 Acres

Total Impervious Area = 2.10 Acres (2.10 acres of paved parking area)

$$I = \frac{Total\ Impervious\ Area}{Total\ Site\ Area}\ x\,100\% = \frac{2.10\ acres}{3.40\ acres}\ x\,100\% = 61.8\%$$

2. Determine the Water Quality Volume - WQv:

$$WQ_V = \frac{P\ Rv\ A}{12} = \frac{(0.98\ inches)(0.61)(3.40\ acres)}{12} = 0.17\ acre - feet$$

Where,

P = 90% Rainfall Event Number = 0.98 (Figure 4.1, Reference 1);
A = the total site area = 3.40 acres;

I = Percent Impervious = 61.8% (calculated above); and
Rv = Runoff coefficient = 0.05 + 0.009(I) = 0.05+0.009(61.8) = 0.61.

3. Verify the permanent pool volume requirement has been achieved:

The required permanent pool storage volume is a minimum of 50% of the WQ_v (Assumption 3).

50% of the WQ_v (0.17 acre-feet, calculated above) is 0.085 acre-feet (say 0.08 acre-feet).

Based on an orifice invert elevation of 134.00 feet (Assumption 5), the maximum elevation of the stormwater pond's permanent pool is 134.00 feet. At this elevation and based on the stormwater pond geometry presented in Reference 3, the available permanent pool volumes is 0.14 acre-feet. Therefore, the required minimum permanent pool volume of 0.08 acre-feet has been achieved.

Elevation-Stormwater volume data for the stormwater pond is provided in Figure 1 below.

4. Verify extended detention volume requirement has been achieved:

The required extended detention volume is a maximum of 50% of the WQ_v (Assumption 3).

50% of the WQ_v (0.19 acre-feet, calculated above) is 0.085 acre-feet (say 0.09 acre-feet).

The volume of storage available between the maximum elevation of the permanent pool and the top of the pond outlet structure is the available extended detention volume. The maximum water surface elevation of the permanent pool and the top of the outlet structure is 134.00 feet and 134.45 feet, respectively (Assumption 5). Based on these elevations and the stormwater pond geometry presented in Reference 3, the available extended detention volume is 0.09 acre-feet. Therefore, the required maximum extended detention volume of 0.09 acre-feet has been achieved.

Elevation-Stormwater volume data for the stormwater pond is provided in Figure 1 below.

CLIENT: General Electric Company PROJECT: Hudson River PCB's Superfund Site Prepared By: JEM Date: October 2006
TITLE: Sediment Remediation Phase I :Work Support Marina Checked By: CAA Date: October 2006
SUBJECT: Stormwater Pond and Outlet Structure Calculations Reviewed By: PHB Date: October 2006

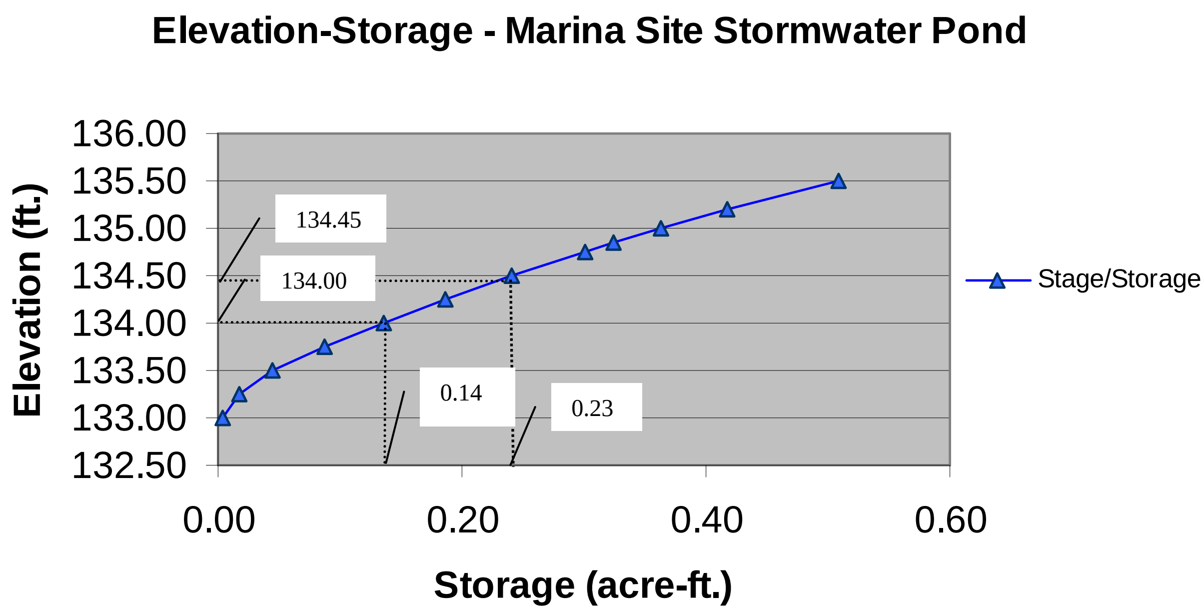


Figure 1

5. Calculate the average extended detention release rate from the catch basin outlet:

Over a 24 hour period, the required average extended detention release rate is as follows:

$$Q = \frac{Volume}{Time} = \frac{Extended\ Detention\ Volume}{24\ hours} = \frac{0.09\ acre\ \ feet\left(43{,}560\,\frac{ft^2}{acre}\right)}{24\ hours\left(3{,}600\,\frac{\sec}{hour}\right)} = 0.05\,\frac{ft^3}{\sec}$$

6. Confirm that the diameter and number of orifices of the outlet structure achieve the average extended detention release rate:

$$Q = C\ A\,(2gH)^{0.5} = \left(0.60\ x\ 0.0055\ ft^2\right)\left[2\left(32.2\,\frac{ft}{\sec^2}\right)(0.23\ ft)\right]^{0.5} = 0.013\,\frac{ft^3}{\sec}$$

Where,

Q = discharge through each orifice;
C = orifice coefficient = 0.60 (Reference 6);
A = cross sectional area of each orifice = $\pi d^2/4 = \pi\ (1\ \text{inch})^2/4 = 0.79\ in^2 = 0.0055\ ft^2$;
g = gravimetric constant = 32.2 ft /s^2 (Reference 6); and

H= average height of water above orifice = (maximum water height – invert elevation of orifice)/2
= (134.45 feet – 134.00feet)/2 = 0.23 ft.

Therefore, four orifices will provide a release rate of 0.05 ft^3/sec (~0.013 ft^3/sec * 4) discharge rate. This confirms that the diameter and number of orifices of the outlet structure achieve the above calculated extended detention release rate of 0.05 ft^3/sec.

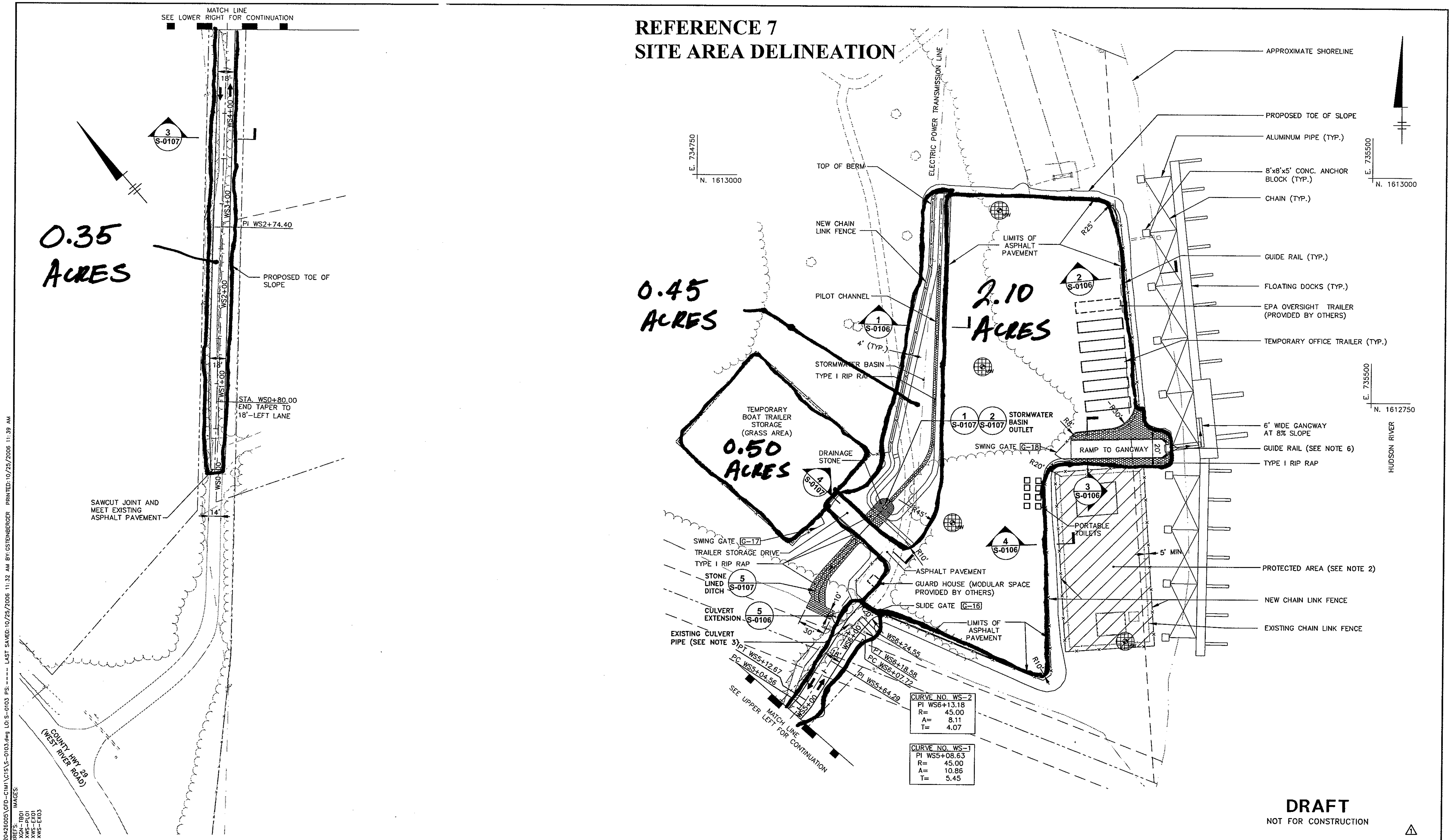
SUMMARY:

The WQ_v of the Work Support Marina stormwater basin is 0.19 acre-feet. A minimum of 50% of the WQ_v is stored within the stormwater basin as a permanent pool and a maximum of 50% of the WQ_v is stored as an extended detention volume. The outlet structure described in Assumption 5 provides for discharge of the extended detention volume over a 24 hour period.

Attachment A

Site Area Map

REFERENCE 7
SITE AREA DELINEATION



ORIGINAL SCALE APPLIES TO 22"X34" DRAWING

1"=50'

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No.	Date	Revisions	Init
1	X/X/06	CONTRACT 1, MODIFICATION NO. 1	JPD

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

Professional Engineer's Name: JOHN PAUL DOODY
Professional Engineer's No.: 067405
State: NY | Date Signed
Project Mgr. | Designed by | Drawn by

BBL
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

SITE PLAN - WORK SUPPORT MARINA

CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION

BBL Project No. 20435.700
Date MARCH 21, 2006
Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

S-0103

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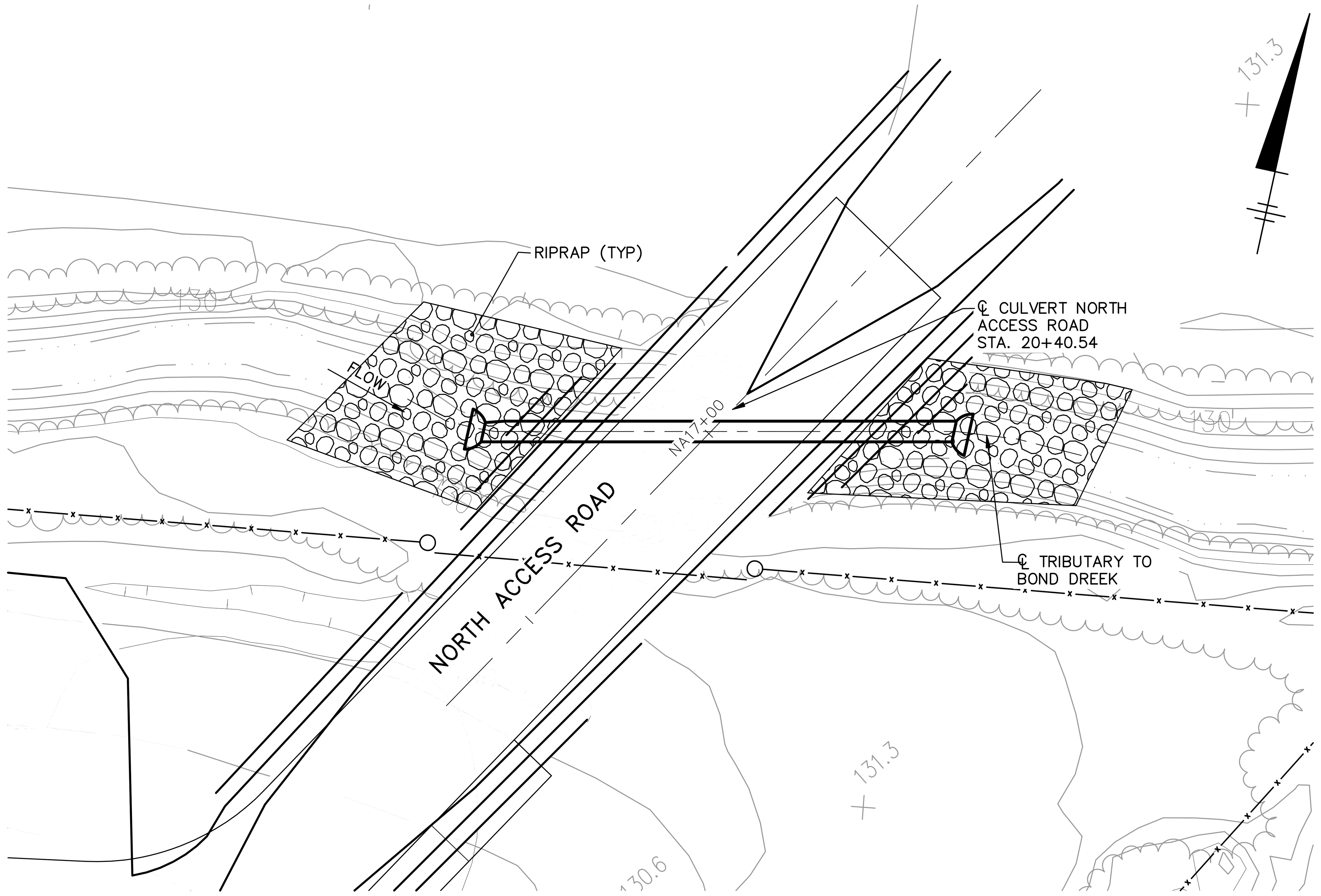
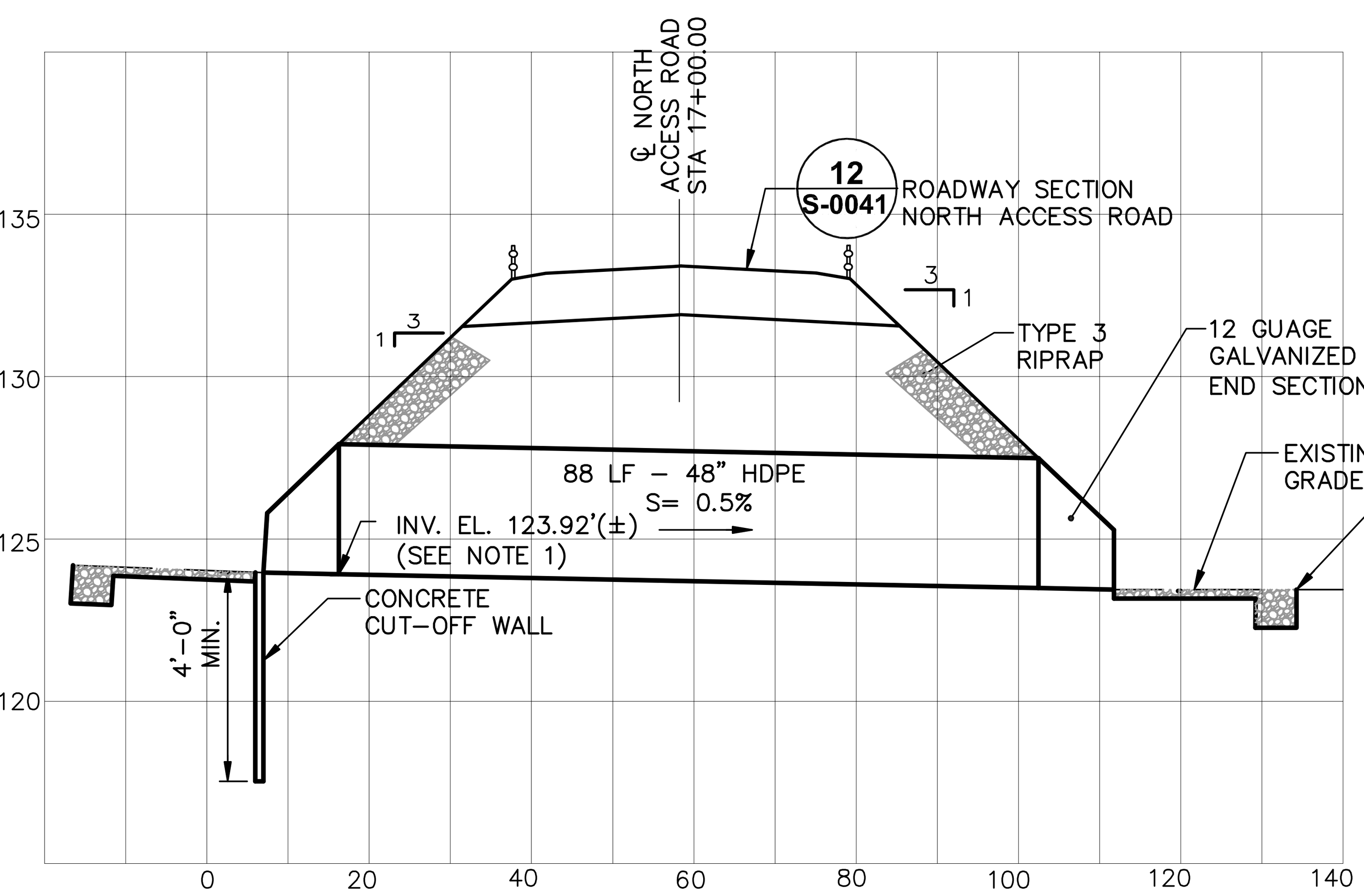


PLAN

0 20' 40'
SCALE



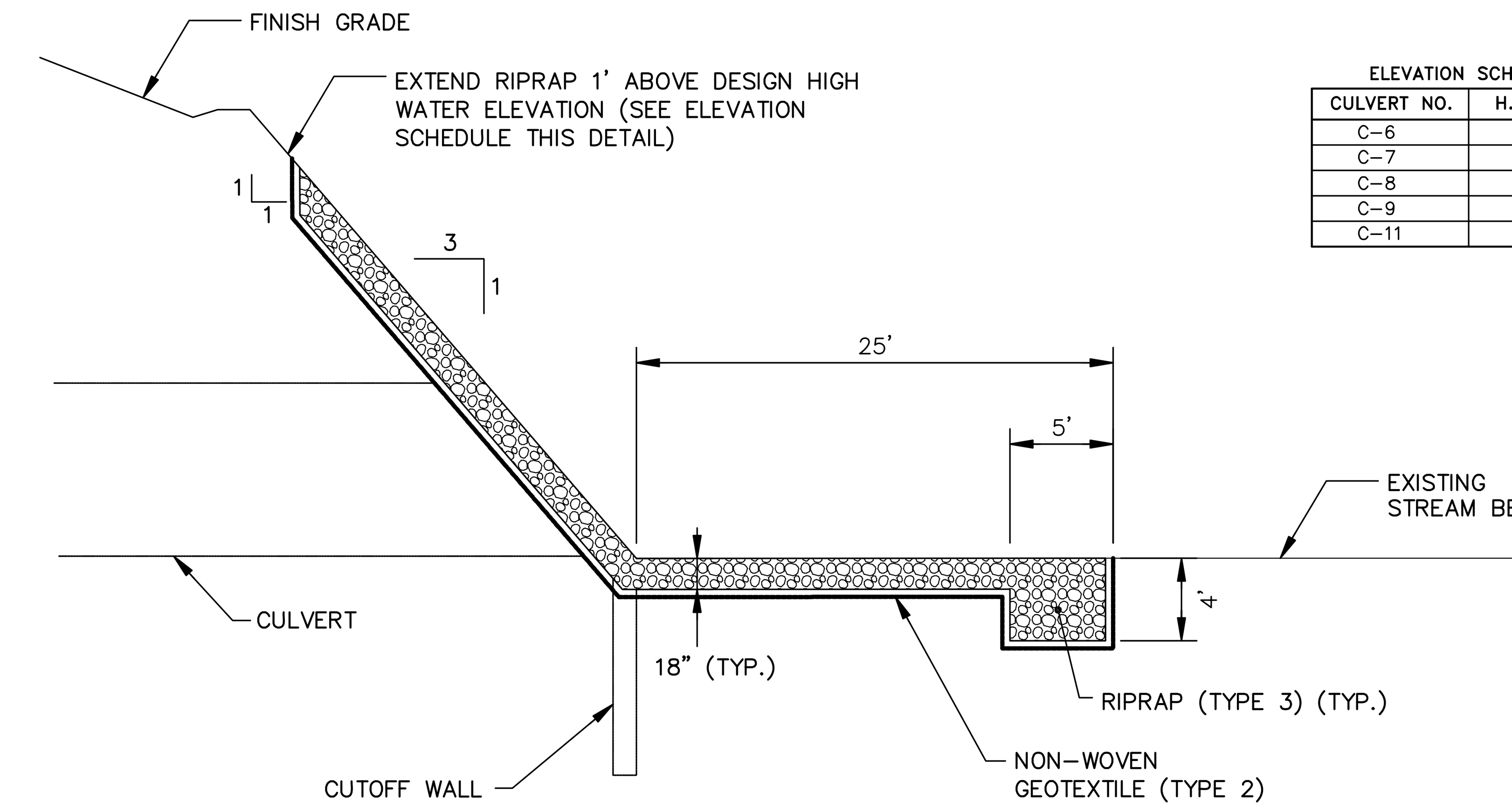
PROFILE

0 20' 40' HORIZONTAL SCALE
0 5' 10' VERTICAL SCALE

NOTES:

1. INVERT ELEVATIONS ARE APPROXIMATE. ACTUAL ELEVATIONS TO BE DETERMINED BY CONTRACTOR PRIOR TO START OF CONSTRUCTION.

NORTH ACCESS ROAD CULVERT C-11 (1)

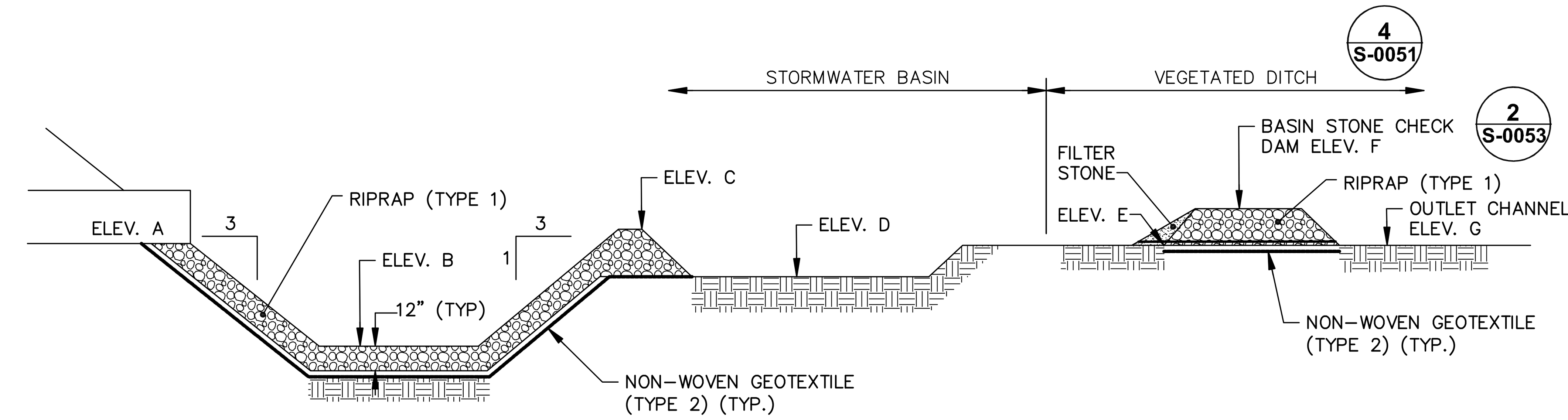


ELEVATION SCHEDULE

CULVERT NO.	H. W. ELEV.
C-6	129.81
C-7	135.50
C-8	136.00
C-9	130.00
C-11	128.74

TYPICAL CULVERT INLET/OUTLET PROTECTION CULVERTS C-6 AND C-7 (2)

NOT TO SCALE

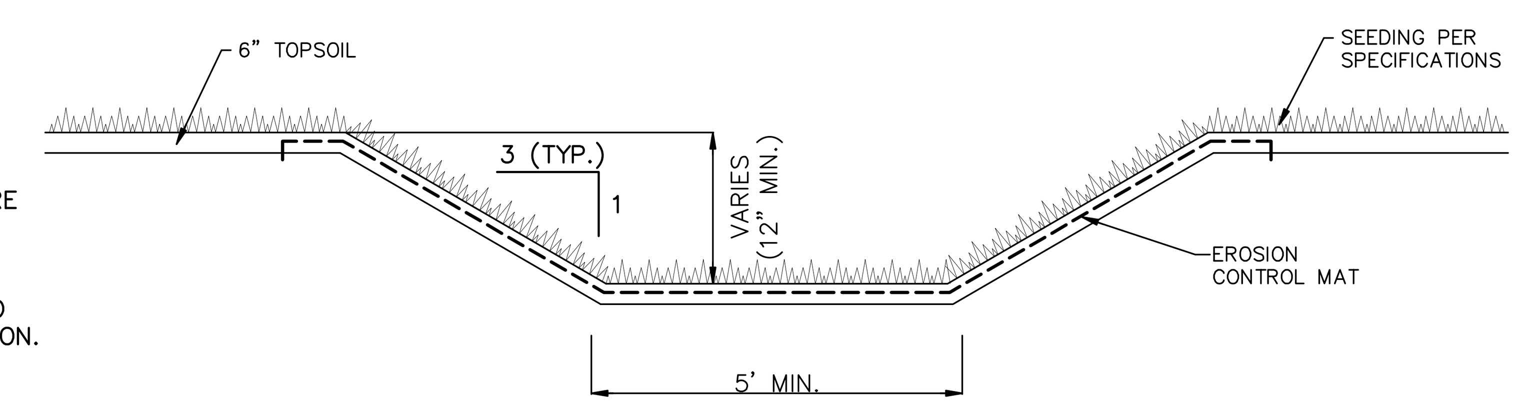


ELEVATION SCHEDULE

ELEV.	STORMWATER A	STORMWATER B
A	129.0	128.3
B	125.5	125.0
C	129.5	128.7
D	128.5	128.0
E	129.3	128.3
F	130.7	129.7
G	129.0	128.0

TYPICAL SECTION STORMWATER BASINS A AND B (3)

NOT TO SCALE

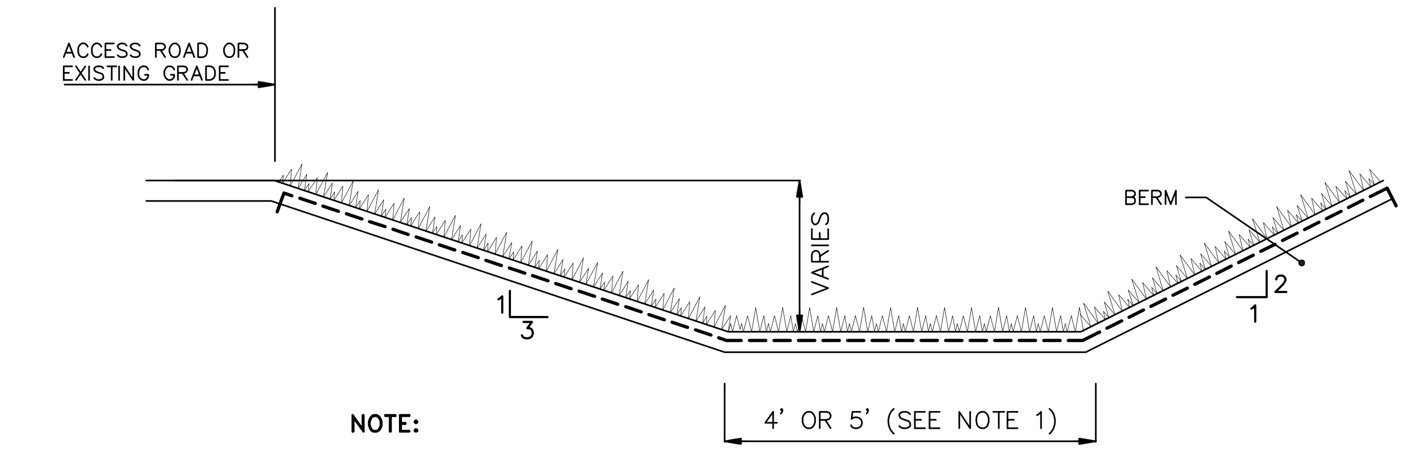


NOTE:

SEE FINAL SITE GRADING PLANS FOR DITCH LOCATIONS AND WIDTHS

VEGETATED DITCH (4)

NOT TO SCALE



NOTE:

1. SEE SECTION 25 ON DRAWING S-0087 FOR DITCH WIDTHS.
2. SEE FINAL SITE GRADING PLANS FOR DITCH LOCATIONS AND DEPTHS.

DIVERSION DITCH (5)

NOT TO SCALE

CONFORMED REVIEW SET – NOT FOR CONSTRUCTION

ORIGINAL SCALE APPLIES TO 22"X34" DRAWING

AS NOTED ABOVE

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No.	Date	Revisions	Init

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

Professional Engineer's Name: JOHN PAUL DOODY
Professional Engineer's No.: 067405
State: NY | Date Signed
Project Mgr. | Designed by | Drawn by

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

STORMWATER AND GRADING DETAILS

CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION

BBL Project No. 20435.700
Date DECEMBER 15, 2006

Blasland, Bouck & Lee, Inc. Corporate Headquarters 6723 Towpath Road Syracuse, NY 13214 315-446-9120

S-0051

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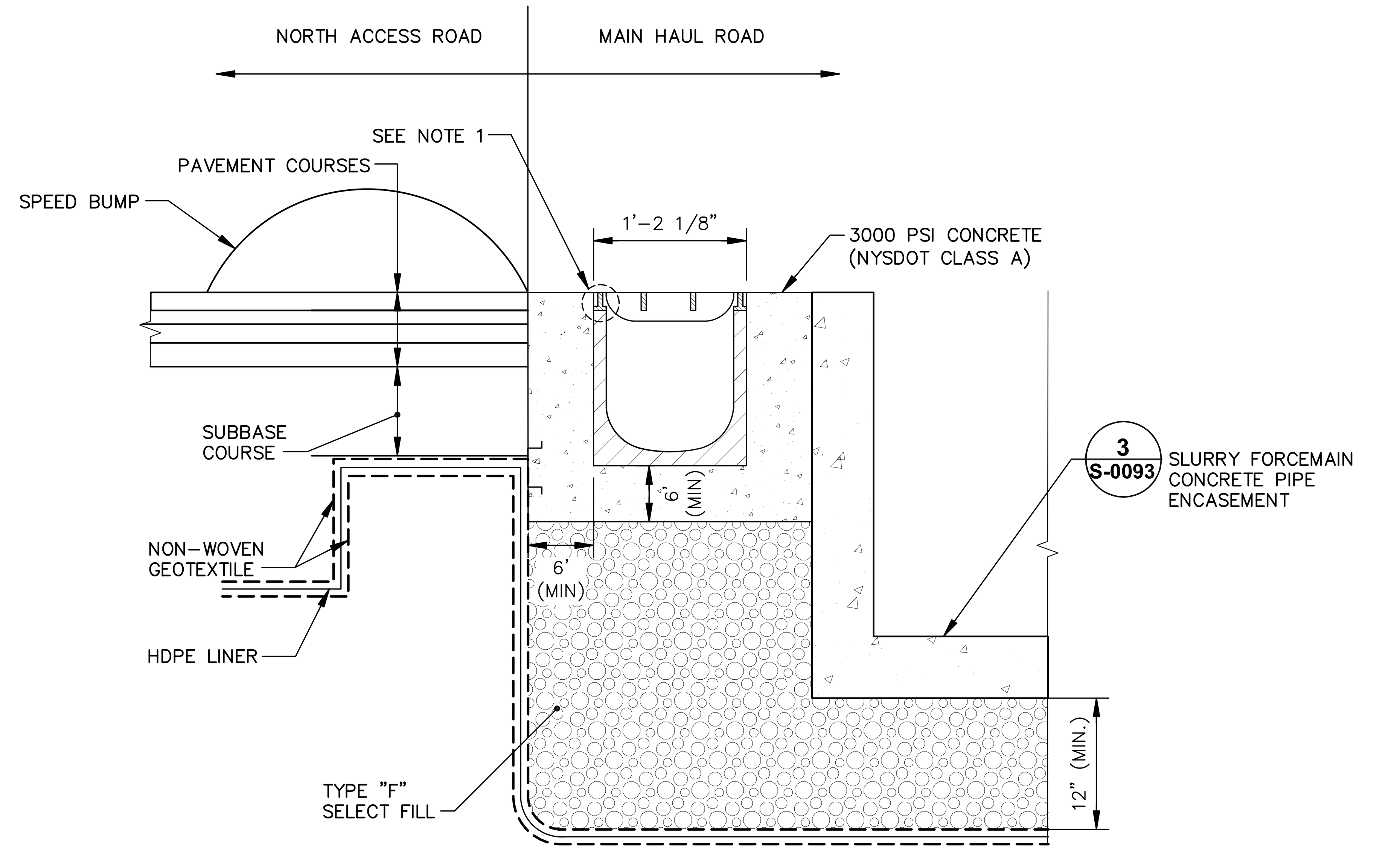
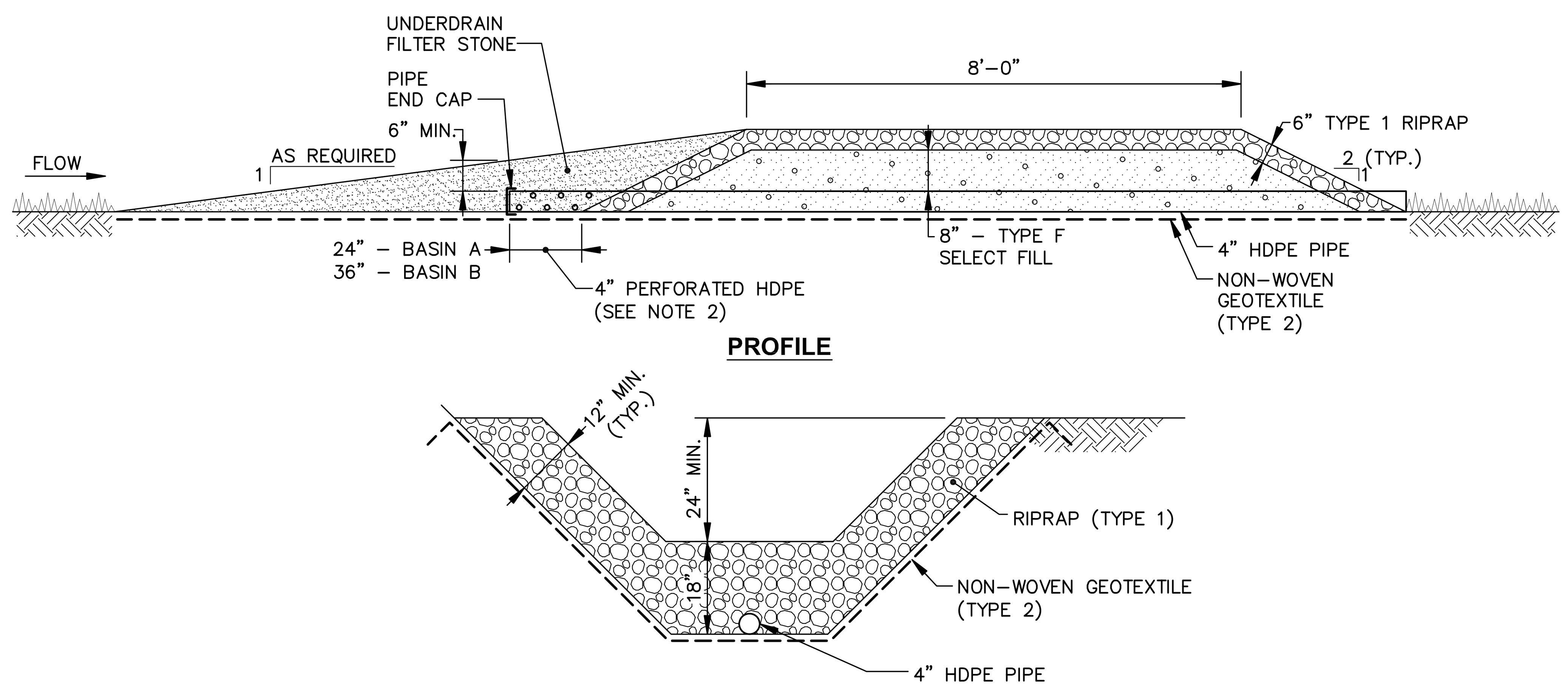


NOTES:

1. THE FINISHED LEVEL OF THE CONCRETE SURROUNDING THE TRENCH DRAIN MUST BE APPROXIMATELY 1/8' ABOVE THE TOP OF THE CHANNEL EDGE.

TRENCH DRAIN (1)

NOT TO SCALE

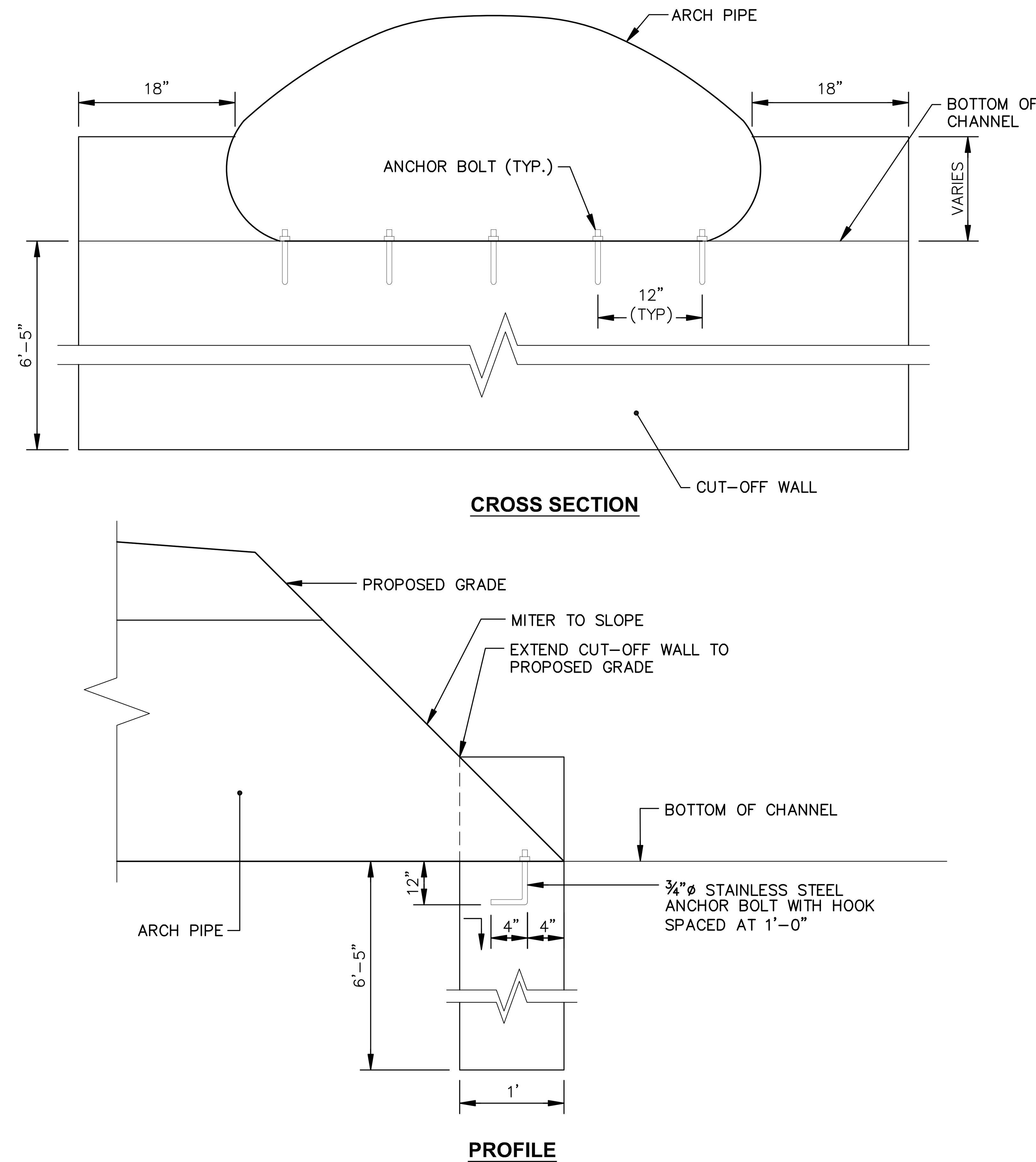


NOTES:

1. ACCUMULATED SEDIMENTS SHALL BE REMOVED FROM BEHIND CHECK DAM AND CHECK DAM RESTORED TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO 1/2 THE HEIGHT OF THE CHECK DAM.
2. PIPE PERFORATIONS TO CONFORM TO AASHTO CLASS II PERFORATIONS.

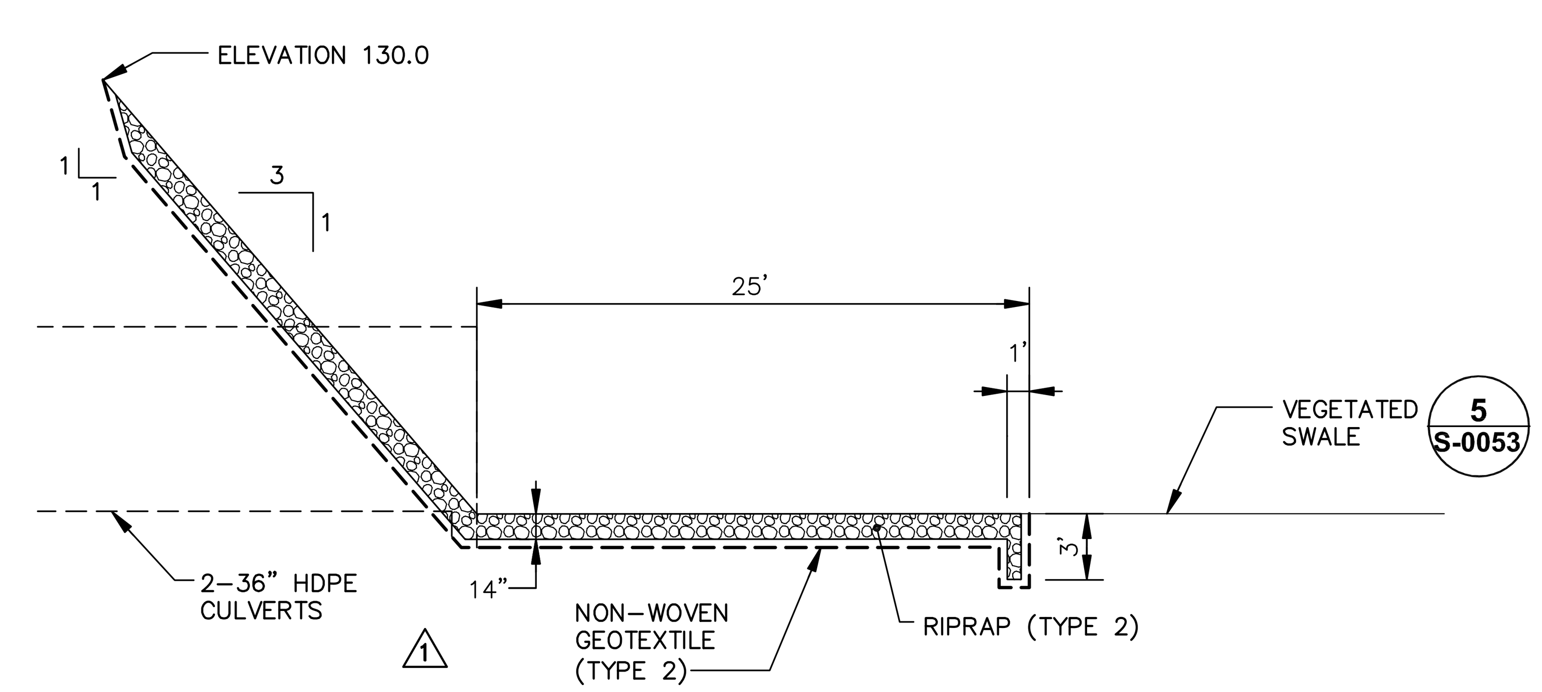
BASIN STONE CHECK DAM (2)

NOT TO SCALE



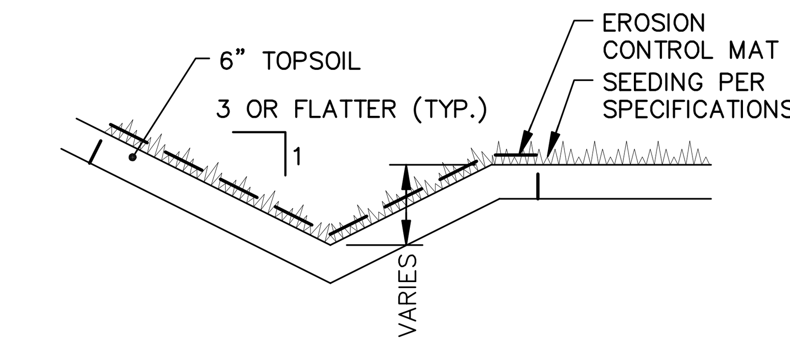
CONCRETE CUT-OFF WALL DETAIL - CULVERT C-6 AND C-7 (3)

NOT TO SCALE



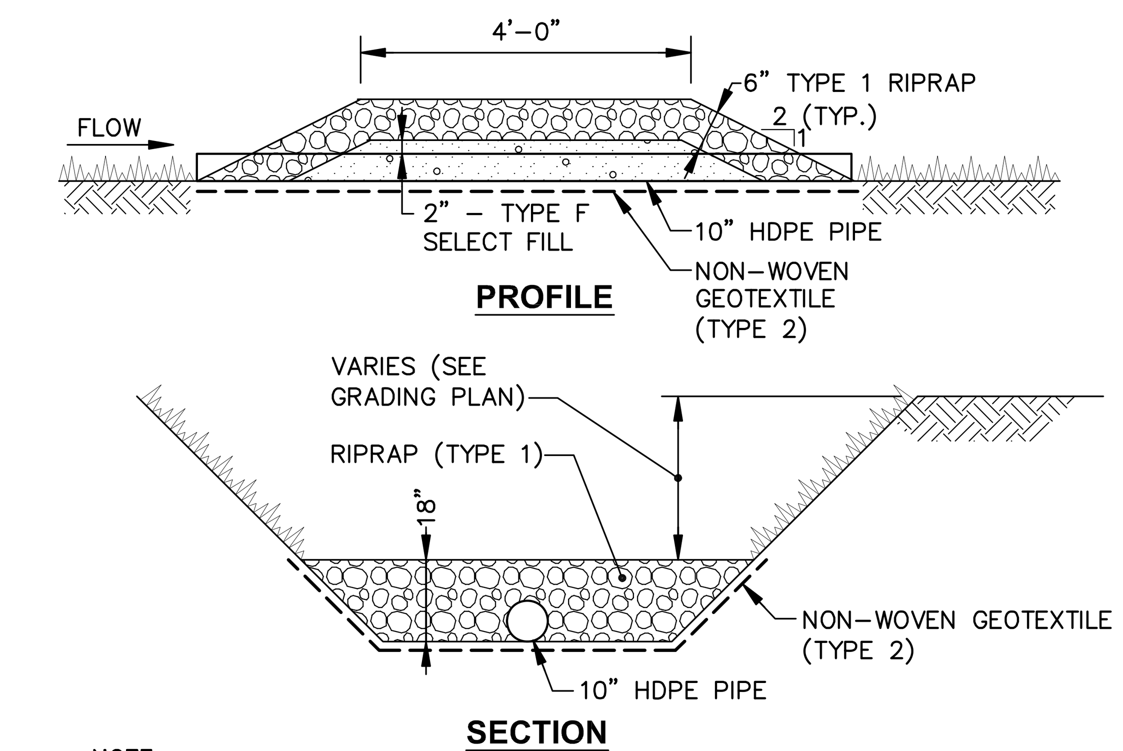
TYPICAL CULVERT INLET/OUTLET PROTECTION CULVERT NO. C-14 AND C-15 (4)

NOT TO SCALE



V-NOTCH SWALE (5)

NOT TO SCALE

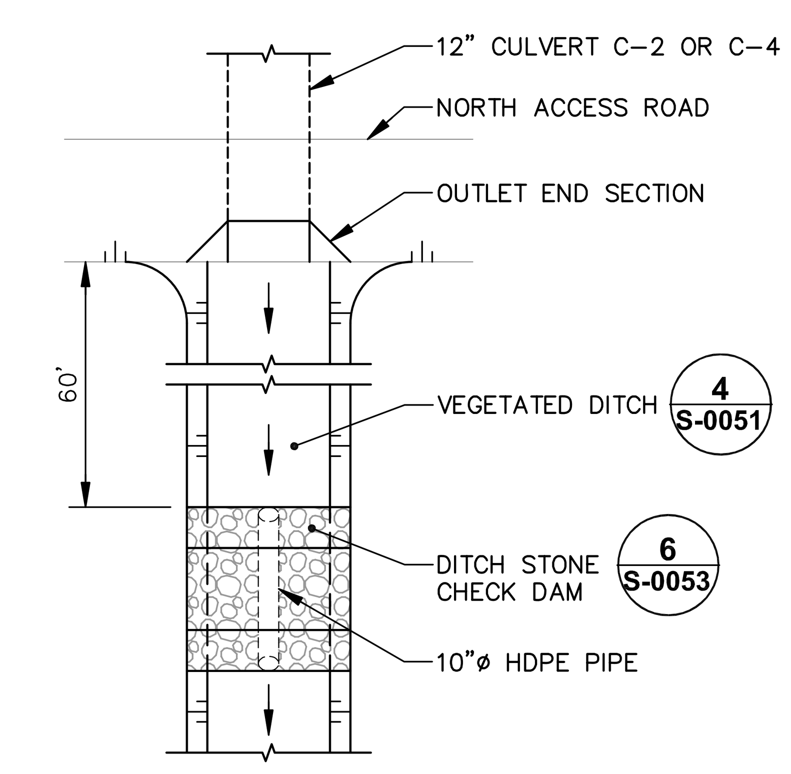


NOTE:

1. ACCUMULATED SEDIMENTS SHALL BE REMOVED FROM BEHIND CHECK DAM AND CHECK DAM RESTORED TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO 1/4 OF THE HEIGHT OF THE CHECK DAM.

DITCH STONE CHECK DAM (6)

NOT TO SCALE



CULVERT C-2 AND C-4 OUTLET SWALE DETAIL (7)

NOT TO SCALE

CONFORMED REVIEW SET – NOT FOR CONSTRUCTION

ORIGINAL SCALE APPLIES TO 22"X34" DRAWING

NOT TO SCALE

THIS DRAWING WAS PREPARED AT THE SCALE(S) INDICATED. INACCURACIES IN THE STATED SCALE(S) MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED. **USE THE GRAPHIC SCALE BAR(S) TO DETERMINE THE ACTUAL SCALE(S) OF THIS DRAWING.**

No.	Date	Revisions	Init

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

Professional Engineer's Name: JOHN PAUL DOODY
Professional Engineer's No.: 067405
State: NY | Date Signed:
Project Mgr. | Designed by | Drawn by

BBL® BLASLAND, BOUCK & LEE, INC. engineers, scientists, economists

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

STORMWATER AND GRADING DETAILS

CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION

BBL Project No. 20435.700

Date DECEMBER 15, 2006

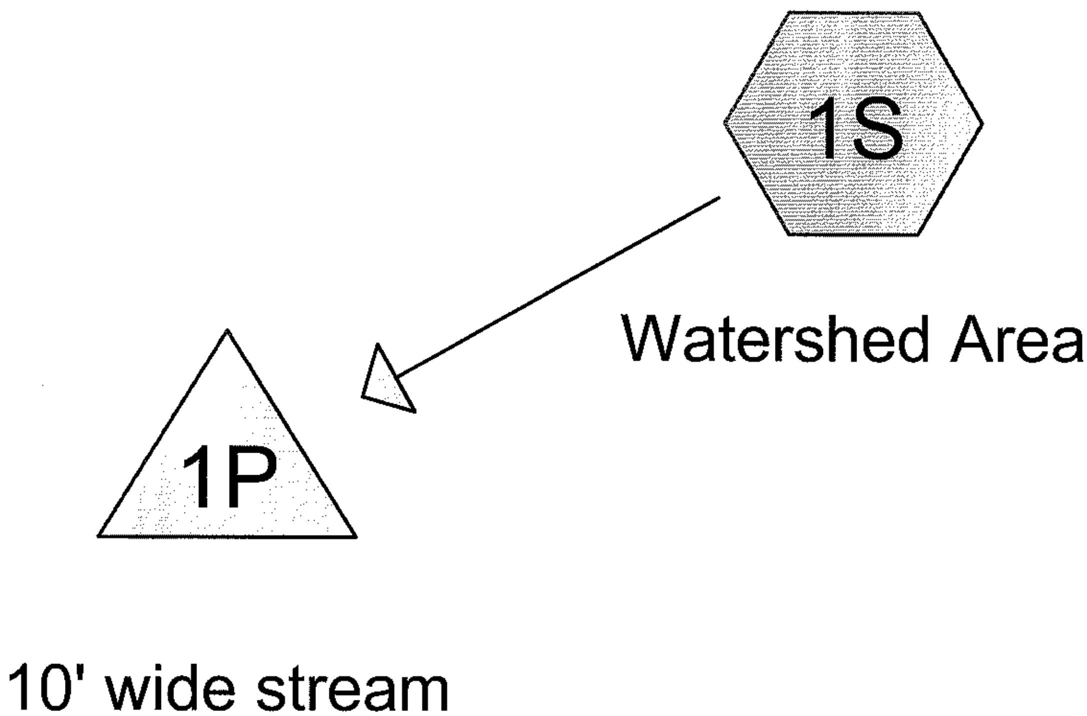
Blasland, Bouck & Lee, Inc. Corporate Headquarters 6723 Towpath Road Syracuse, NY 13214 315-446-9120

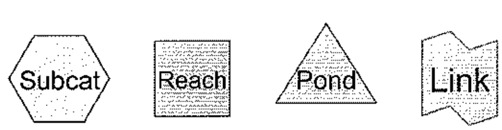
S-0053

HDR

Stormwater Controls Calculations and Details

PRE- DEVELOPED HydroCAD





Drainage Diagram for PRE - EXISTING - GE
Prepared by {enter your company name here} 1/4/2007
HydroCAD® 8.00 s/n 004505 © 2006 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcats)
0.130	70	Brush, Fair, HSG C (1S)
1.970	71	Meadow, non-grazed, HSG C (1S)
0.170	76	Woods/grass comb., Fair, HSG C (1S)
7.620	82	Row crops, SR + CR, Good, HSG C (1S)
0.800	98	Paved roads w/curbs & sewers (1S)
10.690		

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed Area Runoff Area=10.690 ac Runoff Depth>0.80"
Flow Length=955' Tc=20.7 min CN=81 Runoff=8.97 cfs 0.710 af

Pond 1P: 10' wide stream Peak Elev=128.19' Storage=0.104 af Inflow=8.97 cfs 0.710 af
48.0" x 24.0' Culvert Outflow=8.71 cfs 0.643 af

Total Runoff Area = 10.690 ac Runoff Volume = 0.710 af Average Runoff Depth = 0.80"
92.52% Pervious Area = 9.890 ac 7.48% Impervious Area = 0.800 ac

Subcatchment 1S: Watershed Area

Watershed Area Pre Condition

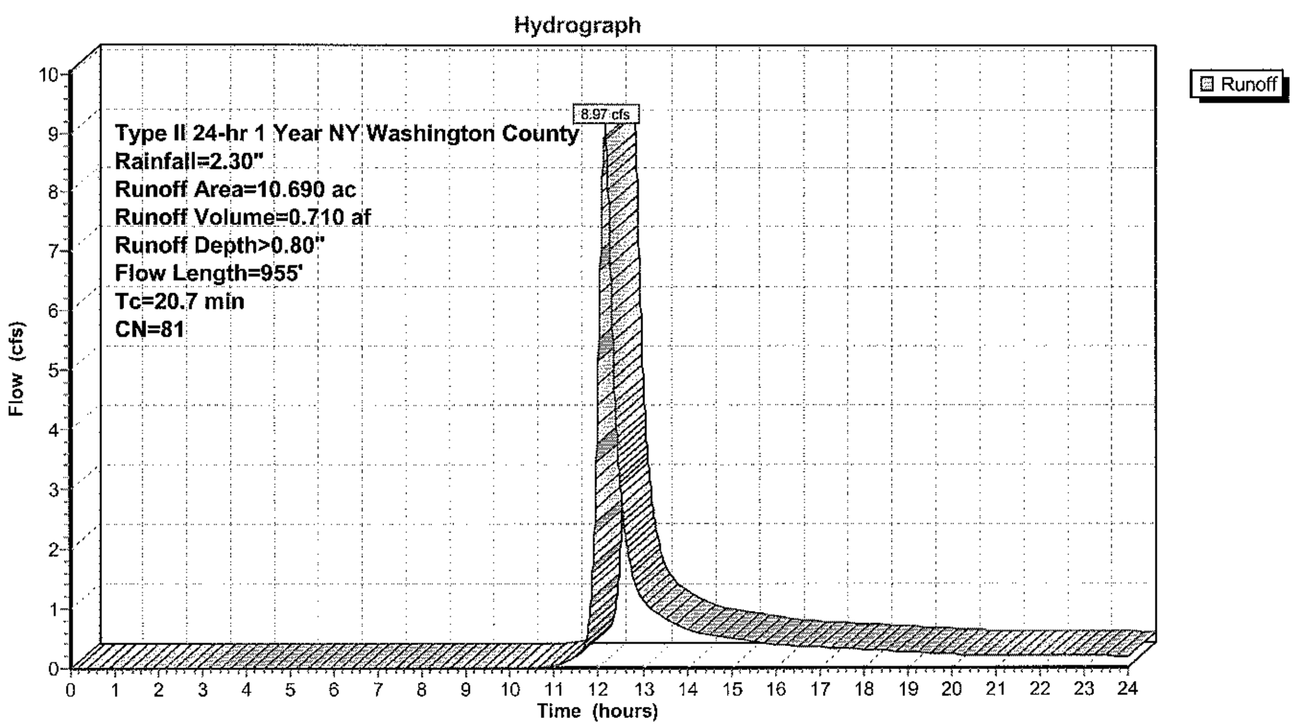
Runoff = 8.97 cfs @ 12.15 hrs, Volume= 0.710 af, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 Year NY Washington County Rainfall=2.30"

Area (ac)	CN	Description
7.620	82	Row crops, SR + CR, Good, HSG C
0.170	76	Woods/grass comb., Fair, HSG C
0.130	70	Brush, Fair, HSG C
1.970	71	Meadow, non-grazed, HSG C
0.800	98	Paved roads w/curbs & sewers
10.690	81	Weighted Average
9.890		Pervious Area
0.800		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	155	0.0600	0.23		**Sheet Flow, Open Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.50"
9.5	800	0.0400	1.40		**Shallow Concentrated Flow, Overland Flow** Short Grass Pasture Kv= 7.0 fps
20.7	955	Total			

Subcatchment 1S: Watershed Area



Pond 1P: 10' wide stream

Inflow Area = 10.690 ac, Inflow Depth > 0.80" for 1 Year NY Washington County event
Inflow = 8.97 cfs @ 12.15 hrs, Volume= 0.710 af
Outflow = 8.71 cfs @ 12.18 hrs, Volume= 0.643 af, Atten= 3%, Lag= 2.2 min
Primary = 8.71 cfs @ 12.18 hrs, Volume= 0.643 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 128.19' @ 12.18 hrs Surf.Area= 0.032 ac Storage= 0.104 af
Flood Elev= 133.00' Surf.Area= 0.000 ac Storage= 0.121 af

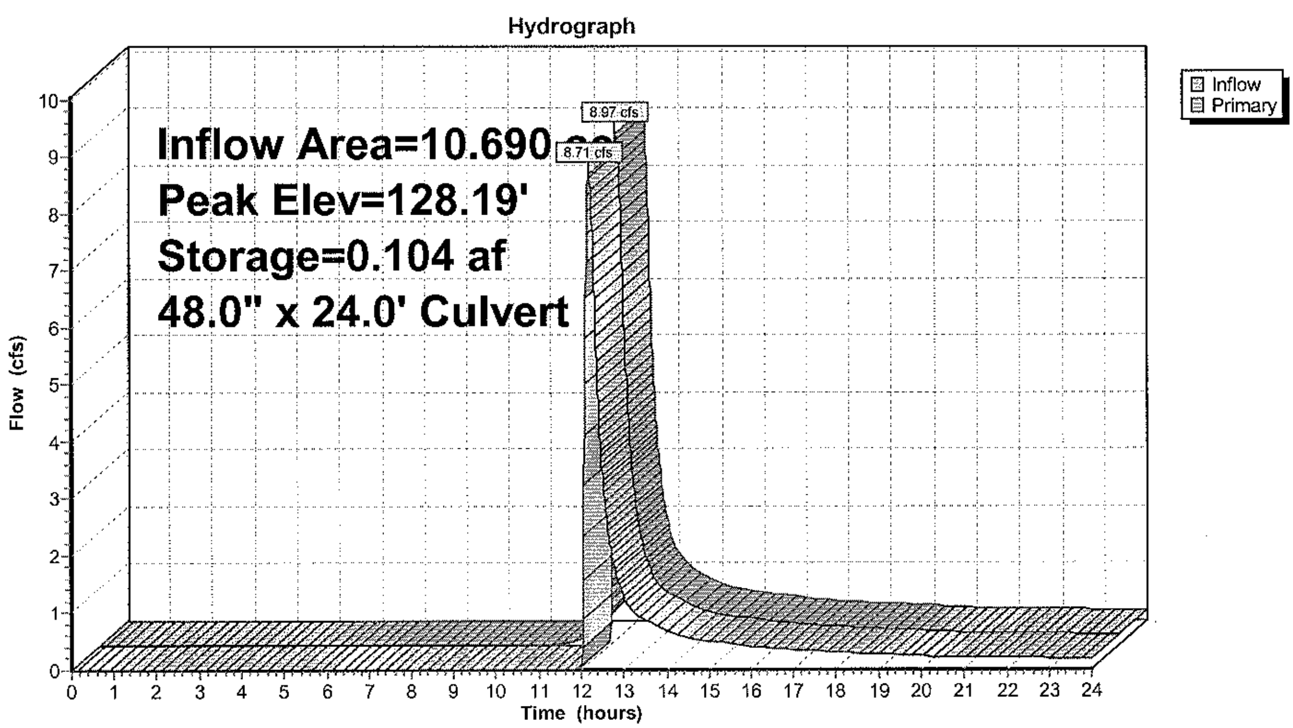
Plug-Flow detention time= 67.5 min calculated for 0.643 af (91% of inflow)
Center-of-Mass det. time= 20.2 min (884.0 - 863.8)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	0.121 af	**120.0"W x 36.0"H x 264.00'L Parabolic Arch**

Device	Routing	Invert	Outlet Devices
#1	Primary	127.10'	**48.0" x 24.0' long Culvert** RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 126.91' S= 0.0079 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=8.69 cfs @ 12.18 hrs HW=128.18' (Free Discharge)
1=Culvert (Barrel Controls 8.69 cfs @ 4.74 fps)

Pond 1P: 10' wide stream



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed Area Runoff Area=10.690 ac Runoff Depth>0.94"
Flow Length=955' Tc=20.7 min CN=81 Runoff=10.66 cfs 0.834 af

Pond 1P: 10' wide stream Peak Elev=128.30' Storage=0.108 af Inflow=10.66 cfs 0.834 af
48.0" x 24.0' Culvert Outflow=10.50 cfs 0.766 af

Total Runoff Area = 10.690 ac Runoff Volume = 0.834 af Average Runoff Depth = 0.94"
92.52% Pervious Area = 9.890 ac 7.48% Impervious Area = 0.800 ac

Subcatchment 1S: Watershed Area

Watershed Area Pre Condition

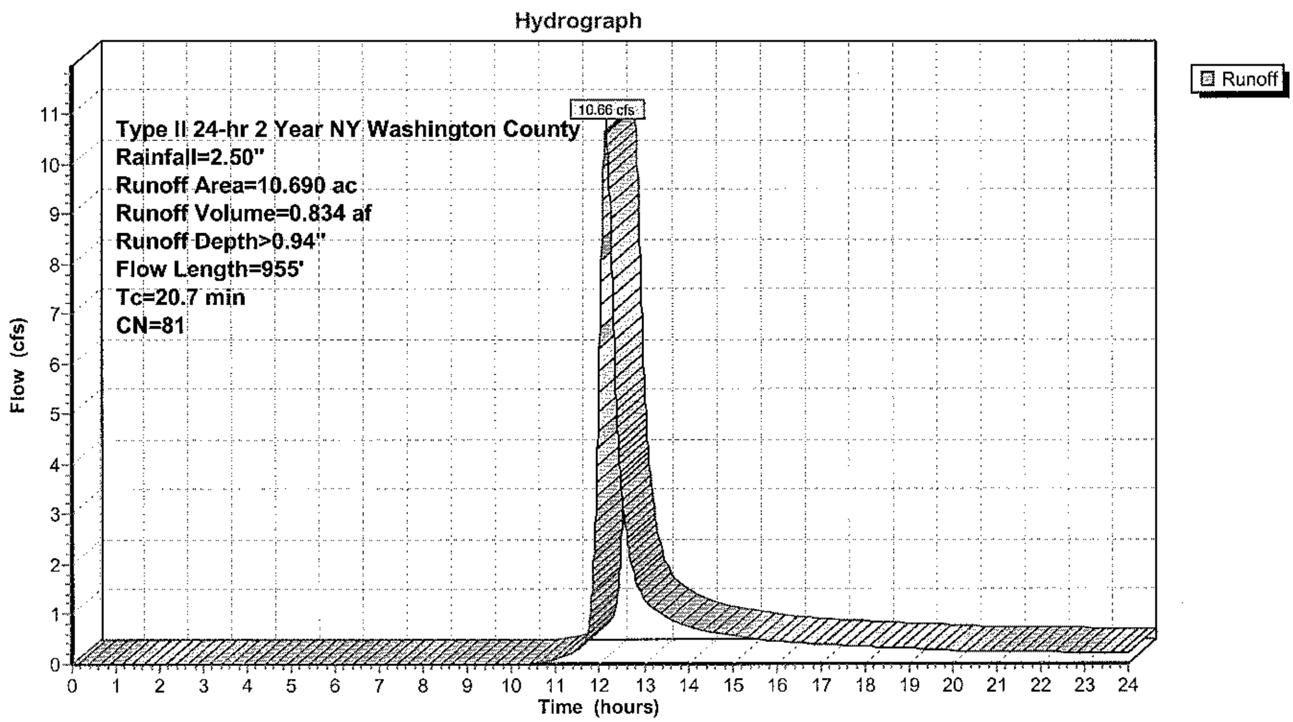
Runoff = 10.66 cfs @ 12.14 hrs, Volume= 0.834 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 Year NY Washington County Rainfall=2.50"

Area (ac)	CN	Description
7.620	82	Row crops, SR + CR, Good, HSG C
0.170	76	Woods/grass comb., Fair, HSG C
0.130	70	Brush, Fair, HSG C
1.970	71	Meadow, non-grazed, HSG C
0.800	98	Paved roads w/curbs & sewers
10.690	81	Weighted Average
9.890		Pervious Area
0.800		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	155	0.0600	0.23		**Sheet Flow, Open Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.50"
9.5	800	0.0400	1.40		**Shallow Concentrated Flow, Overland Flow** Short Grass Pasture Kv= 7.0 fps
20.7	955	Total			

Subcatchment 1S: Watershed Area



Pond 1P: 10' wide stream

Inflow Area = 10.690 ac, Inflow Depth > 0.94" for 2 Year NY Washington County event
Inflow = 10.66 cfs @ 12.14 hrs, Volume= 0.834 af
Outflow = 10.50 cfs @ 12.17 hrs, Volume= 0.766 af, Atten= 2%, Lag= 1.7 min
Primary = 10.50 cfs @ 12.17 hrs, Volume= 0.766 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 128.30' @ 12.17 hrs Surf.Area= 0.029 ac Storage= 0.108 af
Flood Elev= 133.00' Surf.Area= 0.000 ac Storage= 0.121 af

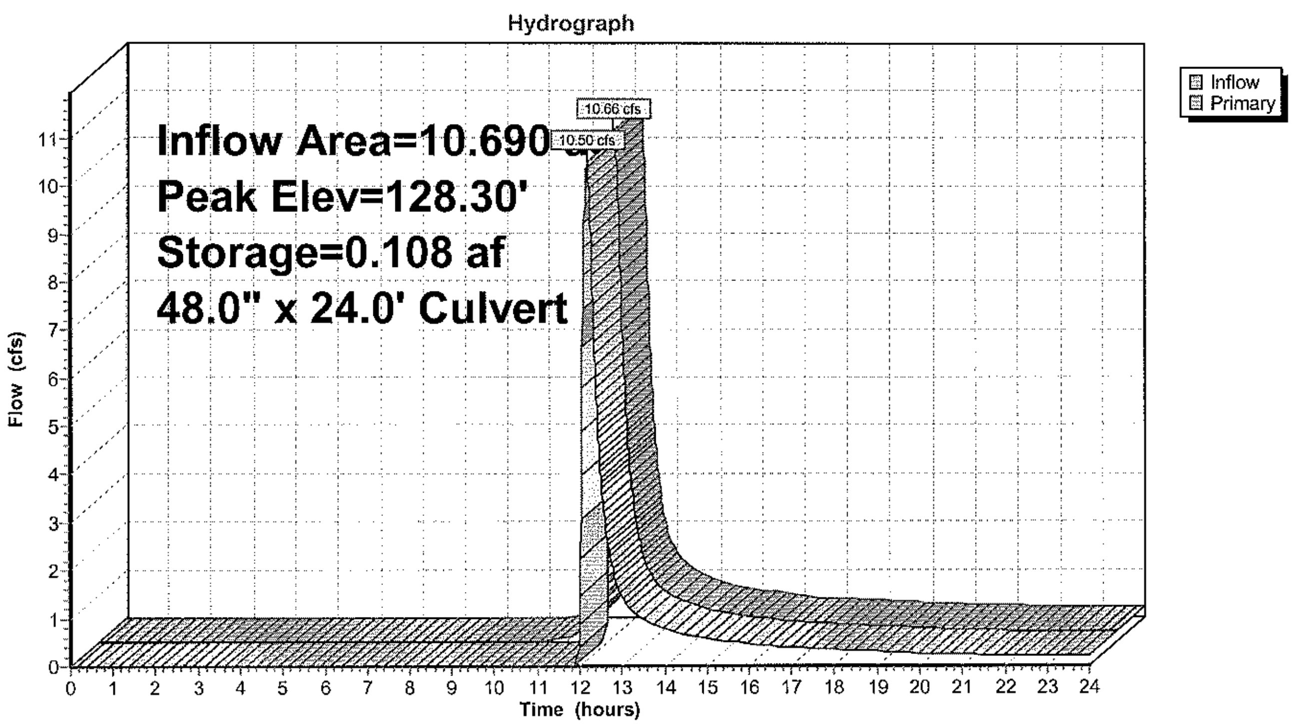
Plug-Flow detention time= 58.9 min calculated for 0.766 af (92% of inflow)
Center-of-Mass det. time= 17.4 min (876.4 - 859.0)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	0.121 af	**120.0"W x 36.0"H x 264.00'L Parabolic Arch**

Device	Routing	Invert	Outlet Devices
#1	Primary	127.10'	**48.0" x 24.0' long Culvert** RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 126.91' S= 0.0079 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=10.50 cfs @ 12.17 hrs HW=128.30' (Free Discharge)
└**1=Culvert** (Barrel Controls 10.50 cfs @ 4.94 fps)

Pond 1P: 10' wide stream



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed Area Runoff Area=10.690 ac Runoff Depth>2.00"
Flow Length=955' Tc=20.7 min CN=81 Runoff=23.43 cfs 1.783 af

Pond 1P: 10' wide stream Peak Elev=128.98' Storage=0.121 af Inflow=23.43 cfs 1.783 af
48.0" x 24.0' Culvert Outflow=23.43 cfs 1.713 af

Total Runoff Area = 10.690 ac Runoff Volume = 1.783 af Average Runoff Depth = 2.00"
92.52% Pervious Area = 9.890 ac 7.48% Impervious Area = 0.800 ac

Subcatchment 1S: Watershed Area

Watershed Area Pre Condition

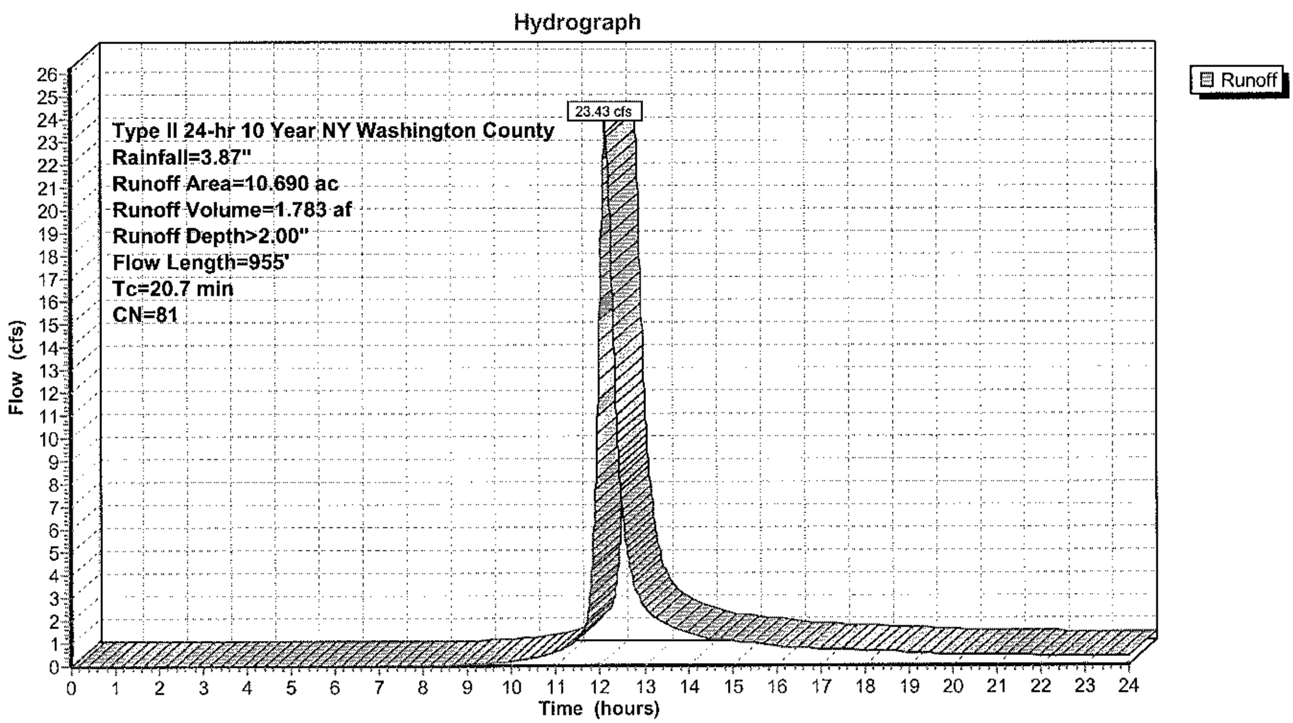
Runoff = 23.43 cfs @ 12.14 hrs, Volume= 1.783 af, Depth> 2.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 Year NY Washington County Rainfall=3.87"

Area (ac)	CN	Description
7.620	82	Row crops, SR + CR, Good, HSG C
0.170	76	Woods/grass comb., Fair, HSG C
0.130	70	Brush, Fair, HSG C
1.970	71	Meadow, non-grazed, HSG C
0.800	98	Paved roads w/curbs & sewers
10.690	81	Weighted Average
9.890		Pervious Area
0.800		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	155	0.0600	0.23		**Sheet Flow, Open Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.50"
9.5	800	0.0400	1.40		**Shallow Concentrated Flow, Overland Flow** Short Grass Pasture Kv= 7.0 fps
20.7	955	Total			

Subcatchment 1S: Watershed Area



Pond 1P: 10' wide stream

Inflow Area = 10.690 ac, Inflow Depth > 2.00" for 10 Year NY Washington County event
Inflow = 23.43 cfs @ 12.14 hrs, Volume= 1.783 af
Outflow = 23.43 cfs @ 12.14 hrs, Volume= 1.713 af, Atten= 0%, Lag= 0.0 min
Primary = 23.43 cfs @ 12.14 hrs, Volume= 1.713 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 128.98' @ 12.14 hrs Surf.Area= 0.005 ac Storage= 0.121 af
Flood Elev= 133.00' Surf.Area= 0.000 ac Storage= 0.121 af

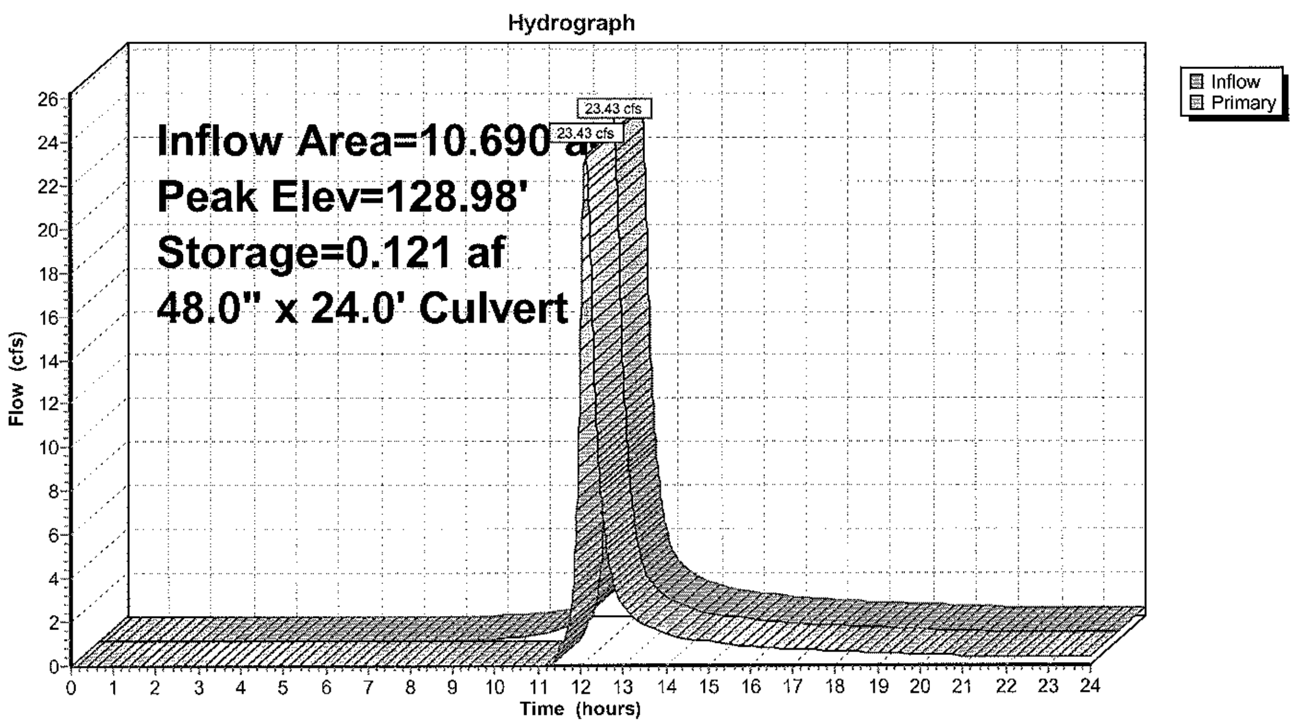
Plug-Flow detention time= 32.9 min calculated for 1.713 af (96% of inflow)
Center-of-Mass det. time= 10.9 min (848.3 - 837.4)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	0.121 af	**120.0"W x 36.0"H x 264.00'L Parabolic Arch**

Device	Routing	Invert	Outlet Devices
#1	Primary	127.10'	**48.0" x 24.0' long Culvert** RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 126.91' S= 0.0079 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=23.42 cfs @ 12.14 hrs HW=128.98' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 23.42 cfs @ 5.91 fps)

Pond 1P: 10' wide stream



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Watershed Area Runoff Area=10.690 ac Runoff Depth>3.28"
Flow Length=955' Tc=20.7 min CN=81 Runoff=38.36 cfs 2.922 af

Pond 1P: 10' wide stream Peak Elev=129.62' Storage=0.121 af Inflow=38.36 cfs 2.922 af
48.0" x 24.0' Culvert Outflow=38.83 cfs 2.850 af

Total Runoff Area = 10.690 ac Runoff Volume = 2.922 af Average Runoff Depth = 3.28"
92.52% Pervious Area = 9.890 ac 7.48% Impervious Area = 0.800 ac

Subcatchment 1S: Watershed Area

Watershed Area Pre Condition

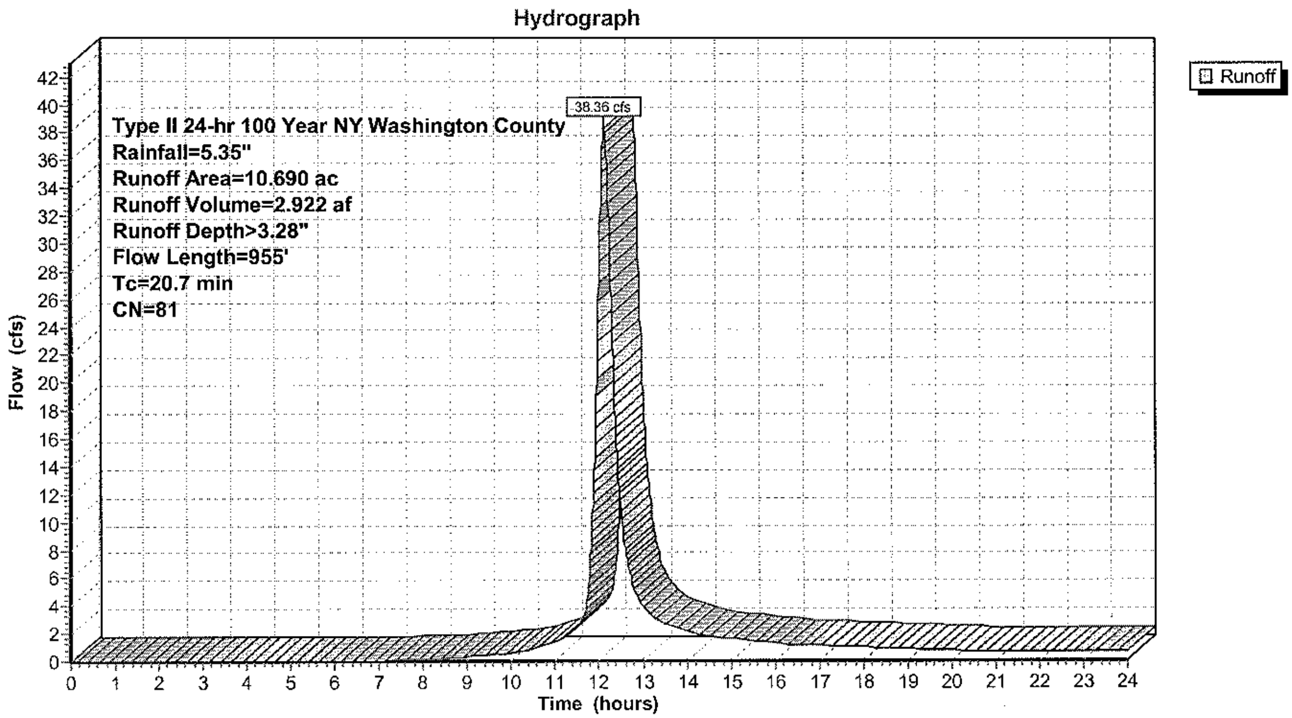
Runoff = 38.36 cfs @ 12.13 hrs, Volume= 2.922 af, Depth> 3.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 Year NY Washington County Rainfall=5.35"

Area (ac)	CN	Description
7.620	82	Row crops, SR + CR, Good, HSG C
0.170	76	Woods/grass comb., Fair, HSG C
0.130	70	Brush, Fair, HSG C
1.970	71	Meadow, non-grazed, HSG C
0.800	98	Paved roads w/curbs & sewers
10.690	81	Weighted Average
9.890		Pervious Area
0.800		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	155	0.0600	0.23		**Sheet Flow, Open Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 2.50"
9.5	800	0.0400	1.40		**Shallow Concentrated Flow, Overland Flow** Short Grass Pasture Kv= 7.0 fps
20.7	955	Total			

Subcatchment 1S: Watershed Area



Pond 1P: 10' wide stream

[93] Warning: Storage range exceeded by 0.62'
[88] Warning: Qout>Qin may require Finer Routing>1
[85] Warning: Oscillations may require Finer Routing>1

Inflow Area = 10.690 ac, Inflow Depth > 3.28" for 100 Year NY Washington County event
Inflow = 38.36 cfs @ 12.13 hrs, Volume= 2.922 af
Outflow = 38.83 cfs @ 12.12 hrs, Volume= 2.850 af, Atten= 0%, Lag= 0.0 min
Primary = 38.83 cfs @ 12.12 hrs, Volume= 2.850 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 129.62' @ 12.12 hrs Surf.Area= 0.000 ac Storage= 0.121 af
Flood Elev= 133.00' Surf.Area= 0.000 ac Storage= 0.121 af

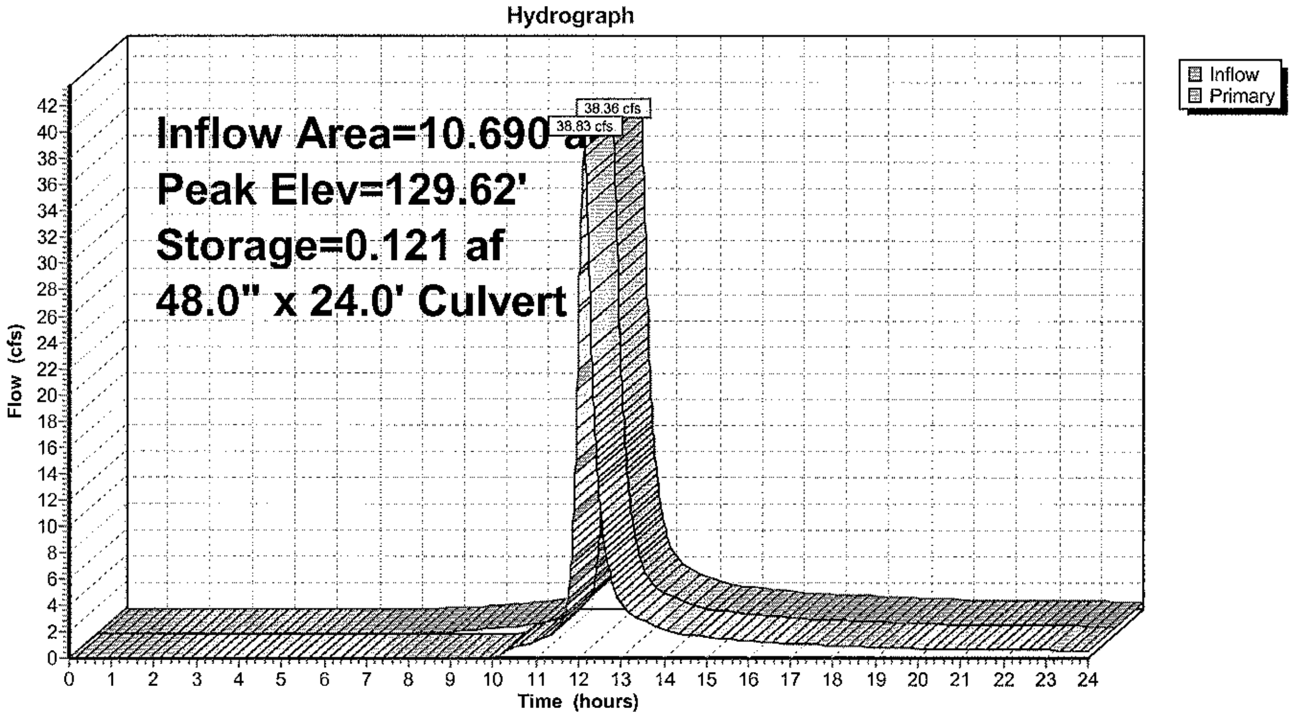
Plug-Flow detention time= 23.4 min calculated for 2.850 af (98% of inflow)
Center-of-Mass det. time= 9.0 min (832.6 - 823.6)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	0.121 af	**120.0"W x 36.0"H x 264.00'L Parabolic Arch**

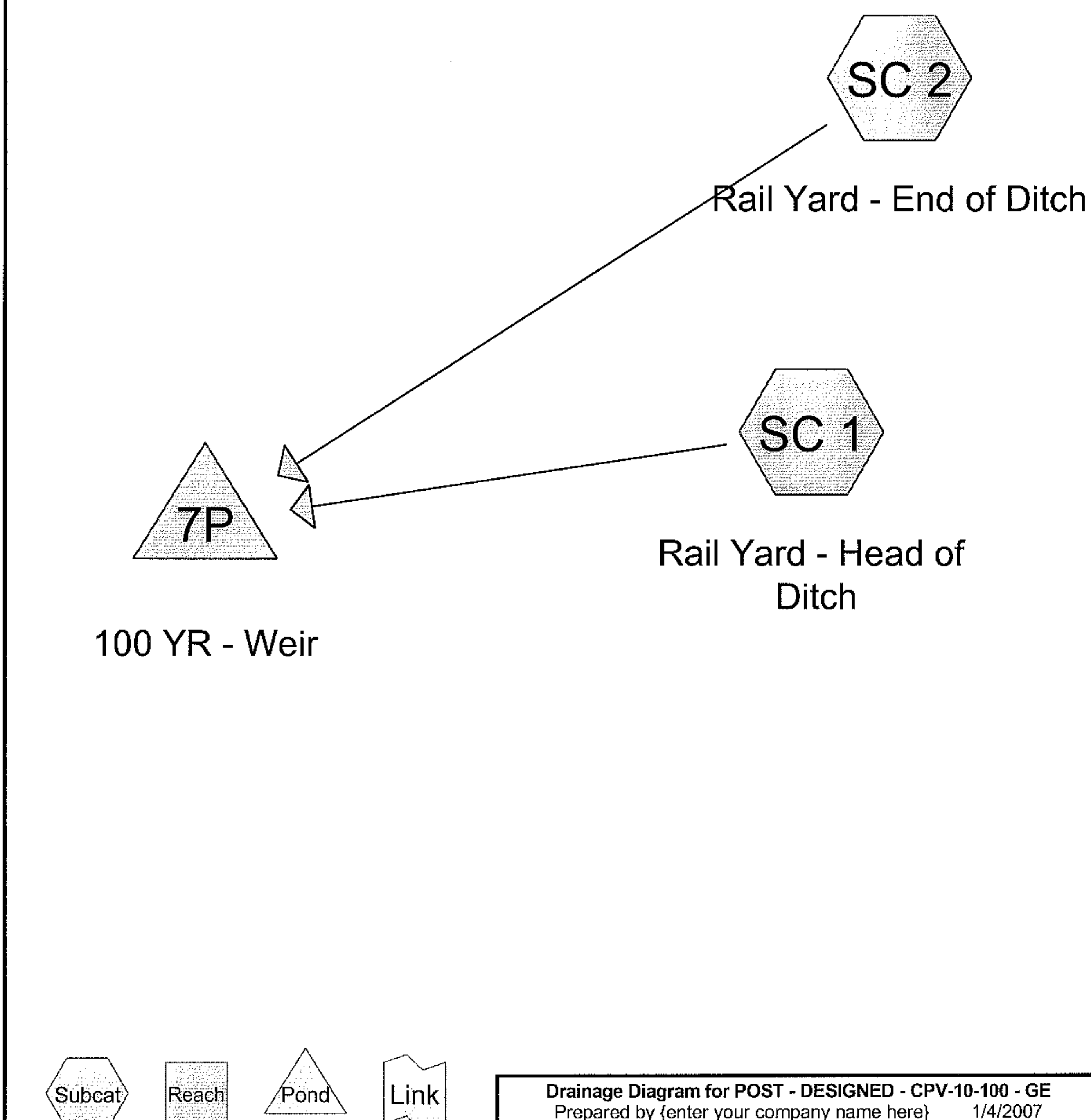
Device	Routing	Invert	Outlet Devices
#1	Primary	127.10'	**48.0" x 24.0' long Culvert** RCP, rounded edge headwall, Ke= 0.100 Outlet Invert= 126.91' S= 0.0079 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=38.73 cfs @ 12.12 hrs HW=129.61' (Free Discharge)
└─**1=Culvert** (Barrel Controls 38.73 cfs @ 6.65 fps)

Pond 1P: 10' wide stream



POST - DEVELOPED HydroCAD



Drainage Diagram for POST - DESIGNED - CPV-10-100 - GE
Prepared by {enter your company name here} 1/4/2007
HydroCAD® 8.00 s/n 004505 © 2006 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcats)
10.700	89	Gravel roads, HSG C (SC 1,SC 2)
10.700		

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

Subcatchment SC 1: Rail Yard - Head of Ditch Runoff Area=5.350 ac Runoff Depth=1.28"
Flow Length=3,735' Tc=83.8 min CN=89 Runoff=2.85 cfs 0.571 af

Subcatchment SC 2: Rail Yard - End of Ditch Runoff Area=5.350 ac Runoff Depth=1.28"
Flow Length=1,945' Tc=42.9 min CN=89 Runoff=4.65 cfs 0.571 af

Pond 7P: 100 YR - Weir Peak Elev=131.51' Storage=40,148 cf Inflow=6.35 cfs 1.143 af
Outflow=0.22 cfs 0.876 af

Total Runoff Area = 10.700 ac Runoff Volume = 1.143 af Average Runoff Depth = 1.28"
100.00% Pervious Area = 10.700 ac 0.00% Impervious Area = 0.000 ac

Subcatchment SC 1: Rail Yard - Head of Ditch

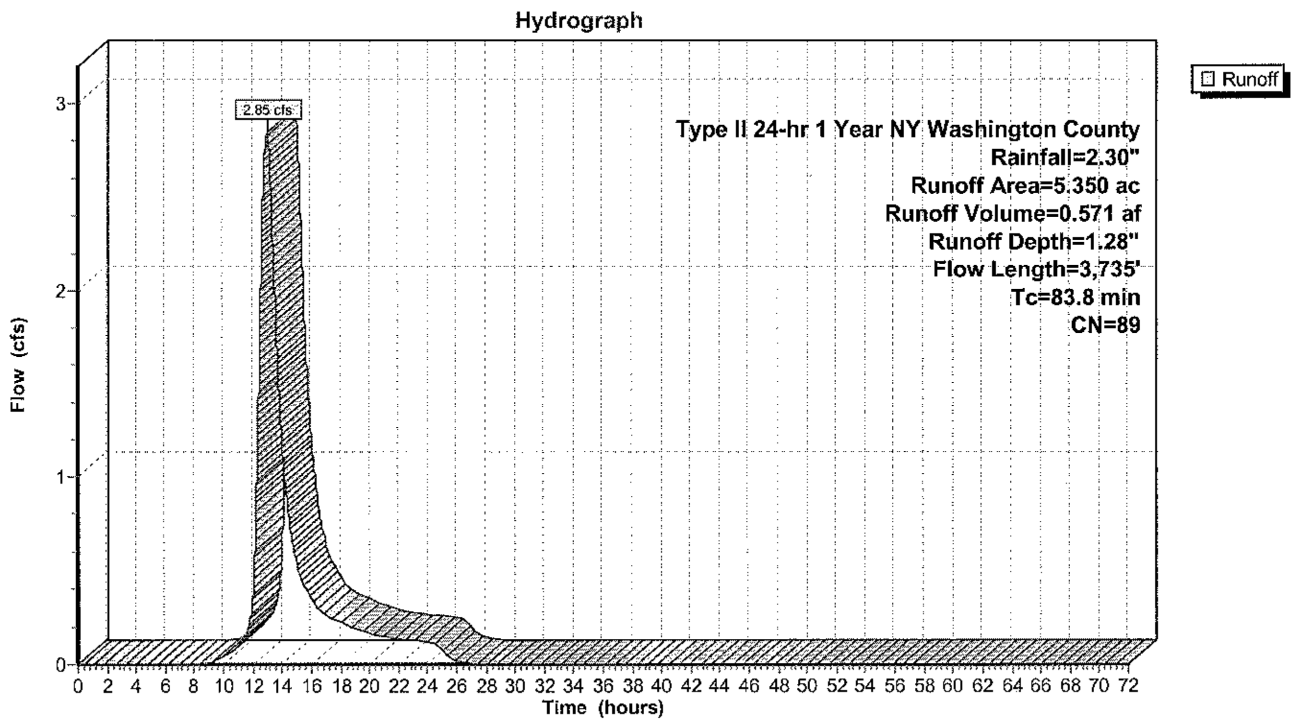
Runoff = 2.85 cfs @ 12.94 hrs, Volume= 0.571 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 Year NY Washington County Rainfall=2.30"

Area (ac)	CN	Description
5.350	89	Gravel roads, HSG C
5.350		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	155	0.0200	1.33		**Sheet Flow, Rail-Yard** Smooth surfaces n= 0.011 P2= 2.50"
81.9	3,580	0.0001	0.73	20.39	**Trap/Vee/Rect Channel Flow,** Bot.W=8.00' D=2.00' Z= 3.0 '/' Top.W=20.00' n= 0.025 Earth, clean & winding
83.8	3,735	Total			

Subcatchment SC 1: Rail Yard - Head of Ditch



Subcatchment SC 2: Rail Yard - End of Ditch

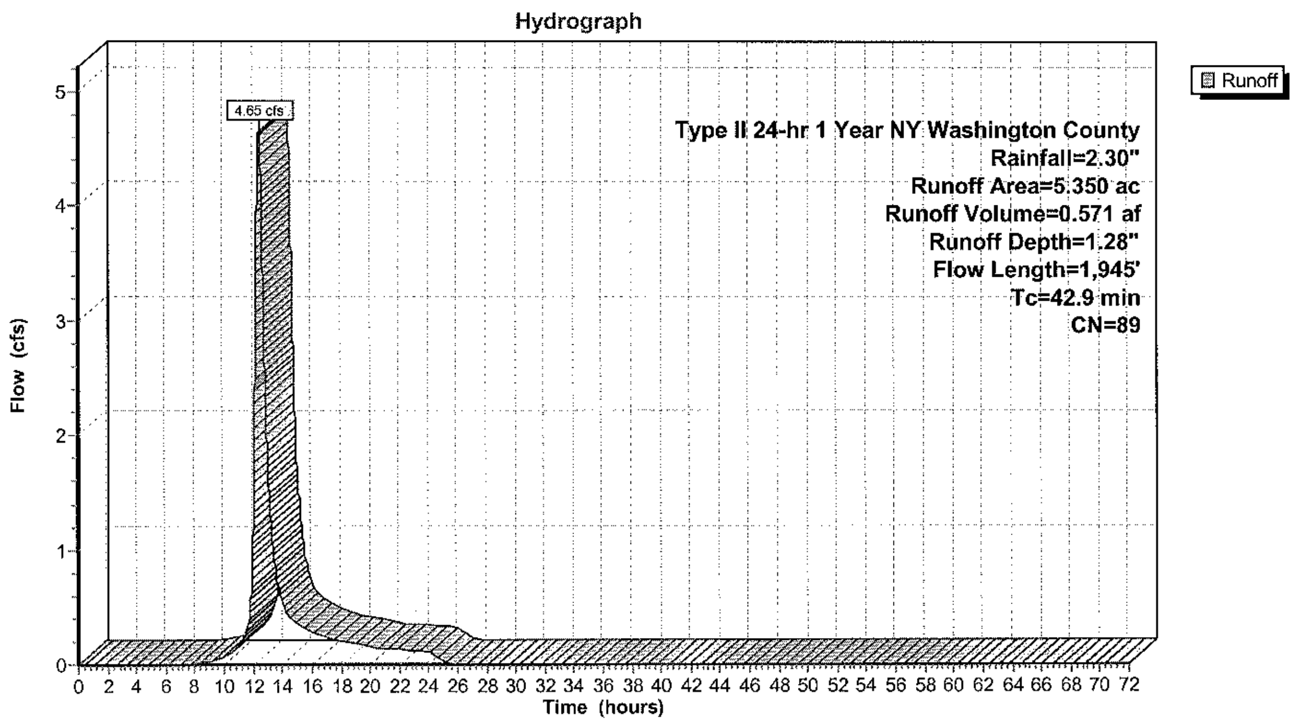
Runoff = 4.65 cfs @ 12.40 hrs, Volume= 0.571 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 Year NY Washington County Rainfall=2.30"

Area (ac)	CN	Description
5.350	89	Gravel roads, HSG C
5.350		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	155	0.0200	1.33		**Sheet Flow, Rail-Yard** Smooth surfaces n= 0.011 P2= 2.50"
41.0	1,790	0.0001	0.73	20.39	**Trap/Vee/Rect Channel Flow,** Bot.W=8.00' D=2.00' Z= 3.0 '/' Top.W=20.00' n= 0.025 Earth, clean & winding
42.9	1,945	Total			

Subcatchment SC 2: Rail Yard - End of Ditch



Pond 7P: 100 YR - Weir

Inflow Area = 10.700 ac, Inflow Depth = 1.28" for 1 Year NY Washington County event
Inflow = 6.35 cfs @ 12.49 hrs, Volume= 1.143 af
Outflow = 0.22 cfs @ 24.36 hrs, Volume= 0.876 af, Atten= 97%, Lag= 712.5 min
Primary = 0.22 cfs @ 24.36 hrs, Volume= 0.876 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 131.51' @ 24.36 hrs Surf.Area= 0 sf Storage= 40,148 cf
Flood Elev= 132.30' Surf.Area= 0 sf Storage= 67,736 cf

Plug-Flow detention time= 1,565.7 min calculated for 0.876 af (77% of inflow)
Center-of-Mass det. time= 1,474.2 min (2,349.2 - 875.0)

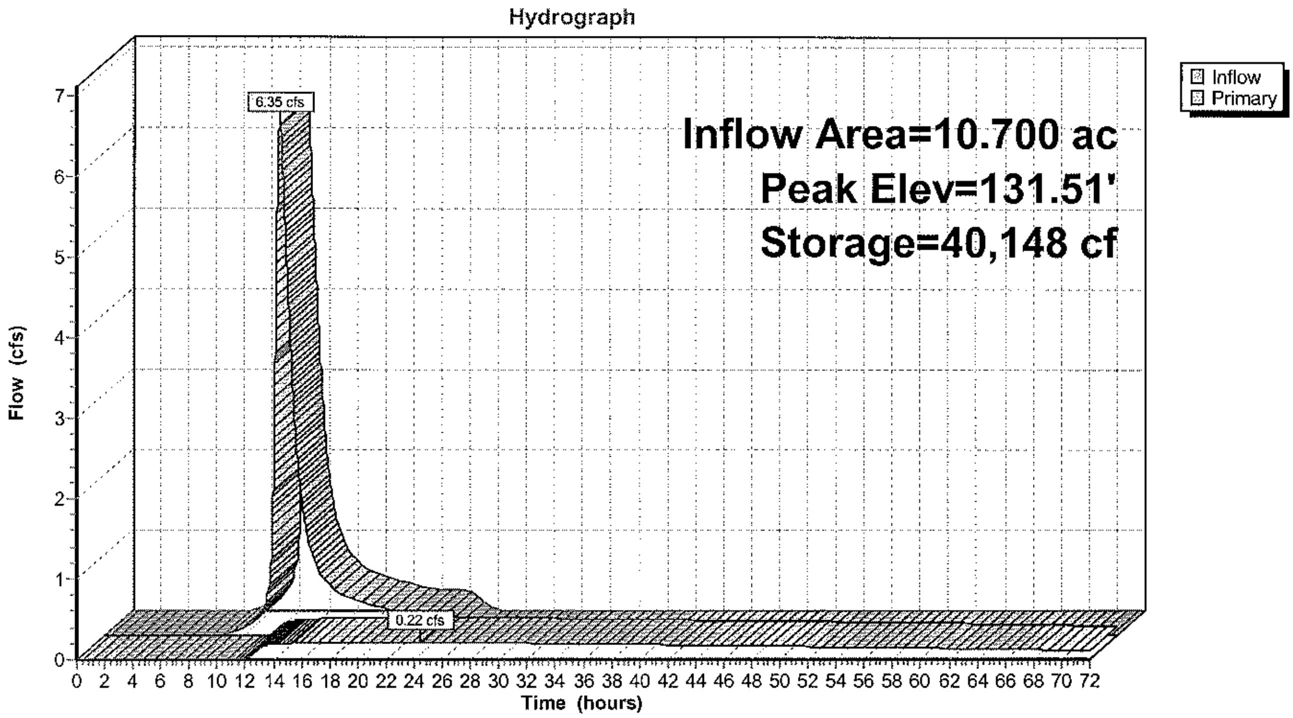
Volume	Invert	Avail.Storage	Storage Description
#1	130.50'	67,736 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
130.50	0
131.00	17,152
131.50	39,729
132.00	67,736

Device	Routing	Invert	Outlet Devices
#1	Device 3	130.50'	**3.0" Vert. inlet drain pipe** C= 0.600
#2	Device 3	131.73'	**0.57' x 0.57' Horiz. Overflow Manhole top X 5.00 columns** X 4 rows Limited to weir flow C= 0.600
#3	Primary	127.84'	**18.0" x 35.0' long Culvert Outlet** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 127.81' S= 0.0009 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#4	Primary	131.74'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.1' Crest Height

Primary OutFlow Max=0.22 cfs @ 24.36 hrs HW=131.51' (Free Discharge)
└─**3=Culvert Outlet** (Passes 0.22 cfs of 16.32 cfs potential flow)
  ├─**1=inlet drain pipe** (Orifice Controls 0.22 cfs @ 4.52 fps)
  └─**2=Overflow Manhole top** (Controls 0.00 cfs)
└─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: 100 YR - Weir



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

Subcatchment SC 1: Rail Yard - Head of Ditch Runoff Area=5.350 ac Runoff Depth=1.45"
Flow Length=3,735' Tc=83.8 min CN=89 Runoff=3.25 cfs 0.649 af

Subcatchment SC 2: Rail Yard - End of Ditch Runoff Area=5.350 ac Runoff Depth=1.45"
Flow Length=1,945' Tc=42.9 min CN=89 Runoff=5.29 cfs 0.649 af

Pond 7P: 100 YR - Weir Peak Elev=131.62' Storage=46,212 cf Inflow=7.23 cfs 1.297 af
Outflow=0.24 cfs 0.958 af

Total Runoff Area = 10.700 ac Runoff Volume = 1.297 af Average Runoff Depth = 1.45"
100.00% Pervious Area = 10.700 ac 0.00% Impervious Area = 0.000 ac

Subcatchment SC 1: Rail Yard - Head of Ditch

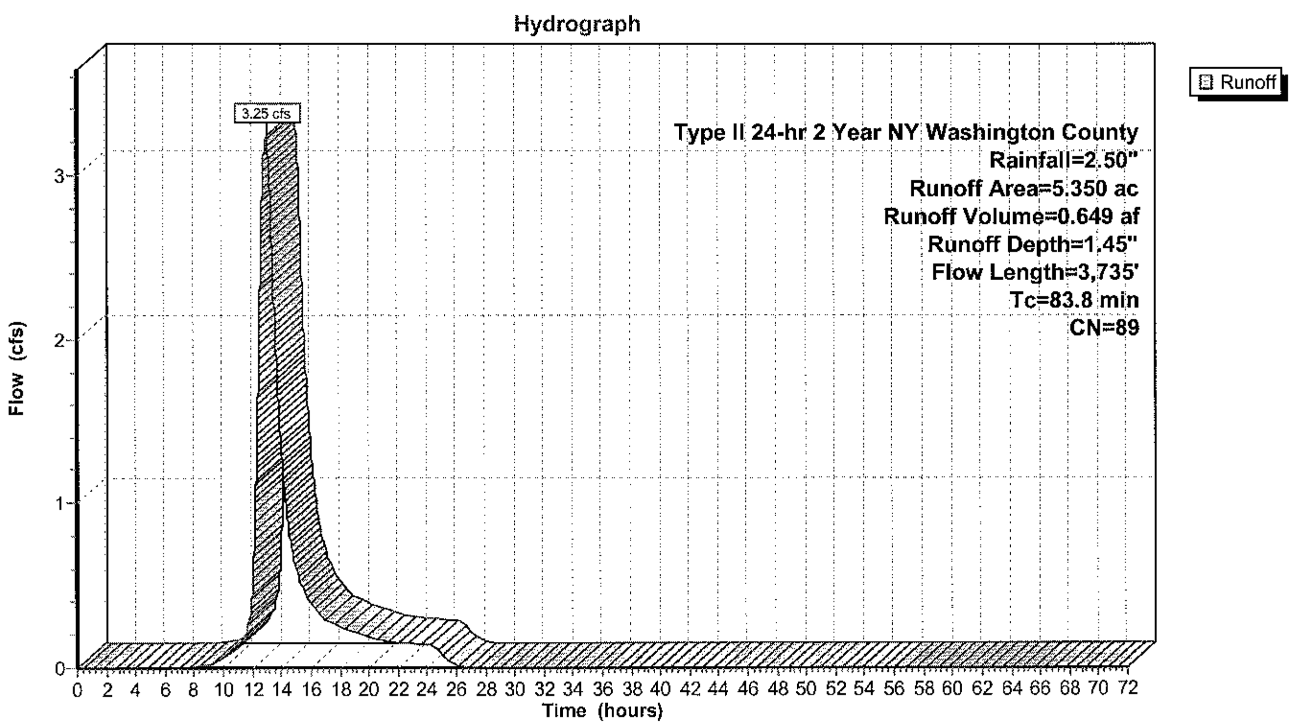
Runoff = 3.25 cfs @ 12.94 hrs, Volume= 0.649 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 Year NY Washington County Rainfall=2.50"

Area (ac)	CN	Description
5.350	89	Gravel roads, HSG C
5.350		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	155	0.0200	1.33		**Sheet Flow, Rail-Yard** Smooth surfaces n= 0.011 P2= 2.50"
81.9	3,580	0.0001	0.73	20.39	**Trap/Vee/Rect Channel Flow,** Bot.W=8.00' D=2.00' Z= 3.0 '/' Top.W=20.00' n= 0.025 Earth, clean & winding
83.8	3,735	Total			

Subcatchment SC 1: Rail Yard - Head of Ditch



Subcatchment SC 2: Rail Yard - End of Ditch

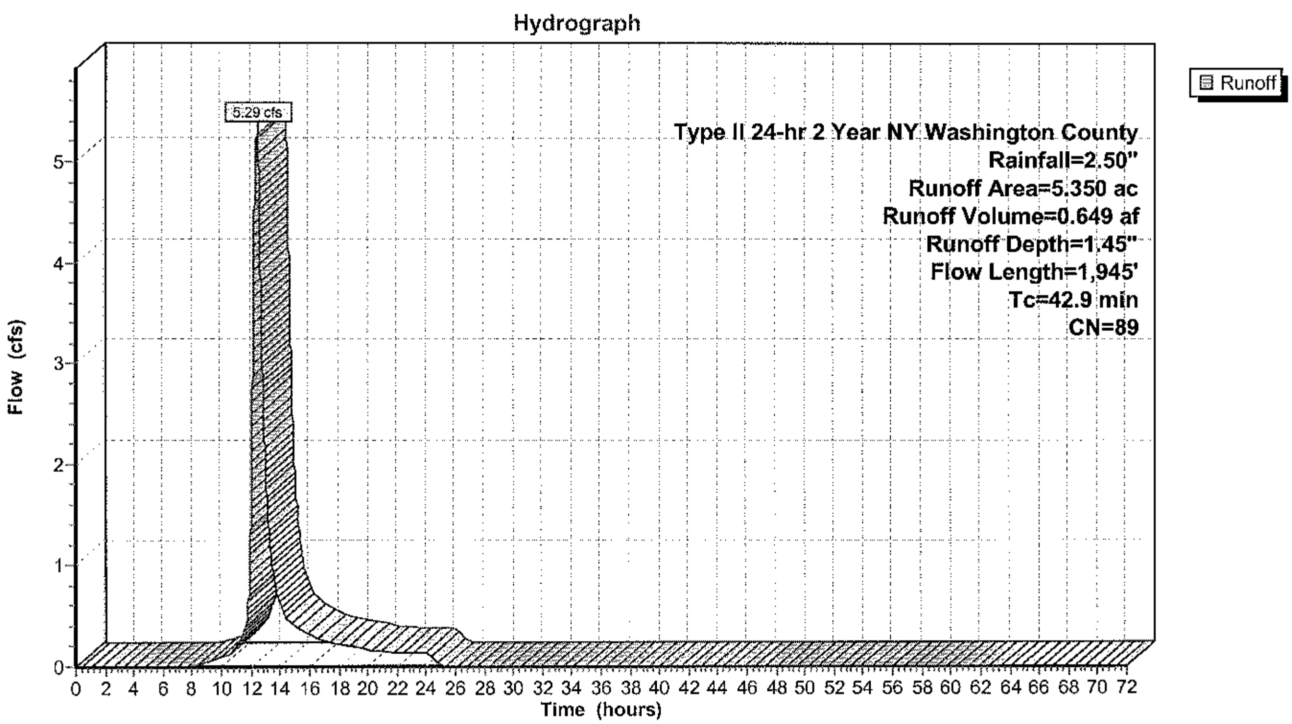
Runoff = 5.29 cfs @ 12.40 hrs, Volume= 0.649 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 Year NY Washington County Rainfall=2.50"

Area (ac)	CN	Description
5.350	89	Gravel roads, HSG C
5.350		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	155	0.0200	1.33		**Sheet Flow, Rail-Yard** Smooth surfaces n= 0.011 P2= 2.50"
41.0	1,790	0.0001	0.73	20.39	**Trap/Vee/Rect Channel Flow,** Bot.W=8.00' D=2.00' Z= 3.0 '/' Top.W=20.00' n= 0.025 Earth, clean & winding
42.9	1,945	Total			

Subcatchment SC 2: Rail Yard - End of Ditch



Pond 7P: 100 YR - Weir

Inflow Area =	10.700 ac,	Inflow Depth = 1.45"	for 2 Year NY Washington County event	
Inflow =	7.23 cfs @	12.49 hrs, Volume=	1.297 af	
Outflow =	0.24 cfs @	24.42 hrs, Volume=	0.958 af,	Atten= 97%, Lag= 715.7 min
Primary =	0.24 cfs @	24.42 hrs, Volume=	0.958 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 131.62' @ 24.42 hrs Surf.Area= 0 sf Storage= 46,212 cf
Flood Elev= 132.30' Surf.Area= 0 sf Storage= 67,736 cf

Plug-Flow detention time= 1,599.5 min calculated for 0.957 af (74% of inflow)
Center-of-Mass det. time= 1,503.3 min (2,374.6 - 871.3)

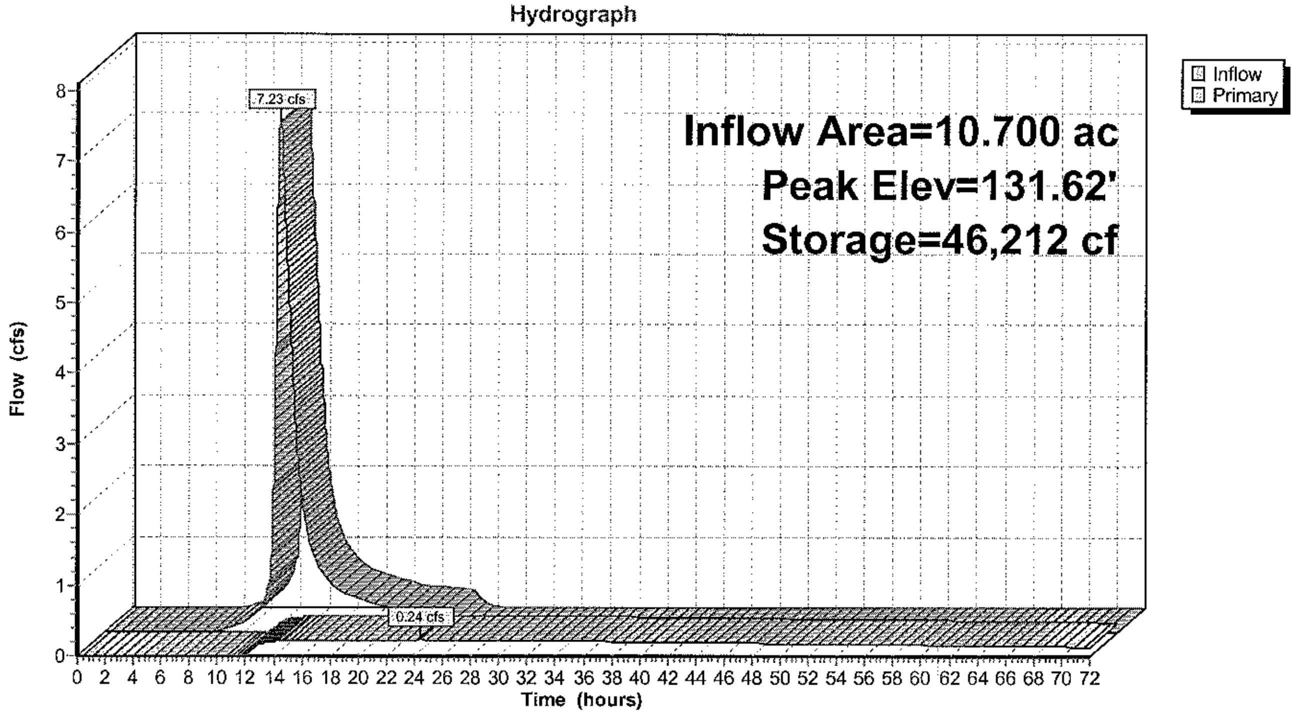
Volume	Invert	Avail.Storage	Storage Description
#1	130.50'	67,736 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
130.50	0
131.00	17,152
131.50	39,729
132.00	67,736

Device	Routing	Invert	Outlet Devices
#1	Device 3	130.50'	**3.0" Vert. inlet drain pipe** C= 0.600
#2	Device 3	131.73'	**0.57' x 0.57' Horiz. Overflow Manhole top X 5.00 columns** X 4 rows Limited to weir flow C= 0.600
#3	Primary	127.84'	**18.0" x 35.0' long Culvert Outlet** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 127.81' S= 0.0009 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#4	Primary	131.74'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.1' Crest Height

Primary OutFlow Max=0.24 cfs @ 24.42 hrs HW=131.62' (Free Discharge)
└─**3=Culvert Outlet** (Passes 0.24 cfs of 16.72 cfs potential flow)
  ├─**1=inlet drain pipe** (Orifice Controls 0.24 cfs @ 4.79 fps)
  └─**2=Overflow Manhole top** (Controls 0.00 cfs)
└─**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: 100 YR - Weir



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

Subcatchment SC 1: Rail Yard - Head of Ditch Runoff Area=5.350 ac Runoff Depth=2.70"
Flow Length=3,735' Tc=83.8 min CN=89 Runoff=6.03 cfs 1.204 af

Subcatchment SC 2: Rail Yard - End of Ditch Runoff Area=5.350 ac Runoff Depth=2.70"
Flow Length=1,945' Tc=42.9 min CN=89 Runoff=9.79 cfs 1.204 af

Pond 7P: 100 YR - Weir Peak Elev=131.82' Storage=57,896 cf Inflow=13.47 cfs 2.409 af
Outflow=5.08 cfs 1.975 af

Total Runoff Area = 10.700 ac Runoff Volume = 2.409 af Average Runoff Depth = 2.70"
100.00% Pervious Area = 10.700 ac 0.00% Impervious Area = 0.000 ac

Subcatchment SC 1: Rail Yard - Head of Ditch

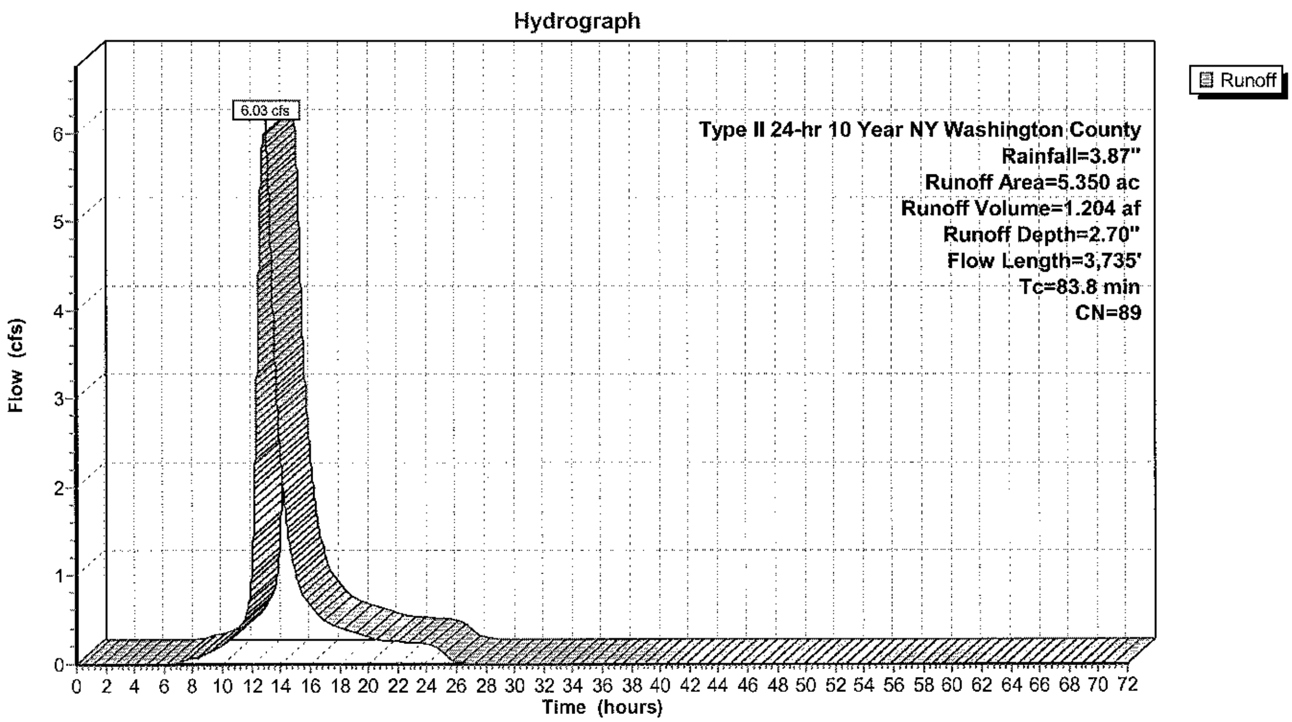
Runoff = 6.03 cfs @ 12.94 hrs, Volume= 1.204 af, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 Year NY Washington County Rainfall=3.87"

Area (ac)	CN	Description
5.350	89	Gravel roads, HSG C
5.350		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	155	0.0200	1.33		**Sheet Flow, Rail-Yard** Smooth surfaces n= 0.011 P2= 2.50"
81.9	3,580	0.0001	0.73	20.39	**Trap/Vee/Rect Channel Flow,** Bot.W=8.00' D=2.00' Z= 3.0 '/' Top.W=20.00' n= 0.025 Earth, clean & winding
83.8	3,735	Total			

Subcatchment SC 1: Rail Yard - Head of Ditch



Subcatchment SC 2: Rail Yard - End of Ditch

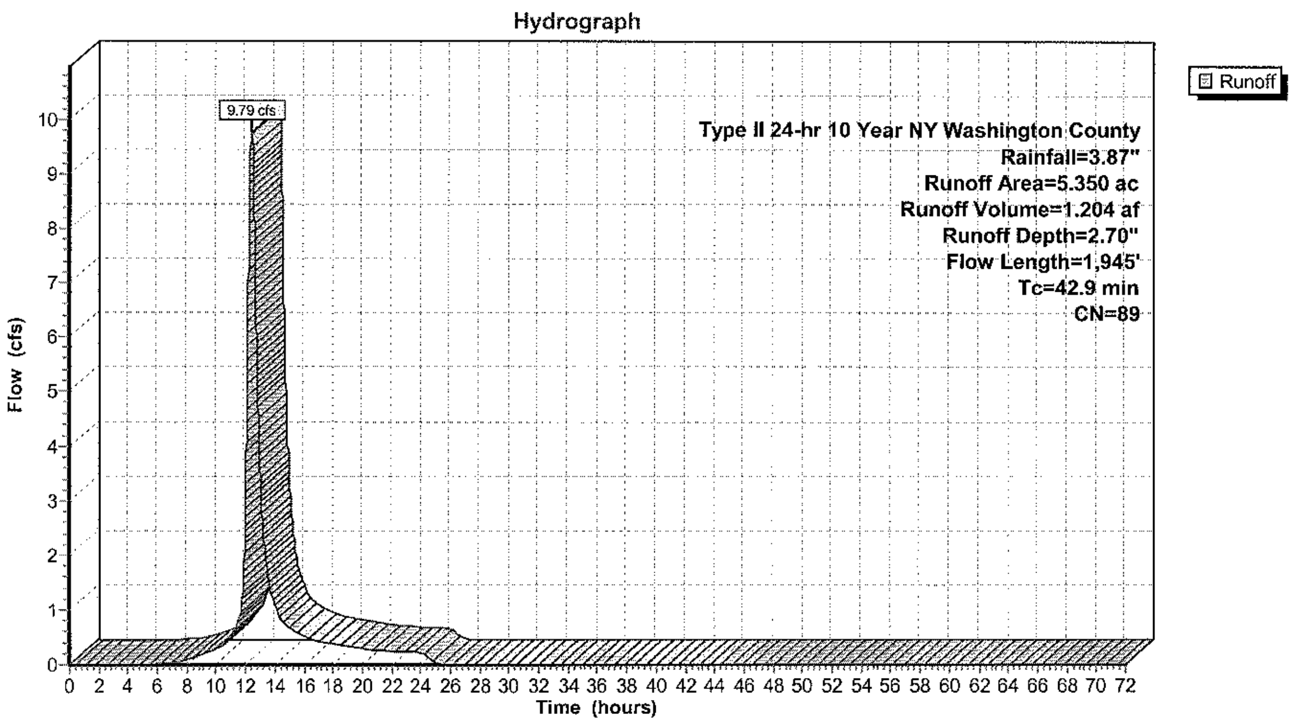
Runoff = 9.79 cfs @ 12.39 hrs, Volume= 1.204 af, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 Year NY Washington County Rainfall=3.87"

Area (ac)	CN	Description
5.350	89	Gravel roads, HSG C
5.350		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	155	0.0200	1.33		**Sheet Flow, Rail-Yard** Smooth surfaces n= 0.011 P2= 2.50"
41.0	1,790	0.0001	0.73	20.39	**Trap/Vee/Rect Channel Flow,** Bot.W=8.00' D=2.00' Z= 3.0 '/' Top.W=20.00' n= 0.025 Earth, clean & winding
42.9	1,945	Total			

Subcatchment SC 2: Rail Yard - End of Ditch



Pond 7P: 100 YR - Weir

```
Inflow Area =     10.700 ac,  Inflow Depth =  2.70"   for 10 Year NY Washington County event
Inflow      =     13.47 cfs @  12.48 hrs,  Volume=        2.409 af
Outflow     =      5.08 cfs @  13.58 hrs,  Volume=        1.975 af,  Atten= 62%,  Lag= 66.3 min
Primary     =      5.08 cfs @  13.58 hrs,  Volume=        1.975 af
```

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 131.82' @ 13.58 hrs Surf.Area= 0 sf Storage= 57,896 cf
Flood Elev= 132.30' Surf.Area= 0 sf Storage= 67,736 cf

Plug-Flow detention time= 934.7 min calculated for 1.975 af (82% of inflow)
Center-of-Mass det. time= 858.2 min (1,712.0 - 853.7)

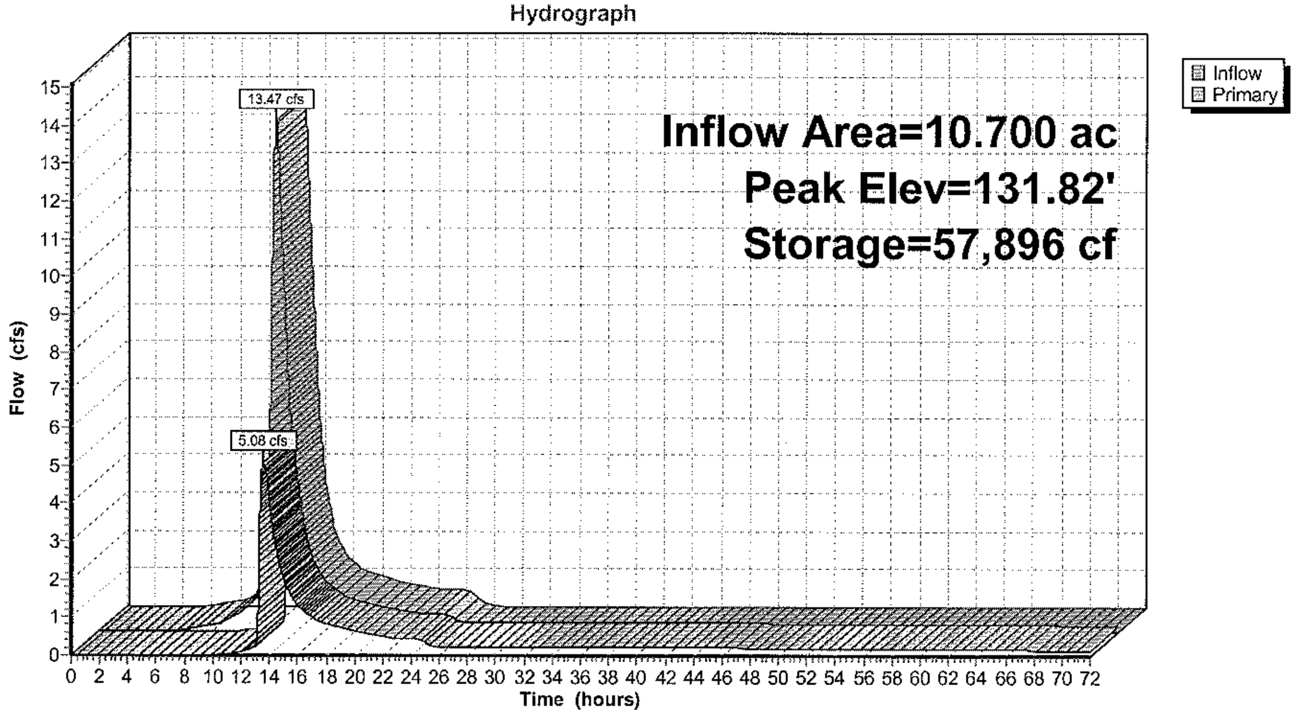
Volume	Invert	Avail.Storage	Storage Description
#1	130.50'	67,736 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
130.50	0
131.00	17,152
131.50	39,729
132.00	67,736

Device	Routing	Invert	Outlet Devices
#1	Device 3	130.50'	**3.0" Vert. inlet drain pipe** C= 0.600
#2	Device 3	131.73'	**0.57' x 0.57' Horiz. Overflow Manhole top X 5.00 columns** X 4 rows Limited to weir flow C= 0.600
#3	Primary	127.84'	**18.0" x 35.0' long Culvert Outlet** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 127.81' S= 0.0009 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#4	Primary	131.74'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.1' Crest Height

```
Primary OutFlow  Max=5.06 cfs @ 13.58 hrs  HW=131.82'  (Free Discharge)
├─3=Culvert Outlet  (Passes 4.58 cfs of 17.46 cfs potential flow)
│  ├─1=inlet drain pipe  (Orifice Controls 0.26 cfs @ 5.27 fps)
│  └─2=Overflow Manhole top  (Weir Controls 4.32 cfs @ 1.00 fps)
└─4=Sharp-Crested Rectangular Weir  (Weir Controls 0.48 cfs @ 0.96 fps)
```

Pond 7P: 100 YR - Weir



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

Subcatchment SC 1: Rail Yard - Head of Ditch Runoff Area=5.350 ac Runoff Depth=4.11"
Flow Length=3,735' Tc=83.8 min CN=89 Runoff=9.08 cfs 1.831 af

Subcatchment SC 2: Rail Yard - End of Ditch Runoff Area=5.350 ac Runoff Depth=4.11"
Flow Length=1,945' Tc=42.9 min CN=89 Runoff=14.71 cfs 1.831 af

Pond 7P: 100 YR - Weir Peak Elev=131.92' Storage=63,278 cf Inflow=20.33 cfs 3.663 af
Outflow=14.19 cfs 3.226 af

Total Runoff Area = 10.700 ac Runoff Volume = 3.663 af Average Runoff Depth = 4.11"
100.00% Pervious Area = 10.700 ac 0.00% Impervious Area = 0.000 ac

Subcatchment SC 1: Rail Yard - Head of Ditch

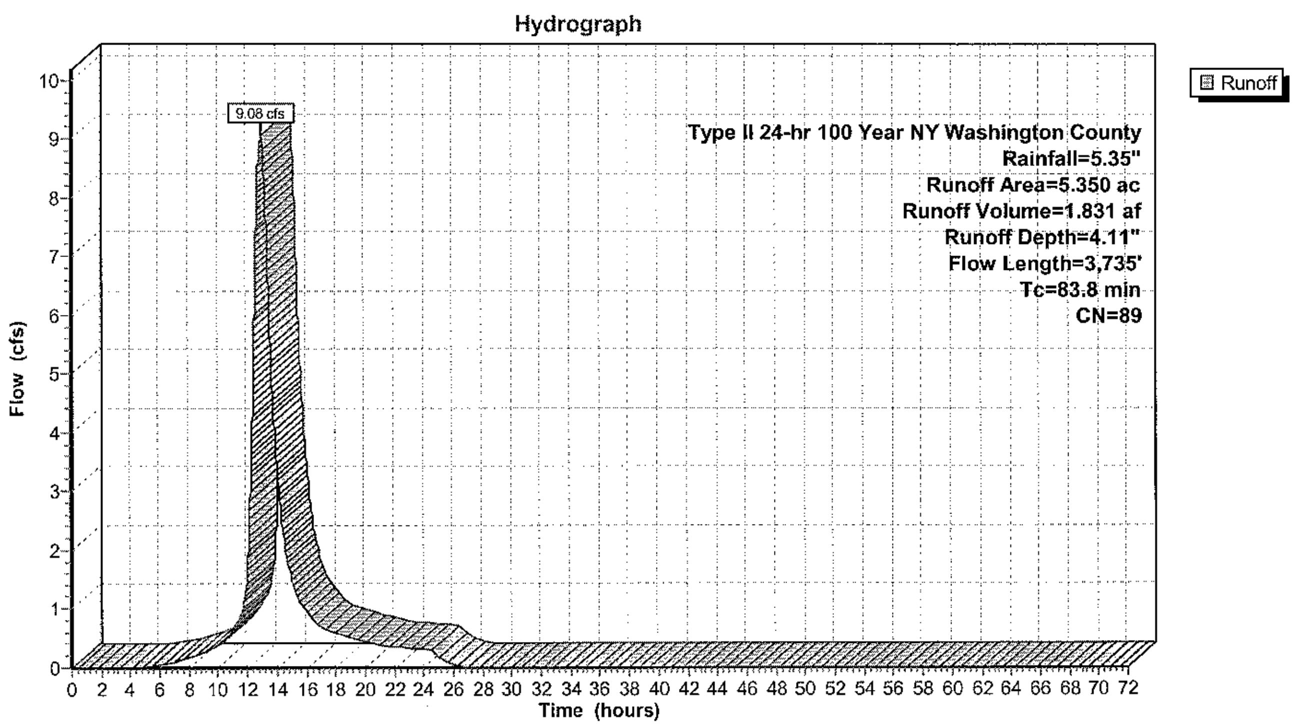
Runoff = 9.08 cfs @ 12.94 hrs, Volume= 1.831 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 Year NY Washington County Rainfall=5.35"

Area (ac)	CN	Description
5.350	89	Gravel roads, HSG C
5.350		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	155	0.0200	1.33		**Sheet Flow, Rail-Yard** Smooth surfaces n= 0.011 P2= 2.50"
81.9	3,580	0.0001	0.73	20.39	**Trap/Vee/Rect Channel Flow,** Bot.W=8.00' D=2.00' Z= 3.0 '/' Top.W=20.00' n= 0.025 Earth, clean & winding
83.8	3,735	Total			

Subcatchment SC 1: Rail Yard - Head of Ditch



Subcatchment SC 2: Rail Yard - End of Ditch

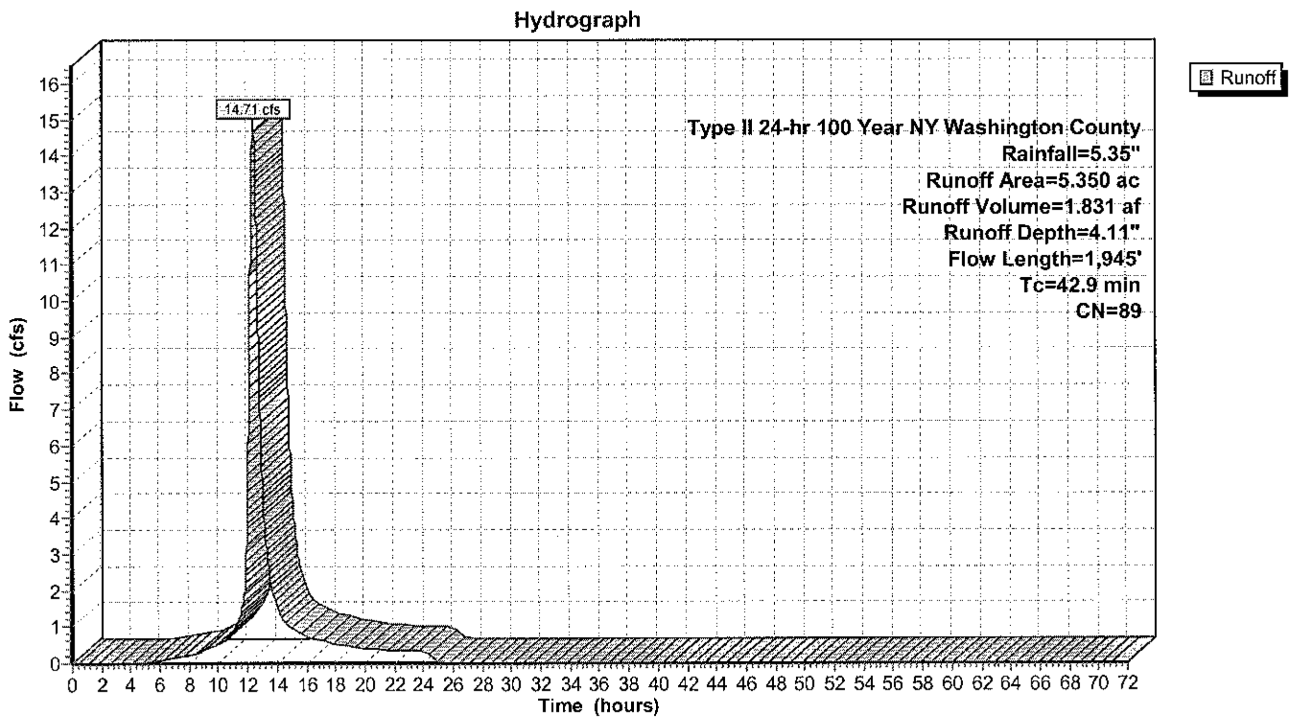
Runoff = 14.71 cfs @ 12.39 hrs, Volume= 1.831 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 Year NY Washington County Rainfall=5.35"

Area (ac)	CN	Description
5.350	89	Gravel roads, HSG C
5.350		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	155	0.0200	1.33		**Sheet Flow, Rail-Yard** Smooth surfaces n= 0.011 P2= 2.50"
41.0	1,790	0.0001	0.73	20.39	**Trap/Vee/Rect Channel Flow,** Bot.W=8.00' D=2.00' Z= 3.0 '/' Top.W=20.00' n= 0.025 Earth, clean & winding
42.9	1,945	Total			

Subcatchment SC 2: Rail Yard - End of Ditch



Pond 7P: 100 YR - Weir

Inflow Area =	10.700 ac, Inflow Depth = 4.11"	for 100 Year NY Washington County event		
Inflow =	20.33 cfs @ 12.47 hrs,	Volume=	3.663 af	
Outflow =	14.19 cfs @ 12.99 hrs,	Volume=	3.226 af,	Atten= 30%, Lag= 31.1 min
Primary =	14.19 cfs @ 12.99 hrs,	Volume=	3.226 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 131.92' @ 12.99 hrs Surf.Area= 0 sf Storage= 63,278 cf
Flood Elev= 132.30' Surf.Area= 0 sf Storage= 67,736 cf

Plug-Flow detention time= 601.4 min calculated for 3.226 af (88% of inflow)
Center-of-Mass det. time= 543.3 min (1,385.3 - 842.0)

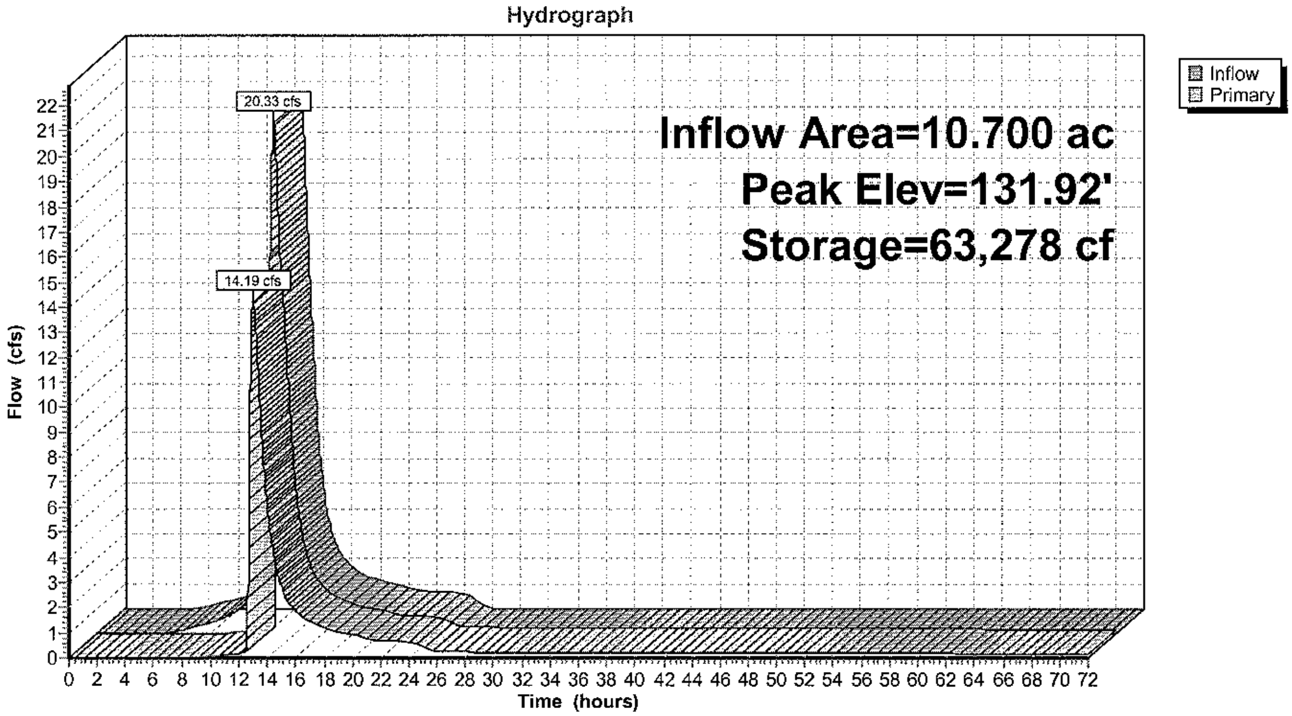
Volume	Invert	Avail.Storage	Storage Description
#1	130.50'	67,736 cf	**Custom Stage Data** Listed below

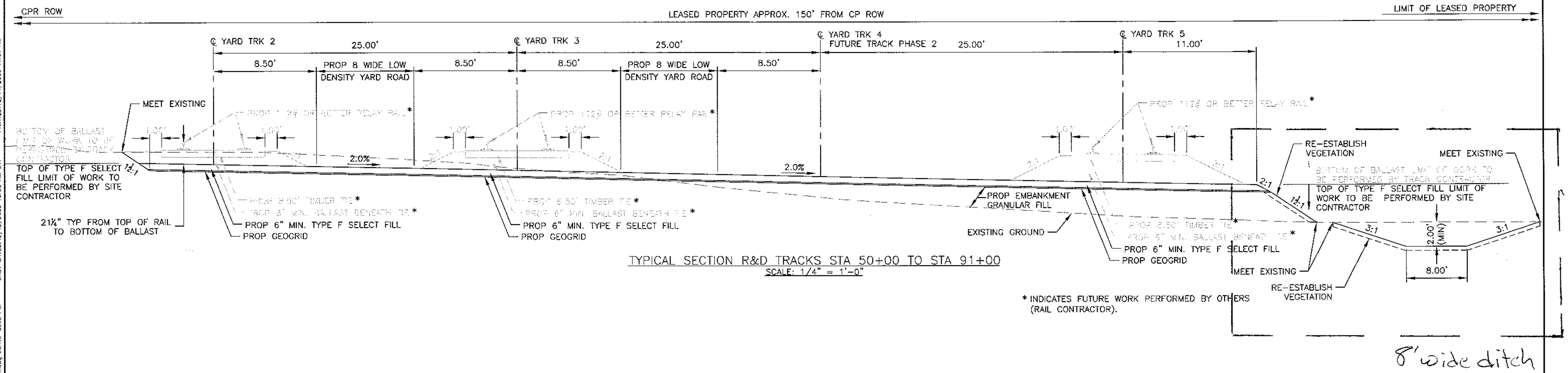
Elevation (feet)	Cum.Store (cubic-feet)
130.50	0
131.00	17,152
131.50	39,729
132.00	67,736

Device	Routing	Invert	Outlet Devices
#1	Device 3	130.50'	**3.0" Vert. inlet drain pipe** C= 0.600
#2	Device 3	131.73'	**0.57' x 0.57' Horiz. Overflow Manhole top X 5.00 columns** X 4 rows Limited to weir flow C= 0.600
#3	Primary	127.84'	**18.0" x 35.0' long Culvert Outlet** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 127.81' S= 0.0009 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean
#4	Primary	131.74'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.1' Crest Height

Primary OutFlow Max=14.18 cfs @ 12.99 hrs HW=131.92' (Free Discharge)
- **3=Culvert Outlet** (Passes 12.66 cfs of 17.79 cfs potential flow)
  - **1=inlet drain pipe** (Orifice Controls 0.27 cfs @ 5.48 fps)
  - **2=Overflow Manhole top** (Weir Controls 12.39 cfs @ 1.43 fps)
- **4=Sharp-Crested Rectangular Weir** (Weir Controls 1.52 cfs @ 1.42 fps)

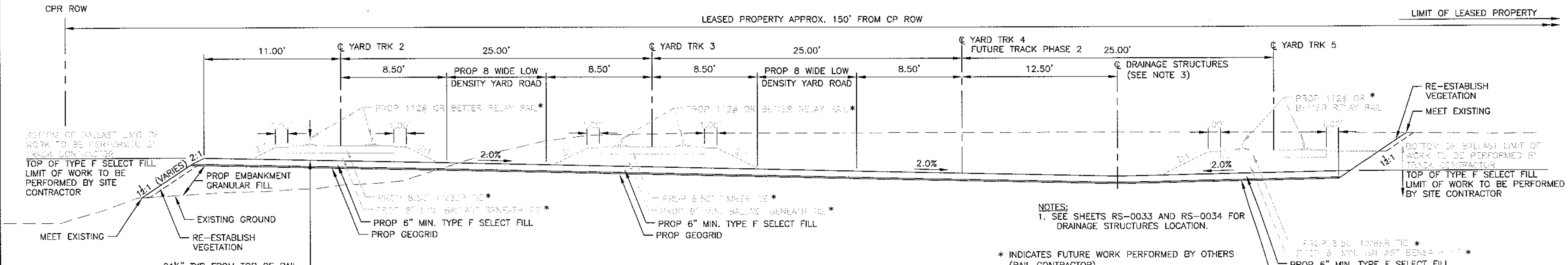
Pond 7P: 100 YR - Weir





TYPICAL SECTION R&D TRACKS STA 50+00 TO STA 91+00

SCALE: 1/4" = 1'-0"



TYPICAL SECTION R&D TRACKS STA 32+00 TO STA 50+00

SCALE: 1/4" = 1'-0"

ENGINEER OF RECORD
HENNINGSON, DURHAM, AND RICHARDSON ARCHITECTURE AND ENGINEERING, P.C.

CONFORMED REVIEW SET – NOT FOR CONSTRUCTION

ORIGINAL SCALE APPLIES TO 22"X34" DRAWING

THIS DRAWING WAS PREPARED AT THE SCALE(S) INDICATED. INACCURACIES IN THE STATED SCALE(S) MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED. USE THE GRAPHIC SCALE BAR(S) TO DETERMINE THE ACTUAL SCALE(S) OF THIS DRAWING.

No.	Date	Revisions	Init

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

Professional Engineer's Name: THOMAS C. MCLAUGHLIN
Professional Engineer's No.: 075823
State: NY | Date Signed: 12/15/06
Project Mgr.: KFB | Designed by: SPK | Drawn by: WJL

HDR Henningson, Durham and Richardson
Architecture and Engineering, P.C.
711 WESTCHESTER AVE
WHITE PLAINS, NY 10604-3504
(914) 993-2000

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

TYPICAL TRACK CROSS SECTIONS

TRACK NOS 2, 3, AND 5

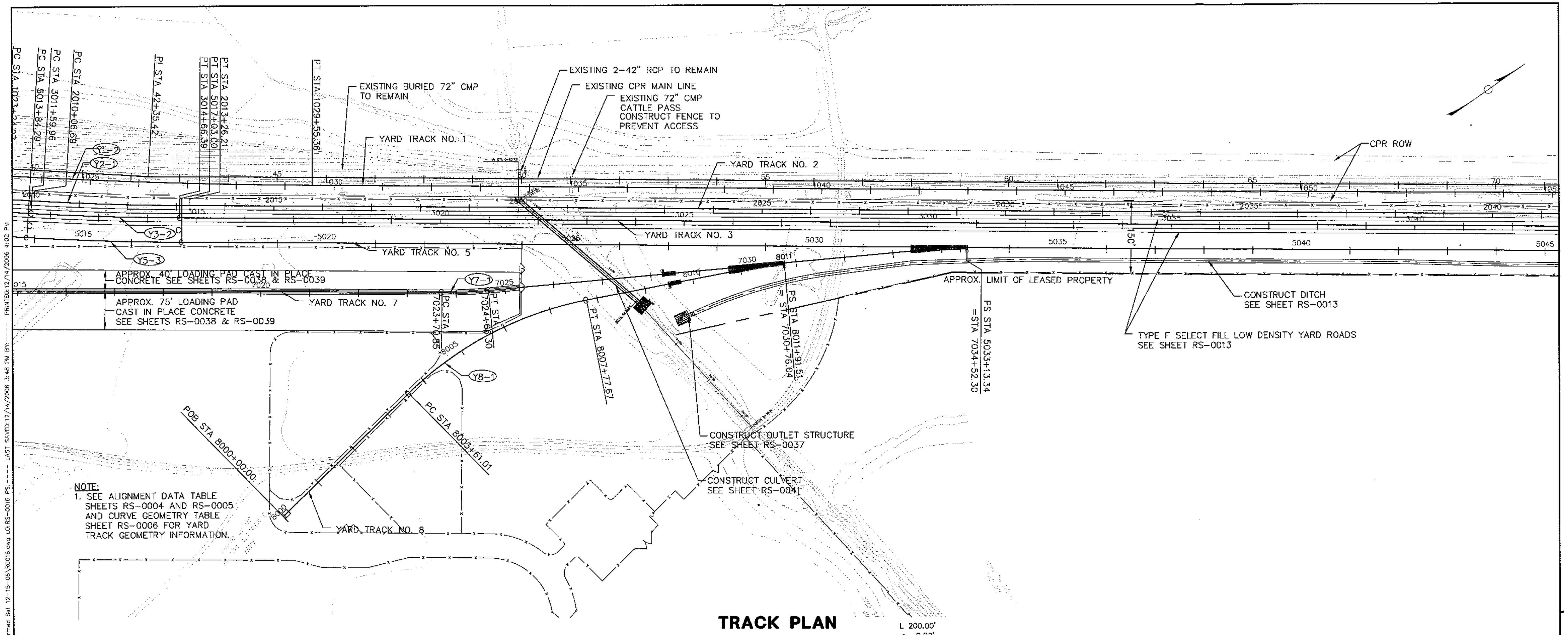
CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION – RAIL YARD CONSTRUCTION

BBL Project No. 20435.700

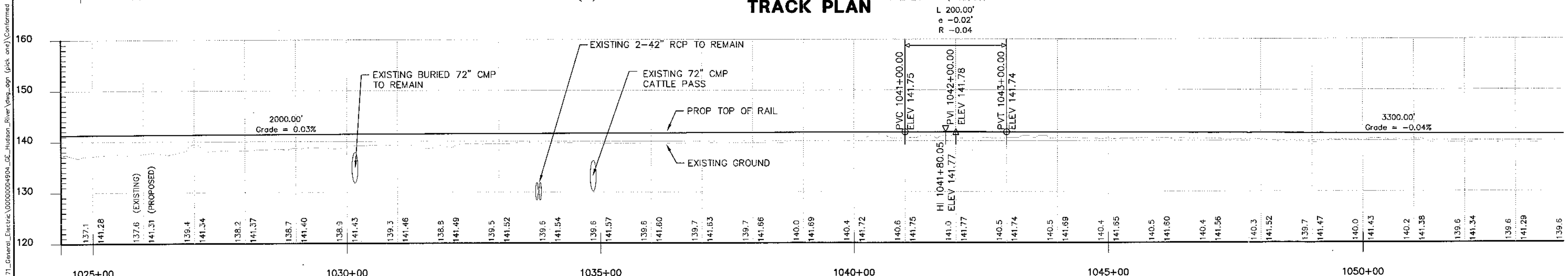
Date: DECEMBER 15, 2006

Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

RS-0013



TRACK PLAN



YARD TRACK NO. 1 PROFILE

ENGINEER OF RECORD
HENNINGSON, DURHAM, AND RICHARDSON ARCHITECTURE AND ENGINEERING, P.C.

CONFORMED REVIEW SET – NOT FOR CONSTRUCTION

ORIGINAL SCALE APPLIES TO 22"X34" DRAWING
H: 50 0 50 100
V: 5 0 5 10
SCALE IN FEET

THIS DRAWING WAS PREPARED AT THE SCALE(S) INDICATED. INACCURACIES IN THE STATED SCALE(S) MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED. USE THE GRAPHIC SCALE BAR(S) TO DETERMINE THE ACTUAL SCALE(S) OF THIS DRAWING.

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Professional Engineer's Name: THOMAS C. MCLAUGHLIN
Professional Engineer's No.: 075823
State: NY | Date Signed: 12/15/06
Project Mgr.: KFB | Designed by: SPK | Drawn by: GFK

HDR Henningson, Durham and Richardson
Architecture and Engineering, P.C.
711 WESTCHESTER AVE
WHITE PLAINS, NY 10604-3504
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GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

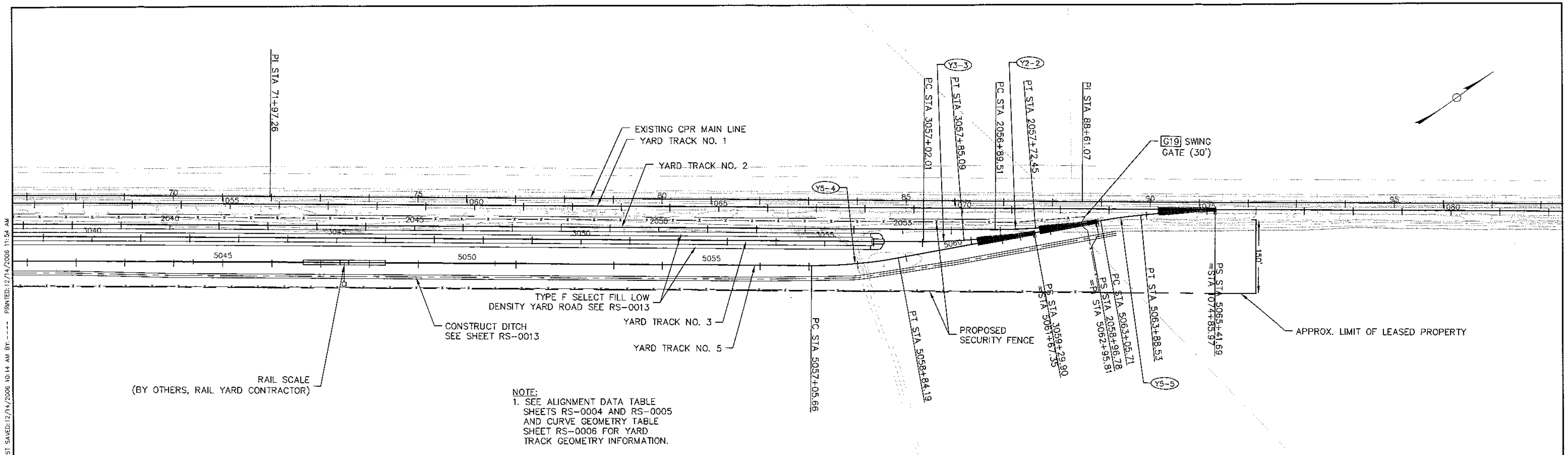
TRACK PLAN & YARD TRACK 1 PROFILE

SHEET 2 OF 4

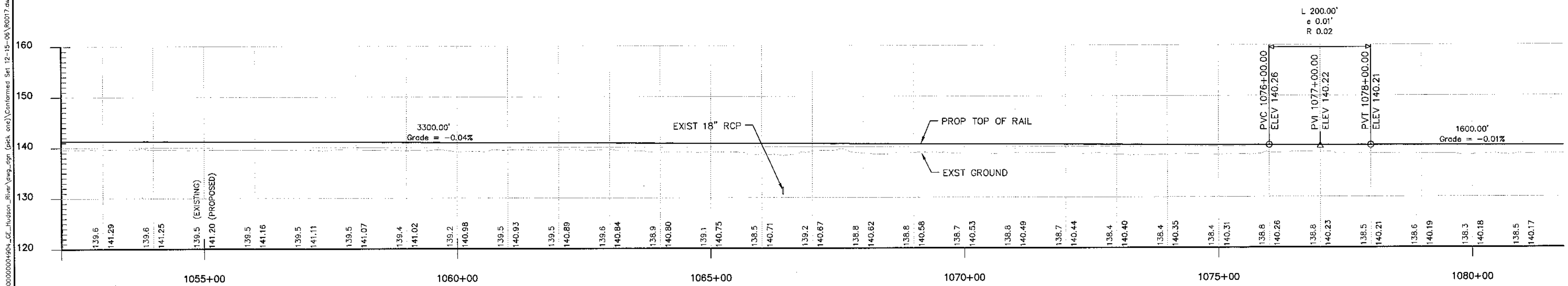
CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION – RAIL YARD CONSTRUCTION

BBL Project No. 20435.700
Date: DECEMBER 15, 2006
Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

RS-0016



TRACK PLAN



YARD TRACK NO. 1 PROFILE

ENGINEER OF RECORD
HENNINGSON, DURHAM, AND RICHARDSON ARCHITECTURE AND ENGINEERING, P.C.

CONFORMED REVIEW SET – NOT FOR CONSTRUCTION

ORIGINAL SCALE APPLIES TO 22"X34" DRAWING
H: 50 0 50 100
V: 50 0 50 100
SCALE IN FEET

THIS DRAWING WAS PREPARED AT THE SCALE(S) INDICATED. INACCURACIES IN THE STATED SCALE(S) MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED. USE THE GRAPHIC SCALE BAR(S) TO DETERMINE THE ACTUAL SCALE(S) OF THIS DRAWING.

No.	Date	Revisions	Init

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

Professional Engineer's Name: THOMAS C. MCLAUGHLIN
Professional Engineer's No.: 075823
State: NY
Date Signed: 12/15/06
Project Mgr.: KFB
Designed by: SPK
Drawn by: GFK

HDR Henningson, Durham and Richardson
Architecture and Engineering, P.C.
711 WESTCHESTER AVE WHITE PLAINS, NY 10604-3504 (914) 993-2000

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

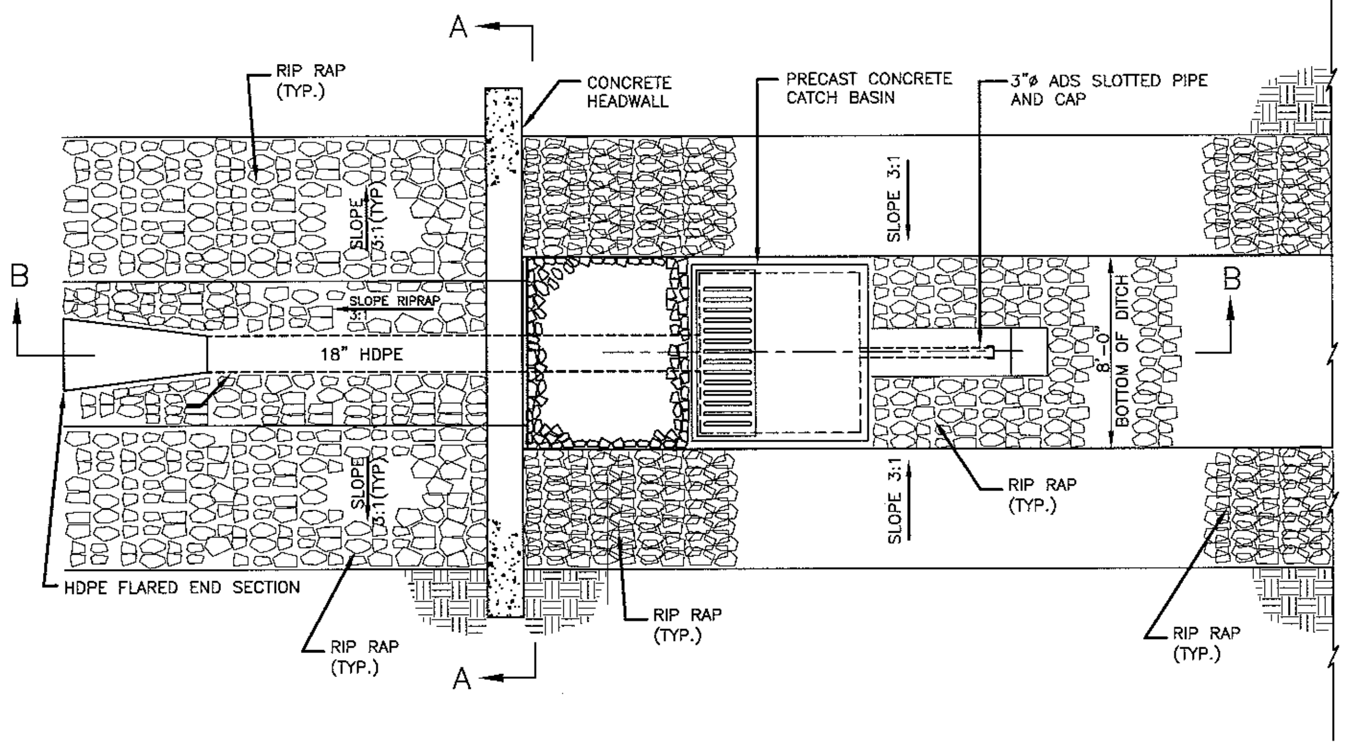
TRACK PLAN & YARD TRACK 1 PROFILE

SHEET 3 OF 4

CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION – RAIL YARD CONSTRUCTION

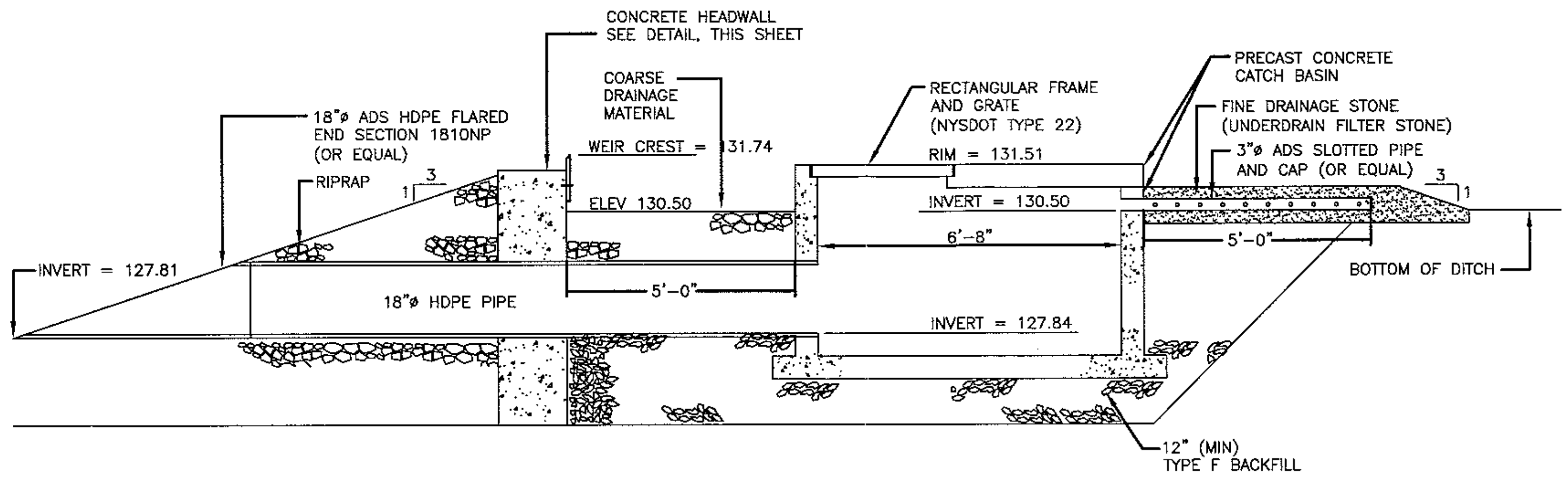
BBL Project No. 20435.700
Date: DECEMBER 15, 2006
Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

RS-0017



PLAN AT STORMWATER BASIN OUTLET STRUCTURE

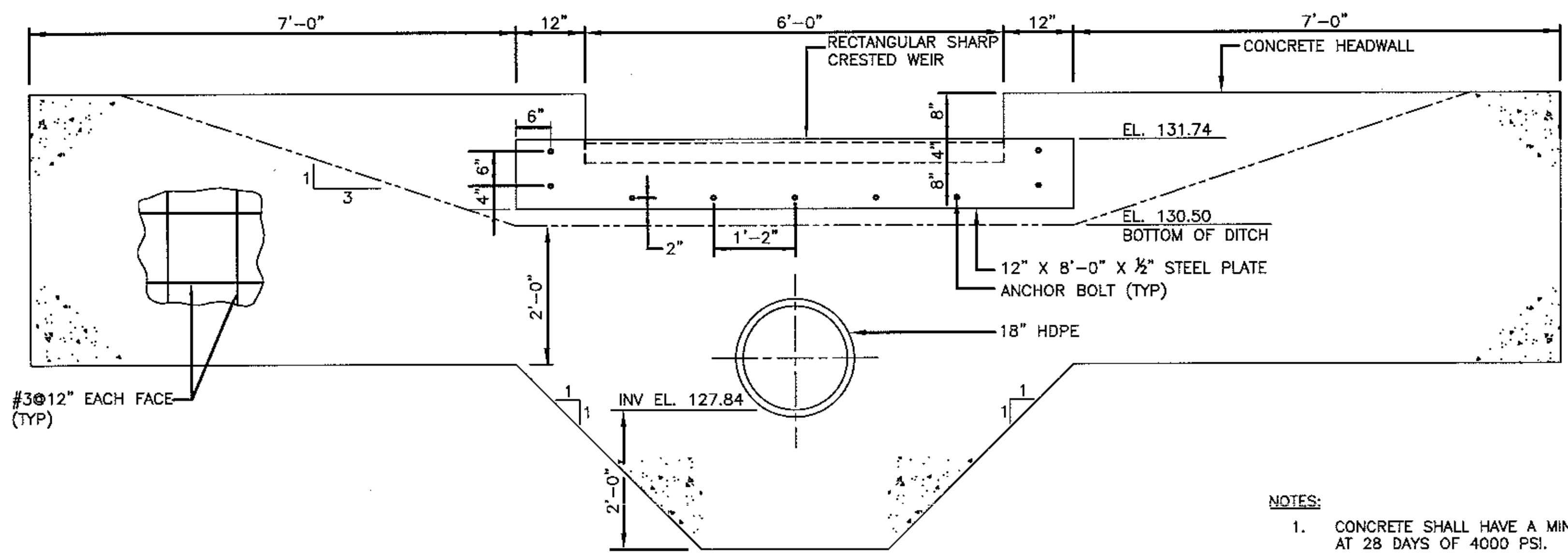
SCALE: ¼" = 1'-0"



SECTION B–B

STORMWATER BASIN OUTLET STRUCTURE

SCALE: 1/2"=1'-0"



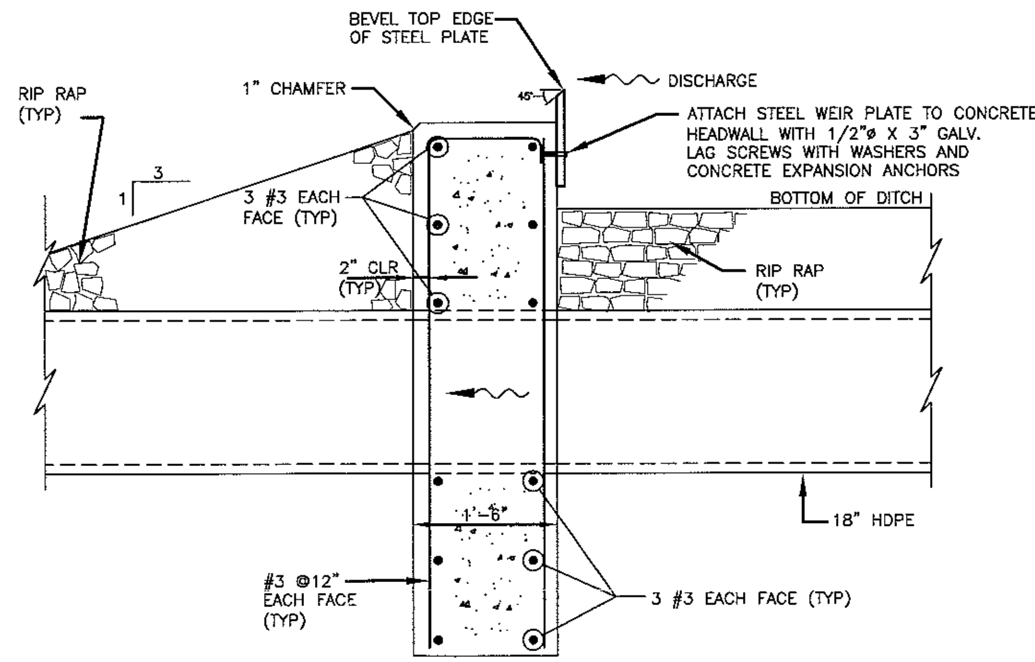
SECTION A–A

CONCRETE HEADWALL / SHARP CRESTED WEIR

SCALE: ¾" = 1'-0"

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS OF 4000 PSI.
2. REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 60.



CONCRETE HEADWALL DETAIL

SCALE: 1" = 1'-0"

CONFORMED REVIEW SET – NOT FOR CONSTRUCTION

ENGINEER OF RECORD
HENNINGSON, DURHAM, AND RICHARDSON ARCHITECTURE AND ENGINEERING, P.C.

ORIGINAL SCALE APPLIES TO 22"X34" DRAWING

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Professional Engineer's No.: 075823
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Project Mgr.: KFS
Designed by: AKS
Drawn by: JG

HDR Henningson, Durham and Richardson Architecture and Engineering, P.C.

GENERAL ELECTRIC COMPANY • HUDSON RIVER PCBs SUPERFUND SITE
SEDIMENT REMEDIATION PHASE 1 PROJECT

DRAINAGE DETAILS

SHEET 3 OF 3

CONTRACT 1 – FACILITY SITE WORK CONSTRUCTION – RAIL YARD CONSTRUCTION

BBL Project No. 20435.700
Date: DECEMBER 15, 2006

Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

RS-0037

Attachment D

Inspection Form and Certifications

GENERAL ELECTRIC COMPANY, HUDSON RIVER SUPERFUND SITE

EROSION CONTROL INSPECTION FORM

I. Inspection Information

Inspection Date: Weather Conditions:

Inspection Area:

Performed by:

Time Arrived: Time Departed:

Date of Prior Inspection:

II. Observations

A. Stabilized Construction Entrance		
1. Are there potholes or loss of surface material?	No	Yes
2. Are there ponding water conditions?	No	Yes
3.	No	Yes
B. Silt Fence		
1.	No	Yes
2.	No	Yes
3.	No	Yes
C. Seeding and Mulching/Vegetation		
1. Does the vegetation provide for adequate erosion protection?	No	Yes
2. Are there bare spots (i.e., areas void of vegetation) or excessive erosion?	No	Yes
3. Is there undesirable vegetative growth?	No	Yes
D. Sediment Basin		
1.	No	Yes
2.	No	Yes
3.	No	Yes
E. Inlet Protection		
1.	No	Yes
2.	No	Yes
3.	No	Yes
F. Check Dams		
1.	No	Yes
2.	No	Yes
3.	No	Yes
G. Bypass Systems		
1.	No	Yes
2.	No	Yes
3.	No	Yes
H. Other		
1. Are there additional conditions that were observed and noted during the inspection?	No	Yes

III. Inspection Observations

Describe observations from right side column in Section II. Use additional pages if necessary.

GENERAL ELECTRIC COMPANY, HUDSON RIVER SUPERFUND SITE

EROSION CONTROL INSPECTION FORM

IV. Inspection Response Actions

Describe response actions to be conducted for each observation noted in Section III above. Use additional pages if necessary.

V. Prior Inspections

Describe response actions conducted to address prior maintenance needs.

VI. Other Observations

List any other relevant observations noted during this period.

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

CERTIFICATE OF ACHIEVEMENT

This is to certify that

Kevin Chandler

has satisfactorily completed the

SOIL EROSION and SEDIMENT CONTROL AWARENESS TRAINING

Sponsored by

The New York State Department of Transportation

and

The Associated General Contractors of America
New York State Chapter, Inc.

Paul T. Wells, P. E.
Assistant Commissioner and Chief Engineer

Spring
2003