ENGINEERING REPORT

Application for 6NYCRR Part 608 Protection of Waters Permit

CARROLL LANDFILL EXPANSION

CARROLL, NEW YORK

SEALAND WASTE, LLC

Prepared on behalf of:

Sealand Waste
85 High Tech Drive
Rush, New York 14543

Prepared by:

DAIGLER ENGINEERING P.C.
2620 Grand Island Blvd.
Grand Island, New York 14072-2131

June 2016

Last Revised July, 2016

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Sealand Waste, LLC

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1 INTRODUCTION

1.1 BACKGROUND

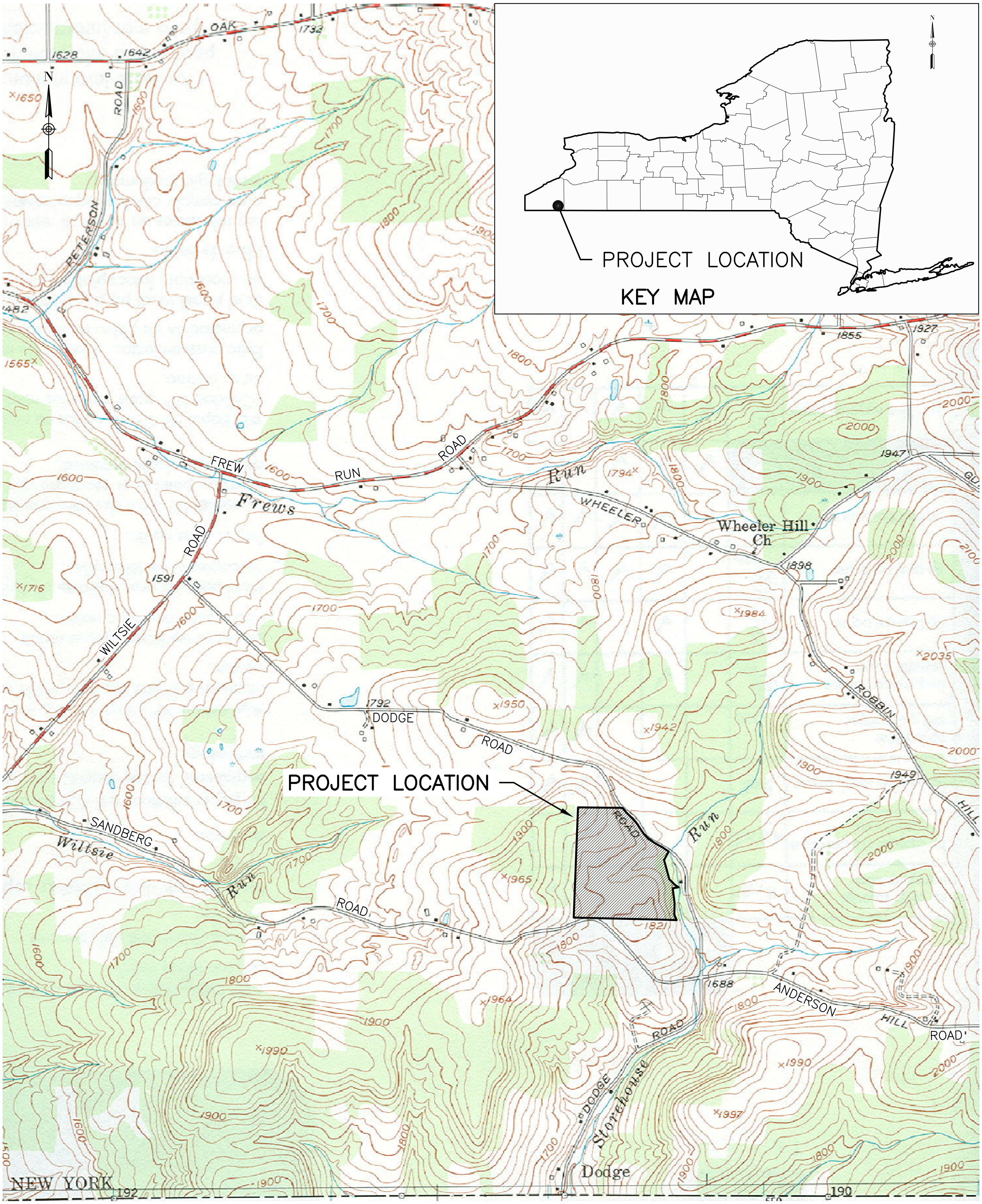
Sealand Waste, LLC (Sealand), a private enterprise headquartered in Rush, New York is proposing to purchase the 53.9-acre parcel of land containing the existing Jones Carroll Construction and Demolition (C&D) Debris landfill from Carol L. Jones. The site is located on Dodge Road in the Town of Carroll, Chautauqua County, New York, approximately one mile north of the New York/Pennsylvania State line, as shown in Figure 1-1.

Sealand intends to continue land disposal activity at the site beyond the three acre limit identified in the most recent New York State Department of Environmental Conservation (NYSDEC) Permit (#9-0624-00025/00002-0 expired October 31, 2007). In concert with the land disposal operations, the facility will also offer C&D waste recycling and yard waste composting services, supported by stormwater, leachate, landfill gas and environmental management infrastructure.

A majority of facility wide stormwater runoff will discharge to Storehouse Run and its tributaries located along the eastern boundary of the site. The major elements of the stormwater management system include drainage channels, culverts, stilling basins, sediment basins, control structures, graded filters and stream discharge structures. Construction of the stream discharge structures, graded filters and portions of the sediment basins will temporarily disturb the regulated streambank area of Storehouse Run and its onsite tributaries. Disturbance of the regulated stream bank area of Storehouse Run and the onsite tributaries will require the NYSDEC to issue a 6 NYCRR Part 608 Protection of Waters Permit.

1.2 FACILITY EXPANSION PERMIT APPLICATION

The continuation and expansion of solid waste management services at the site is a multi-faceted project. Several state and federal requirements must be met in the design, construction and operation of the facility, and a number of permits must be issued. The facility expansion is defined in detail in Sealand's Expansion Permit Application. Appendix A includes a summary of pertinent regulations, permits, and documents submitted for the application, as has been presented in the January 2016 Draft Environmental Impact Statement (DEIS).



TOPOGRAPHY FROM USGS IVORY 2 QUADRANGLE

Q:\Sealand\02-0104 Carroll Landfill\Stream Disturbance Permit Application\AutoCAD\FIG 1-1 Site Location.dwg 6/26/2015 2:19 PM

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SITE LOCATION CARROLL LANDFILL EXPANSION APPLICATION			
SEALAND WASTE, LLC			FIGURE 1-1
TOWN OF CARROLL	CHAUTAUQUA COUNTY	NEW YORK	
March 2016	SCALE: NOT TO SCALE	REVISION # 0	

The design of the site wide stormwater management system is presented in detail in the Engineering Report and Permit Drawings addressing the 6 NYCRR Part 360 requirements of the Expansion Permit Application. Information contained in companion documents associated with the Expansion Permit Application that is considered relevant to the Part 608 requirements has been repeated herein as deemed appropriate.

1.3 STREAM DISTURBANCE PERMIT STANDARDS

Storehouse Run, Stream Index Pa 29, and its tributaries are assigned a default Water Quality Class of C, and Standards of C(T) by 6 NYCRR Part 800.6 Table III, Item #2. In 2004, following a survey of Storehouse Run near the proposed site by personnel from the NYSDEC Division of Fish, Wildlife and Marine Resources, the stream was unofficially re-classified as C(TS) (Cornett, 2004)[1]. Pursuant to 6 NYCRR Part 701.8, the best usage of Class C waters is fishing and primary and secondary contact recreation. The (TS) designates a trout spawning stream indicating the waterway is suitable for fish propagation and survival; accordingly, adherence to the Class C (TS) standards must be considered in the design of the stormwater management system.

Surface water quality standards for New York State waters are outlined in 6 NYCRR Part 703. Specifically for Storehouse Run and its tributaries, 6 NYCRR Parts 703.2, 703.3 and 703.3 summarize the standards for turbidity, pH, dissolved oxygen and coliform.

Title 6 NYCRR Part 608 defines a protected stream as any stream or section of a stream with a designation of Class A, B, or C(T) or (TS), and these streams are granted special safeguards. The stream bank area regulated under Part 608 is defined as that land area immediately adjacent to, and which slopes toward, the bed of a watercourse, and which is necessary to maintain the integrity of a watercourse. A stream bank will not be considered to extend more than 50 feet horizontally from the mean high water line, except where a generally uniform slope of 45 degrees (100 percent) or greater adjoins the bed of the watercourse, where the bank is extended to the crest of the slope or the first definable break in slope, either a natural or constructed (*i.e.* road or railroad grade) feature, lying generally parallel to the watercourse. For this project, the

[1] Cornett, Scott. (2004). Memorandum Subject: Survey of Storehouse Run (Dodge Creek). New York State Department of Environmental Conservation, Division of Fish, Wildlife, and Marine Resources, Region 9, Allegany, New York. September 7, 2004.

protected stream bank area under Part 608 is 50-feet from the Ordinary High Water Mark (OHWM) as shown in the Permit Drawings in Appendix D.

According to 6 NYCRR Part 608.7 the Protection of Waters Permit review will consider the environmental impacts of the project, including effects on:

- Aquatic, wetland, and terrestrial habitats; unique and significant habitats; rare, threatened and endangered species habitats;
- Water quality, including such criteria as temperature, dissolved oxygen and suspended solids;
- Hydrology, including such criteria as water velocity, depth, discharge volume, flooding potential; and,
- Water course and water body integrity, including such criteria as erosion, turbidity, and sedimentation.

6 NYCRR Part 608.8 standards for the issuance of a Protection of Waters Permit consider that:

- The proposal is reasonable and necessary;
- The proposal will not endanger the health, safety or welfare of the people of the State of New York;
- The proposal will not cause unreasonable, uncontrolled or unnecessary damage to the natural resources of the State including soil, forests, water, fish, shell fish, crustaceans, and the aquatic and land-related environment.

The review will also consider the following issues:

- Adequacy of the design and construction techniques for structures;
- Operational and maintenance characteristics;
- The safe commercial and recreational use of water resources;

- The water dependent nature of a use;
- The safeguarding of life and property; and,
- Natural resource management objectives and values.

Fluctuations in the temperature of a stream can impact cold water fisheries, and may alter spawning and migration patterns. Thermal discharge criteria for trout waters are described in 6 NYCRR Part 704.2 as follows:

- No discharge at a temperature over 70 degrees Fahrenheit shall be permitted at any time to streams classified for trout.
- From June through September no discharge shall be permitted that will raise the temperature of the stream more than two Fahrenheit degrees over that which existed before the addition of heat of artificial origin.
- From October through May no discharge shall be permitted that will raise the temperature of the stream more than five Fahrenheit degrees over that which existed before the addition of heat of artificial origin or to a maximum of 50 degrees Fahrenheit, whichever is less.
- From June through September no discharge shall be permitted that will lower the temperature of the stream more than two Fahrenheit degrees from that which existed immediately prior to such lowering

Note that heat of artificial origin is defined in 6 NYCRR Part 700.1 as all heat from other than natural sources, and does not apply to this project. This report and the associated permit drawings are intended to provide the information needed to address the above standards for the issuance of a Protection of Waters Permit.

2 DRAINAGE BASIN CHARACTERISTICS

2.1 REGIONAL WATERSHED

The site lies wholly in the Storehouse Run (otherwise known as Dodge Creek) watershed and on a vicinity wide basis, the Conewango Creek Watershed. The Conewango Creek Watershed is part of the Allegheny River Basin; which in turn, lies within the Ohio River Basin.

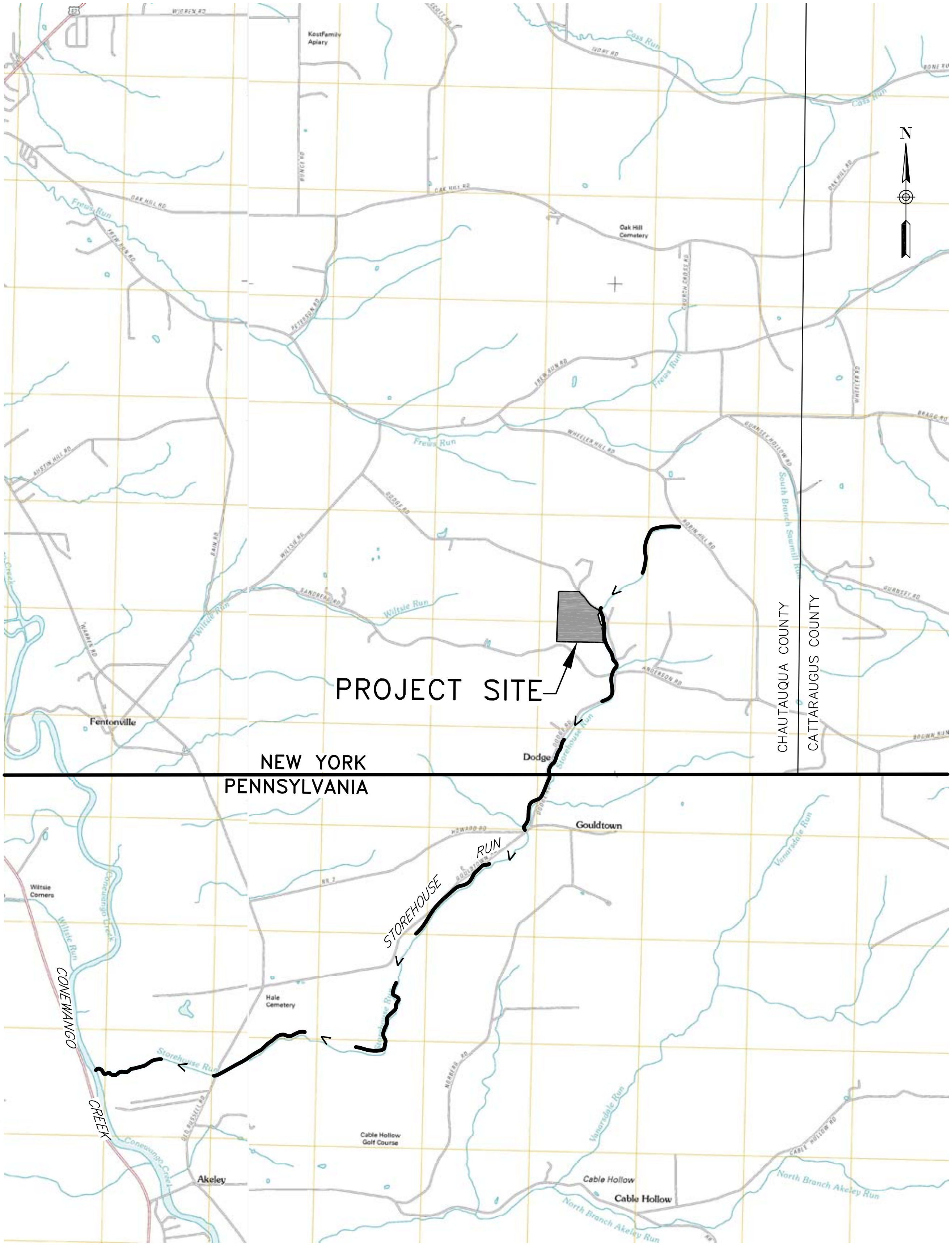
As shown in Figure 2-1 Storehouse Run crosses the New York State line into Pennsylvania about one mile south of the site and approximately 1.4 miles west of the Chautauqua/Cattaraugus County line, eventually discharging to Conewango Creek at a point about four miles southwest of the property. Conewango Creek drains into the Allegheny River at Warren, Pennsylvania, which ultimately discharges into the Ohio River at Pittsburgh, Pennsylvania. The Ohio River discharges to the Mississippi River near Cairo, Illinois.

2.2 EXISTING SITE SPECIFIC WATERSHED

Storehouse Run flows from north to south near and inside the eastern property boundary, draining an approximate 550-acre area upgradient of and including the site. The upgradient and onsite watersheds are as shown in Figure 2-2.

The site specific surface water drainage patterns are naturally an artifact of the topography, defining three separate watersheds. As shown in Figure 2-3, the predominant surface water drainage feature on the site is a small intermittent drainageway flowing along a central swale from west to east and draining a total of about 72.8 acres. This intermittent watercourse discharges to the unnamed tributary, and the combined flow joins Storehouse Run approximately 100 feet further downstream.

Approximately one-acre of the site drains offsite to the north, discharging to the roadside drainage channel along the southwest edge of Dodge Road. The middle 46-acres of the site drains to the intermittent drainageway, conveying stormwater runoff to the east. An area of about seven-acres in the southwestern corner of the site drains offsite to the roadside channel adjacent the north side of Sandberg Road.



Q:\Sealand\02-0104 Carroll Landfill\Stream Disturbance Permit Application\AutoCAD\FIG 2-1 STOREHOUSE RUN.dwg 3/17/2016 8:49 AM

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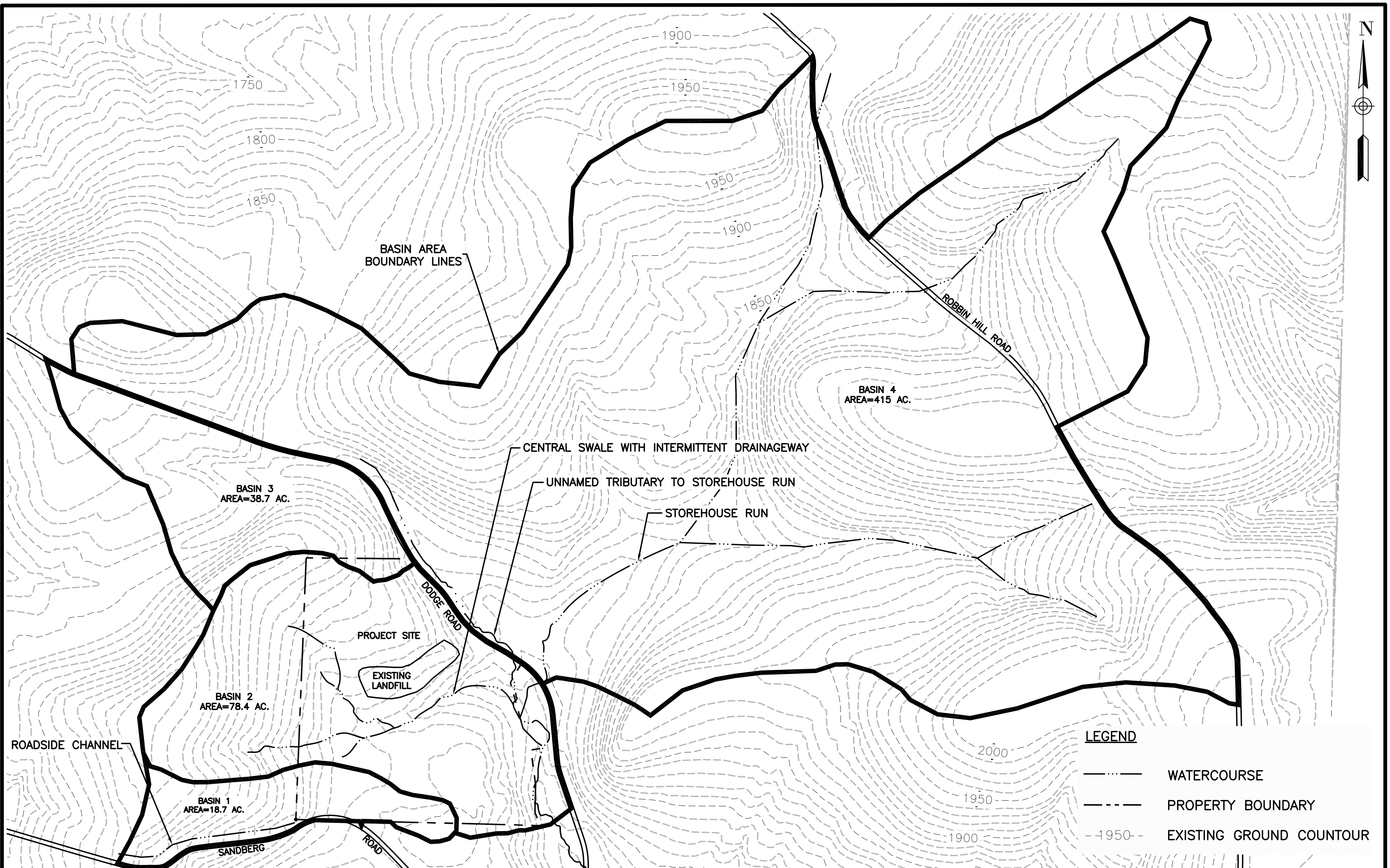
STOREHOUSE RUN EXTENT

CARROLL LANDFILL EXPANSION APPLICATION

SEALAND WASTE, LLC			FIGURE 2-1
TOWN OF CARROLL	CHAUTAUQUA COUNTY	NEW YORK	
March 2016	NOT TO SCALE	REVISION # 0	

Q:\Sealand\02-0104 Carroll Landfill\Stream Disturbance Permit Application\AutoCAD\FIG 3-8 PRE-DEVELOPMENT SURFACE WATER DRAINAGE CONDITIONS.dwg 12/14/2015



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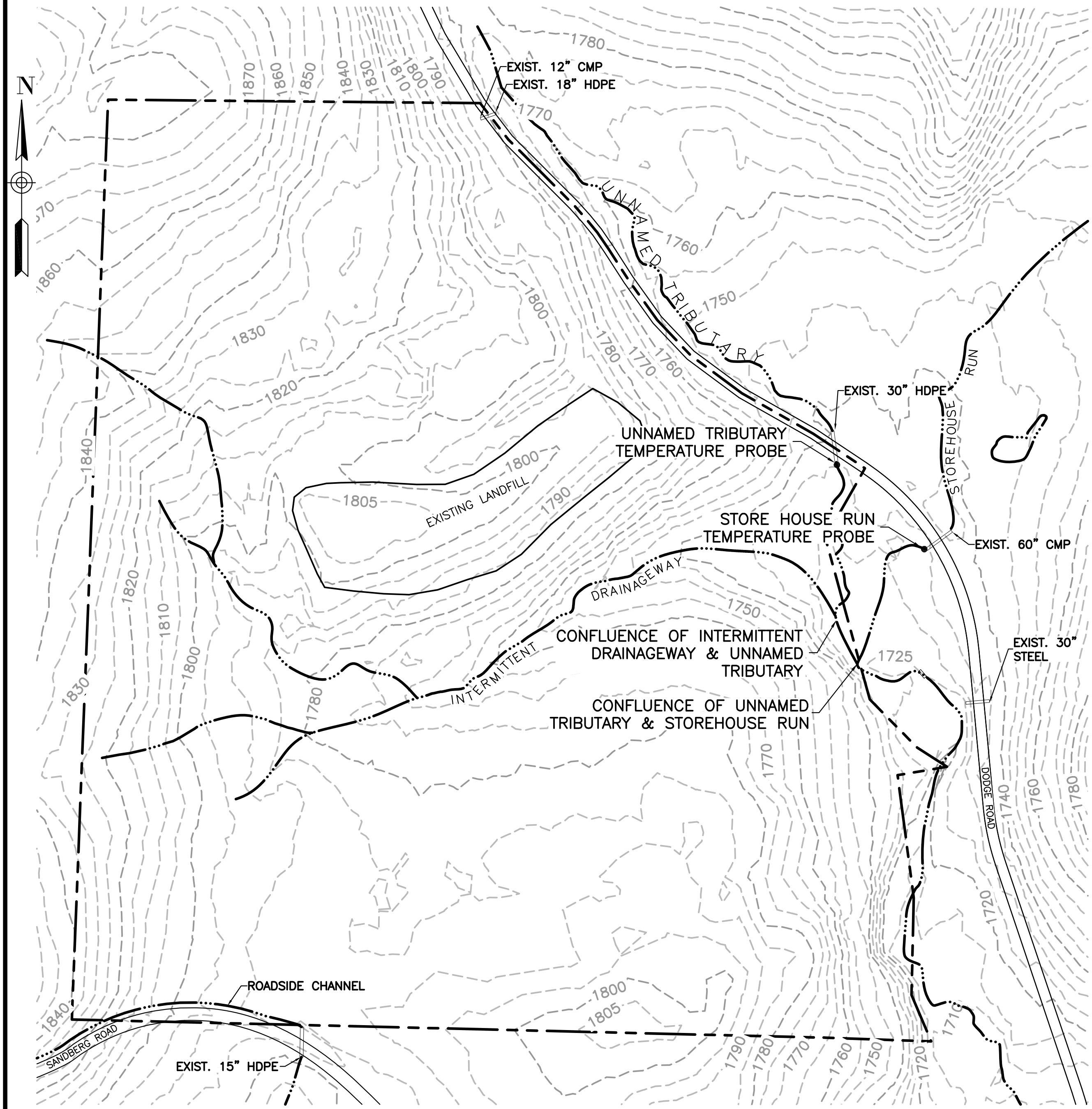
SEALAND WASTE, LLC		PRE-DEVELOPMENT SURFACE WATER DRAINAGE SHEDS CARROLL LANDFILL EXPANSION APPLICATION			FIGURE 2-2
SCALE: 1"=900'	REVISION # 0				
April 2016		TOWN OF CARROLL	CHAUTAUQUA COUNTY	NEW YORK	



LEGEND

WATERCOURSE

EXISTING CULVERT

PROPERTY BOUNDARY

--1850-- EXISTING GROUND CONTOUR

Q:\Sealand\02-0104 Carroll Landfill\Stream Disturbance Permit Application\AutoCAD\FIG 3-9 EXISTING ONSITE SURFACE WATER DRAINAGE FEATURES.dwg 12/14/2015 11:25 AM

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EXISTING ONSITE SURFACE WATER DRAINAGE FEATURES			
CARROLL LANDFILL EXPANSION APPLICATION			
SEALAND WASTE, LLC			FIGURE 2-3
TOWN OF CARROLL	CHAUTAUQUA COUNTY	NEW YORK	
April 2016	SCALE: 1" = 300'	REVISION # 0	

Point surface water drainage from offsite enters the site at three locations; two along the western property boundary, and one at the eastern property boundary. An approximate 26.7 acre offsite area drains across the western property boundary at two points and subsequently through the intermittent drainageway. Offsite surface water from the unnamed tributary to Storehouse Run crosses into the site through a 30-inch culvert under Dodge Road, approximately 400 feet south and east of the existing landfill.

2.3 STOREHOUSE RUN

The stream bed and bank conditions in Storehouse Run near the site have been the subject of two separate investigations by EcoLogic, LLC of Cazenovia, New York (EcoLogic). In July, 2015 EcoLogic completed a freshwater mussel survey and habitat assessment in Storehouse Run, the unnamed tributary and the intermittent drainageway[2]. In April, 2016 EcoLogic completed a focused assessment of the physical and biologic characteristics of a 220-foot long reach of the stream in the southeast corner of the site[3].

Storehouse Run in the vicinity of the site is a relatively high-gradient stream with actively eroding and unstable stream banks. During summer low-flow conditions, water depths within the channel are generally found to be less than six inches, with a corresponding low flow velocity of less than 1.0 fps. These low flow conditions and the sloughing of stream banks contribute to high bed loads resulting in the deposition of finer material over existing channel substrate. Due to the significant topographic relief in the headwaters near the site, Storehouse Run is flashy, with rapidly increasing and erosive flows developing during and immediately after extreme storm and/or snowmelt events.

Riffles, runs, and pools of variable quality are found throughout Storehouse Run and the unnamed tributary to Storehouse Run. The substrate in these different reaches varies in the vicinity of the site with unconsolidated cobble, gravel, and sand found in riffles, while cobble, gravel, and sand coated with silt are found in runs and pools. Large boulders are found sporadically along Storehouse Run and the unnamed tributary. Exposed bedrock is also

[2] Jirka, K.J. (2015). A Freshwater Mussel Survey and Habitat Assessment of Storehouse Run in the Vicinity of the Carroll Landfill. EcoLogic, LLC, dated August 20, 2015.
[3] Jirka, K.J. (2016). Assessment of the Physical and Biological Characteristics of Four Stream Systems Related to the Proposed Expansion of the Carroll Landfill, Ton of Carroll, Chautauqua county, New York, EcoLogic, LLC, dated May 15, 2016.

common, which is found overlain with cobble and gravel. Silt is found dominating the substrate, typically coating rock and sand in low flow areas. Representative photographs of Storehouse Run are included in Appendix B.

The channel suffers from excessive erosion, shallow depth and poor shading. Poor riffle embeddedness is evident in areas due to abundant fine sediment in riffle areas. The riparian area is severely degraded due to the presence of wood frame residential buildings, gravel driveways, residential wastewater treatment systems, culverts and mown lawns along the banks, with severe sloughing and collapsing of a large bluff along the southwest bank, as shown in Photo 8 in Appendix B. The presence of a crumbling concrete pad along the east bank's edge adds to the degraded nature of the riparian zone. The degraded physical condition of the toe and bank zones in Storehouse Run contributes to continuing bank erosion and continued sediment loading.

The natural plant community is compromised by the presence of invasive and ornamental species, a general lack of tree and shrub cover in what was naturally a wooded riparian zone, and the severe sloughing of the bank near the southeast corner of the site that has resulted in large trees sliding into the stream and denuding the stream bank. Remaining ecological communities include wetland areas, as well as successional deciduous and mixed forest. Aquatic macrophytes are generally absent.

Thirteen flow rate measurements have been obtained in Storehouse Run and the unnamed tributary by Daigler Engineering PC (DE) during the course of the site specific studies completed for the expansion application. Measured flow rates in Storehouse Run ranged between 0.1 and 5.65 cubic feet per second (cfs). Measured flow rates in the unnamed tributary were as low as 0.03 cfs, and as great as 1.5 cfs. The maximum flow rates measured at the site corresponded with a widespread snowmelt event.

2.4 SURFACE WATER QUALITY

Conductivity and pH were measured at 185 UMHO/cm and 7.5 standard units on average in Storehouse Run during the NYSDEC's September 2004 survey. The average in-stream temperature was measured by the NYSDEC at 60.5ºF, while the average ambient temperature was 66ºF. The estimated flow rate was between 0.25 and 0.75 cfs.

Five random turbidity measurements were taken over a two year timeframe by DE in Storehouse Run and in the unnamed tributary. The field-measured turbidity at both locations was low, generally less than 6.25 and 11 Nephelometric Turbidity Unit (NTU) in Storehouse Run and the unnamed tributary, respectively. Turbidity was observed to be elevated during the widespread snowmelt event referenced above (estimated to be greater than 100 NTU), but was not measured.

2.5 SURFACE WATER TEMPERATURE MEASUREMENTS

In September 2011, DE deployed temperature probes in Storehouse Run immediately downstream of the 60-inch diameter culvert under Dodge Road and in the unnamed tributary to Storehouse Run immediately downstream of the 30-inch culvert under Dodge Road. Stream temperature measurements were recorded at five-minute intervals for over two years. The data were reduced to daily averages for presentation. Figure 2-4 is a plot of the daily average temperature for the unnamed tributary and Storehouse Run. Differences between the two surface waters were very slight, such that the plots are nearly indistinguishable. Water temperature fluctuated seasonally as expected in both the unnamed tributary and Storehouse Run with maximum summer temperatures of 77.5ºF and 78.3ºF and minimum temperatures of 32.2ºF and 32.2ºF, respectively (un-averaged, five-minute recordings). As shown in Figure 2-4, the flashy nature of streamflow is depicted by significant short term fluctuations in water temperature.

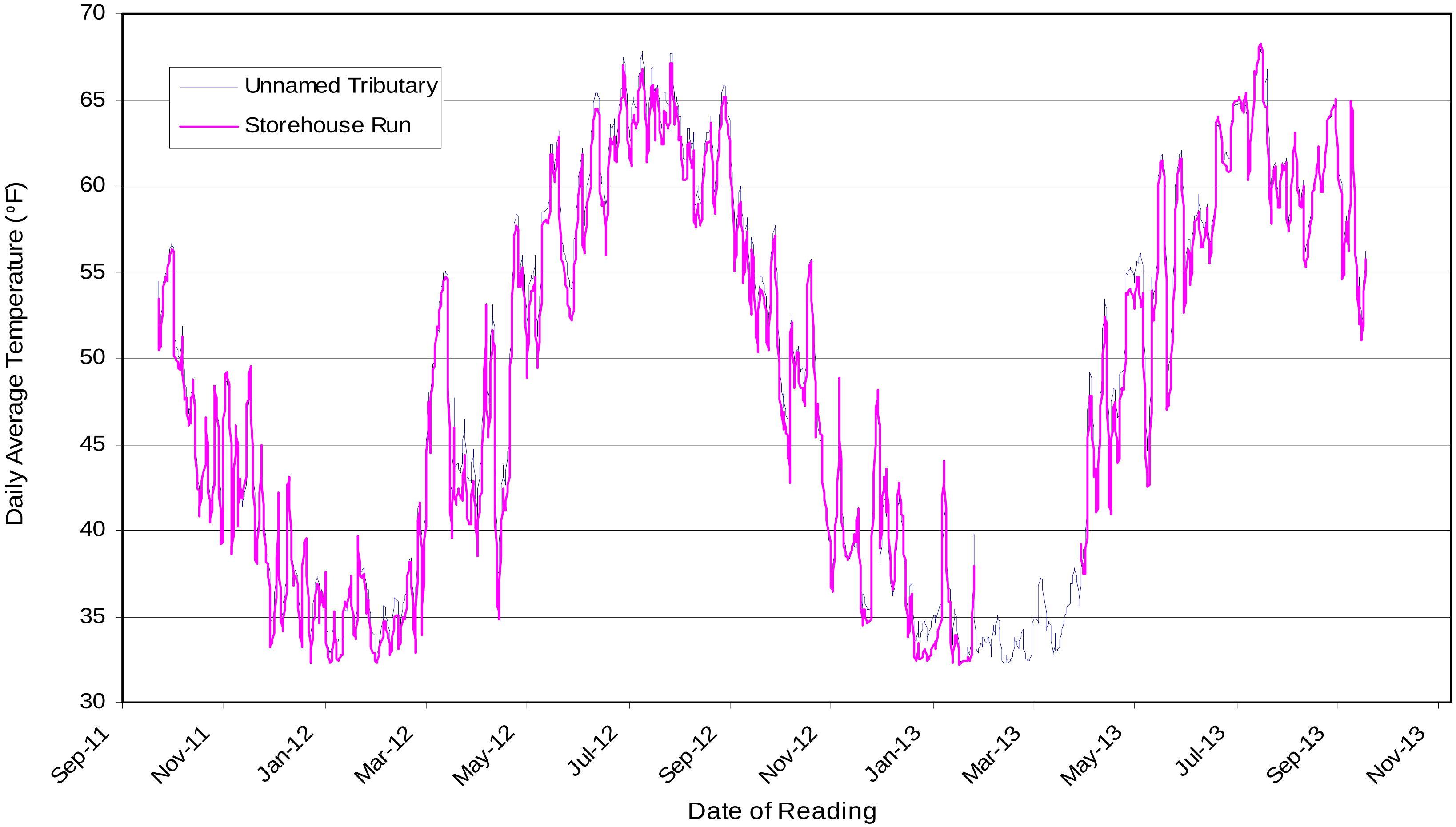


FIGURE 2-4: DAILY AVERAGE TEMPERATURES IN THE UNNAMED TRIBUTARY AND STOREHOUSE RUN

3 STORMWATER MANAGEMENT SYSTEM DESIGN

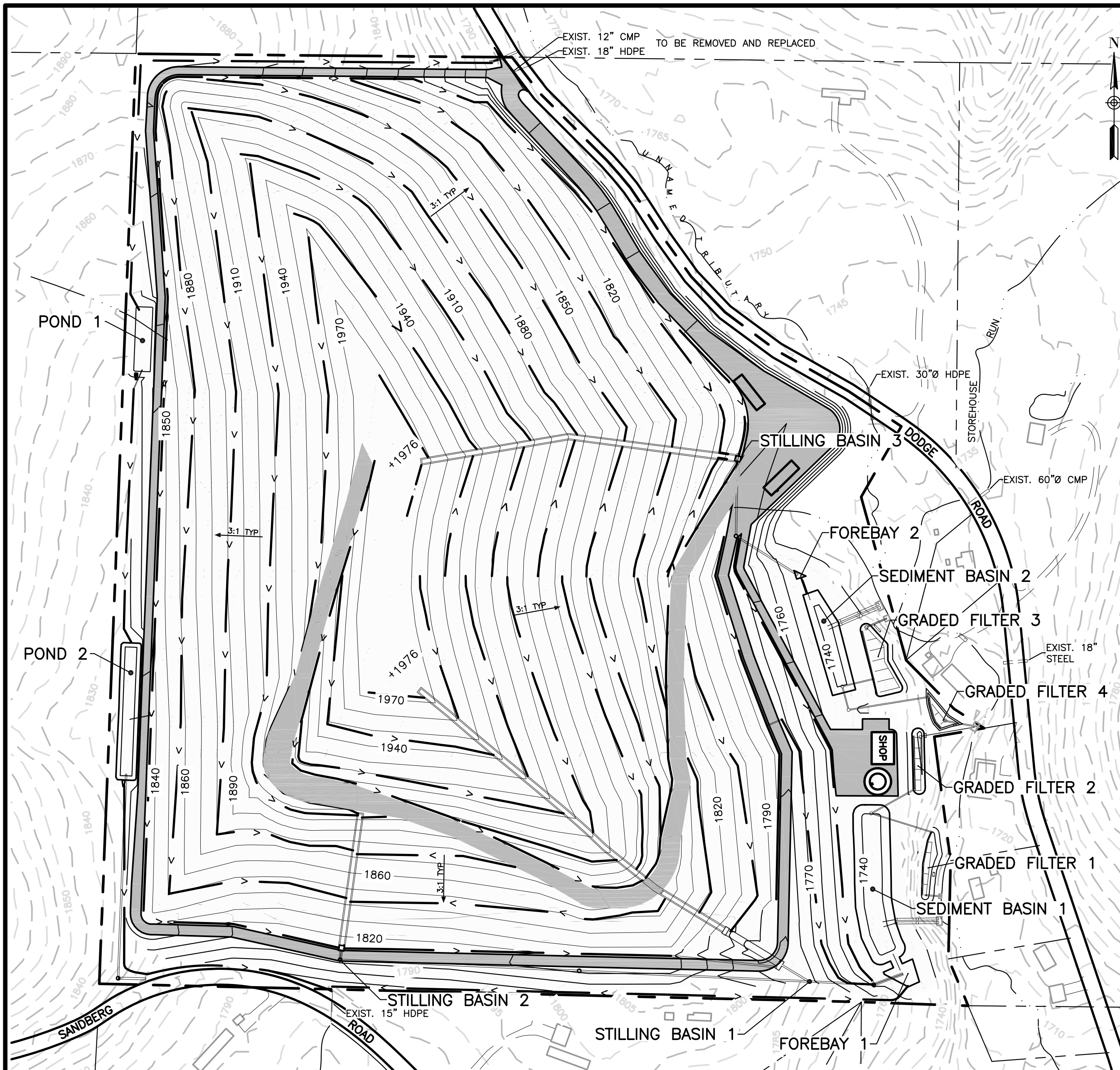
3.1 DESCRIPTION

The site-wide stormwater management system for the solid waste management facility buildout is shown in Figure 3-1, and is designed to convey runoff from disturbed areas through vegetated and rock lined swales and culverts or other structures to dual chambered sediment basins. High frequency storms drain from the sediment basins to graded filters, then stream discharge structures and ultimately to the intermittent drainageway and/or Storehouse Run. Runoff from the lower frequency higher intensity storms will be conveyed through the sediment basins, the graded filter outlet control structure and graded filter emergency spillways to the stream discharge structures.

The graded filters will be installed along the eastern side of the property to cool and clarify stormwater prior to discharge to the intermittent drainageway and/or Storehouse Run. Emergency spillways in the sediment basins and graded filters will convey stormwater directly to the stream discharge structures as shown on Sheet PD-1.

Sediment Basin 1 will discharge to Graded Filter 1 or Graded Filter 2, while Sediment Basin 2 will discharge to Graded Filter 3 or Graded Filter 4. The two main graded filters, Graded Filter 2 and Graded Filter 3, will normally be operational, while Graded Filter 1 and Graded Filter 4 will be employed when their respective main graded filter is offline for maintenance. Sediment Basin 1 and Sediment Basin 2 also each have an emergency spillway. These spillways are only necessary in the event of low frequency, high volume storm events. The Sediment Basin 1 emergency spillway structure will discharge to Storehouse Run through Stream Discharge Structure 1 (SDS-1). The Sediment Basin 2 emergency spillway structure will discharge to the intermittent drainageway through SDS-3. During the initial landfill construction phases, Temporary Sediment Basin 1 and a groundwater drain will also discharge to the intermittent drainageway through SDS-3.

The stormwater management system design is described in detail in Section 7 and Appendix G of the Engineering Report.



LEGEND

1750	EXISTING GROUND CONTOUR
1740	PROPOSED CONTOUR
	PROPERTY BOUNDARY
>	DRAINAGE CHANNEL AND FLOW DIRECTION
	GRAVEL SURFACE
	WATER COURSE
	DOWNCHUTE
	CULVERT

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FINAL STORMWATER MANAGEMENT SYSTEM

CARROLL LANDFILL EXPANSION APPLICATION

SEALAND WASTE, LLC			FIGURE 3-1
TOWN OF CARROLL	CHAUTAUQUA COUNTY	NEW YORK	
January 2016	SCALE: 1" = 300'	REVISION # 0	

Q:\Sealand\02-0104 Carroll Landfill\Stream Disturbance Permit Application\AutoCAD\FIG 4-13 STORMWATER MANAGEMENT SYSTEM.dwg 1/11/2016 3:58 PM

3.2 Sediment Basins

Each sediment basin includes:

- A hard bottomed forebay;
- A permanent pool with a length to width ratio exceeding the minimum recommended ratio of 1.5 to one;
- A minimum surface area to drainage area ratio greater than the recommended ratio of one to 100;
- An aquatic bench;
- Perimeter access/maintenance roads no less than 12 feet in width sloping inwards toward the basin;
- Two emergency spillway pipes with a crest elevation at the elevation of the 100-year, 24-hour storm ponding elevation able to convey 1.5 times the 100-year, 24-hour storm rainfall; and,
- One foot of freeboard above the 100-year, 24-hour storm ponding water surface elevation.

3.3 Graded Filters

The graded filters consist of the following layers in descending order from the ground surface:

- Six inches minimum Sandy Loam Topsoil;
- Separation geotextile;
- 18 inches No. 2 stone;
- 8 inches No. 1 stone;
- 24 inches filter sand; and,
- 12 inches No. 1 stone drain.

Slotted distribution pipes will span the length of the graded filters to distribute sediment basin discharge throughout the 18-inch thick No. 2 stone layer promoting seepage through the filter. Underdrain lateral pipes and a header pipe located in the 12-inch No. 1 stone drain at the bottom of the filter will collect filtered stormwater from high frequency storms and convey it through the outlet control structures to the stream discharge structures. Lower frequency higher intensity storms will be discharged through graded filter outlet control structures to the stream discharge structures.

3.4 OUTFALL CULVERTS AND STREAM DISCHARGE STRUCTURES

The following objectives were established to guide the design of the outfall culverts and stream discharge structures:

- To minimize overall impacts to the streams, the outfall culvert and stream discharge structures have been offset from the stream bed and bank to the maximum practicable extent; and,

- To minimize erosion and disturbance to streamflow, the outfall culverts have been designed to produce low energy subcritical flow characteristics.

As shown on sheets PD-2 and PD-3, the outfall culverts, and where possible the stream discharge structures, are placed as distant from the natural streambed as the site conditions and facility design will allow.

Subcritical flow is characterized as relatively deep, slow moving flow with a low energy state, and will reduce the potential for erosion. Subcritical flow conditions are achieved using large outfall culverts placed on flat slopes, and drop structures that help dissipate potential energy generated by the elevation change between the sediment basins, graded filters and the streambed. The rock lined aprons are oversized to help spread water flow transitioning to the natural water courses.

3.4.1 Outfall Culvert Analysis

The outfall culverts were designed using the AutoCAD HydraFlow Express Extension program and the 24-hour 100 year design storm event. Subcritical flow was achieved for the Sediment Basin 1 and Sediment Basin 2 emergency spillway using two 48 inch diameter HDPE outfall culverts placed at a slope of 0.002 (Culvert 15 and Culvert 21 respectively). Subcritical flow was achieved in the outfall culverts for Graded Filters 1, 2, 3 and 4 using one 24 inch HDPE outfall culvert placed at a slope of 0.002 (Culvert 17, Culvert 19, Culvert 23 and Culvert 26 respectively). Culvert analysis reports are included in Appendix C. Outfall culvert and stream discharge structure design is shown in plan and cross section view on drawings PD-2 and PD-3 in Appendix D.

3.4.2 Outlet Protection

Culvert outlet protection consists of rip rap lined aprons and channels, the design is shown in plan and cross section view on drawings PD-2 and PD-3.

To limit disturbance within the stream bank area, outfall culverts were combined to the extent practicable into common stream discharge structures. Specifically, Sediment Basin 1 and Graded Filter 1 outlet culverts share SDS-1 at the southeastern area of the property. Graded Filter 2 and Graded Filter 3 outlet culverts share SDS-2 at the eastern portion of the property. Sediment Basin 2, Graded Filter 4 and Temporary Sediment Basin 1 outlet culverts share SDS-3 in the north eastern area of the property.

4 POTENTIAL STREAM IMPACTS AND MITIGATION

Potential impacts from stormwater discharges on Storehouse Run, the intermittent drainageway and the unnamed tributary include increased sediment loads, increased erosion, increased flow rates from the developed site and thermal impacts. Impacts on ecological and biological communities will be temporary, and are mitigated by the streambank restoration program.

4.1 RUNOFF QUANTITY AND FLOW RATE

4.1.1 Potential Impacts

An increase in flow rates combined with an overall increase in stormwater quantity has the potential to overwhelm the natural drainage system downstream of the site causing localized flash flooding and increased scouring and erosion of the stream bed and banks. Increased sediment loads can in turn adversely affect stream ecology and possibly reduce a stream's capacity to convey high volume storm events without overtopping its banks leading to an even greater potential for flooding.

4.1.2 Mitigation

There are several design features that will mitigate the potential for stormwater quantity impacts. First, the nature of the development is such that new "impervious" surfaces are minimal. Thus, natural infiltration of stormwater is maintained to some degree, reducing the potential for overall increases in stormwater quantity. Second, the stormwater management system was designed to manage high volume storms by creating long flow pathways on the project site, and by limiting post-development discharge flow rates to less than pre-development flow rates by detention as shown in Table 4-1.

TABLE 4-1: PEAK STORMWATER RUNOFF RATES

Storm Event Frequency	Peak Runoff (Pre-Development)	Peak Runoff (Post-Development)
1-year, 24-hour	1.26 cfs	0.78 cfs
10-year, 24-hour	35.23 cfs	31.30 cfs
100-year, 24-hour	91.88 cfs	82.91 cfs

4.2 THERMAL DISCHARGE

4.2.1 Potential Impacts

In September 2004 the NYSDEC completed an electrofishing survey of two sections of Storehouse Run along Dodge Road. These surveys revealed the presence of reproducing populations of mottled sculpin, blacknose dace, creek chub, and brown trout. Extreme fluctuations in stream water temperature, and stream water temperatures above 70°F can adversely impact cold water fisheries, altering spawning and migration patterns. Accordingly, discharges to Class C(TS) streams such as Storehouse Run are subject to thermal limitations under 6 NYCRR Part 704.

According to Van Seters (2013), stormwater management pond maximum temperatures can reach as high as 88ºF[4]. Water temperatures in streams and ponds are known to fluctuate in response to changes in solar radiation, ambient air temperature, groundwater flux, sediment conduction, and evaporation. The two most influential factors are ambient air temperature and solar radiation.

Ambient air increases are typically limited to a 0.6°C – 0.8°C temperature increase for every 1°C increase in air temperature (Morrill et al., 2005). Brownridge[5] measured solar induced thermal stratification in a pond outside Binghamton, New York at latitude 42.03 north, virtually the same latitude as the subject site. That research clearly illustrated that solar radiation is the single most significant factor in pond water temperature fluctuation, and confirmed the maximum temperatures reported by Van Seters. Brownridge' s data also demonstrates the value of pulling water out of the pond at some depth below the surface, with peak temperatures 40-inches below the surface commonly three to four degrees Fahrenheit cooler than water temperature at the surface.

[4] Van Seters, T., Graham, C. (2013). Evaluation of an Innovative Technique for Augmenting Stream Baseflows and Mitigating the Thermal Impacts of Stormwater Ponds. Sustainable Technologies Evaluation Program, Toronto and Region Conservation Authority, Toronto, Ontario, dated April 2013.

[5] Brownridge, James D. Solar Induced Thermal Activity and Stratification in Pond Water. State University of New York at Binghamton (2012).

4.2.2 Mitigation

Mitigation measures employed to prevent the discharge of treated stormwater at temperatures greater than 70°F include facility design elements, operational practices and subsurface cooling of stormwater in culverts and graded filters.

4.2.2.1 Facility Design

Temperature Monitoring

The temperature of the stormwater runoff detained in Sediment Basin 1 and Sediment Basin 2, and the discharge from the graded filters will be measured and monitored between May 15th and September 15th each year using sealed thermistors.

Water temperature in the sediment basins will be measured using two sealed thermistors in each basin. The uppermost sediment basin thermistor will be positioned four-inches below the permanent pool elevation, with the deeper thermistor positioned 2.0-feet below the permanent pool elevation to monitor thermal stratification in the upper reaches of the pool. Ambient air temperature will be monitored with a third thermistor positioned at the top of the outlet control structure. A sealed thermistor will be installed in the base of each of the four graded filter outlet control structures to monitor the temperature of water discharged to Storehouse Run. Thermistor placement is as illustrated on Sheet PD-5.

Data from each thermistor will be recorded once per second for 60 seconds, and then averaged and saved as one data point. Data will be collected continuously using wireless data loggers. An external digital panel meter will be installed in the control panel positioned at the edge of each sediment basin to allow for visual monitoring of basin and discharge water temperatures.

The temperature data will allow for a determination of the timeframe it will be necessary to close the sediment basin outlet control structure discharge valves allowing for the containment and diversion of warm stormwater away from Storehouse Run and its tributaries for use in site operations, as described in Section 4.2.2.2 below.

Shading/Submerged Discharge

After the operational techniques referenced in Section 4.2.2.2 below are no longer in-play, the permanent pool in the sediment basins will be shaded by closely spaced wetland tolerant shade trees (*Viburnum lentago*) planted adjacent the aquatic bench as illustrated on Sheets PD-1 and PD-5. These wetland trees can grow to a height of 20 feet or more and will be pruned to grow to a width of no less than 20 feet to shade the permanent pool. Given that shading pattern, the pool will be completely shaded for nearly the entire day; the exception will be that during the mid-day hours, the center five foot width will be exposed.

During the post closure and custodial care period, cooler pond water will be drawn out of the sediment basins from a depth of 36-inches below the water surface.

Trench Pool

Storehouse Run is a gaining stream in a groundwater discharge zone. Rainfall percolating through the surficial soils in upland areas becomes perched within the upper till or glacio-fluvial deposits flowing laterally down slope toward Storehouse Run and percolating downward through the lower till and entering the shale bedrock, where it continues to flow down slope and discharge in a near vertical direction to Storehouse Run. Data recorded during groundwater monitoring well development at the site documents a typical groundwater temperature on the order of 55°F.

While not intended for direct mitigation of impacts from the facility, Sealand proposes an indirect mitigation that is expected to provide a thermal refuge for trout and other fish species by excavating a four foot deep trench pool in the bottom of the stream, coupled with downstream vanes adjacent to SDS-1, as shown on Sheets PD-2 and PD-5. By intersecting the groundwater table and creating an artesian condition at the bottom of the pool, cold groundwater will mix with stream water at a greater rate, providing refuge for distressed fish species.

To ensure that the trench pool will not drain the streambed, a wedge dam will be constructed immediately downstream of the trench, functioning as a weir. A wedge dam is constructed using two logs that gradually slope down to midstream, where they meet at an approximate 90-degree angle to form an upstream-pointing wedge. The structure is supported by two brace logs that are perpendicular to the wedge logs, buried in the stream bank and reinforced with rocks. The midstream height of the dam will be about 1.0-feet, which will maintain a minimum flow depth above the streambed of six-inches at the head of the trench pool. The sloping nature of the crest of the dam will allow large flow events, to be conveyed over the dam at water surface elevations below the adjacent overbank area.

4.2.2.2 Operations

Timely Site Restoration

The benefits of timely planting and establishment of vegetation at the site can not to be understated; and they include, stormwater runoff attenuation, erosion control and water quality improvement. Establishing a quality stand of vegetation in drainage channels and on disturbed areas increases the amount of reflected solar radiation, thereby reducing ground surface temperature when compared to bare wet soil or asphalt. As such, the temperature of stormwater runoff will also be reduced throughout the site as it flows from the vegetated surfaces to the sediment basins.

Dust Suppression

The use of heavy equipment and trucks can contribute to dusting if not properly managed, and the operation of the site requires routine watering of site roadways and other travelled surfaces. Accordingly, when temperatures measured in the graded filter outlet structures reach 68°F, sediment basin discharge valves will be closed and runoff contained in the sediment basins will be pumped into water trucks in support of dust suppression operations.

Irrigation

In the absence of dust suppression operations, where additional water must be removed from the sediment basins to increase stormwater storage, or to remove heated runoff, Sealand will pump stormwater from the sediment basins to irrigate site vegetation. This pro-active irrigation activity will continue throughout the facilities post closure and custodial care period, eliminating warm discharge to Storehouse Run over the long term.

4.2.2.3 Subsurface Cooling

Graded filters provide clarification of contact stormwater discharges to Storehouse Run and its tributaries for the highest frequency storms representing 90 percent of the average annual stormwater runoff volume, while also utilizing ambient earth thermal moderating to help cool the discharge. Terrestrial cooling will reduce water temperature by shielding it from solar radiation while utilizing the significant heat sink that is the natural ground and filter material. This phenomenon is expected to shorten the timeframe over which the pro-active measures identified above will be required to prevent thermal discharges from the site.

4.3 EROSION AND SEDIMENTATION

4.3.1 Potential Impacts

Uncontrolled erosion and increased sediment loads are among the most common impacts to surface waters, particularly for activities that involve earthwork. During storm events, erosion of soil-lined channels or unvegetated slopes will contribute to increased suspended matter in runoff, potentially stressing any number and variety of aquatic species and habitats.

Construction of the stormwater management system components will result not only in disturbance of vegetation and soil resources within the 50 foot wide streambank area of Storehouse Run and its tributaries, but also in upland areas of the site. Accordingly, measures protective of surface water and stream quality must be implemented prior to initial disturbance of this upland area.

4.3.2 Mitigation

4.3.2.1 Initial Access Control and Staging

The dominant drainage feature preventing untreated stormwater runoff from entering Storehouse Run and its tributaries during the construction of the initial access roads and the staging area is the approximate 900-foot long main diversion swale positioned between the initial access road/staging area and the streambank area. This main diversion swale will convey runoff from the disturbed areas to Temporary Sediment Basin-1 (TSB-1).

Sheet PD-1 illustrates the construction of temporary roadways, the staging area, drainage controls and erosion and sediment control Best Management Practices (BMPs) to accommodate equipment staging/maintenance and delivery/storage of materials needed to construct the sediment basins, graded filters, outlet culverts and stream discharge structures in the streambank area.

As shown, the main access road to the staging area and the streambank area has been positioned to closely follow the contours of the site, thereby creating a mild centerline slope and minimizing the potential for soil erosion. Construction access roadway surfaces are designed with an inward cross slope that will direct runoff from the road surface to an adjacent drainage channel of equally shallow slope.

Access to the streambank area will be gained from the main access road at three locations, where the slope of these minor roadways will necessarily be steeper. On these steeper road grades, an inward sloping subgrade and hardened road surface of porous NYSDOT No. 4 coarse aggregate will reduce surface runoff and erosion by promoting shallow seepage of runoff in the coarse aggregate toward the adjacent roadside channel. Roadway and adjacent area runoff at SDS-2 and SDS-3 will be conveyed by roadside channels to sediment traps and flow diffusers at the lowermost terminus of the access road in the streambank area. Roadway and adjacent area runoff at SDS-1 will be conveyed by a roadside channel to a level controlled sump pit, where accumulated runoff will be pumped to the access road channel and eventually the main diversion swale and TSB-1.

Best Management Practices

A number of BMPs will be employed to limit erosion and control sedimentation. The two most important practices to control erosion will be to minimize disturbance by protecting vegetation in areas not required for the construction, and ground stabilization by seeding and mulching of disturbed areas as soon as is practicable after the design grades are obtained. Erosion and sediment control BMPs are consistent with New York State Standards and Specifications for Erosion and Sediment Control, as shown on Sheet PD-4. Complimentary BMP’s planned for the site include:

- Upslope diversions to prevent runon to disturbed areas;
- Anchored stabilization mat;
- Sediment traps;
- Flow diffusers;
- Flow spreaders;
- Coir log check dams;
- Silt fence; and,
- Turbidity curtains.

4.3.2.2 Trench Pool Streambed Modification - Equipment and Procedures

Construction activities in the streambank area will be planned for the July and August timeframes to allow for the intrusive work in the streambed to be completed under low streamflow conditions. Runoff from the branch access way and areas adjacent the stream bank near the proposed trench pool at SDS-1 will be directed to a Sump Pit as shown schematically on Sheet PD-4 and in plan view on Sheet PD-5. A pump installed in the sump pit will pump collected runoff up to the access road stormwater channel above the elevation needed to convey that runoff by gravity to Temporary Sediment Basin 1 (TSB-1).

Heavy equipment expected to be used to construct the trench pool includes a medium size tracked excavator, a mini tracked excavator, small off road dump trucks and a skid steer loader. Implements needed to complete the work include a portable concrete mixer and pump, submersible dewatering pumps, a generator and small tools. An approximately 2.5 foot high wire wrapped concrete filled geotube coffer dam will be installed to allow dewatering of the trench pool area in Storehouse Run.

Once all stormwater BMPs and the branch access road are in-place, the materials required to construct the coffer dam will be delivered streamside and staged at the north end of the roadway.

The coffer dam will consist of six 12-inch diameter geotube segments fabricated from high-strength engineered geotextiles and installed in a 3–2–1 pyramid structure in the approximate location shown on Sheet PD-5. Unfilled geotubes will be fit to the contours of the channel bottom and termination points, and each layer will be independently filled in-place with low strength concrete to permit simple low energy deconstruction. A stainless steel wire frame will be wound throughout the interior geotube mating surfaces and across the circumference of the pyramidal structure to stiffen and add rigidity to the cofferdam. A submersible electric pump will be installed inside the coffer dam to pump stream water to the sump pit.

Once the streambed is sufficiently dry, a chisel attachment on the medium tracked excavator will break the highly weathered shale in the trench pool corridor to manageable size rock pieces. The mini excavator will remove the broken rock and load that material on an off road dump truck. The dump truck will haul the rock to the fill area shown on sheet PD-1, where it will be used in construction of the landfill embankment. The trench pool excavation will continue to the lines and grades shown in the drawings. The excavation will be continually dewatered as the prismatic rock back wall, cantilever pool roof and waterfall slab are installed. Similar to the coffer dam construction, trench pool construction materials will be delivered and staged at the north end of the branch access road. The roughed surface rock back wall, pinned roof and pinned waterfall slabs will be installed by skilled labor, predominantly by manual means with mechanical assistance as needed.

Once all the pinned/grouted joints are cured and the rock structures are in place, the submersible pump will be removed from the trench pool. The mini and medium tracked excavators will then dismantle and remove the wire wrapped filled geotubes from the streambed and load them on to the off road dump trucks for proper disposal. The wedge dam downstream of the trench pool will be placed in the stream under low flow conditions using the medium tracked excavator.

4.4 ECOLOGICAL AND BIOLOGICAL COMMUNITIES

4.4.1 Potential Impacts

Construction and operation of the facility components brings the potential for the loss of wildlife and habitat. The long term impacts and mitigation of these impacts is addressed in Section 5.5 of the DEIS. Impacts on ecological and biological communities in the streambank area are considered temporary, as the restoration plan is designed to restore and improve the diversity of existing habitat.

4.4.2 Mitigation

4.4.2.1 Stream Restoration Plan

Restoration of the streambank area will incorporate biological, mechanical and ecological engineering solutions to limit erosion, control sedimentation and stabilize the soil while improving wildlife habitat, water quality and aesthetics over the long term.

The streambank area will be restored using a variety of plants capable of providing ground cover and root penetration for erosion protection, food and cover that will attract and sustain wildlife, and to improve water quality. All disturbed areas will be reseeded with a permanent native riparian seed mix as shown in the drawings. Conventional hard structures such as rip rap will be supplemented with soft treatments including a native riparian seed mix, shrubs, and native trees to restore the disturbed areas and provide shading and cooling of surface water resources. Upland areas adjacent to the intermittent drainageway will be replaced with seepage wetlands transplanted from the landfill footprint.

Restoration activity for each riparian zone as defined by this application is described below.

Toe Zone

The toe zone is the zone of highest stress, where the bank has been undercut by stream flow as shown in Photo 3 in Appendix B. The toe zone lies within and below the normal stream water elevation range, and will be protected from continued undercutting using rock armoring where needed. The rock armoring will be extended from the stream bottom or below to elevations above the toe zone. Vegetation will be planted between and above the armoring and deflecting rock structure.

Brown trout, found in the stream by the NYSDEC survey in September 2004, are reported to seek cover more than any other trout species (Raleigh *et al*, 1986) and undercut banks have been described as key cover components for trout. The existing scour and fallen vegetation in the toe zone in Storehouse Run provides overhanging shade and shelter for fish; however, these degraded erosional features will be repaired by the stream restoration activity. To compensate, Sealand will construct a shaded trench pool as described in Section 4.2.2.1, thereby providing attractive fish habitat.

Bank Zone

The bank zone above the normal stream water elevation is exposed to periodic flooding, wave wash, erosive currents, ice and debris movement, wet-dry cycles, and freeze/thaw cycling, and it can be inundated for relatively long periods of time.

Shrubs and live cuttings of flood tolerant woody plants, including elderberry, and shrub-like willows such as sandbar willow and silky willow will be planted in the bank zone. These plantings will provide bank stabilization as well as cover for native wildlife and beneficial shading for Storehouse Run and its tributaries. These plants can tolerate considerable flooding and are more likely to thrive in this zone as they can extend roots into deeper water than other woody plants, binding the soil both above and below the water line and forming permeable underwater obstacle to slow currents and reduce impacts on the soil.

Upland Zone

The upland zone is that portion of the bank inland from the bank zone which is not subject to erosive flooding or wave action. Native grasses, herbs, and shrubs, are planned for the upland zone outside of the graded filters where vegetation is considered important for tying the upper portion of the streambank together with its soil-binding root network. A combination of shrubs, and grasses in this zone will not only serve as an integrated plant community for erosion control, but will improve wildlife habitat diversity and aesthetic appeal. The graded filters are expected to be predominantly wet through the year and emergent vegetation will be planted at the surface of the filters, further improving habitat diversity in the stream bank area.

4.4.2.2 Planting Schedule

The native riparian seed mix shall consist of the Ernst Conservation Seed's PA Northern Allegheny Plateau Province Riparian Mix which is summarized in Table 4-2.

Table 4-2 Riparian Seed Mix

Quantity (Percentage by Weight)	**Botanical Name**	**Common Name**
20%	*Panicum clandestinum*	Deertongue
16%	*Schizachyrium scoparium*	Little Bluestem
14%	*Andropogon gerardii*	Big Bluestem
10%	*Elymus virginicus*	Virginia Wildrye
10%	*Poa palustris*	Fowl Bluegrass
10%	*Elymus riparius*	Riverbank Wildrye
2%	*Juncus effusus*	Soft Rush
2%	*Agrostis perennans*	Autumn Bentgrass
2%	*Panicum virgatum*	Switchgrass
2%	*Heliopsis helianthoides*	Oxeye Sunflower
1%	*Scirpus polyphyllus*	Many Leaved Bulrush
1%	*Monarda fistulosa*	Wild Bergamot
1%	*Eupatorium perfoliatum*	Boneset
1%	*Eupatorium perfoliatum*	Joe Pye Weed
1%	*Aster umbellatus*	Flat Topped White Aster
1%	*Aster Puniceus*	Purple Stem Aster

Quantity (Percentage by Weight	**Botanical Name**	**Common Name**
1%	*Aster prenanthoides*	Zigzag Aster
1%	*Aster novae-angliae*	New England Aster
1%	*Asclepias incarnata*	Swamp Milkweed
1%	*Eupatorium maculatum*	Spotted Joe Pye Weed

The riparian seed mix shall be seeded at a rate of 20 lbs per acre with a cover crop such as grain oats at 30 lb per acre. The riparian shrub plantings are listed in Table 4-3 and shall be planted randomly at ten feet on center as shown on the drawings.

Table 4-3 Riparian Shrub Plantings

Botanical Name	**Common Name**
Aronia arbutifolia	Red Chokeberry
Aronia melanocarpa	Black Chokeberry
Cephalanthus occidentalis	Button Bush
Cornum amomum	Silky Dogwood
Cornus sericea	Red-Osier Dogwood
Hamamelis virginiana	Common Witch Hazel
Salix sericea	Silky Willow
Ilex verticillata	Winterberry

Live stake cuttings will be planted along the Storehouse Run stream bank, and the Stream Discharge Structures. Live stake species are listed in Table 4-4 and will be planted on approximately two foot centers, except at the normal waterline, where they will be planted on one foot centers.

Table 4-4 Live Stake Plantings

Botanical Name	Common Name
Salix exigua ssp. Interior	Sandbar Willow
Salix sericea	Silky Willow
Sombucus canadensis	Elderberry

Emergent vegetation to be planted on the surface of the graded filters is listed in Table 4-4.

Table 4-5 Emergent Plantings

Botanical Name	Common Name
Juncus effusus	Soft Rush
Scirpus atrovirens	Green Bulrush
Scirpus cyperinus	Wool Grass
Scirpus microcarpus	Small-Fruit Bulrush
Scirpus pungens	Common Three Square
Scirpus validus	Soft Stem Bulrush

The upland shrub plantings are listed in Table 4-6 and shall be planted randomly in upland areas as shown in the drawings.

Table 4-6 Upland Shrub Plantings

Botanical Name	Common Name
Corylus Americana	American Hazelnut
Physocarpus opulifolius	Ninebark
Viburnum trilobum	American Highbush Cranberry
Viburnum lentago	Nannyberry

New vegetation will be well watered immediately after planting. Plantings and seeding will be completed at a time of the year, where precipitation is sufficient to allow the planted vegetation to sprout roots and stems and obtain a foothold.

4.4.2.3 Monitoring and Aftercare

Inspections

Erosion protection and habitat development will be assumed once the hard elements are demonstrated to be stable over the near term, and viable and vigorous vegetation covers the restored areas. Routine monitoring and maintenance of the restoration will be completed to ensure the establishment of plants and that the stream is not undercutting, flanking or scouring the restoration elements to the point of failure. Signs of distress will trigger remedial actions to repair observed or pending damage. Corrective measures that may be required include placement of additional rock, vegetation or soil.

Weekly qualitative monitoring of the restoration will be completed by a qualified professional for the first two to three months after restoration is completed. An array of high resolution photographs will be taken, from the same point and in the same direction each time, which will allow a progressive correlation of the degree of erosion or lack thereof with plant development.

Descriptions of the site conditions at the time the photos are taken will be recorded, documenting the viability of the restoration, and/or the degree of severity of rilling, gullying, toe undercutting, flanking or other distress. The cause of any distress, such as drought, scouring or pest infestation, will be documented.

Once it is apparent vegetation is becoming well established, monthly inspections will continue until such time the restored area is fully established, or at least two years after restoration is complete. Special inspections will be completed following at least the first two flood events after restoration to determine the viability of the overbank treatments.

Performance Standards

Site restoration will be considered complete once:

- Vegetation is established over 95% of the disturbed area;
- Survival and establishment of 80% of the live stake, shrub and tree plantings is confirmed and documented; and,
- Regulating authorities concur that continuing inspections and corrective actions are no longer warranted.

Appendix A

SUMMARY OF EXPANSION PERMIT APPLICATION DOCUMENTS

PERMIT APPLICATIONS AND SUBMITTED DOCUMENTS

Many documents have been prepared to regulatory agencies in support of the proposed action. The required environmental permits or registrations and the relevant documents include the following:

6 NYCRR Part 201 - Air State Facility Permit:

- Air Emissions Inventory/Supplemental Air Emissions Inventory;
- Air Quality Modeling Report;
- Air State Facility Permit Application; and,
- Air Quality Monitoring Plan.

6 NYCRR Part 360 – Solid Waste Management Facility Permit

- Site Investigation Plan;
- Site Investigation Report;
- Engineering Report;
- Operations and Maintenance Manual;
- Contingency Plan;
- Construction Quality Assurance/Construction Quality Control Plan;
- Environmental Monitoring Plan;
- Site Analytical Plan; and,
- Permit Drawings:

PD-1	Title Sheet
PD-2	Site Map
PD-3	Generalized Contours for the Top of the Highly Weathered Shale
PD-4	Generalized Contours for the Highly Weathered Shale/Upper Bedrock Piezometric Surface
PD-5	Excavation Plan
PD-6	Subgrade Plan
PD-7	Secondary Liner and Leachate Collection System Plan
PD-8	Primary Liner and Leachate Collection System Plan
PD-9	Final Grading and Drainage Plan
PD-10	Phasing Plan
PD-11	Grid Map

PERMIT APPLICATIONS AND SUBMITTED DOCUMENTS (CONT.)

Permit Drawings (Cont.)

PD-12	Landfill Cross Sections
PD-13	Landfill Cross Sections
PD-14	Landfill Cross Sections
PD-15	Embankment Sections
PD-16	Trench Drain Plan, Profile and Details
PD-17	MSE Berm Drain Plan, Sections and Details
PD-18	Liner and Leachate Collection System Details
PD-19	Liner and Leachate Collection System Details
PD-20	Sump Plan, Profiles & Sections
PD-21	Sump Riser Details
PD-22	Sideriser Pipe Details
PD-23	Leachate Forcemain Plan, Profiles and Details
PD-24	Leachate Storage and Loadout Details
PD-25	Landfill Gas Collection and Control System Plan
PD-26	Landfill Gas Collection System Sections and Profiles
PD-27	Landfill Gas Collection and Control System Details
PD-28	Sediment Basin 1 & Graded Filter Plan and Profiles
PD-29	Sediment Basin 2 & Graded Filter Plan and Profiles
PD-30	Pond 1 & Pond 2 Plans, Profiles, Sections and Details
PD-31	Temporary Sediment Basin 1 Plan, Profile and Details and Sediment Basin 1 & 2 Weir Sections & Spillway Details
PD-32	Drainage System Details
PD-33	Miscellaneous Details

6 NYCRR Part 617 State Environmental Quality Review

- Draft Environmental Impact Statement and Supporting Specialty Studies; including:
  - Cultural Resources Survey Report;
  - Evaluation of Potential Impacts on the Martz Observatory;
  - Noise Assessment;
  - Traffic Impact Study;
  - Vegetation and Wildlife Survey and Part 182 Takings Determination; and,
  - Visual Resource Assessment.

PERMIT APPLICATIONS AND SUBMITTED DOCUMENTS (CONT.)

6 NYCRR Part 750 – Stormwater Discharge and Stream Disturbance Permit

- Stream Disturbance Permit;
- SPDES Individual Permit Application; and,
- Stormwater Pollution Prevention Plan.

6 NYCRR Part 601 – Water Withdrawal Permit

- Water Withdrawal Permit Application.

Clean Water Act Section 404 –Federal Freshwater Wetland Disturbance Permit

- Wetland Delineation Report;
- Alternatives Analysis
- Supplemental Alternatives Analysis; and,
- Wetland and Drainageway Mitigation Plan.

6 NYCRR Parts 612-614 Bulk Petroleum Storage Facility Registration

- Bulk Petroleum Storage Registration Application; and,
- Spill Prevention, Control, and Countermeasures Plan

Appendix B

PHOTOGRAPHS

Photo 1 - Unnamed Tributary and Intermittent Drainageway

Photo 2 - Location for SDS-3

CARROLL LANDFILL EXPANSION APPLICATION **STREAM DISTURBANCE PERMIT** **SEALAND WASTE, LLC**	**Existing Conditions Photograph**
	1

Photo 3 - Undercut Bank North of SDS-1 Looking South

Photo 4 - Fallen Trees Near SDS-1 Looking South

CARROLL LANDFILL EXPANSION APPLICATION **STREAM DISTURBANCE PERMIT** **SEALAND WASTE, LLC**	**Existing Conditions Photograph**
	2

Photo 5 - Location of SDS-2 Looking South

Photo 6 - Location of SDS-1 Looking North

CARROLL LANDFILL EXPANSION APPLICATION **STREAM DISTURBANCE PERMIT** **SEALAND WASTE, LLC**	**Existing Conditions Photograph**
	3

Photo 7 - Location of SDS-1 Looking South

Photo 8 - Fallen Trees Near SDS-1

CARROLL LANDFILL EXPANSION APPLICATION **STREAM DISTURBANCE PERMIT** **SEALAND WASTE, LLC**	**Existing Conditions Photograph**
	4

Appendix C

CULVERT ANALYSIS

Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc.

Friday, May 13 2016

Culvert 15

Invert Elev Dn (ft)	=	1715.33
Pipe Length (ft)	=	32.00
Slope (%)	=	0.19
Invert Elev Up (ft)	=	1715.39
Rise (in)	=	48.0
Shape	=	Cir
Span (in)	=	48.0
No. Barrels	=	2
n-Value	=	0.012
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

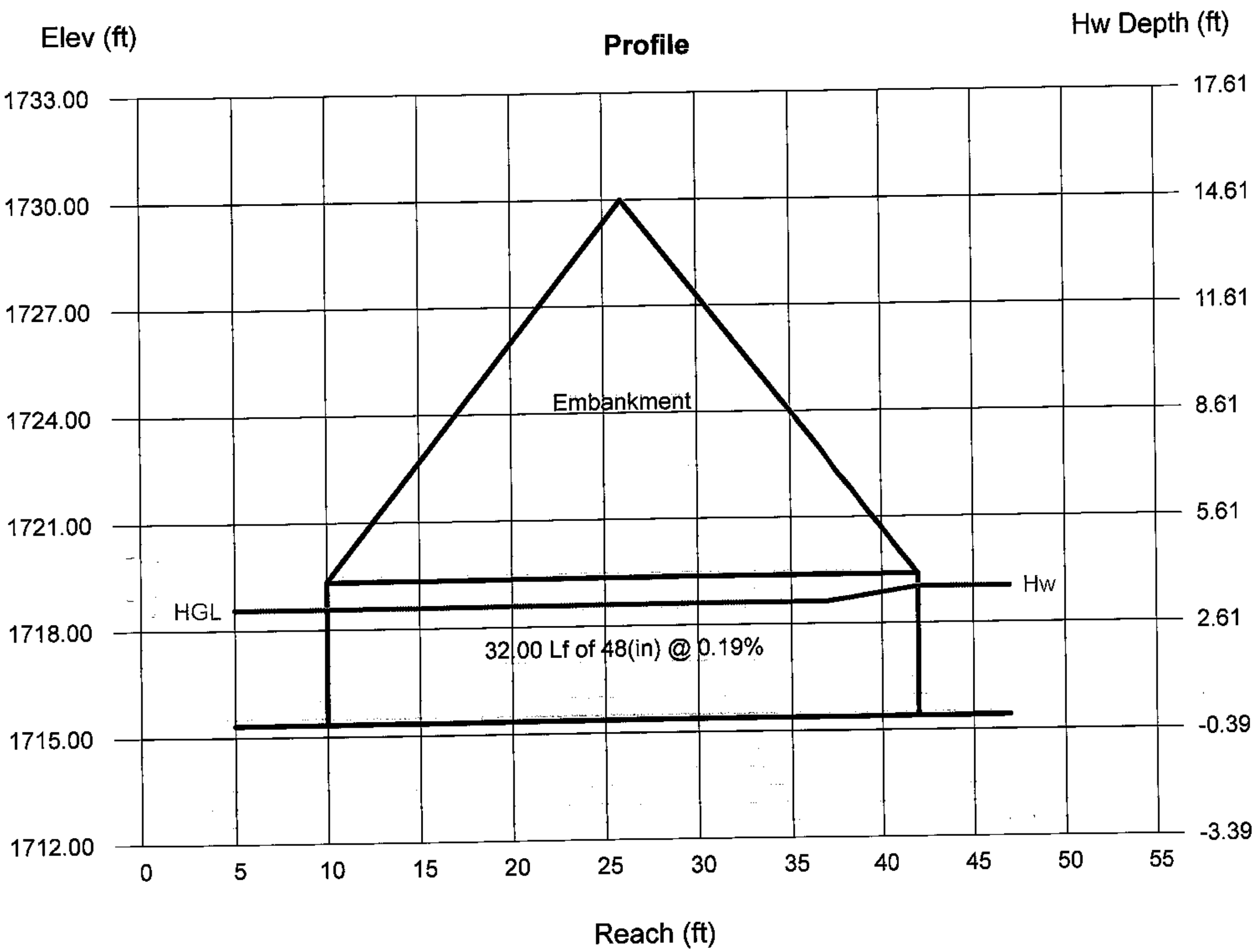
Top Elevation (ft)	=	1730.00
Top Width (ft)	=	0.00
Crest Width (ft)	=	5.00

Calculations

Qmin (cfs)	=	133.50
Qmax (cfs)	=	133.50
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	133.50
Qpipe (cfs)	=	133.50
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.11
Veloc Up (ft/s)	=	6.11
HGL Dn (ft)	=	1718.58
HGL Up (ft)	=	1718.64
Hw Elev (ft)	=	1719.03
Hw/D (ft)	=	0.91
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Tuesday, Mar 29 2016

Culvert 17

Invert Elev Dn (ft)	=	1715.33
Pipe Length (ft)	=	17.00
Slope (%)	=	0.18
Invert Elev Up (ft)	=	1715.36
Rise (in)	=	42.0
Shape	=	Cir
Span (in)	=	42.0
No. Barrels	=	1
n-Value	=	0.012
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

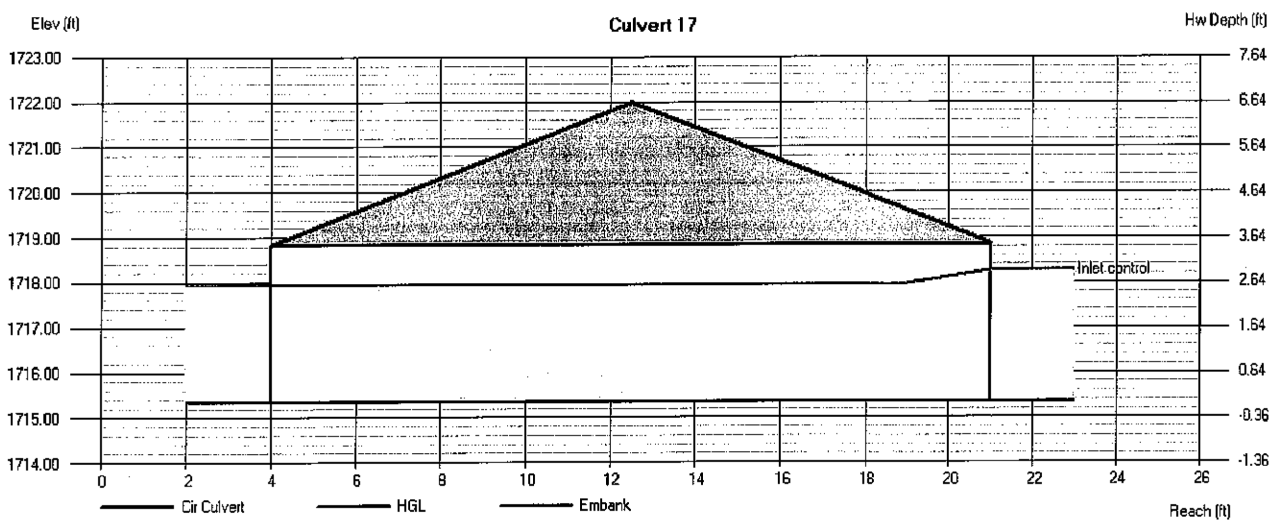
Top Elevation (ft)	=	1722.00
Top Width (ft)	=	0.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	41.61
Qmax (cfs)	=	41.61
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	41.61
Qpipe (cfs)	=	41.61
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.39
Veloc Up (ft/s)	=	5.39
HGL Dn (ft)	=	1717.95
HGL Up (ft)	=	1717.98
Hw Elev (ft)	=	1718.28
Hw/D (ft)	=	0.83
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc.

Friday, May 13 2016

Culvert 19

Invert Elev Dn (ft)	=	1722.00
Pipe Length (ft)	=	30.00
Slope (%)	=	0.33
Invert Elev Up (ft)	=	1722.10
Rise (in)	=	42.0
Shape	=	Cir
Span (in)	=	42.0
No. Barrels	=	1
n-Value	=	0.012
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

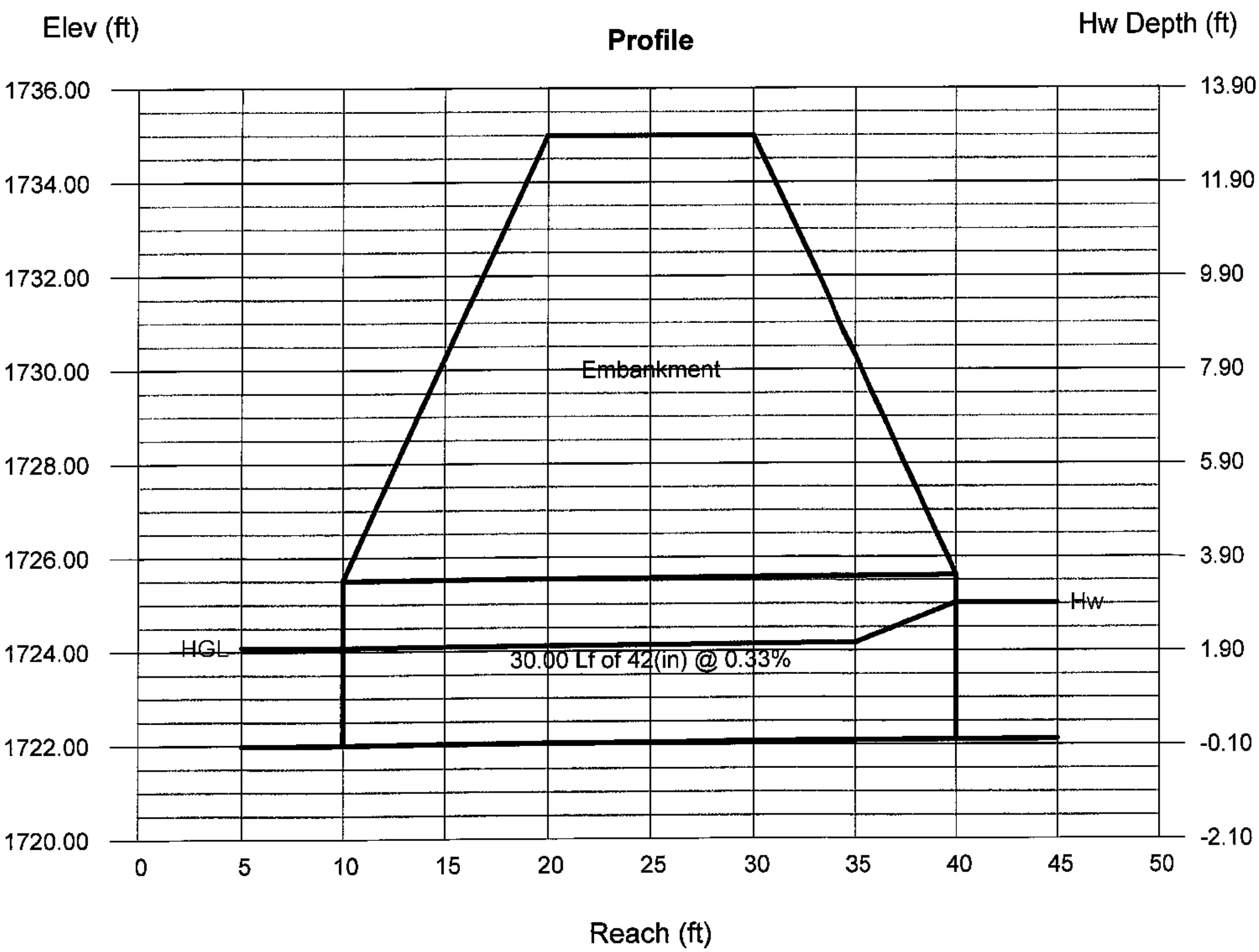
Top Elevation (ft)	=	1735.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	41.61
Qmax (cfs)	=	41.61
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	41.61
Qpipe (cfs)	=	41.61
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.99
Veloc Up (ft/s)	=	6.99
HGL Dn (ft)	=	1724.08
HGL Up (ft)	=	1724.18
Hw Elev (ft)	=	1725.02
Hw/D (ft)	=	0.83
Flow Regime	=	Inlet Control



Culvert Report

Culvert 21

Invert Elev Dn (ft)	= 1730.00
Pipe Length (ft)	= 29.00
Slope (%)	= 0.21
Invert Elev Up (ft)	= 1730.06
Rise (in)	= 48.0
Shape	= Cir
Span (in)	= 48.0
No. Barrels	= 2
n-Value	= 0.012
Inlet Edge	= Projecting
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.5

Embankment

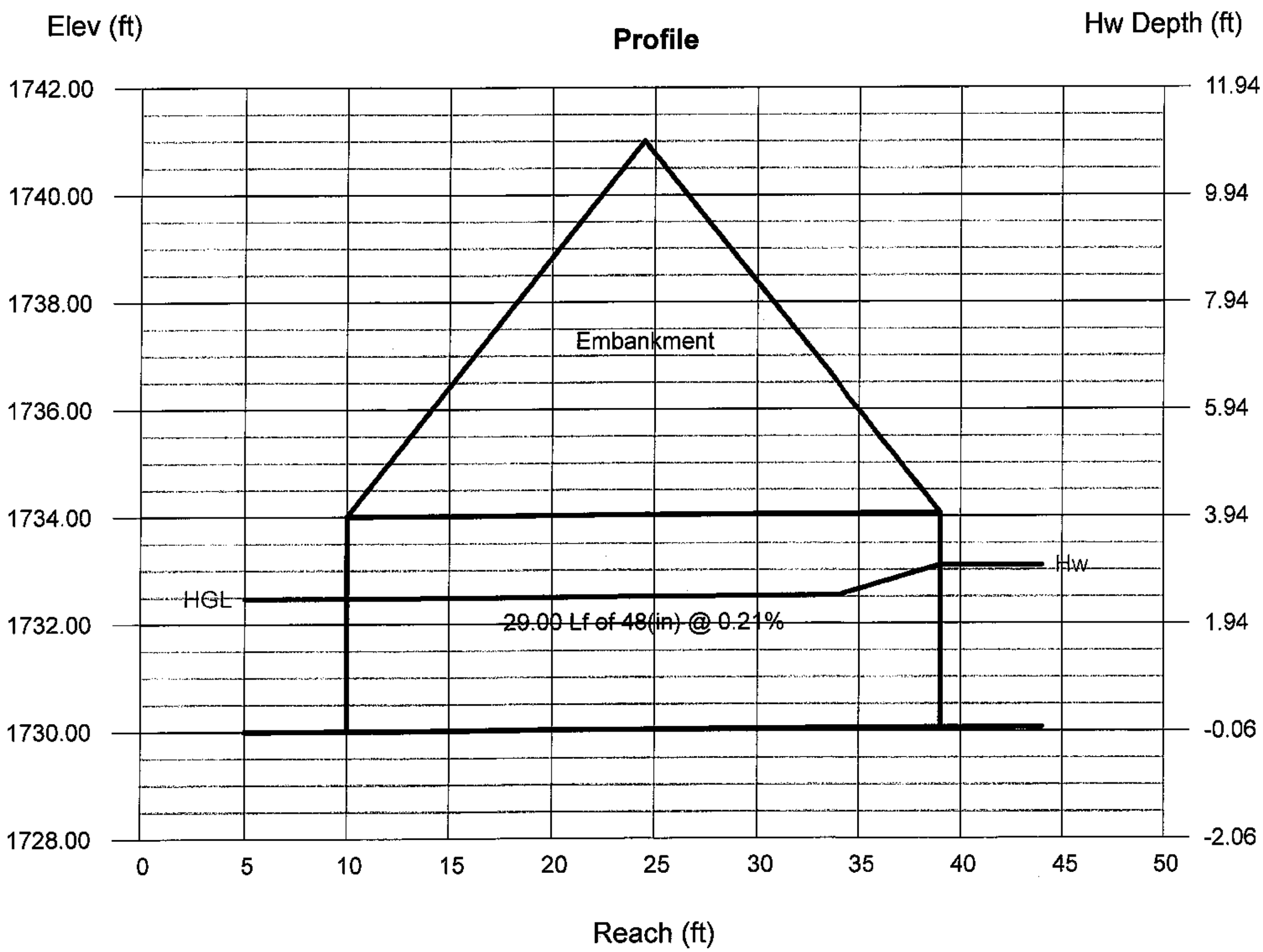
Top Elevation (ft)	= 1741.00
Top Width (ft)	= 0.00
Crest Width (ft)	= 0.00

Calculations

Qmin (cfs)	= 99.30
Qmax (cfs)	= 99.30
Tailwater Elev (ft)	= Normal

Highlighted

Qtotal (cfs)	= 99.30
Qpipe (cfs)	= 99.30
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 6.08
Veloc Up (ft/s)	= 6.08
HGL Dn (ft)	= 1732.47
HGL Up (ft)	= 1732.53
Hw Elev (ft)	= 1733.09
Hw/D (ft)	= 0.76
Flow Regime	= Inlet Control



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc.   Tuesday, Mar 29 2016

Culvert 23

Invert Elev Dn (ft)	=	1730.00
Pipe Length (ft)	=	136.00
Slope (%)	=	0.21
Invert Elev Up (ft)	=	1730.28
Rise (in)	=	42.0
Shape	=	Cir
Span (in)	=	42.0
No. Barrels	=	1
n-Value	=	0.012
Inlet Edge	=	Projecting
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.5

Embankment

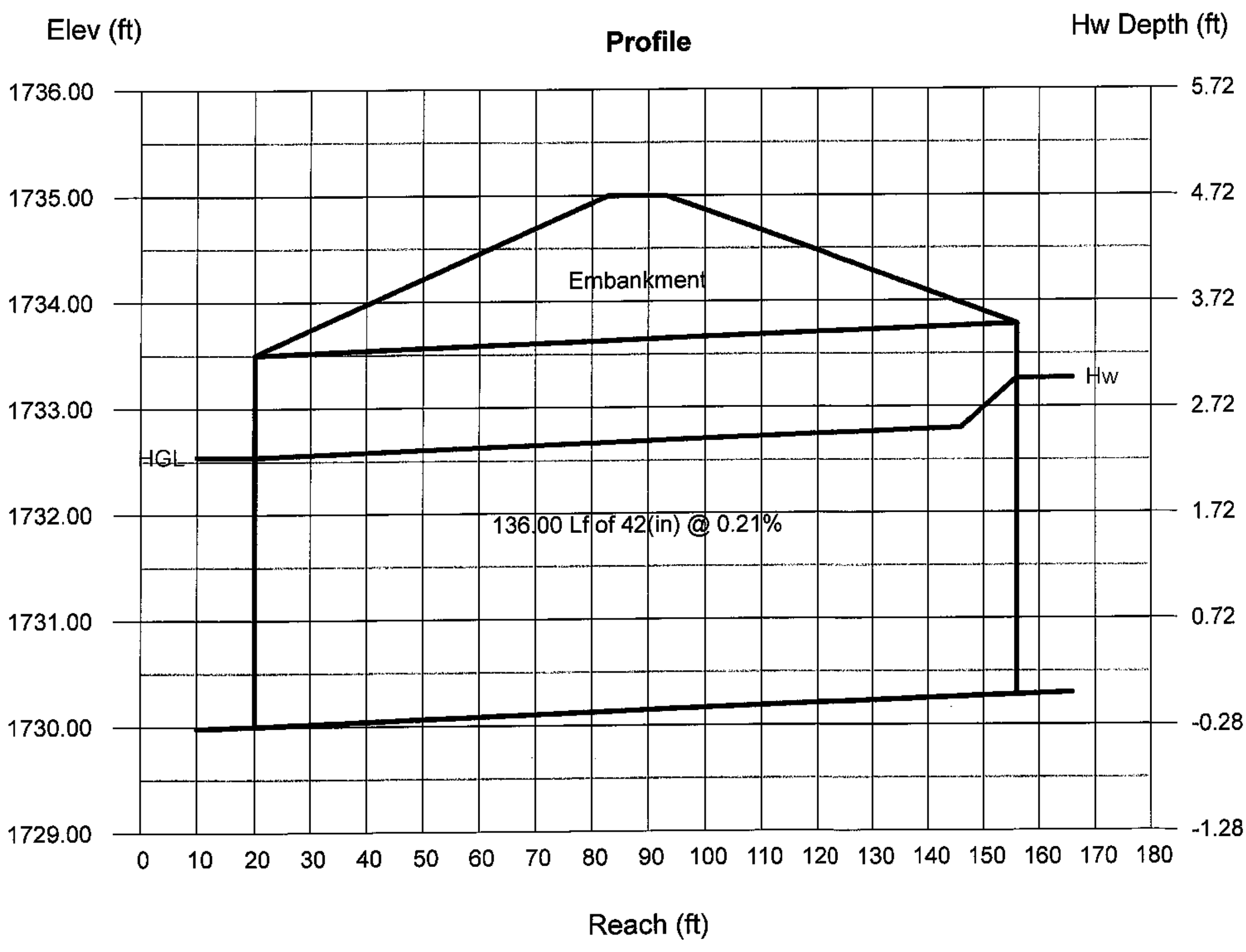
Top Elevation (ft)	=	1735.00
Top Width (ft)	=	10.00
Crest Width (ft)	=	10.00

Calculations

Qmin (cfs)	=	43.24
Qmax (cfs)	=	43.24
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	43.24
Qpipe (cfs)	=	43.24
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.78
Veloc Up (ft/s)	=	5.78
HGL Dn (ft)	=	1732.54
HGL Up (ft)	=	1732.82
Hw Elev (ft)	=	1733.27
Hw/D (ft)	=	0.85
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc.

Friday, May 13 2016

Culvert 26

Invert Elev Dn (ft)	= 1730.00
Pipe Length (ft)	= 29.00
Slope (%)	= 0.17
Invert Elev Up (ft)	= 1730.05
Rise (in)	= 42.0
Shape	= Cir
Span (in)	= 42.0
No. Barrels	= 1
n-Value	= 0.012
Inlet Edge	= Projecting
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.5

Embankment

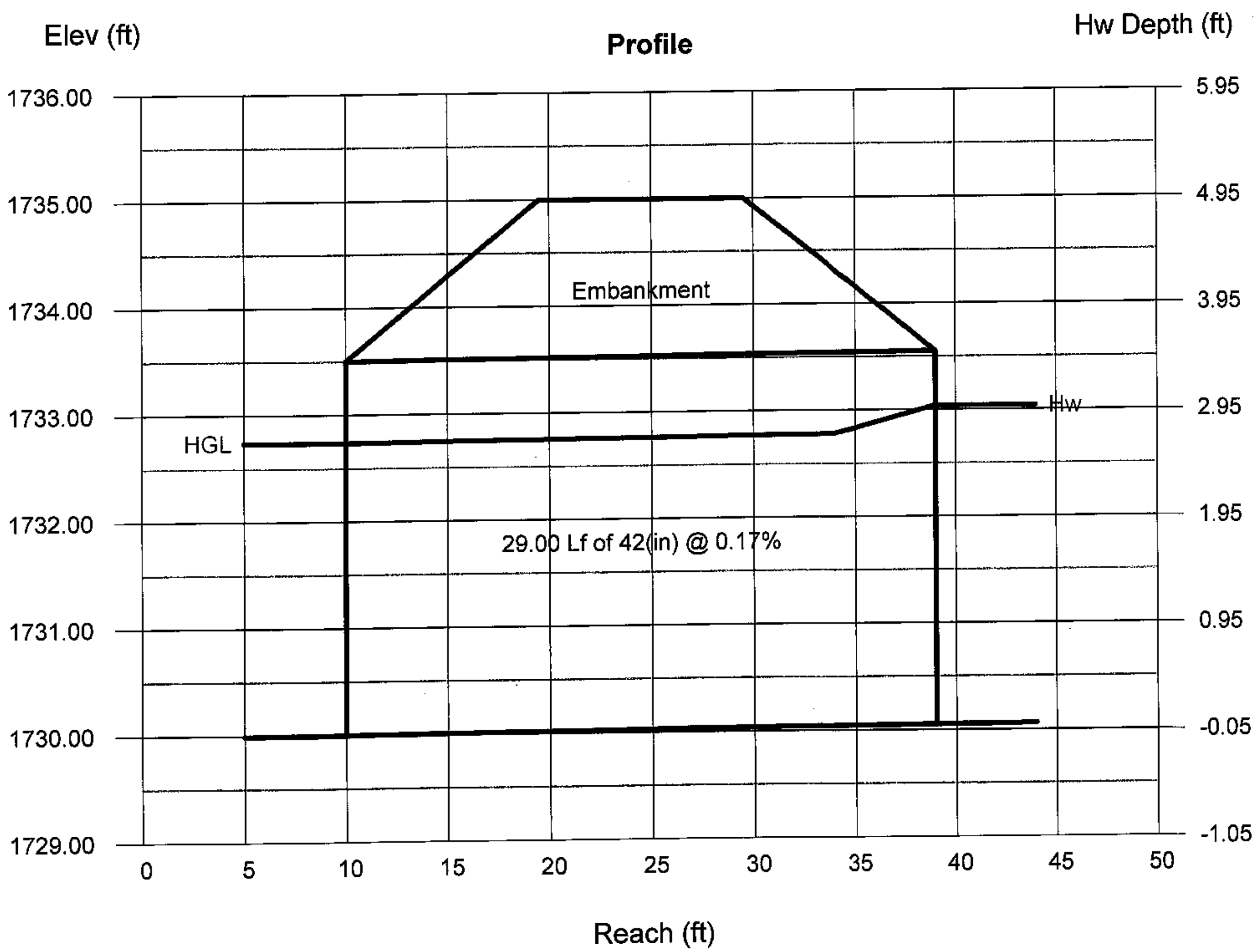
Top Elevation (ft)	= 1735.00
Top Width (ft)	= 10.00
Crest Width (ft)	= 10.00

Calculations

Qmin (cfs)	= 43.24
Qmax (cfs)	= 43.24
Tailwater Elev (ft)	= Normal

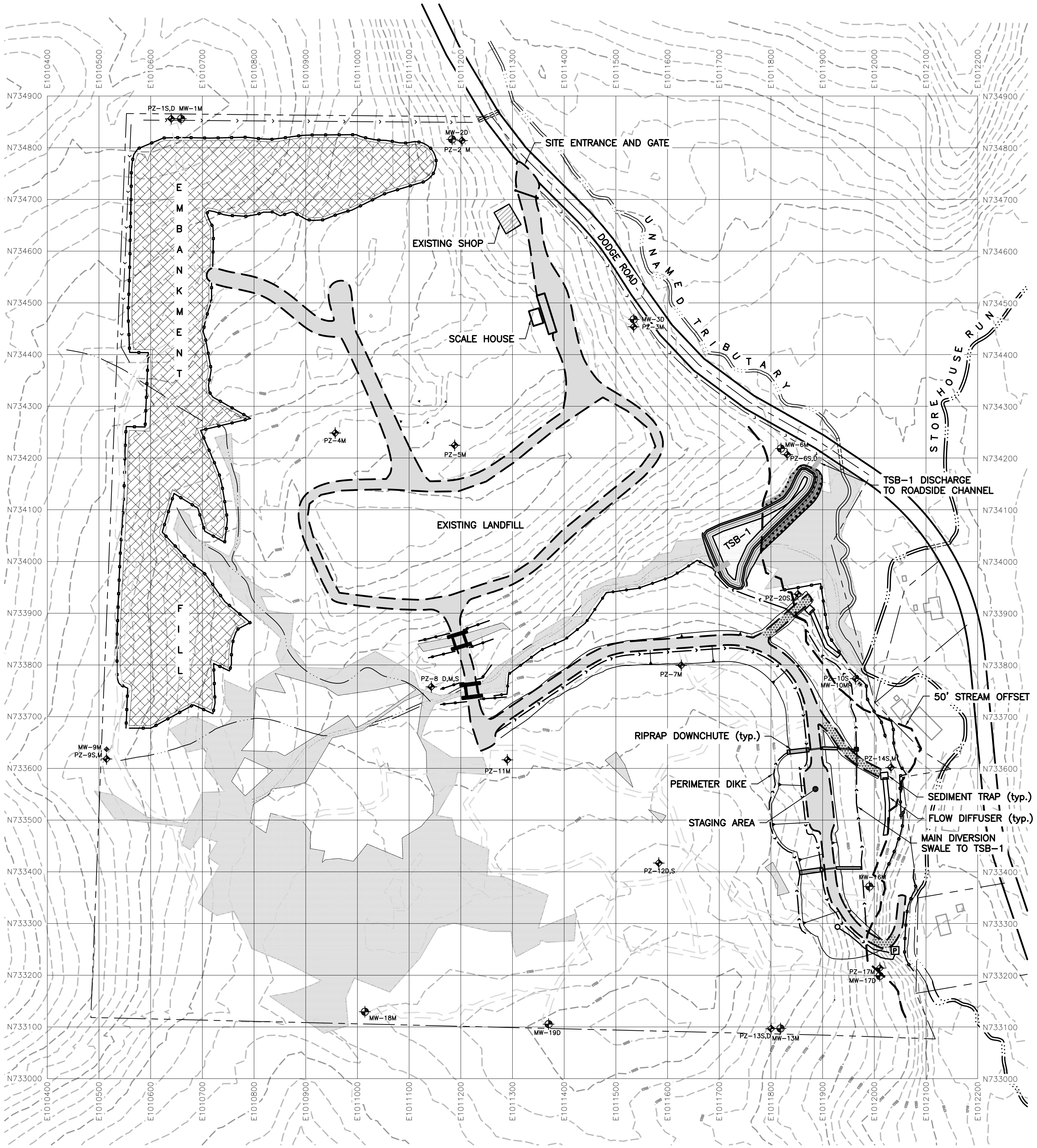
Highlighted

Qtotal (cfs)	= 43.24
Qpipe (cfs)	= 43.24
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 5.36
Veloc Up (ft/s)	= 5.36
HGL Dn (ft)	= 1732.74
HGL Up (ft)	= 1732.79
Hw Elev (ft)	= 1733.04
Hw/D (ft)	= 0.85
Flow Regime	= Inlet Control



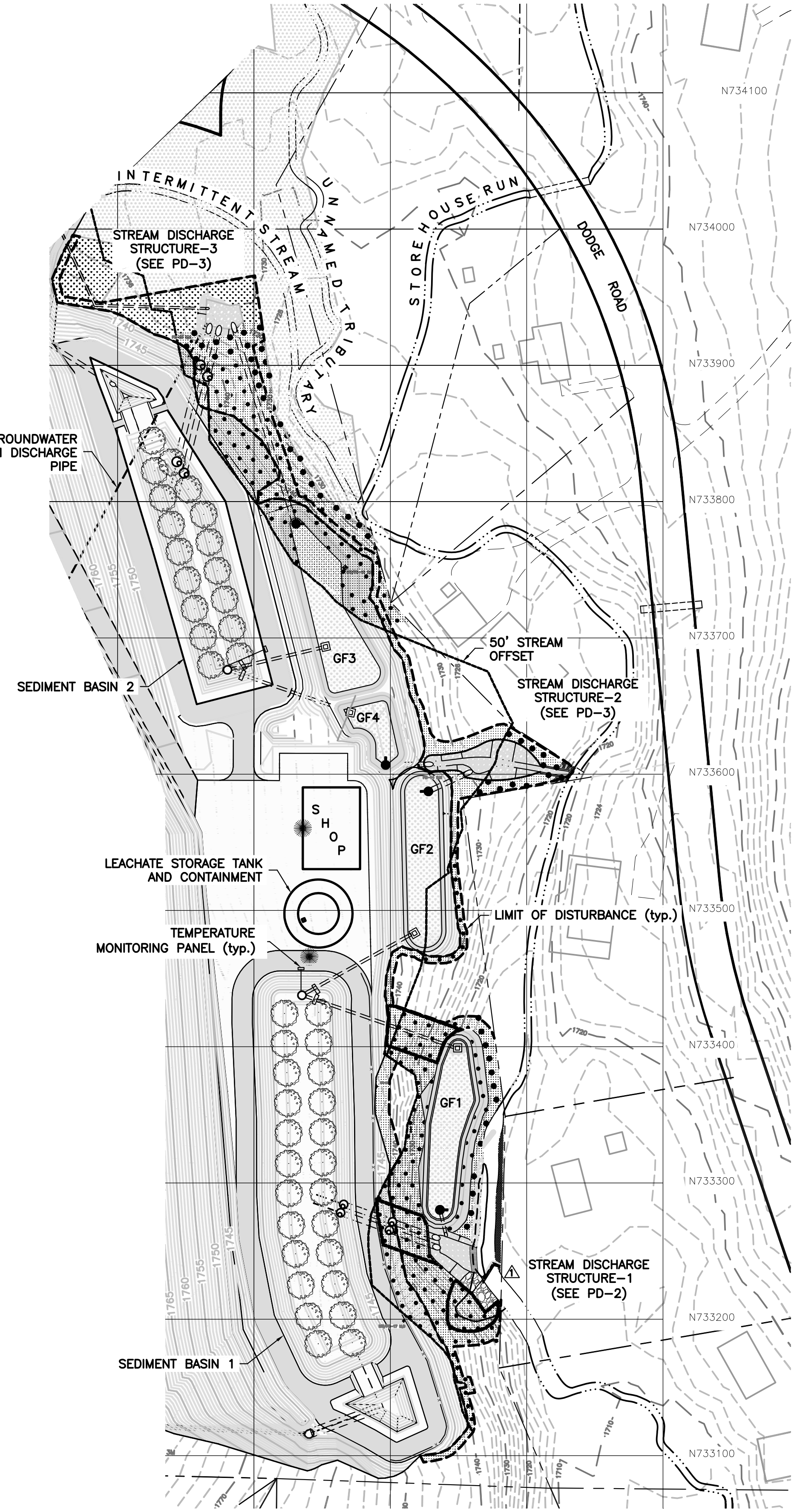
Appendix D

STREAM DISTURBANCE PERMIT APPLICATION DRAWINGS



PROJECT AREA PREPARATION PLAN

SCALE: 1"=120'



PROJECT AREA RESTORATION PLAN

SCALE: 1"=60'

N

LEGEND

- BASIN SHADING TREE
- PIEZOMETER
- MONITORING WELL
- PROPERTY BOUNDARY
- LIMIT OF DISTURBANCE
- WATERCOURSE
- CULVERT AND VALVE
- ORANGE CONSTRUCTION FENCE
- SILT FENCE
- PERIMETER DIKE OR DIVERSION
- NEW BUILDING
- FULLY SHIELDED AREA LIGHT
- GRADED FILTER THERMISTOR
- P SUMP PIT
- ROCK LINED CHANNEL
- BRIDGE
- ACCESS ROAD
- WETLAND
- #4 COARSE AGGREGATE

NOTES:

1. DISTURBED AREAS ASSOCIATED WITH THE CONSTRUCTION OF THE PROPOSED DRAINAGE SYSTEM MUST BE SEEDED AND MULCHED WITH STRAW IMMEDIATELY AFTER THE EARTHWORK HAS BEEN COMPLETED IN ORDER TO REDUCE SOIL EROSION AND TO KEEP THE SOIL MOIST FOR GERMINATION.
2. ALL SEEDING AND PLANTING SHOULD BE CONDUCTED BEFORE JUNE 15TH OR AFTER SEPTEMBER 15TH.
3. SEED MIXTURES AND PLANTING ARE SUBJECT TO CHANGE ACCORDING TO AVAILABILITY.
4. TO PREVENT THE UNINTENTIONAL INTRODUCTION OR SPREAD OF INVASIVE SPECIES ALL CONSTRUCTION EQUIPMENT MUST BE CLEANED OF MUD, SEEDS, VEGETATION AND OTHER DEBRIS PRIOR TO ENTERING THE PROJECT AREA. LOOSE PLANT AND SOIL MATERIAL SHALL BE REMOVED FROM CLOTHING AND TOOLS PRIOR TO ENTERING THE PROJECT AREA.
5. A MINIMUM OF SIX INCHES OF TOP SOIL SHALL BE USED WITHIN THE SEEDING AND PLANTING AREA.
6. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN PLACE PRIOR TO ANY EARTH DISTURBANCE.

NO.	REVISION	BY	DATE
1	REMOVE ROCK VANES, ADD WEDGE DAM, SHORTEN TRENCH POOL	SjD	7/11/16

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JAMES A. DAIGLER, P.E.
NYSPE NO. 061689

DATE: June 2016

SCALE: NOTED

PREPARED FOR: SEALAND WASTE, LLC

DES. BY: DRW. BY: CHK. BY:

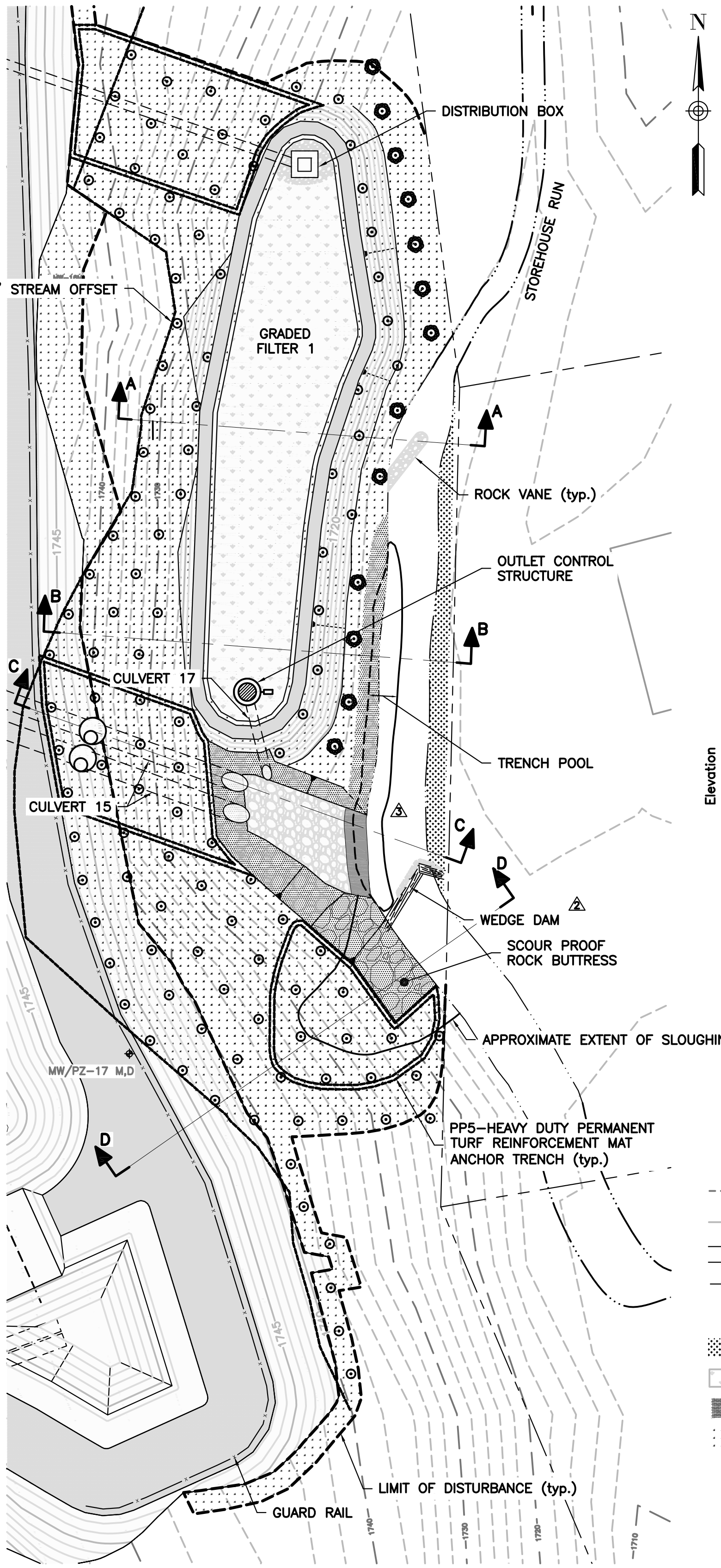
DWG. SEDIMENT BASIN PLAN AND PROFILE-REV 1_recover.dwg

PROJECT AREA PLANS

CARROLL LANDFILL EXPANSION APPLICATION

TOWN OF CARROLL | CHAUTAUQUA COUNTY | STATE OF NEW YORK

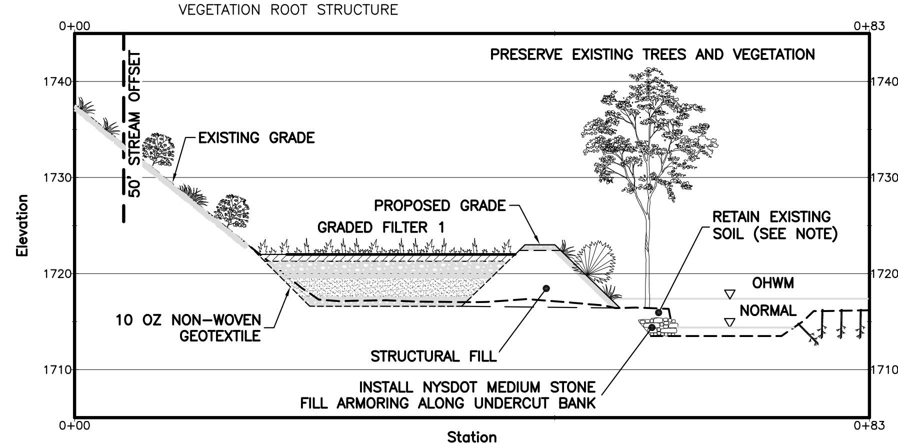
SHEET PD-1



PLAN: STREAM DISCHARGE STRUCTURE 1

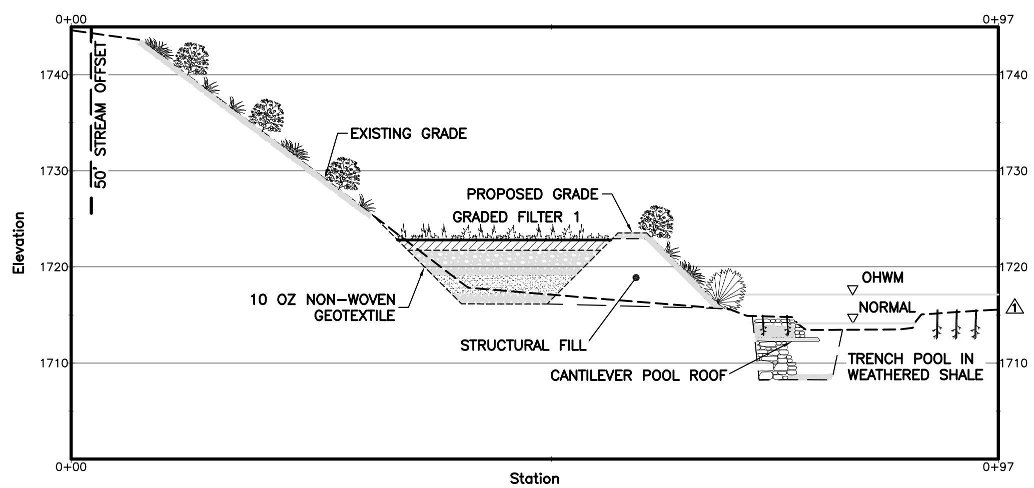
SCALE: 1"=20'

NOTE:
MANUAL/HAND PLACEMENT OF STONE FILL IS REQUIRED TO RETAIN EXISTING VEGETATION ROOT STRUCTURE



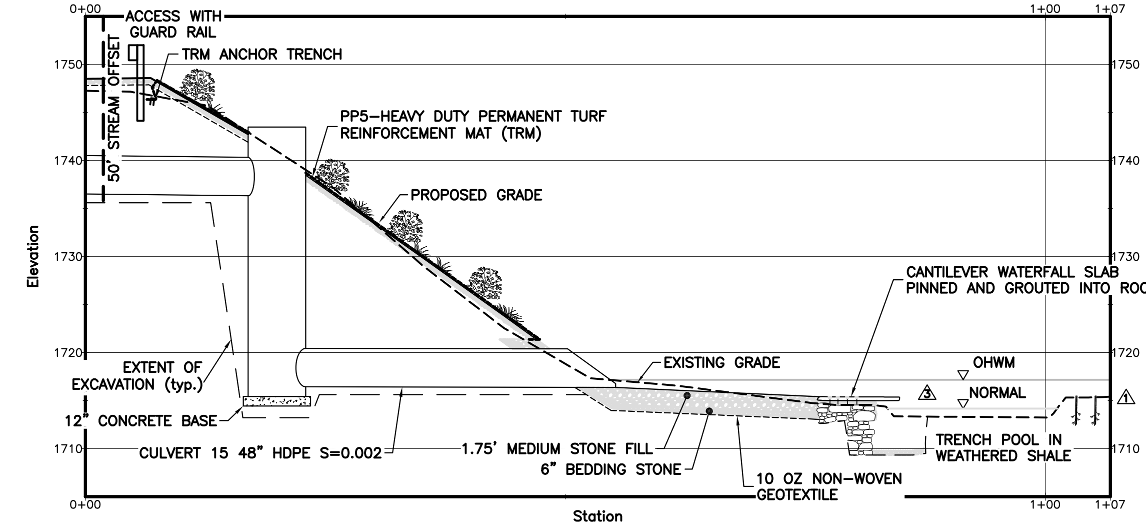
PROFILE VIEW – A–A

SCALE: 1"=10'



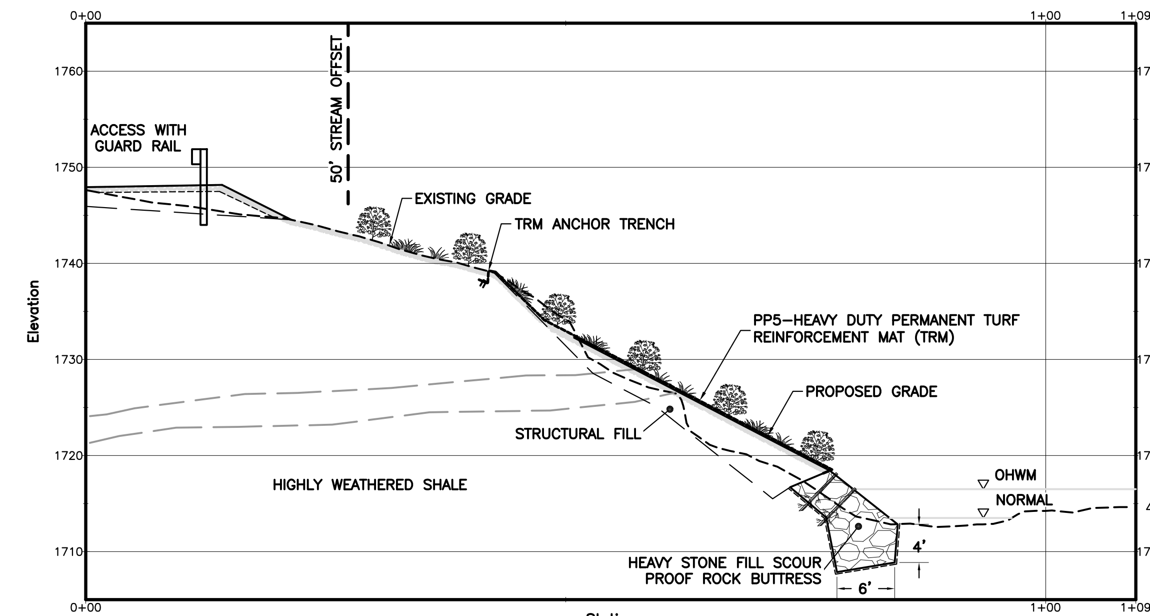
PROFILE VIEW – B–B

SCALE: 1"=10'



PROFILE VIEW – C–C

SCALE: 1"=10'



PROFILE VIEW – D–D

SCALE: 1"=10'

LEGEND

- 1740 EXISTING CONTOUR
- 1740 PROPOSED CONTOUR
- APPROXIMATE BASEFLOW WATER SURFACE
- PROPERTY LINE
- MONITORING WELL/PIEZIOMETER
- LIVE STAKE PLANTING
- EMERGENT PLANTING
- JOINT PLANTING
- RIPARIAN SEEDING AREA
- UPLAND SHRUB PLANTING
- RIPARIAN SHRUB PLANTING
- LIVE STAKE
- THERMISTOR AND WIRELESS TRANSMITTER

STONE CHANNEL LINING GRADATION REQUIREMENTS;

LIGHT STONE FILLING TYPE I

STONE SIZE	PERCENT TOTAL BY WEIGHT
LIGHTER THAN 110 LBS	90–100
LARGER THAN 6 INCHES	50–100
SMALLER THAN ½ INCH	0–10

LIGHT STONE FILLING TYPE II

STONE SIZE	PERCENT TOTAL BY WEIGHT
HEAVIER THAN 110 LBS	90–100
LARGER THAN 12 INCHES	50–100
SMALLER THAN 6 INCH	0–10

MEDIUM STONE FILLING TYPE III

STONE SIZE	PERCENT TOTAL BY WEIGHT
HEAVIER THAN 110 LBS	50–100
SMALLER THAN 6 INCHES	0–10

HEAVY STONE FILLING TYPE IV

STONE SIZE	PERCENT TOTAL BY WEIGHT
HEAVIER THAN 660 LBS	50–100
SMALLER THAN 6 INCHES	0–10

RIP-RAP FILLING NOTES:

1. A MINIMUM OF SIX-INCHES OF BEDDING MATERIAL MEETING THE REQUIREMENTS OF NYSDOT ITEM 620-2.05 SHALL BE PLACED BELOW THE RIP-RAP. BEDDING MATERIAL SHALL BE PLACED USING METHODS THAT WILL NOT RESULT IN SEGREGATION OF PARTICLE SIZES.
2. ALL RIP-RAP FILLING SHALL BE ACCEPTED OR REJECTED FOR USE BASED ON A VISUAL EXAMINATION OF THE MATERIAL BY THE ENGINEER.
3. RIP-RAP SHALL BE PLACED AND CONSOLIDATED IN-PLACE TO ITS FULL COURSE THICKNESS IN ONE OPERATION. STONE FILLING SHALL BE PLACED IN A MANNER THAT PRODUCES A REASONABLY WELL-GRADED MASS WITH THE SMALLER STONE FRAGMENTS FILLING THE VOIDS BETWEEN THE LARGER PARTICLES WITH A MINIMUM PRACTICABLE VOID RATIO IN THE COMPLETED LINING. THE MATERIAL SHALL BE PLACED SUCH THAT THERE ARE NO POCKETS OF UNIFORM SIZE MATERIAL. PLACEMENT OF THE LINING SHALL BE COMPLETED IN A MANNER THAT AVOIDS DISRUPTION AND DAMAGE TO THE UNDERLYING BEDDING MATERIAL.
4. IT IS RECOMMENDED THAT THE DESIRED DISTRIBUTION OF THE VARIOUS SIZES OF STONE THROUGHOUT THE LINING BE OBTAINED BY SELECTIVE LOADING AT THE SOURCE, BY CONTROLLED DUMPING OF SUCCESSIVE LOADS DURING FINAL PLACEMENT, BY REARRANGING OF INDIVIDUAL STONES BY MECHANICAL EQUIPMENT OR BY HAND, OR BY OTHER WELL CONSIDERED METHODS THAT WILL PRODUCE THE SPECIFIED RESULTS.

NO.	REVISION	BY	DATE
3	REMOVE ROCK EDGE FROM TRENCH POOL		
2	REMOVE ROCK VANES, ADD WEDGE DAM, SHORTEN TRENCH POOL	SJD	7/11/16
1	ADJUST VERTICAL POSITION OF SECTION BASED ON JULY 6, 2016 FIELD SURVEY	SJD	7/11/16

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(716) 773-6872 (716) 773-6873 FAX

JAMES A. DAIGLER, P.E.
NYSPE NO. 061689

DATE: June 2016

SCALE: NOTED

PREPARED FOR: SEALAND WASTE, LLC			
DES. BY:	DRW. BY:	CHK. BY:	
DWG. SEDIMENT BASIN PLAN AND PROFILE-REV 1_recover.dwg			

SEDIMENT BASIN 1 AND GRADED FILTER 1 OUTLET PROTECTION

CARROLL LANDFILL EXPANSION APPLICATION

TOWN OF CARROLL | CHAUTAUQUA COUNTY | STATE OF NEW YORK

SHEET PD-2

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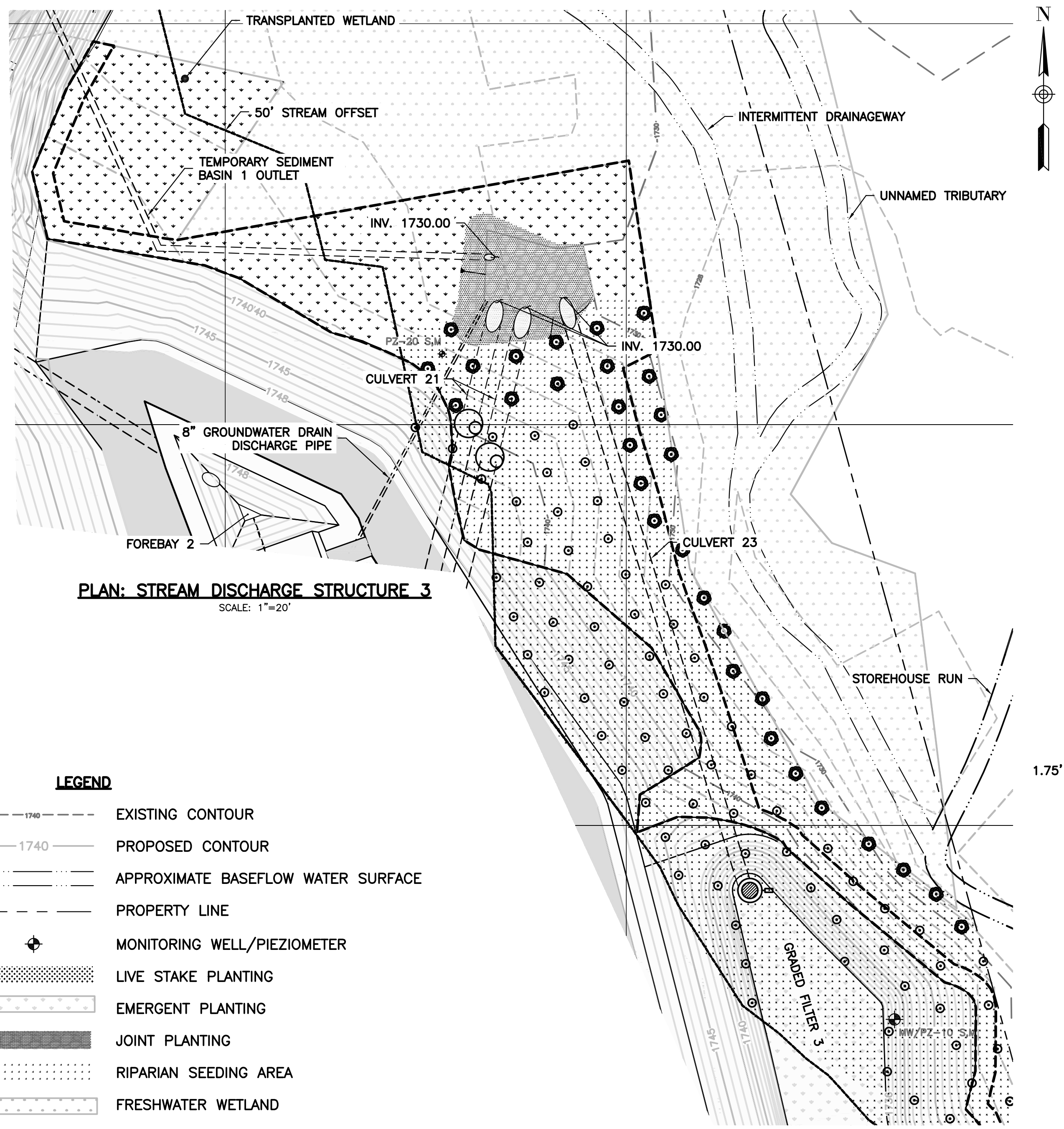
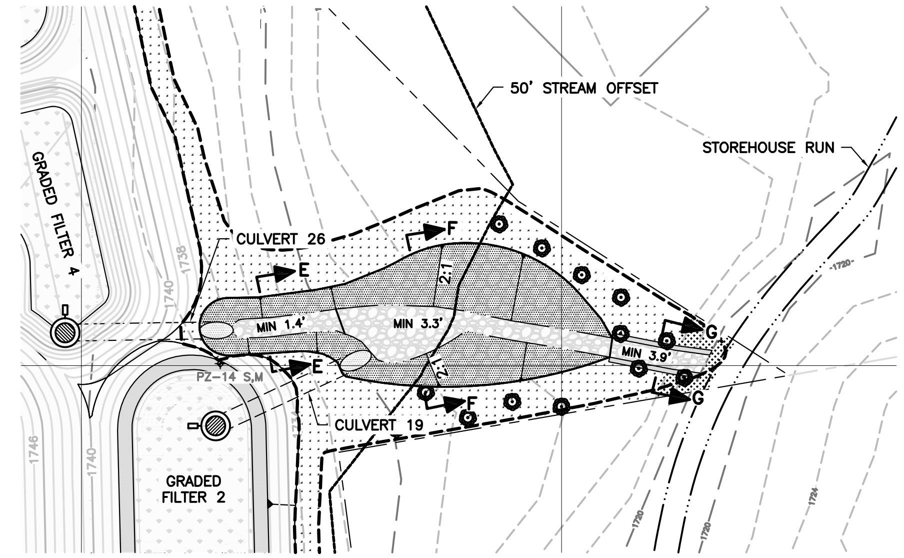


PLAN: STREAM DISCHARGE STRUCTURE 3

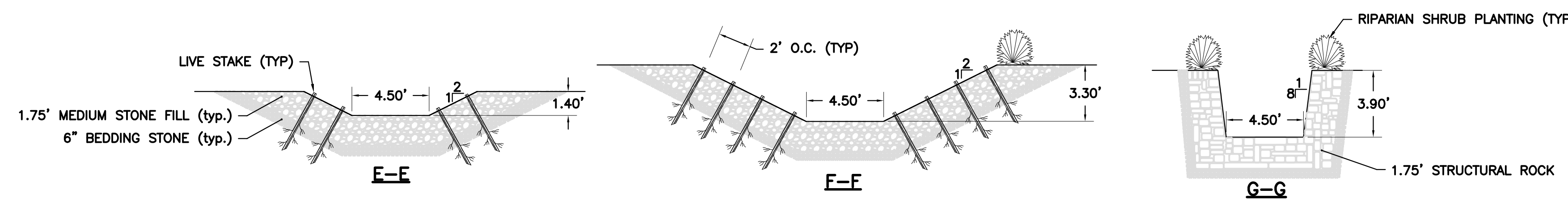
SCALE: 1"=20'



PLAN: STREAM DISCHARGE STRUCTURE 2

SCALE: 1"=20'

NOTE: ALL ROCK LINING IS 1.75 FEET MEDIUM STONE FILL UNDERLAID BY 0.50 FEET NYSDOT 620–2.05 STONE BEDDING



SCHEMATIC SECTIONS

SCALE: 1"=5'

LEGEND

1740 (dashed)	EXISTING CONTOUR
1740 (solid)	PROPOSED CONTOUR
	APPROXIMATE BASEFLOW WATER SURFACE
	PROPERTY LINE
	MONITORING WELL/PIEZIOMETER
	LIVE STAKE PLANTING
	EMERGENT PLANTING
	JOINT PLANTING
	RIPARIAN SEEDING AREA
	FRESHWATER WETLAND
	UPLAND SHRUB PLANTING
	RIPARIAN SHRUB PLANTING
	LIVE STAKE
	THERMISTOR AND WIRELESS TRANSMITTER

STONE CHANNEL LINING GRADATION REQUIREMENTS;

LIGHT STONE FILLING TYPE I

STONE SIZE	PERCENT TOTAL BY WEIGHT
LIGHTER THAN 110 LBS	90–100
LARGER THAN 6 INCHES	50–100
SMALLER THAN ½ INCH	0–10

LIGHT STONE FILLING TYPE II

STONE SIZE	PERCENT TOTAL BY WEIGHT
HEAVIER THAN 110 LBS	90–100
LARGER THAN 12 INCHES	50–100
SMALLER THAN 6 INCH	0–10

MEDIUM STONE FILLING TYPE III

STONE SIZE	PERCENT TOTAL BY WEIGHT
HEAVIER THAN 110 LBS	50–100
SMALLER THAN 6 INCHES	0–10

HEAVY STONE FILLING TYPE IV

STONE SIZE	PERCENT TOTAL BY WEIGHT
HEAVIER THAN 660 LBS	50–100
SMALLER THAN 6 INCHES	0–10

RIP-RAP FILLING NOTES:

1. A MINIMUM OF SIX-INCHES OF BEDDING MATERIAL MEETING THE REQUIREMENTS OF NYSDOT ITEM 620–2.05 SHALL BE PLACED BELOW THE RIP-RAP. BEDDING MATERIAL SHALL BE PLACED USING METHODS THAT WILL NOT RESULT IN SEGREGATION OF PARTICLE SIZES.
2. ALL RIP-RAP FILLING SHALL BE ACCEPTED OR REJECTED FOR USE BASED ON A VISUAL EXAMINATION OF THE MATERIAL BY THE ENGINEER.
3. RIP-RAP SHALL BE PLACED AND CONSOLIDATED IN-PLACE TO ITS FULL COURSE THICKNESS IN ONE OPERATION. STONE FILLING SHALL BE PLACED IN A MANNER THAT PRODUCES A REASONABLY WELL-GRADED MASS WITH THE SMALLER STONE FRAGMENTS FILLING THE VOIDS BETWEEN THE LARGER PARTICLES WITH A MINIMUM PRACTICABLE VOID RATIO IN THE COMPLETED LINING. THE MATERIAL SHALL BE PLACED SUCH THAT THERE ARE NO POCKETS OF UNIFORM SIZE MATERIAL. PLACEMENT OF THE LINING SHALL BE COMPLETED IN A MANNER THAT AVOIDS DISRUPTION AND DAMAGE TO THE UNDERLYING BEDDING MATERIAL.
4. IT IS RECOMMENDED THAT THE DESIRED DISTRIBUTION OF THE VARIOUS SIZES OF STONE THROUGHOUT THE LINING BE OBTAINED BY SELECTIVE LOADING AT THE SOURCE, BY CONTROLLED DUMPING OF SUCCESSIVE LOADS DURING FINAL PLACEMENT, BY REARRANGING OF INDIVIDUAL STONES BY MECHANICAL EQUIPMENT OR BY HAND, OR BY OTHER WELL CONSIDERED METHODS THAT WILL PRODUCE THE SPECIFIED RESULTS.

NO.	REVISION	BY	DATE

DAIGLER ENGINEERING, P.C.
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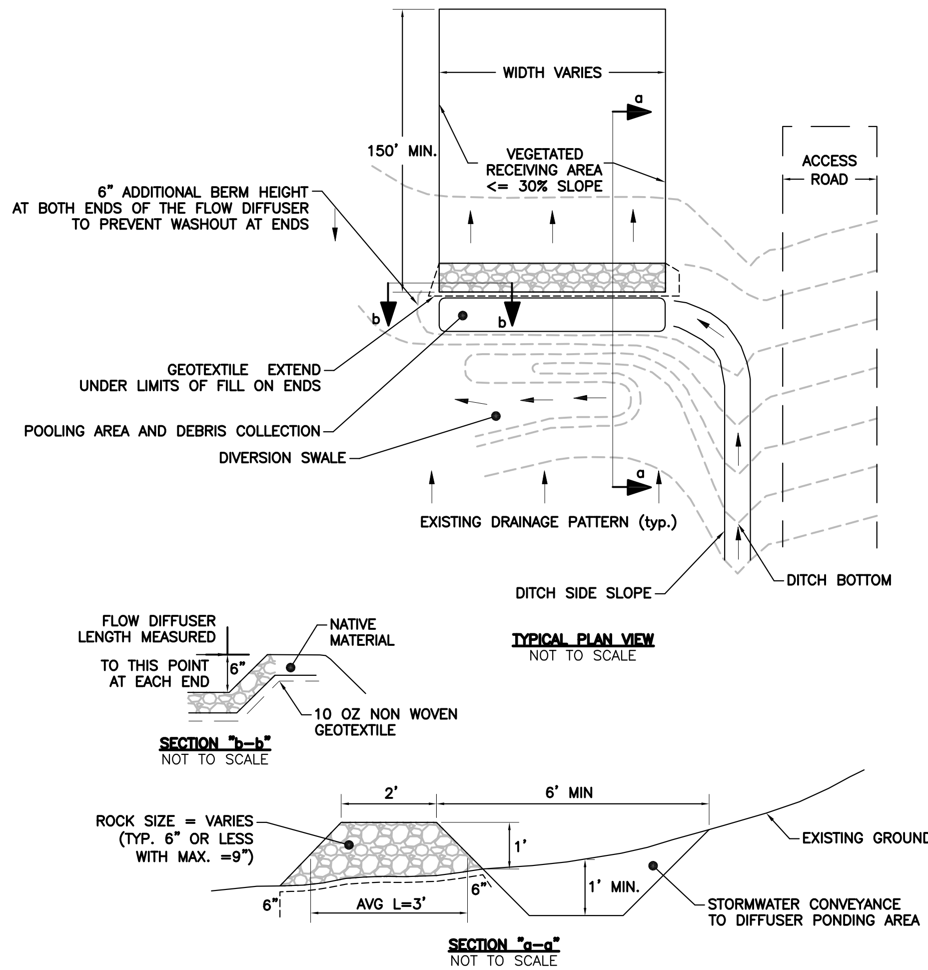
(716) 773-6872 (716) 773-6873 FAX

JAMES A. DAIGLER, P.E.
NYSPE NO. 061689

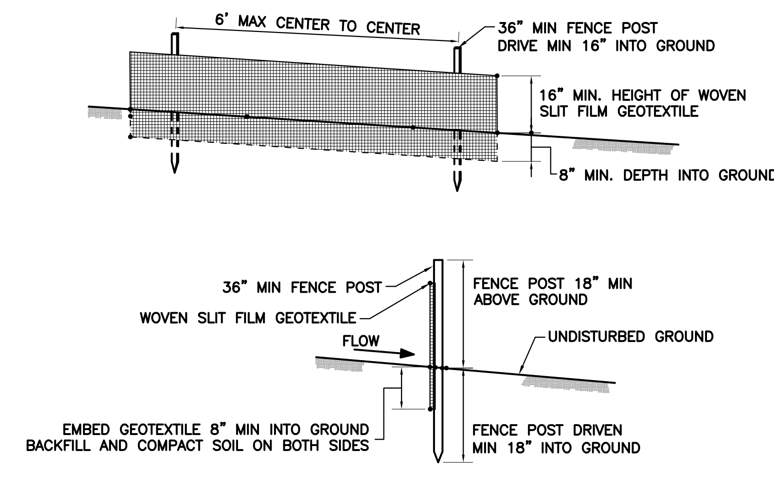
DATE: June 2016

SCALE: NOTED

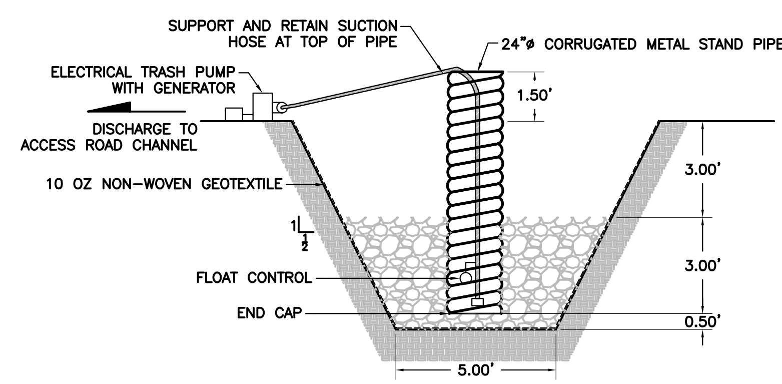
PREPARED FOR: SEALAND WASTE, LLC		SEDIMENT BASIN 2 AND GRADED FILTERS 2, 3, AND 4 OUTLET PROTECTION	SHEET PD-3
DES. BY:	DRW. BY:	CHK. BY:	CARROLL LANDFILL EXPANSION APPLICATION
DWG. SEDIMENT BASIN PLAN AND PROFILE-REV 1.dwg	TOWN OF CARROLL	CHAUTAUQUA COUNTY	STATE OF NEW YORK



FLOW DIFFUSER SCHEMATIC DETAIL
NOT TO SCALE

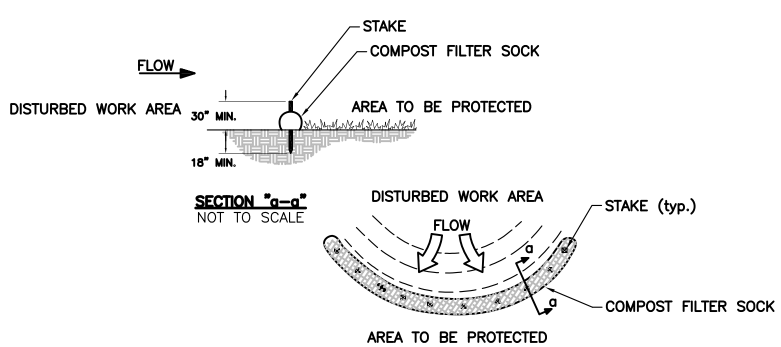


SILT FENCE SCHEMATIC DETAILS
NOT TO SCALE



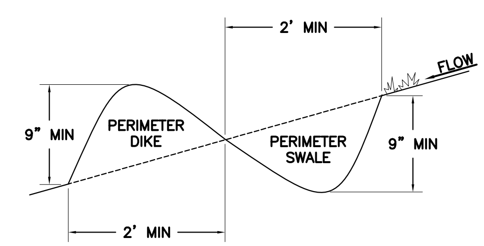
SUMP PIT NOTES:
1. THE STANDPIPE SHALL BE CONSTRUCTED BY PERFORATING A 24" DIAMETER METAL PIPE
2. A BASE OF NYS DOT #2 OR EQUIVALENT COARSE AGGREGATE SHOULD BE PLACED IN THE PIT TO A DEPTH OF 12". AFTER INSTALLING THE STANDPIPE THE SURROUNDING PIT SHALL BE BACKFILLED WITH NYS DOT #2 OR EQUIVALENT COARSE AGGREGATE.
3. THE STANDPIPE SHALL EXTEND 18" ABOVE THE LIP OF THE SUMP PIT.
4. DISCHARGE WILL BE PUMPED DIRECTLY TO THE ACCESS ROAD CHANNEL AS SHOWN ON PD-1.

SUMP PIT SCHEMATIC DETAIL
NOT TO SCALE



FILTER SOCK SCHEMATIC DETAILS
NOT TO SCALE

PERIMETER DIKE AND SWALE NOTES:
1. ALL PERIMETER DIKES SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM ANY DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATIONS FOR TEMPORARY SEEDING AND MULCHING, AND SHALL BE COMPLETED WITHIN 10 DAYS.



PERIMETER DIKE SCHEMATIC DETAIL
NOT TO SCALE

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ALTERATION OF ANY SURVEY, DRAWING, DESIGN, SPECIFICATION OR REPORT MUST BE COMPLETED IN ACCORDANCE WITH SECTION 7209 PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

NO.	REVISION	BY	DATE

DAIGLER ENGINEERING, P.C.
CIVIL & GEO-ENVIRONMENTAL ENGINEERING
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(716) 773-6872 (716) 773-6873 FAX
JAMES A. DAIGLER, P.E.
NYSPE NO. 061689

DATE: June 2016
SCALE: NOTED

PREPARED FOR: SEALAND WASTE, LLC			EROSION AND SEDIMENT CONTROL DETAILS			SHEET PD-4
DES. BY:	DRW. BY:	CHK. BY:	CARROLL LANDFILL EXPANSION APPLICATION		
DWG.	DETAIL SHEET.dwg		TOWN OF CARROLL	CHATAUQUA COUNTY	STATE OF NEW YORK

LIVE STAKE NOTES:

1. LIVE STAKES SHALL BE 1-2 INCHES IN DIAMETER AND 2-6 FEET LONG (SEE NOTE 5)
2. NO LEAF BUDS SHALL HAVE INITIATED GROWTH BEYOND 1/4" AND THE CAMBIUM LAYER SHALL BE MOIST, GREEN AND HEALTHY.
3. ALL MATERIAL SHALL BE MAINTAINED IN A CONTINUOUSLY COOL, COVERED, AND MOIST STATE PRIOR TO USE AND BE IN GOOD CONDITION WHEN INSTALLED.
4. MATERIALS HARVESTED ON SITE SHALL BE INSTALLED THE SAME DAY THEY ARE PREPARED. NURSERY GROWN MATERIAL SHALL BE MAINTAINED IN A MOIST CONDITION FOR INSTALLATION.
5. INSTALLATION DETAILS;

5.a. THE LENGTHS OF LIVE CUTTINGS/LIVE STAKES DEPENDS ON THE APPLICATION. IF THROUGH RIPRAP, THE LENGTH SHALL EXTEND THROUGH THE SURFACE OF THE STONE FILL. AT LEAST HALF THE LENGTH SHALL BE INSERTED INTO THE SOIL, BELOW THE STONE FILL. SPACING ALONG THE WATERLINE IS 1' FOOT.

5.b. MINIMUM 2 TO 4 INCHES AND 2-5 LIVE BUDS OF THE LIVE STAKE SHALL BE EXPOSED ABOVE THE STONE FILLING.

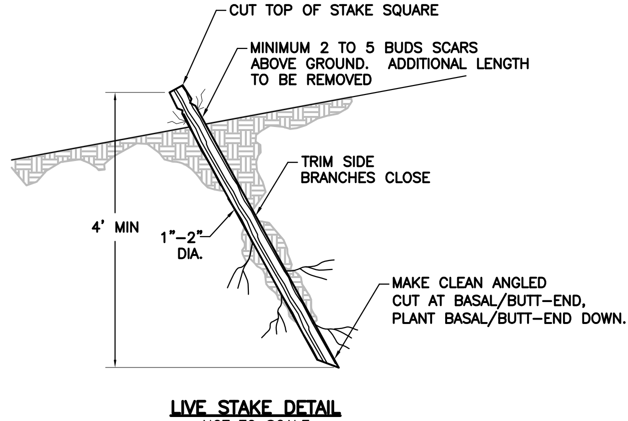
5.c. LIVE STAKES SHALL BE CUT TO A POINT ON THE BASAL END FOR INSERTION IN THE GROUND.

5.d. USE A DEAD BLOW HAMMER TO DRIVE STAKES INTO THE GROUND. THE HAMMER HEAD SHOULD BE FILLED WITH SHOT OR SAND. A DIBBLE, IRON BAR, OR SIMILAR TOOL SHALL BE USED TO MAKE A PILOT HOLE TO PREVENT DAMAGING THE MATERIAL DURING INSTALLATION.

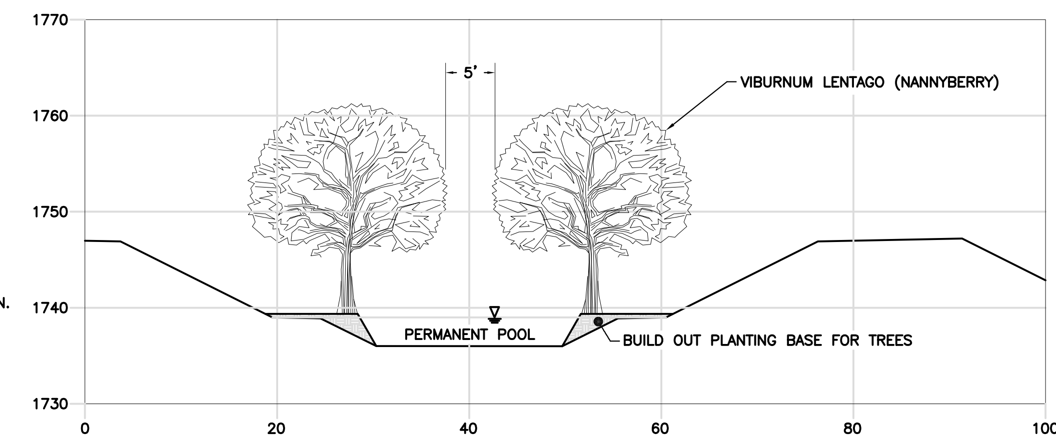
5.e. LIVE CUTTINGS SHALL BE INSERTED BY HAND INTO PILOT HOLES.

5.f. WHERE PRACTICAL, TAMP SOIL AROUND LIVE STAKES.

5.g. CARE SHALL BE TAKEN NOT TO DAMAGE THE LIVE STAKES DURING INSTALLATION. THOSE DAMAGED AT THE TOP DURING INSTALLATION SHALL BE TRIMMED BACK TO UNDAMAGED CONDITION.



LIVE STAKE DETAIL
NOT TO SCALE



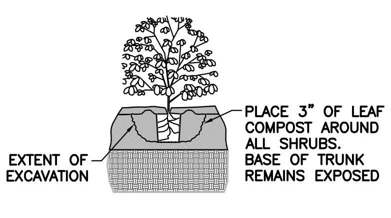
SEDIMENT BASIN TREE SHADING DETAIL
SCALE: 1"=10'

SEED MIXTURE TYPE 1 (TEMPORARY VEGETATION)		
MIXTURE TYPE	RATE	SEEDING SEASON
COMMON WHITE CLOVER	8lbs/ac	SPRING, SUMMER, OR FALL
*PERENNIAL RYE GRASS	30lbs/ac	SPRING, SUMMER, OR FALL
*"AROOSTOOK" WINTER RYE	100lbs/ac	SPRING, SUMMER, OR FALL
ANNUAL RYE	75lbs/ac	SPRING, SUMMER, OR FALL

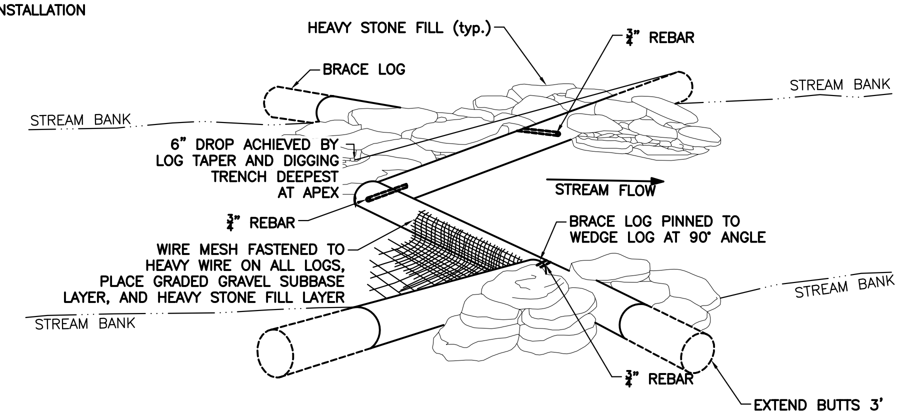
* IF TEMPORARY VEGETATION IS UNDERTAKEN DURING LATE FALL, CERTIFIED WINTER RYE (CEREAL RYE) MAY BE SUBSTITUED FOR PERENNIAL RYE GRASS.

MULCHING MATERIAL – OAT OR WHEAT STRAW, FREE FROM WEEDS, FOREIGN MATTER DETRIMENTAL TO PLANT LIFE, AND DRY. HAY OR CHOPPED CORNSTALKS ARE NOT ACCEPTABLE. MULCH SHALL BE PLACED LOOSE AND OPEN ENOUGH FOR SUNLIGHT TO PENETRATE AND TO ALLOW CIRCULATION OF AIR, 70% COVERAGE SHALL BE MAINTAINED ON THE SURFACE.

RIPARIAN SHRUB PLANTINGS			
BOTANICAL NAME	COMMON NAME	SIZE/ROOT	SPACING
ARONIA ARBUTIFOLIA	RED CHOKEBERRY	18"	10' O.C.
ARONIA MELANOCARPA	BLACK CHOKEBERRY	18"	10' O.C.
CEPHALANTHUS OCCIDENTALIS	BUTTON BUSH	18"	10' O.C.
CORNUM AMOMUM	SILKY DOGWOOD	18"	10' O.C.
CORNUS SERICEA	RED-OSIER DOGWOOD	18"	10' O.C.
HAMAMELIS VIRGINIA	COMMON WITCH HAZEL	18"	10' O.C.
SALIX SERICEA	SILKY WILLOW	18"	10' O.C.
ILEX VERTICILLATA	WINTER BERRY	18"	10' O.C.



SHRUB PLANTING DETAIL
NOT TO SCALE

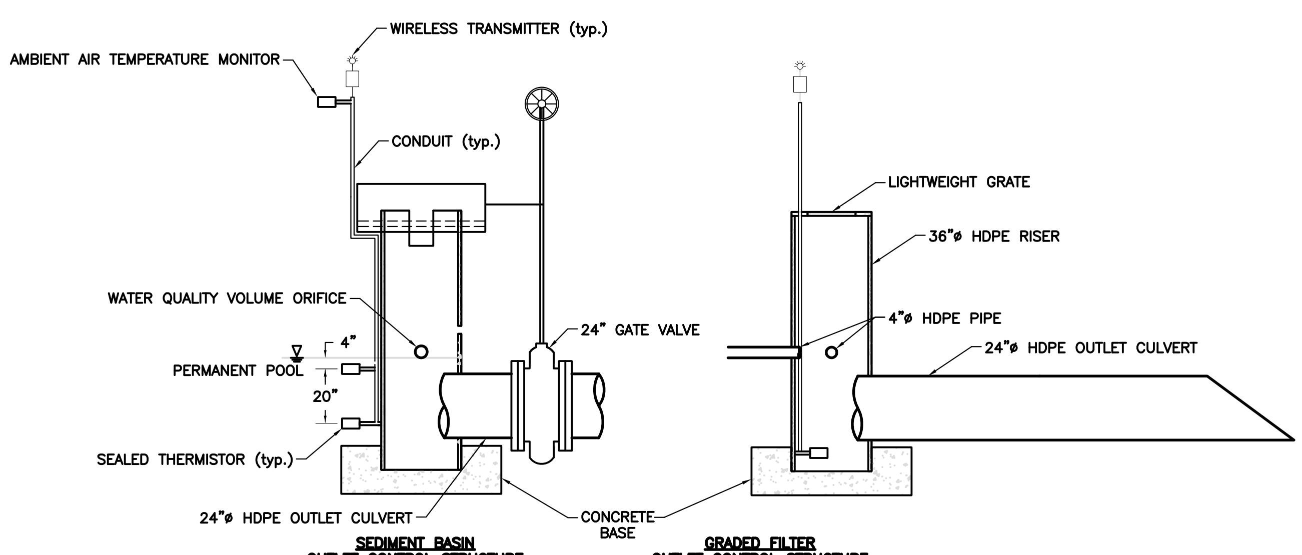


WEDGE DAM SCHEMATIC DETAIL 2
NOT TO SCALE

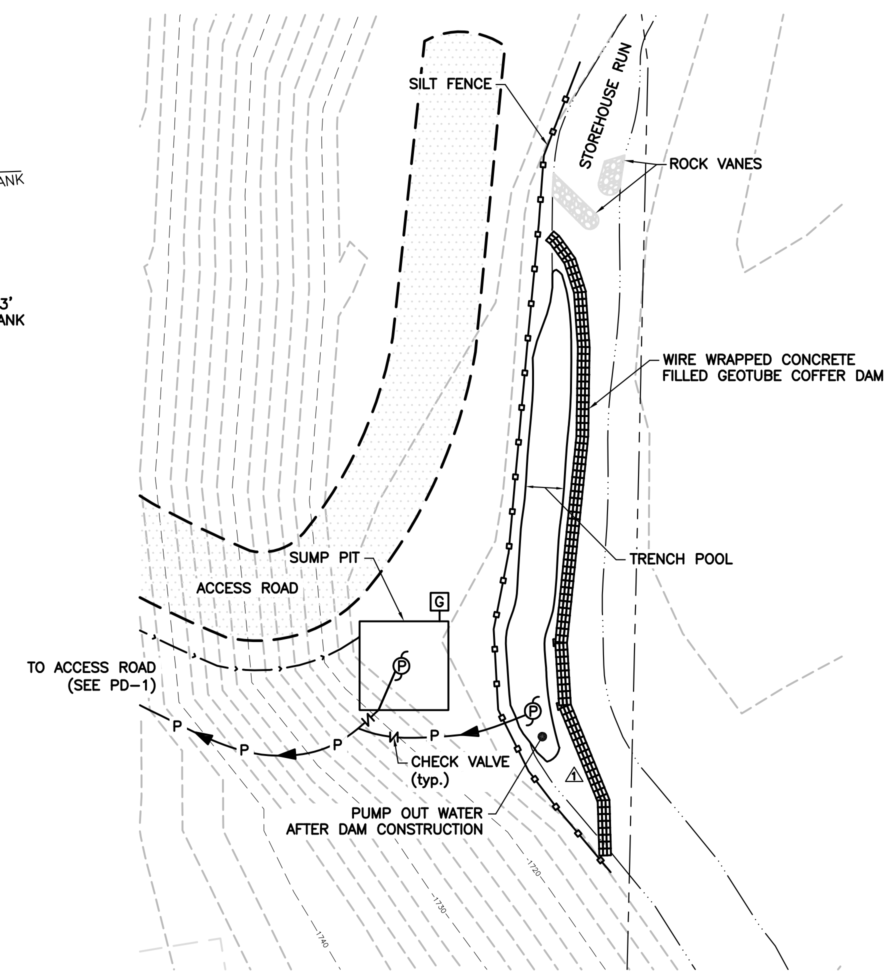
EMERGENT PLANTINGS	
BOTANICAL NAME	COMMON NAME
JUNCUS EFFUSUS	SOFT RUSH
SCIRPUS ATROVIRENS	GREEN BULRUSH
SCIRPUS CYPERINUS	WOLL GRASS
SCIRPUS MICROCARPUS	SMALL-FRUIT BULRUSH
SCIRPUS PUNGENS	COMMON THREE SQUARE
SCIRPUS VALIDUS	SOFT STEM BULRUSH

LIVE STAKE PLANTINGS			
BOTANICAL NAME	COMMON NAME	SIZE/ROOT	SPACING
SALIXIEXIGUA SSO INTERIOR	SANDBAR WILLOW	4'	24" O.C.
SALIX SERICEA	SILKY WILLOW	4'	24" O.C.
SAMBUCUS CANADENSIS	ELDERBERRY	4'	24" O.C.

UPLAND SHRUB PLANTINGS	
BOTANICAL NAME	COMMON NAME
CORYLUS AMERICANA	AMERICAN HAZELNUT
PHYSOCARPUS OPULIFOLIUS	NINEBARK
VIBURNUM TRILOBUM	AMERICAN HIGHBUSH CRANBERRY
VIBURNUM LENTAGO	NANNYBERRY



OUTFALLS STRUCTURE DETAILS
NOT TO SCALE



TRENCH POOL ACCESS / TEMPORARY COFFER DAM PLAN
NOT TO SCALE

GENERAL NOTES:

1. DISTURBED AREAS ASSOCIATED WITH THE CONSTRUCTION OF THE PROPOSED OUTFALL CULVERTS, OUTLET PROTECTION, AND GRADED FILTERS MUST BE SEEDED AND MULCHED WITH STRAW IMMEDIATELY AFTER THE EARTHWORK HAS BEEN COMPLETED IN ORDER TO REDUCE SOIL EROSION AND TO KEEP SOIL MOIST FOR GERMINATION.
2. ALL PERMANENT SEEDING AND PLANTING SHOULD BE CONDUCTED BETWEEN APRIL 1 TO JUNE 15 OR OCTOBER 15 TO DECEMBER 15.
3. SEED MIXTURES AND PLANTING ARE SUBJECT TO CHANGE ACCORDING TO AVAILABILITY.
4. TO PREVENT THE UNINTENTIONAL INTRODUCTION OR SPREAD OF INVASIVE SPECIES, ALL CONSTRUCTION EQUIPMENT AND MACHINERY MUST BE CLEANED OF ALL MUD, SEEDS VEGETATION, AND OTHER DEBRIS PRIOR TO ENTERING THE PROJECT AREA. LOOSE PLANT AND SOIL MATERIAL SHALL BE REMOVED FROM CLOTHING AND HAND TOOLS PRIOR TO ENTERING THE PROJECT AREA.
5. A MINIMUM OF SIX INCHES OF TOPSOIL SHALL BE PLACED WITHIN THE SEEDING AND PLANTING AREA.
6. ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE IN PLACE PRIOR TO ANY EARTH DISTURBANCE.

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NO.	REVISION	BY	DATE
2	ADD WEDGE DAM DETAIL	SJD	7/11/16
1	SHORTEN TRENCH POOL	SJD	7/11/16

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JAMES A. DAIGLER, P.E.
NYSPE NO. 061689

DATE: June 2016

SCALE: NOTED

PREPARED FOR: SEALAND WASTE, LLC			
DES. BY:	DRW. BY:	CHK. BY:	
DWG. DETAIL SHEET.dwg	TOWN OF CARROLL	CHATAUQUA COUNTY	STATE OF NEW YORK

STREAM BANK STABILIZATION DETAILS
CARROLL LANDFILL EXPANSION APPLICATION

SHEET PD-5