EROSION AND SEDIMENT CONTROL PLAN

WIND COLEBROOK NORTH

COLEBROOK, CONNECTICUT

Prepared for:

BNE Energy Inc.
Producer of green clean energy

BNE Energy
29 South Main Street
Town Center, Suite 200
West Hartford, CT 06107

by:

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Suite D-101
Woodbury, CT 06798

CIVIL 1
Civil Engineers

SEPTEMBER 2011

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APPENDICES

Contact Information / Responsible Parties:

Permittee(s):
BNE Energy
29 South Main Street
Town Center, Suite 200
West Hartford, CT 06107
(800) 450-0503

Contractor Co-Permittee:
To be determined

Contractor Operator(s):
To be determined

Stormwater Manager and SWPPP Contact(s):
BNE Energy
29 South Main Street
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West Hartford, CT 06107
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Section 1.0
PROJECT INTRODUCTION

1.0 PROJECT INTRODUCTION

Project/Site Information:

Project/Site Name: Wind Colebrook North

Location: Winsted- Norfolk Road
Colebrook, Connecticut

Latitude/Longitude:	Latitude:	Longitude:
	41º 58' 30" N	73º 08' 28" W

Method for determining latitude/longitude: Google Earth

1.1 SITE SUMMARY

1.1.1 Existing Conditions

Located along the Winsted- Norfolk Road and Rock Hall Road, the project site consists of approximately 125 acres of primarily undeveloped property. Development on the property is limited to a seasonal use building in the southwest corner of the property which services a golf driving range. The Property is located approximately 1,050 feet east of the Norfolk town line town line and is located in Drainage Basin 4302 Mad River which is part of the larger Farmington Regional Basin as indentified in the Atlas of the Public Water Supply Sources and Drainage Basins of Connecticut . The surrounding land is predominately low density residential. The site will be accessed via Rock Hall Road. This access point will be maintained throughout the construction process. Currently, there are no structural stormwater discharge points. All stormwater flows over land to discharge points off site.

1.1.2 Project Description

The Project consists of three GE 1.6MW wind turbines, associated ground equipment, the installation of an access driveway and an electrical connection. The installation of the turbines will require the construction of temporary equipment lay-down areas for the turbines, crane assembly area, access road and associated ground equipment including an electrical collector yard and associated utility infrastructure so that the turbines can be interconnected to the electrical grid. Following completion of the project, all temporary structures will be removed and the site returned to pre-construction conditions as far as practicable.

1.1.3 Site Specific Concerns

The terrain and existing topography of the project site is such that during construction special care will be required to ensure that all BMPs remain intact and are functional.

1.1.4 Construction Schedule

Currently specific dates for construction have not been determined but anticipate construction to begin in Fall 2011.

1.2 PROJECT OWNER AND OPERATOR

The project owner and operator, BNE Energy, will be the responsible entity for completing the project. The address and telephone is:
BNE Energy
29 South Main Street
Town Center Suite 200
West Hartford, CT 06107
(800) 450-0503

1.3 SOILS, SLOPES, VEGETATION, AND CURRENT DRAINAGE PATTERNS

1.3.1 Soil type(s)

Based upon a review of typical geologic conditions and the National Soil Cooperative Survey, the soils have been classified as (1) Bice- Millsite complex 3-15% slopes, very rocky, (2) Bice-Millsite complex 15-45% slopes, very rocky, (3) Bice fine sandy loam 3-8% slopes, very stony, (4) Bice fine sandy loam 8-15% slopes, very stony, (5) Bice fine sandy loam 15-25% slopes, very stony, (6) Schroon fine sandy loam 2-15% slopes, very stony, (7) Shelburne fine sandy loam 3- 8% slopes, (8) Shelburne fine sandy loam 8-15% slopes, (9) Shelburne fine sandy loam 8-15% slopes, very stony and (10) Brayton- Loonmeadow complex extremely stony.

1.3.2 Slopes

The project site consists of varying slope conditions ranging from relatively flat conditions in the central portion of the site and moderately steeper slopes in the extreme easterly and westerly portion of the site. The proposed towers are to be located on gentle slopes.

1.3.3 Drainage Patterns

Existing site topography is such that runoff migrates, typically via overland sheet flow from the easterly and westerly upland portions of the site towards the wetlands in the center portion of the site. The flow through the wetlands is generally from the north to the south and southeast through the Mill Brook which is a perennial watercourse.

1.3.4 Vegetation

Six major habitat types have been identified in the Terrestrial Wildlife Habitat & Wetland Impact Analysis prepared by VHB, Inc. These types include (1) second growth Northern Hardwood forest, (2) second growth Northern Hardwoods- Hemlock- White Pine forest, (3) early successional Northern Hardwood forest, (4) Palustrine forested wetlands (which include Mill Brook, a pereenial watercourse), (5) Palustrinescrub- shrub- emergent wetlands and (6) maintained lawn (golf driving range).

1.4 SITE FEATURES AND SENSITIVE AREAS TO BE PROTECTED

1.4.1 Receiving Waters and TMDL Applicability

Mill Brook runs through the property and ultimately receives the storm water runoff from the site.. This water body is not considered impaired and is not listed on the most current 303(d) listing of impaired waterways.

1.4.2 Wetlands

Within to the property boundary a wetland has been identified and delineated. Mitigation and impacts are discussed in the environmental assessment completed by VHB, Inc.

Section 2.0
CONSTRUCTION ACTIVITIES

2.0 CONSTRUCTION ACTIVITIES

2.1 DESCRIPTION OF CONSTRUCTION ACTIVITY

During construction, BNE will continuously monitor construction methodologies and procedures as well as site conditions to minimize adverse effects to the environment and public.

Construction will typically consist of activities such as:

- Surveys to stake access roads, structure locations and limits of clearing
- Land clearing
- Establishment of construction staging area
- Installation of sediment and erosion control devices
- Excavation and installation of access roads
- Excavation and installation of lay-down and equipment assembly areas
- Excavation and installation of foundations and erection of new structures
- Installation of conductors
- Restoration of site, including re-establishment of vegetative areas

2.2 CONSTRUCTION SITE ESTIMATES

The following are estimates of the construction site:

Property Area: 125 acres
Area to be disturbed: 14.63 acres
Percentage impervious area before construction: 0%
Runoff coefficient number (RCN) before construction: 58
Percentage impervious area after construction: 0.98%
Runoff coefficient number (RCN) after construction: 60
Summary of peak flows: See Section 2.3.3 of the Stormwater Management Plan With Stormwater Pollution Prevention Plam Report
Summary of groundwater recharge: 0.015 AC-FT

Section 3.0
BEST MANAGEMENT PRACTICES

3.0 BEST MANAGEMENT PRACTICES

Soil erosion and sediment controls are measures that are used to reduce the amount of soil particles that are carried from a land area and deposited in receiving waters. This section provides a general description of the most appropriate control measures proposed for the Project. The permittee's construction contractor(s) and their subcontractors will be responsible for amending the erosion and sediment controls in the SWPPP for their portion(s) of the project as needed. Based on field conditions at the time of construction, the contractors or subcontractors may adjust the locations and types of BMPs so that erosion and sedimentation are controlled to the maximum extent practicable. However, in no case will modifications to the SWPPP result in any less stringent erosion and sedimentation control measures than specified herein.

3.1 STRUCTURAL CONTROL PRACTICES

Structural control practices divert flows from exposed soils, store water flow, or otherwise limit runoff from exposed areas of the site. Such practices may include silt fences, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, rock outlet protection (rip-rap), reinforced soil retaining systems, and temporary or permanent sediment basins. Some of these practices may be used as both temporary and permanent control measures. Structural control practices should be placed in upland areas to the degree practicable to prevent erosion and reduce sedimentation in lower elevation areas. See Appendix A for additional information.

3.2 TEMPORARY EROSION CONTROL PRACTICES

Erosion and sediment control measures will be in place prior to the initiation of soil disturbing activities and will be maintained throughout construction. The contractor may need erosion control measures in other locations of the project as work progresses to keep sediment from leaving the construction site. These measures will be determined by the contractor in the field; if measures are changed in the field, the SWPPP must be modified accordingly. All temporary erosion controls will be removed after the protected area is finally stabilized. The minimum temporary erosion and sediment control practices that will be used for the Project are discussed in the following sections. See Appendix D for additional information.

3.2.1 Sediment Fence (GSF)

Will retain sediment from small disturbed areas. Sediment fence will be placed along slopes as shown on construction details. The contractor will use his best judgment to install additional sediment fence as necessary to prevent loss of sediment. Refer to section 5-11 of 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

Maintenance: Inspect the silt fence at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inches or greater to determine maintenance needs. When used for dewatering operations, inspect frequently before, during and after pumping operations. Remove the sediment deposits, or if room allows, install a second silt fence up slope from the existing fence when deposits reach approximately one half the height of the existing fence. Replace or repair within 24 hours of an observed failure. Refer to Connecticut Guidelines for Soil Erosion and Sediment Control figure GF-5 for troubleshooting failures. Maintain silt fence until the contributing area is stabilized.

3.2.2 Hay Bale Barrier (HB)

Will retain sediment from small disturbed areas. Hay bales will be placed along slopes as shown on construction details. The contractor will use his best judgment to install additional hay bales as necessary to prevent loss of sediment. Refer to section 5-11 of 2002 Connecticut Guidelines for Soil and Sediment Control.

Maintenance: Inspect the hay bale barrier at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inches or greater to determine maintenance needs. When used for dewatering operations, inspect frequently before, during and after pumping operations. Remove the sediment deposits, or if room allows, install a secondary barrier up slope from the existing barrier when deposits reach approximately one half the height of the barrier. Replace or repair within 24 hours of an observed failure. Refer to Connecticut Guidelines for Soil Erosion and Sediment Control figure HB-5 for troubleshooting failures. Maintain hay bale barrier until the contributing area is stabilized.

3.2.3 Stone Check Dam (SCD)

Will be used to reduce velocity of concentrated flows, thus reducing erosion of the drainage way.

Maintenance: Inspect the stone check dam at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inches or greater to determine maintenance needs. Remove the sediment deposits when deposits reach approximately one half the height of the Check dam. Replace or repair within 24 hours of an observed failure. Maintain until the contributing area is stabilized.

3.2.4 Permanent Diversion (PD)

Will be a permanent component of the water management system used to protect downgradient areas from erosion and sedimentation. It will also direct water originating from undisturbed areas away from areas where construction activities are taking place.

Maintenance: When the permanent diversion is located within close proximity to on going construction activities, inspect the diversion at the end of each work day and immediately repair damage caused by construction equipment. Otherwise, inspect the permanent diversion and associated measures at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inches or greater to determine maintenance needs. Repair within 24 hours of an observed failure.

3.2.5 Temporary Diversion (TD)

Will be used to divert sediment laden runoff from a disturbed area to a sediment trapping facility. It will also direct water originating from undisturbed areas away from areas where construction activities are taking place.

Maintenance: When the temporary diversion is located within close proximity to on going construction activities, inspect the diversion at the end of each work day and immediately repair damage caused by construction equipment. Otherwise, inspect the temporary diversion and associated measures at least once a week and within 24 hours of the end of a storm with a rainfall

amount of 0.5 inches or greater to determine maintenance needs. Repair within 24 hours of an observed failure.

3.2.6 Temporary Sediment Trap (TST)

Will be used to detain sediment laden runoff from small disturbed areas long enough to allow the majority of sediment to settle out.

Maintenance: Inspect the temporary sediment trap and associated controls at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inches or greater to determine maintenance needs. Check the outlet to verify that it is structurally sound and has not been damaged by erosion or construction equipment. The height of the stone outlet should be maintained at least 1 foot below the crest of the embankment. When sediment has accumulated more than one quarter of the minimum wet storage volume, dewater and remove sediment as necessary to restore the trap to its original dimensions.

3.2.7 Construction Entrance (CE)

Will be used to reduce tracking of sediment off site to paved areas.

Maintenance: Maintain the entrance in a condition which will prevent tracking and washing of sediment onto paved surfaces. Provide periodic top dressing with additional stone or additional length as required. Immediately remove all sediment spilled, dropped, washed or tracked onto paved surfaces.

3.2.8 Temporary Erosion Control Blankets (ECB)

Will be used to provide temporary surface protection to disturbed soils to absorb raindrop impact and to reduce sheet and rill erosion until vegetation is established.

Maintenance: Inspect temporary erosion control blankets at least once a week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inches or greater to determine maintenance needs. Repair any dislodged or failed blankets immediately.

3.3 SOIL STABILIZATION PRACTICES

Soil stabilization involves covering disturbed soils with grass, mulch, straw, geotextiles, trees, vines, or shrubs. Stabilization practices for exposed disturbed soils are extremely important while conducting construction activities. Vegetative cover serves to reduce the erosion potential by absorbing the energy of raindrops, promoting infiltration in lieu of runoff, and reducing the velocity of runoff. Stabilization measures shall be initiated as soon as practicable, but no more than 14 days after construction activities have temporarily or permanently ceased on any portion of the site.

3.4 MAINTENANCE AND INSPECTIONS

All erosion and sediment control devices shall be installed pursuant to the specifications in the construction details and in accordance with the Connecticut General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities . They will be maintained so that they remain effective at all times.

Erosion and sediment control devices will be inspected by qualified personnel at least once every seven calendar days or within 24 hours of each 0.5-inch or greater rainfall event. During each inspection, the construction inspector will complete the Inspection and Maintenance Report Form located in the appendix. This form will be copied and used as necessary. Ineffective temporary erosion control measures will be repaired or replaced before the next storm event or as soon as practicable. The permittee will immediately install additional temporary erosion control devices in any area deemed in need of protection.

Following temporary or final stabilization, inspections must be conducted at least once a month. If construction has been halted due to frozen conditions, regular inspections are not mandatory until one month before the expected thaw. If vegetation establishment is not satisfactory, special steps to correct the problem will be implemented such as over seeding, mulching, sodding, or the use of erosion control blankets. Once a definable area of the construction site has been finally stabilized, no further inspection requirements apply to that area.

3.5 FINAL STABILIZATION

3.5.1 Seeding

The contractor will be responsible for labor, materials, tools, equipment, and other related items required for preparing ground, providing for sowing of seeds, fertilizing, mulching and top dressing, and other management practices required for erosion control and to achieve final stabilization. It will be the contractor's responsibility to make sure that the soil seedbed is not blown, washed, or otherwise removed from the site. The contractor will make repairs (including replacement of lost topsoil and mulch) to the seedbed preparation site in the event of heavy rain, wind, or other natural events that cause damage. When practicable, native plant species should be used for landscaping.

3.5.2 Fertilizer

Soil in areas of disturbance may need supplementation from fertilizer. Soil tests may be necessary to determine the most appropriate fertilizer for each location. Once applied, the fertilizer will be worked into the soil to limit exposure to stormwater. Fertilizer spills will be cleaned up immediately and will not be applied along or in a waterway.

3.5.3 Mulching

Mulching will be used in conjunction with both temporary and permanent seeding practices to enhance success by providing erosion protection prior to the onset of vegetative growth. Mulches enhance plant establishment by moderating soil temperatures and conserving moisture. After seeding, straw or hay mulch will be applied at a rate of two to three tons per acre on the disturbed areas. Other forms of mulch will be applied at a rate designated by the Project Engineer. Mulch will not be applied in wetlands, on lawns, and areas where hydro-mulch is used. Mulch will be anchored immediately after placement on steep slopes and stream banks. Mulch will be held in place by a very thin covering of topsoil, small brush, pins, stakes, wire mesh, asphalt binder, or other adhesive material approved by the project engineer.

3.5.4 Topsoiling

Topsoil should be applied in areas where the subsoil or existing surface soil does not provide an adequate growth medium for the desired vegetation, where soil is too shallow to provide adequate

rooting depth, or where the soil contains substances toxic to the desired vegetation. Topsoil shall be reasonably free from subsoil and stumps, roots, brush, stones, and clay lumps or similar objects.

3.5.5 Temporary Control Removal

Temporary erosion controls will be left in place until the Project site is stabilized with a uniform vegetative cover of 70 percent density of vegetative cover on all unpaved areas. Following re-vegetation, the permittee will conduct periodic site visits to make sure that vegetation establishment is satisfactory. If sufficient vegetative cover has not been achieved, additional restoration measures will be implemented. Inspection results will be documented using the Inspection and Maintenance Report Form found in the appendix. All temporary soil erosion and sediment control measures will be removed and disposed of after final site stabilization is achieved and before submitting the Notice of Termination (NOT) to the CT DEP.

Section 4.0

EROSION CONTROL PLAN APPENDICES

4.0 SWPPP APPENDICES

Attach the following documentation to the SWPPP in the following appendices.

Appendix A – Maps and Drawings

- Site Maps
- Site Plan

Appendix B – Inspection and Maintenance Records

- Inspection & Maintenance Log
- Inspection Report
- Maintenance Report

Appendix C – Supporting Calculations

- Calculations for Swales, Culverts, Riprap and Temporary Sediment Traps

Appendix A

MAPS AND DRAWINGS


TOPO! map printed on 03/21/11 from "Untitled.tpo"
73°12'00" W
73°10'00" W
73°08'00" W
73°06'00" W
73°04'00" W
WGS84 73°02'00" W
42°02'00" N
42°01'00" N
42°00'00" N
41°59'00" N
41°58'00" N
41°57'00" N
41°56'00" N
41°55'00" N
SITE
NORFOLK
COLEBROOK
North Colebrook
Colebrook
Norfolk
Winsted
WINCHESTER
Robertsville
ALGONQUIN STATE FOREST
DENNIS HILL STATE PARK
HAYSTACK MOUNTAIN STATE PARK
Mill Brook
Map created with TOPO!® ©2006 National Geographic; ©2005 Tele Atlas, Rel. 8/2005
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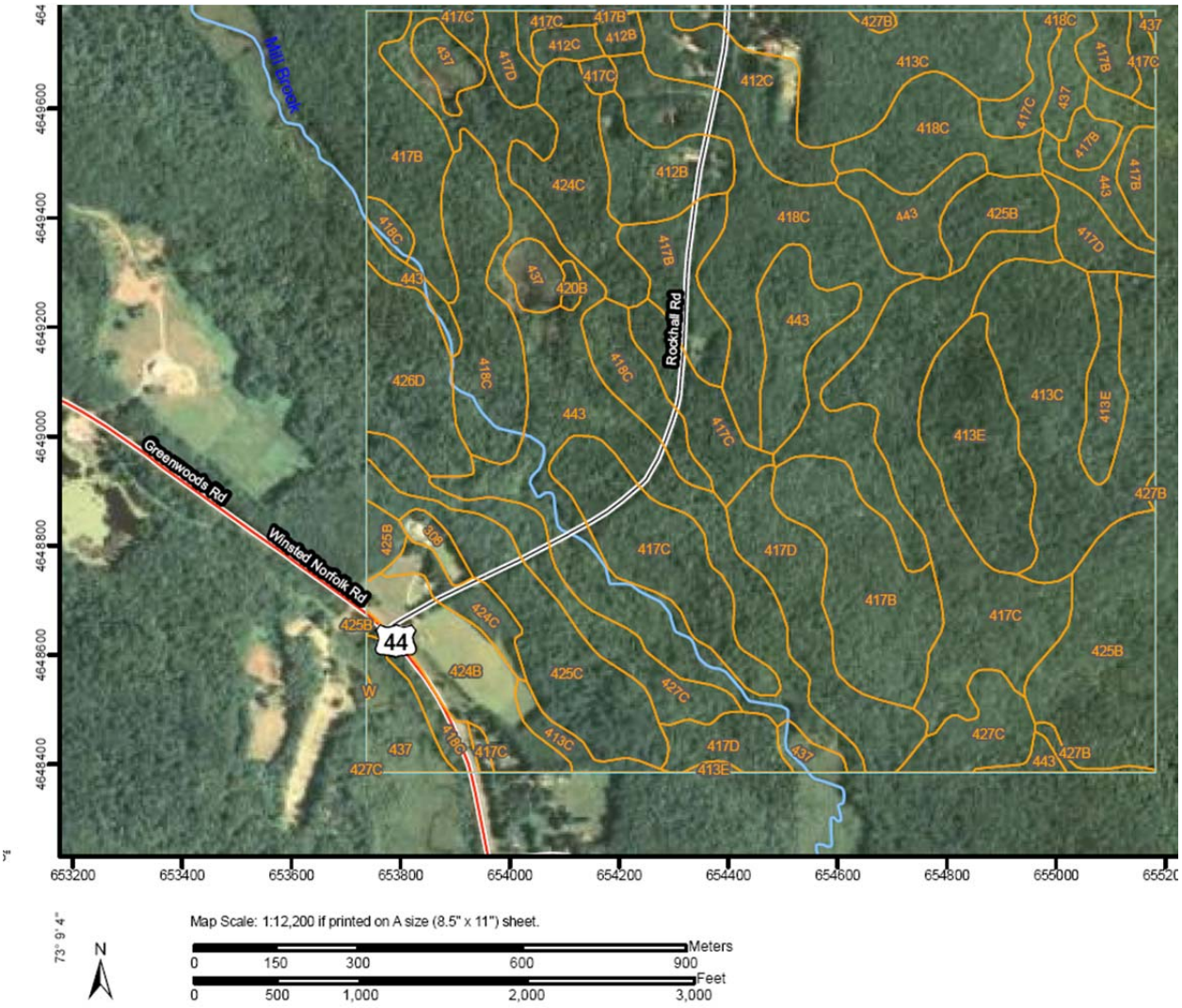
0.0 0.5 1.0 1.5 2.0 2.5 3.0 miles
0 1 2 3 4 5 km
MN TN
14°
03/21/11


Mill Brook
Rockhall Rd
Greenwoods Rd
Winsted Norfolk Rd
44
417C
417B
412C
412B
427B
413C
418C
437
417D
424C
412B
418C
425B
443
420B
426D
413E
424B
425C
427C
413C
417D
427C
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654400
654600
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4649600
4649400
4649200
4649000
4648800
4648600
4648400
73° 9' 4"
N
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0
150
300
600
900
Feet
0
500
1,000
2,000
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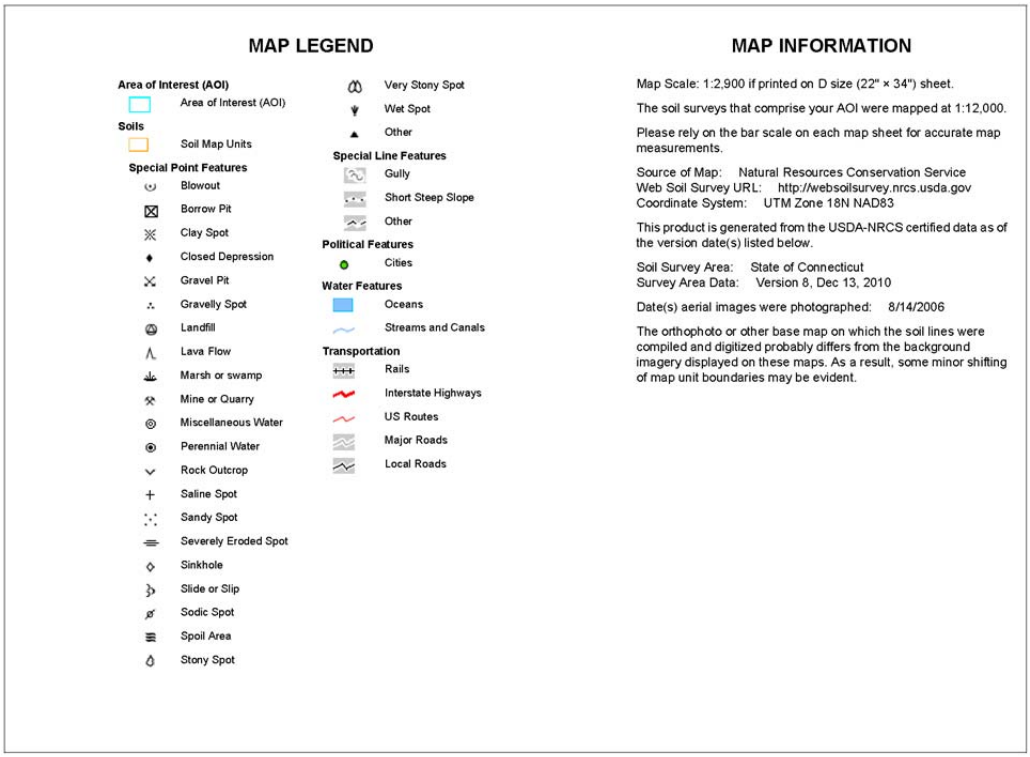
Soil Map–State of Connecticut



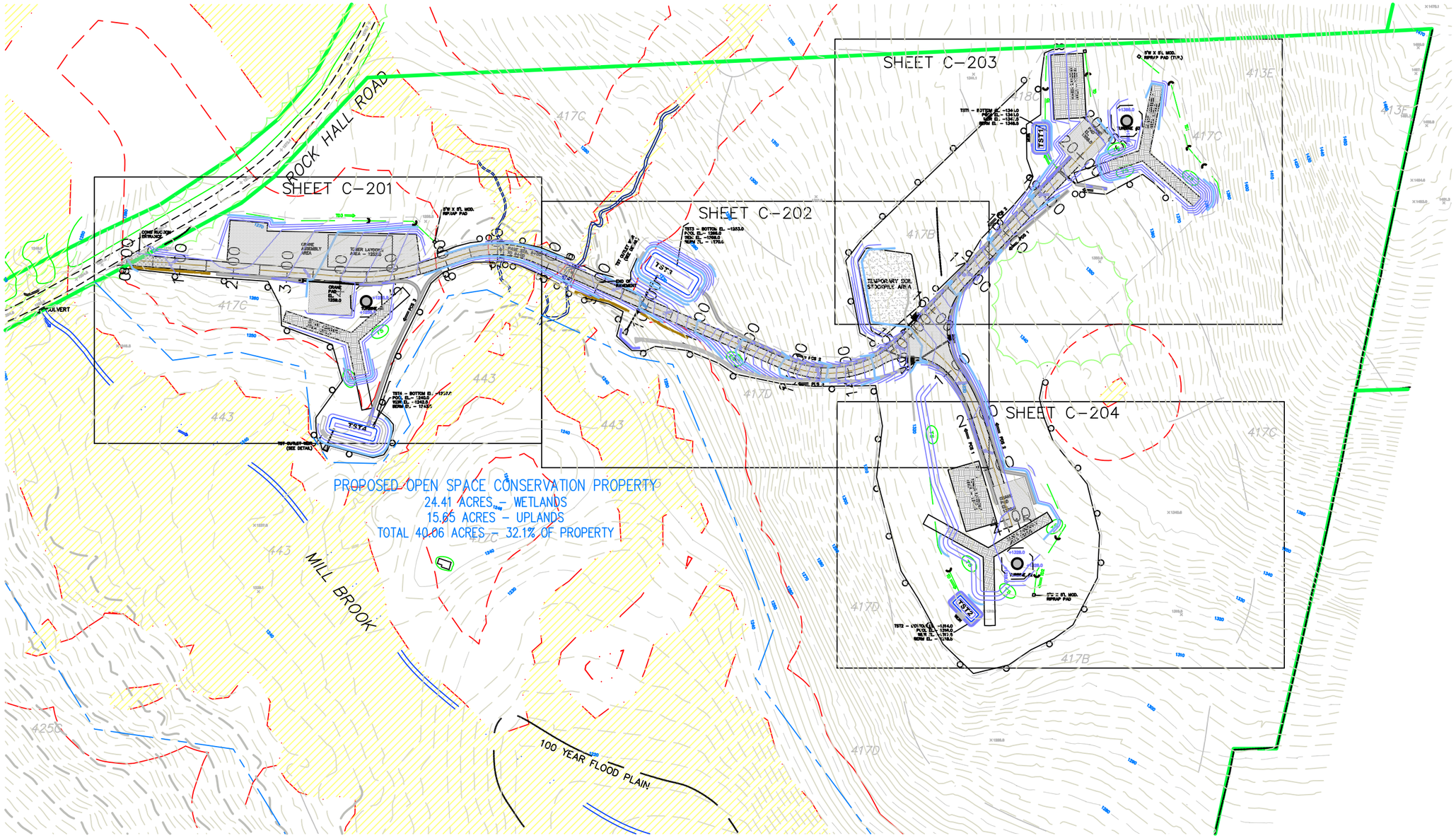
USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

3/13/2011
Page 2 of 3

Map Unit Legend

State of Connecticut (CT600)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
61C	Canton and Charlton soils, 8 to 15 percent slopes, very stony	0.3	0.1%
62D	Canton and Charlton soils, 15 to 35 percent slopes, extremely stony	0.4	0.1%
412B	Bice fine sandy loam, 3 to 8 percent slopes	15.4	3.0%
412C	Bice fine sandy loam, 8 to 15 percent slopes	15.3	3.0%
413C	Bice-Millsite complex, 3 to 15 percent slopes, very rocky	64.9	12.8%
413E	Bice-Millsite complex, 15 to 45 percent slopes, very rocky	23.5	4.6%
417B	Bice fine sandy loam, 3 to 8 percent slopes, very stony	58.1	11.5%
417C	Bice fine sandy loam, 8 to 15 percent slopes, very stony	93.1	18.4%
417D	Bice fine sandy loam, 15 to 25 percent slopes, very stony	18.3	3.6%
418C	Schroon fine sandy loam, 2 to 15 percent slopes, very stony	57.5	11.3%
420B	Schroon fine sandy loam, 3 to 8 percent slopes	0.6	0.1%
424C	Shelburne fine sandy loam, 8 to 15 percent slopes	9.1	1.8%
425B	Shelburne fine sandy loam, 3 to 8 percent slopes, very stony	21.1	4.2%
425C	Shelburne fine sandy loam, 8 to 15 percent slopes, very stony	4.9	1.0%
426D	Shelburne fine sandy loam, 15 to 35 percent slopes, extremely stony	2.8	0.6%
427B	Ashfield fine sandy loam, 2 to 8 percent slopes, very stony	17.3	3.4%
427C	Ashfield fine sandy loam, 8 to 15 percent slopes, very stony	12.3	2.4%
428A	Ashfield fine sandy loam, 0 to 3 percent slopes	2.9	0.6%
437	Wonsqueak mucky peat	22.6	4.5%
443	Brayton-Loonmeadow complex, extremely stony	65.9	13.0%
Totals for Area of Interest		**506.5**	**100.0%**



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED STORM DRAINAGE
- EDGE OF WATER
- PROPOSED CONSERVATION PROPERTY
- WETLANDS/WATERCOURSE BOUNDARY
- 100' WETLANDS REVIEW AREA
- EXISTING ROADWAY
- PROPOSED GRAVEL ACCESS DRIVE
- COMPACTED EARTH
- LIMITS OF CLEARING
- TEMP. WATER DIVERSION SWALE
- PERM. RIPRAP DIVERSION/CONVEYANCE SWALE
- SOIL TYPE BOUNDARY
- STAKED HAY BALES
- SILT FENCE/WOOD TURTLE EXCLUSIONARY FENCE
- BALED FILTER
- TEMPORARY SOIL STOCKPILE
- TEMPORARY SEDIMENT TRAP
- TEMPORARY SEEDING
- EROSION CONTROL BLANKET
- STONE CHECK DAM
- STONE INFILTRATION TRENCH

NO.	REVISION	DATE

Previous Editions Obsolete

0 100 200

1 inch = 200 ft.

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

OVERALL
EROSION CONTROL PLAN

WIND COLEBROOK NORTH
ROCK HALL ROAD
COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN: BB APPROVED: CJ
SCALE: 1" = 200'
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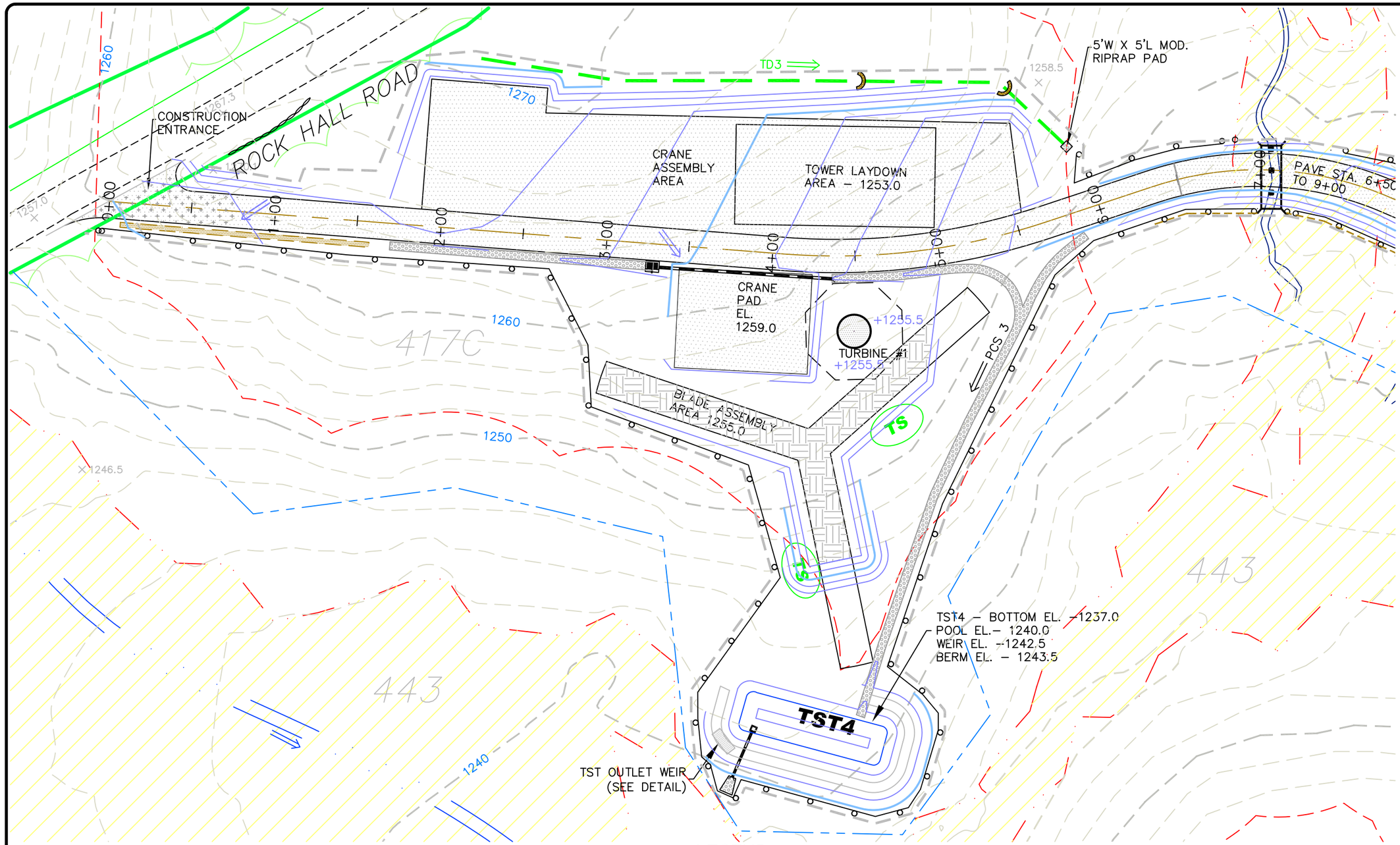

LEGEND

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- PROPOSED GRAVEL ACCESS DRIVE
- COMPACTED EARTH
- LIMITS OF CLEARING
- TD — TEMP. WATER DIVERSION SWALE
- PCS — PERM. RIPRAP DIVERSION/CONVEYANCE SWALE
- SOIL TYPE BOUNDARY
- STAKED HAY BALES
- SILT FENCE/WOOD TURTLE EXCLUSIONARY FENCE
- BALED FILTER
- TEMPORARY SOIL STOCKPILE
- TST — TEMPORARY SEDIMENT TRAP
- TS — TEMPORARY SEEDING
- ECB — EROSION CONTROL BLANKET
- STONE CHECK DAM
- STONE INFILTRATION TRENCH

NO.	REVISION	DATE

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0 30 60

1 inch = 60 ft.

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

EROSION CONTROL PLAN TURBINE ONE

WIND COLEBROOK NORTH
ROCK HALL ROAD
COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

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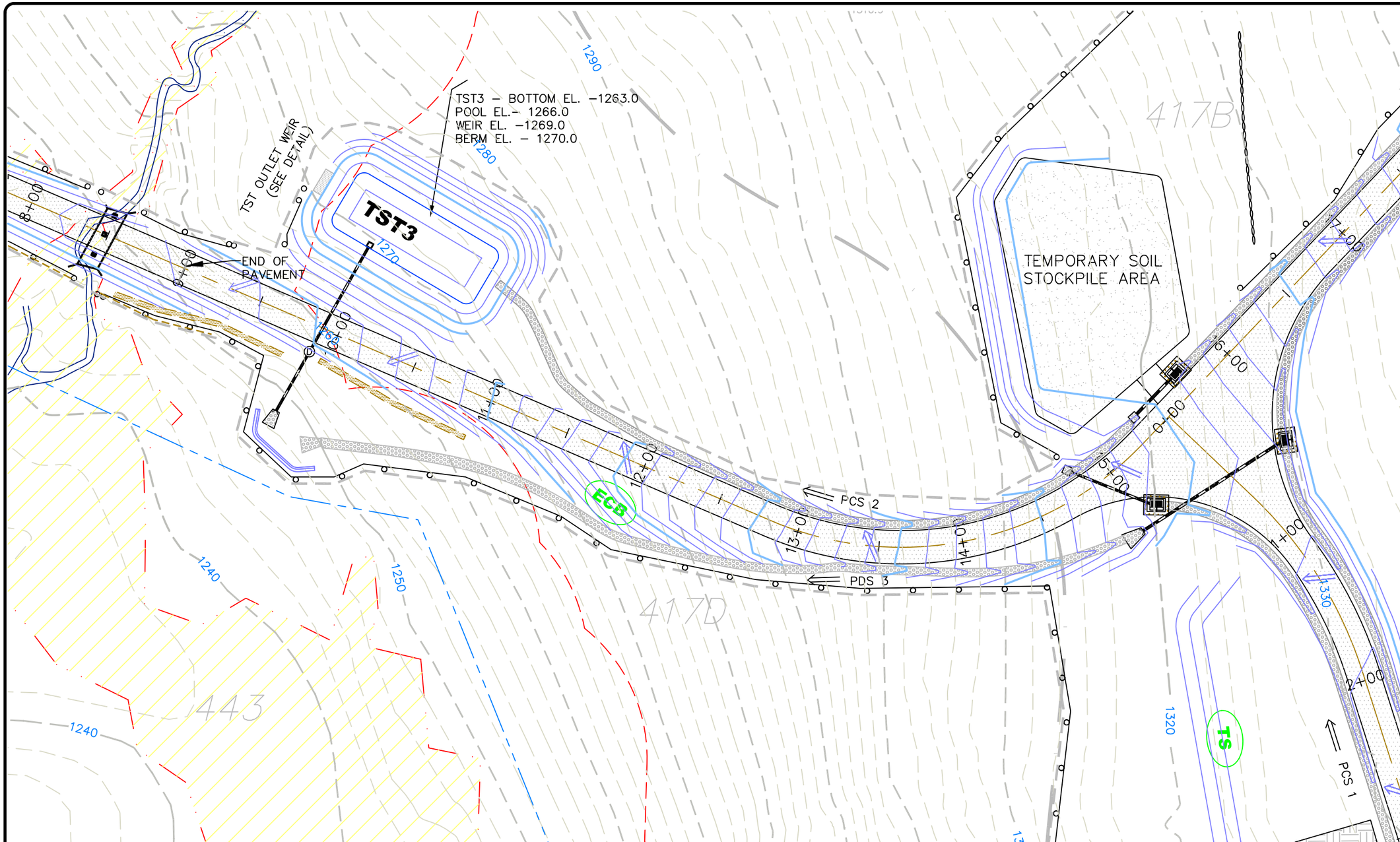

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BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

EROSION CONTROL PLAN
MAIN ACCESS DRIVE
STA. 8+00 TO 17+00

WIND COLEBROOK NORTH
ROCK HALL ROAD
COLEBROOK CONNECTICUT

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED STORM DRAINAGE
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- PROPOSED CONSERVATION PROPERTY
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- TS — TEMPORARY SEEDING
- ECB — EROSION CONTROL BLANKET
- STONE CHECK DAM
- STONE INFILTRATION TRENCH

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

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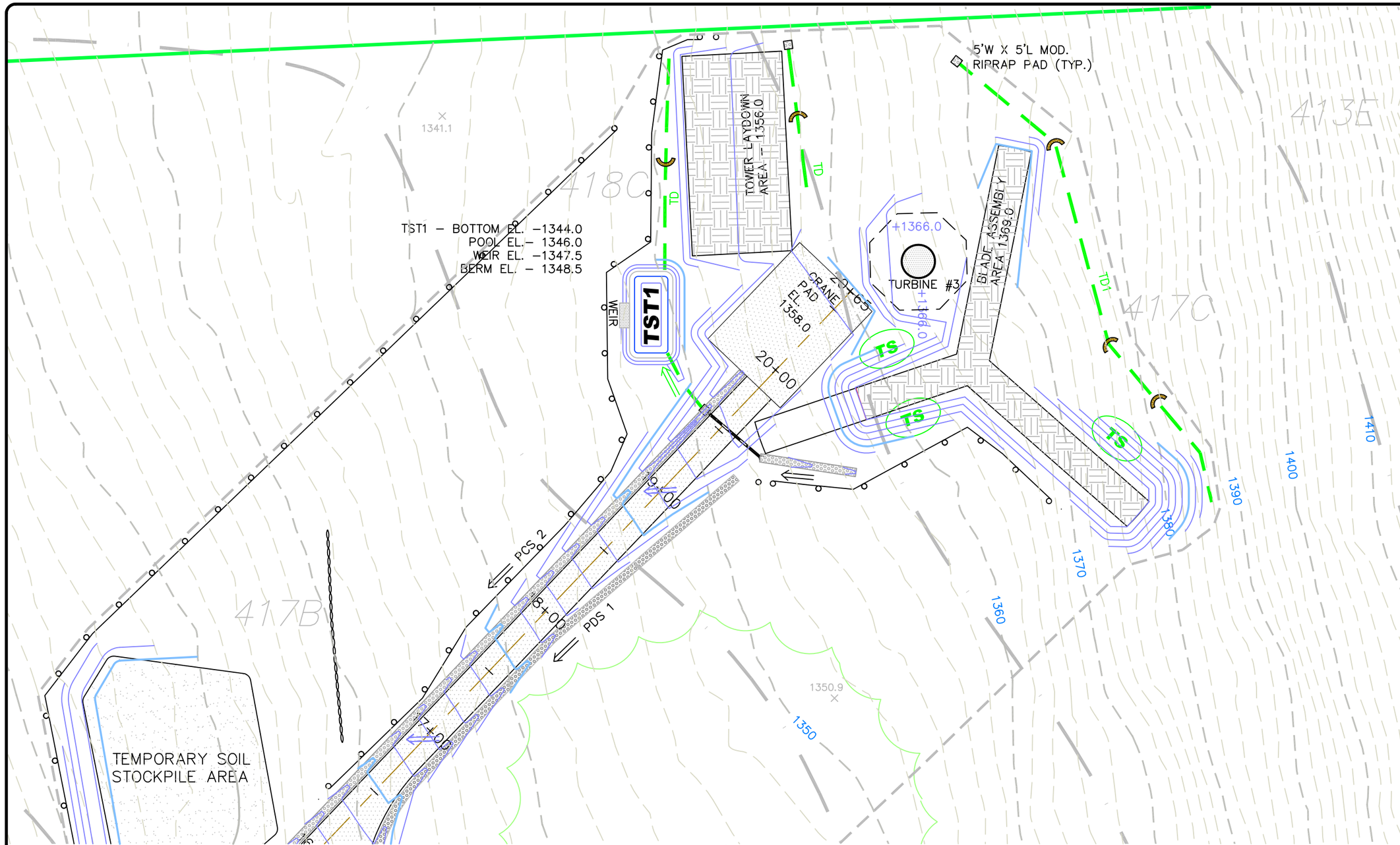
DRAWING NO.:	C-202



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED STORM DRAINAGE
- EDGE OF WATER
- PROPOSED CONSERVATION PROPERTY
- WETLANDS/WATERCOURSE BOUNDARY
- 100' WETLANDS REVIEW AREA
- EXISTING ROADWAY
- PROPOSED GRAVEL ACCESS DRIVE
- COMPACTED EARTH
- LIMITS OF CLEARING
- TEMP. WATER DIVERSION SWALE (TD)
- PERM. RIPRAP DIVERSION/CONVEYANCE SWALE (PCS)
- SOIL TYPE BOUNDARY
- STAKED HAY BALES
- SILT FENCE/WOOD TURTLE EXCLUSIONARY FENCE
- BALED FILTER
- TEMPORARY SOIL STOCKPILE
- TST — TEMPORARY SEDIMENT TRAP
- TS — TEMPORARY SEEDING
- ECB — EROSION CONTROL BLANKET
- STONE CHECK DAM

NO.	REVISION	DATE

Previous Editions Obsolete

0 30 60

1 inch = 60 ft.

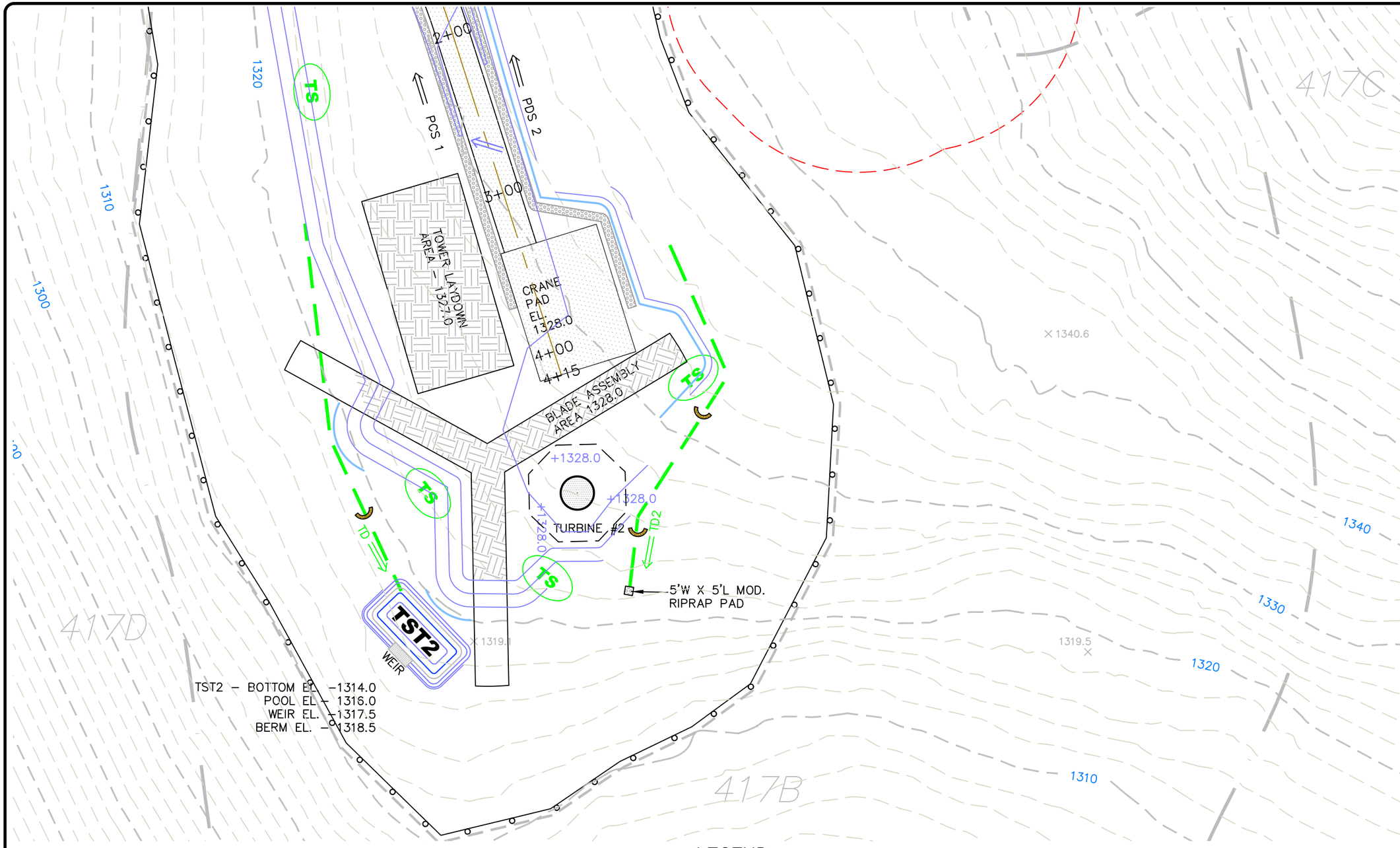
BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

EROSION CONTROL PLAN
TURBINE THREE

WIND COLEBROOK NORTH
ROCK HALL ROAD
COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN:	BB
APPROVED:	CJ
SCALE:	1" = 60'
DATE:	23 SEP 11
PROJ. NO.:	3093
CADD FILE NAME:	3093
DRAWING NO.:	C-203



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED STORM DRAINAGE
- EDGE OF WATER
- PROPOSED CONSERVATION PROPERTY
- WETLANDS/WATERCOURSE BOUNDARY
- 100' WETLANDS REVIEW AREA
- EXISTING ROADWAY
- PROPOSED GRAVEL ACCESS DRIVE
- COMPACTED EARTH
- LIMITS OF CLEARING
- TEMP. WATER DIVERSION SWALE (TD)
- PERM. RIPRAP DIVERSION/CONVEYANCE SWALE (PCS)
- SOIL TYPE BOUNDARY
- STAKED HAY BALES
- SILT FENCE/WOOD TURTLE EXCLUSIONARY FENCE
- BALED FILTER
- TEMPORARY SOIL STOCKPILE (TST)
- TEMPORARY SEDIMENT TRAP
- TEMPORARY SEEDING (TS)
- EROSION CONTROL BLANKET (ECB)
- STONE CHECK DAM

NO.	REVISION	DATE

Previous Editions Obsolete

0 30 60

1 inch = 60 ft.

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

EROSION CONTROL PLAN TURBINE TWO

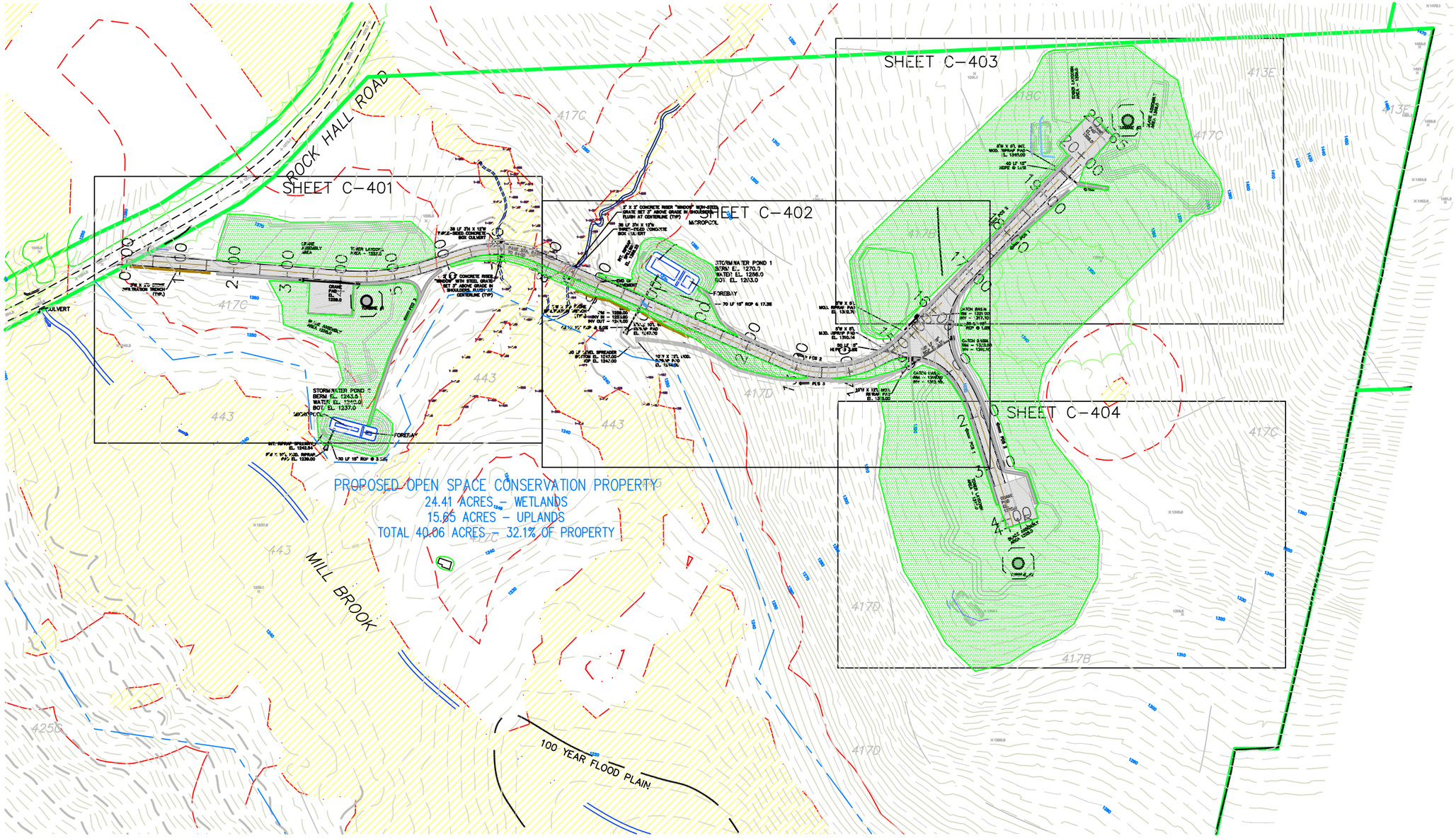
WIND COLEBROOK NORTH

ROCK HALL ROAD

COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN:	BB
APPROVED:	CJ
SCALE:	1" = 60'
DATE:	23 SEP 11
PROJ. NO.:	3093
CADD FILE NAME:	3093
DRAWING NO.:	C-204



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- CONTOUR FROM CONSTRUCTION GRADING TO REMAIN
- CONTOUR FROM CONSTRUCTION GRADING TO BE MODIFIED
- PROPOSED CONTOUR
- PROPOSED STORM DRAINAGE
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- PROPOSED CONSERVATION PROPERTY
- WETLANDS/WATERCOURSE BOUNDARY
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- EXISTING ROADWAY
- PROPOSED GRAVEL ACCESS DRIVE
- PERM. RIPRAP DIVERSION/CONVEYANCE SWALE
- SOIL TYPE BOUNDARY
- PROPOSED UPLAND MEADOW RESTORATION AREA

NO.	REVISION	DATE

Previous Editions Obsolete

0 100 200

1 inch = 200 ft.

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

OVERALL POST CONSTRUCTION GRADING PLAN

WIND COLEBROOK NORTH

ROCK HALL ROAD

COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN: BB APPROVED: CJ
SCALE: 1" = 200'
DATE: 23 SEP 11
PROJ. NO.: 3093
CADD FILE NAME: 3093
DRAWING NO.:

C-500

ROCK HALL ROAD

CRANE ASSEMBLY AREA

TOWER LAYDOWN AREA – 1253.0

38 LF 3'H X 12'W THREE-SIDED CONCRETE BOX CULVERT

PAVE STA. 6+50 TO 9+00

2' X 2' CONCRETE RISER "WINDOW" WITH STEEL GRATE SET 3" ABOVE GRADE IN SHOULDERS, FLUSH AT CENTERLINE (TYP)

3'W X 2'D STONE INFILTRATION TRENCH (TYP.)

CRANE PAD EL. 1259.0

TURBINE #1

PCS 3

BLADE ASSEMBLY AREA 1255.0

STORMWATER POND 2
BERM EL. 1243.5
WATER EL. 1240.0
BOT. EL. 1237.0

MICROPOOL

FOREBAY

INT. RIPRAP SPILLWAY EL. 1242.54

8'W X 10'L MOD. RIPRAP PAD EL. 1239.00

30 LF 15" RCP @ 3.33%

417C

443

443

1260

1270

1250

1240

1258.5

1246.5

1261.3

1257.0

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
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- PERM. RIPRAP DIVERSION/CONVEYANCE SWALE
- SOIL TYPE BOUNDARY
- PROPOSED UPLAND MEADOW RESTORATION AREA

NO.	REVISION	DATE

Previous Editions Obsolete

0 30 60

1 inch = 60 ft.

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

POST CONSTRUCTION GRADING PLAN TURBINE ONE

WIND COLEBROOK NORTH
ROCK HALL ROAD
COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN: BB APPROVED: CJ
SCALE: 1" = 60'
DATE: 23 SEP 11
PROJ. NO.: 3093
CADD FILE NAME: 3093
DRAWING NO.:

C-501

2' X 2' CONCRETE RISER "WINDOW" WITH STEEL GRATE SET 3" ABOVE GRADE IN SHOULDERS, FLUSH AT CENTERLINE (TYP)

38 LF 3'H X 12'W THREE-SIDED CONCRETE BOX CULVERT

MICROPOOL

INT. RIPRAP SPILLWAY EL. 1269.25

STORMWATER POND 1
BERM EL. 1270.0
WATER EL. 1266.0
BOT. EL. 1263.0

FOREBAY

70 LF 15" RCP @ 17.3%

END OF PAVEMENT

3'W X 2'D STONE INFILTRATION TRENCH (TYP.)

DMH
RIM – 1259.00
INV IN – 1253.90
INV OUT – 1249.00

40 LF 15" RCP @ 5.0%

8'W X 10'L INT. RIPRAP PAD
EL. 1247.00

30 LF LEVEL SPREADER
BOTTOM EL. 1247.00
TOP EL. 1248.00

10'W X 12'L MOD. RIPRAP PAD
EL. 1244.00

5'W X 5'L MOD. RIPRAP PAD
EL. 1302.70

CATCH BASIN
RIM – 1321.00
INV – 1317.50

30 LF 15" RCP @ 1.0%

5'W X 5'L MOD. RIPRAP PAD
EL. 1310.54

50 LF 15" HDPE @ 3.8%

100 LF 18" RCP @ 3.1%

CATCH BASIN
RIM – 1323.50
INV – 1318.10

CATCH BASIN
RIM – 1318.50
INV – 1312.45

10'W X 12'L MOD. RIPRAP PAD
EL. 1315.00

PCS 2

PDS 3

PCS 1

0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00

1240 1250 1260 1270 1280 1290 1300 1310 1320 1330

417B 417D 443

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- CONTOUR FROM CONSTRUCTION GRADING TO REMAIN
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- EDGE OF WATER
- PROPOSED CONSERVATION PROPERTY
- WETLANDS/WATERCOURSE BOUNDARY
- 100' WETLANDS REVIEW AREA
- EXISTING ROADWAY
- PROPOSED GRAVEL ACCESS DRIVE
- PERM. RIPRAP DIVERSION/CONVEYANCE SWALE
- SOIL TYPE BOUNDARY
- PROPOSED UPLAND MEADOW RESTORATION AREA

NO.	REVISION	DATE

Previous Editions Obsolete

0 30 60

1 inch = 60 ft.

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

POST CONSTRUCTION GRADING PLAN MAIN ACCESS DRIVE STA. 8+00 TO 17+00

WIND COLEBROOK NORTH

ROCK HALL ROAD

COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN:	BB
APPROVED:	CJ
SCALE:	1" = 60'
DATE:	23 SEP 11
PROJ. NO.:	3093
CADD FILE NAME:	3093
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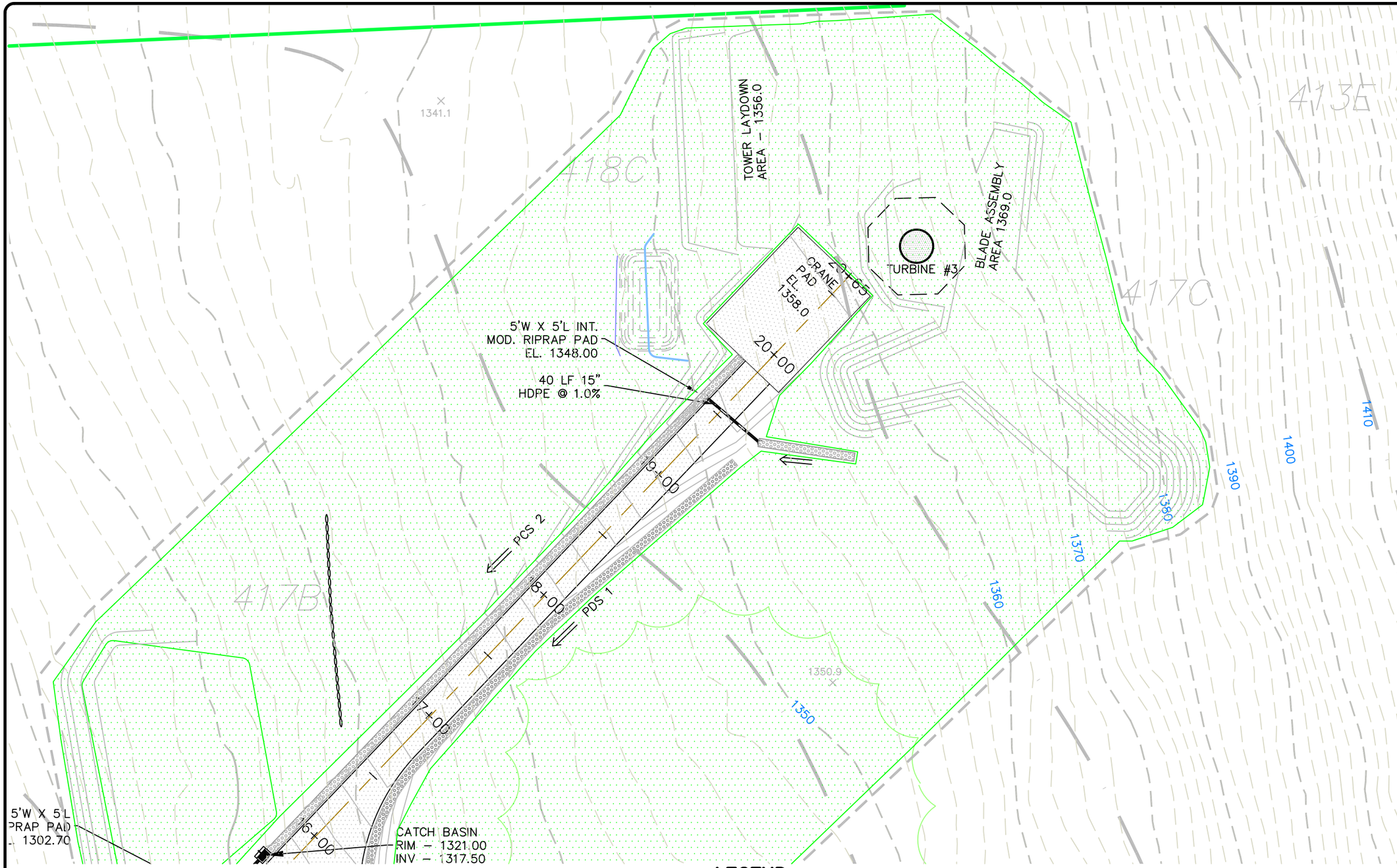

LEGEND

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- PROPOSED GRAVEL ACCESS DRIVE
- PERM. RIPRAP DIVERSION/CONVEYANCE SWALE
- SOIL TYPE BOUNDARY
- PROPOSED UPLAND MEADOW RESTORATION AREA

NO.	REVISION	DATE

Previous Editions Obsolete

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1 inch = 60 ft.

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

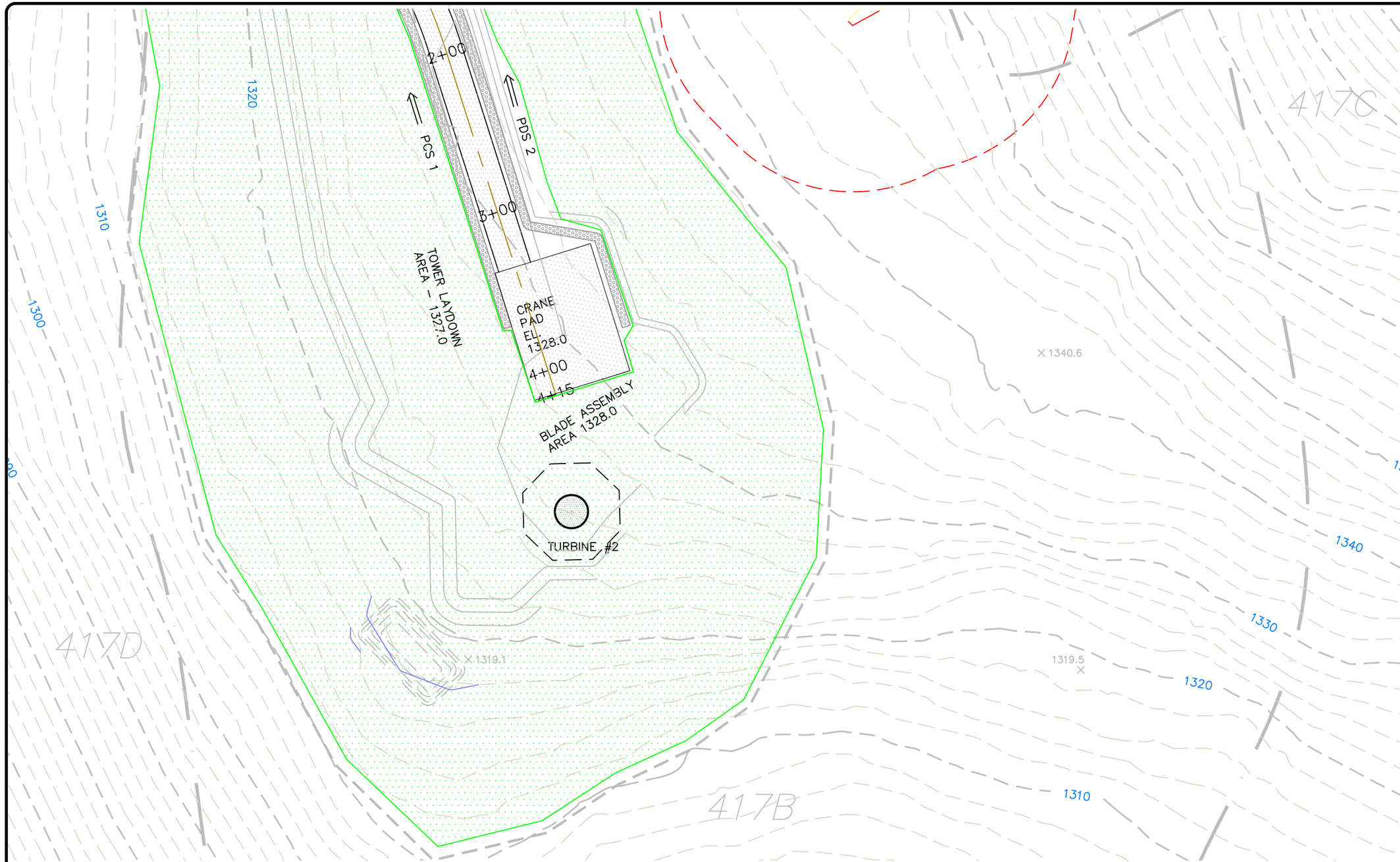
POST CONSTRUCTION
GRADING PLAN
TURBINE THREE

WIND COLEBROOK
NORTH
ROCK HALL ROAD

COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN:	BB
APPROVED:	CJ
SCALE:	1" = 60'
DATE:	23 SEP 11
PROJ. NO.:	3093
CADD FILE NAME:	3093
DRAWING NO.:	C-503



LEGEND

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- PERM. RIPRAP DIVERSION/CONVEYANCE SWALE
- SOIL TYPE BOUNDARY
- PROPOSED UPLAND MEADOW RESTORATION AREA

NO.	REVISION	DATE

Previous Editions Obsolete

0 30 60

1 inch = 60 ft.

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

POST CONSTRUCTION GRADING PLAN TURBINE TWO

WIND COLEBROOK NORTH
ROCK HALL ROAD
COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN:	BB
APPROVED:	CJ
SCALE:	1" = 60'
DATE:	23 SEP 11
PROJ. NO.:	3093
CADD FILE NAME:	3093
DRAWING NO.:	C-504

CONSTRUCTION SEQUENCE

STEPS TO BE TAKEN TO PREVENT THE SILTING OF THE WETLANDS DURING CONSTRUCTION OF THE ACCESS DRIVE AND LAYDOWN AREAS FOR THE 'WIND COLEBROOK NORTH' PROJECT, ROCK HALL ROAD, COLEBROOK, CT.

THE SEQUENCE OF CONSTRUCTION WILL BE AS FOLLOWS:

Field stakeout the limits of all construction activities.

Clear all vegetation within the construction area. Do not remove stumps at this time. All trees/shrubs less than 6" in diameter shall be chipped. Corduroy bridges or portable skidder bridge shall be used to cross watercourses to access eastern portion of the site.

The construction entrance, silt fence, haybales and/or other perimeter siltation devices shall be placed as shown on the erosion and sediment control plans prior to removal of any stumps. The silt fence along southern edge of disturbance shall be installed contiguously to the area east of turbine 2 to prevent reptile and amphibian access into construction area.

The wood turtle protection program shall be implemented as noted on Sheet C-602.

Remove stumps from the area of the proposed temporary sediment trap #4, crane assembly area, turbine 1 location and access drive to Station 9+00. Stumps may be ground in place or removed from the site. Stumps are not to be buried.

Construct the temporary sediment trap #4 as shown.

Strip topsoil material and stockpile prior to rough grading of roadway. Stockpile material at locations shown on the plans. Ensure adequate erosion control measures are in place around any stockpile areas.

Rough grade access drive to station 6+95, install the first three-sided box culvert in accordance with sequence below.

Rough grade access drive to station 8+25, install the second three-sided box culvert in accordance with sequence below.

Remove stumps from the remainder of the area of construction. Stumps may be ground in place or removed from the site. Stumps are not to be buried.

Construct temporary sediment traps 1-3 and the temporary and permanent water diversions to keep clean water away from construction areas and direct sediment laiden water toward temporary sediment traps.

Rough grade remainder of access drives and laydown areas for turbine construction. The cuts and fills will be made and material processed on site as necessary. All finished slopes loamed, seeded and mulched.

Additional haybales shall be placed across unpaved roads at the end of each work day to prevent sedimentation and soil erosion as required.

Construct riprap swales and water quality trenches as shown on plans. The swales and water quality trenches need to be protected from sedimentation during construction. If sedimentation occurs they will need to be cleaned or reconstructed as necessary after vegetation has been established.

Temporary diversion ditches with haybales may need to be installed to control lateral runoff along both sides of the proposed road prior to importing processed gravel.

Place gravel on drive, compact in 3-8" lifts per detail.

Provide temporary seeding measures on all exposed soils which were damaged due to construction activities and are not to be permanently restored or are outside of construction traffic zones for a period in excess of 30 days.

Seed all disturbed areas.

Clean all silt from drainage structures. Remove temporary outlet measures from the outlet structures for Stormwater Ponds 1 and 2 after site is stabilized with vegetation.

After turbine construction is complete grade site back to the approximate original grades in accordance with the post-construction grading plans and plant the upland meadow restoration areas as shown.

The starting time for construction is unknown, however the time limit for the construction of the drive should be limited to 180 days.

EARTHWORK QUANTITY ESTIMATE

TOTAL CUT - 16,250 C.Y.

TOTAL FILL - 12,300 C.Y.

COMMON CLEAN FILL REQUIRED (TOPSOIL AND SUBSOIL FROM ON-SITE) - 7,150 C.Y.

RIP RAP TO BE PROCESSED FROM ON-SITE MATERIAL - 1,200 C.Y.

PROCESS GRAVEL, ASPHALT AND STONE TO BE IMPORTED - 3,950 C.Y.

OVERALL SITE DISTURBANCE ASSOCIATED WITH THE PROPOSED IMPROVEMENTS - 14.63 ACRES

RESPONSIBILITY FOR EROSION CONTROL PLAN

THE PARTY RESPONSIBLE FOR THE IMPLEMENTATION AND OVERSIGHT OF THE EROSION CONTROL PLAN SHALL BE:
BNE ENERGY, INC.
TOWN CENTER, SUITE 200
29 SOUTH MAIN STREET
WEST HARTFORD, CT 06107
PHONE # - 860-561-5102

WETLAND REGULATED ACTIVITY

Wetlands Impacts:
Crossing at Station 7+00 - 3,850 sf
Crossing at Station 8+80 - 1,110 sf

Total Activity in Wetlands - 4,960 sf

EROSION CONTROL NARRATIVE

RESPONSIBILITY FOR THE PLAN

Whenever sedimentation is caused by stripping vegetation and/or grading, it shall be the responsibility of the person, corporation or other entity having responsibility to remove sedimentation from all lower properties, drainage systems and watercourses and to repair any damage at their expense as quickly as possible.

All control measures will be maintained in effective condition throughout the construction period. Surface inlets shall be kept open and free of sediment and debris. The system shall be checked after every major storm and sediment shall be disposed of at an approved location consistent with the plan.

It shall be the responsibility of any person, corporation or other entity engaging in any act on or near any stream, watercourse or swale or upon the flood plain or right-of-way thereof to maintain as nearly as possible in its present state that same stream, watercourse, swale, flood plain or right-of-way for the duration of the activity and to return it to its original or equal condition after such activity is completed.

No person, corporation or other entity shall block, impede the flow of, alter, construct any structure or deposit any material or thing or commit any act which affects normal or flood flow in any communal stream or watercourse without having obtained prior approval from the Town.

SEEDING AND PLANTING REQUIREMENTS

Seedbed Preparation
Fine grade and rake surface to remove stones larger than 2" in diameter. Install needed erosion control devices such as surface water diversions. Grade stabilization structures, sediment basins or drainage channels to maintain grassed areas. Apply limestone at a rate of 2 tons/Ac. or 90 lbs/1000 SF unless otherwise required according to soil test results. Apply fertilizers with 10-10-10 at a rate of 300 lbs./Ac. or 77.5 lbs/1000 SF. At least 50% of the nitrogen shall be from organic sources. Work lime and fertilizer into soil uniformity to a depth of 4" with a whisk, springtooth harrow or other suitable equipment following the contour lines.

Seed Application
Apply grass mixtures at rates specified by hand, cyclone seeder or hydroseeder. Increase seed mixture by 10% if hydroseeder is used. Lightly drag or roll the seeded surface to cover seed. Seeding for selected fine grasses should be done between April 1 and June 1 or between August 15 and October 15. If seeding cannot be done during these times, repeat mulching procedure below until seeding can take place or seed with a quick germinating seed mixture to stabilize slopes. A quick germinating seed mixture (Domestic Rye) can be applied between June 15 through August 15 as approved by the Architect or Engineer.

Mulching
Immediately following seeding, mulch the seeded surface with straw, hay or wood fiber at a rate of 1.5 to 2 tons/Ac. except as otherwise specified elsewhere. Mulches should be free of weeds and coarse matter. Spread mulch by hand or mulch blower. Punch mulch into soil surface with track machine or disk harrow set straight up. Mulch material should be "tucked" approximately 2- 3" into the soil surface. Chemical mulch binders or netting, in combination with the straw, hay or wood fibers, will be used where difficult slopes do not allow harrowing by machines.

Grass Seed Mixtures

Temporary Covers		Permanent Covers	
Perennial ryegrass	20 lbs/Ac.	Creeping Red Fescue	40 lbs/Ac.
Annual ryegrass	20 lbs/Ac.	Canada Bluegrass	20 lbs/Ac.

GENERAL PRINCIPLES

The following general principles shall be maintained as effective means of minimizing erosion and sedimentation during the development process.

Stripping away of vegetation, regrading or other development shall be done in such a way as to minimize erosion.

Grading and development plans shall preserve important natural features, keep cut and fill operations to a minimum, and insure conformity with topography so as to create the least erosion potential and adequately handle the volume and velocity of surface water runoff.

Whenever feasible, natural vegetation shall be retained, protected and supplemented wherever indicated on the site development plan.

The undisturbed area and the duration of exposure shall be kept to a practical minimum.

Disturbed soils shall be stabilized as quickly as possible.

GENERAL PRINCIPLES (continued)

Temporary vegetation and/or mulching shall be used to protect exposed critical areas during development when expected to be exposed in excess of 30 days.

The permanent (final) vegetation and mechanical erosion control measures shall be installed as soon as practical during construction.

Sediment in the runoff water shall be trapped until the disturbed areas is stabilized by the use of debris basins, sediment basins, silt traps or similar measures.

Concentration of surface runoff shall be only permitted by piping and/or through drainage swales or natural watercourses.

Excavation and Fills --

Slopes created by cuts or fills shall not be steeper than 1.5:1 and shall be restabilized by temporary or permanent measures, as required during the development process and shown on the site plans.

Adequate provisions shall be made to prevent surface water from damaging the cut face of excavations or the sloping surfaces of fills.

Cut and fills shall not endanger adjoining property.

All fills shall be compacted to provide stability of material and to prevent undesirable settlement. The fill shall be spread in a series of layers each not exceeding twelve (12) inches in thickness and shall be compacted by a sheep roller or other approved method after each layer is spread.

Fills shall not encroach on natural watercourses, constructed channels or regulated flood plain areas, unless permitted by license or permit from authority having jurisdiction in accordance with approved site plans.

Fills placed adjacent to natural watercourses, constructed channels or flood plains shall have suitable protection against erosion during periods of flooding.

Grading shall not be done in such a way as to divert water onto the property of another landowner without their express written consent.

During grading operations, necessary measures for dust control shall be exercised.

Sedimentation and erosion control shall be implemented in accordance with the Guidelines for Soil Erosion and Sediment Control (2002) - State of Connecticut DEP Bulletin 34.

The following general specifications will also be adhered to:

Land disturbance will be kept to a minimum. Restabilization will be scheduled as soon as practical.

Haybale filters will be installed at all culvert outlets and along the toe of all critical cut and fill slopes.

Culvert discharge areas will be protected with riprap channels. Energy dissipaters will be provided as necessary.

Catch basins will be protected with haybale filters throughout the construction period and until all disturbed areas are thoroughly stabilized.

All erosion and sediment control measures will be constructed in accordance with the standards and specifications of the Guidelines for Soil Erosion and Sediment Control (2002) - State of Connecticut DEP Bulletin 34.

Erosion and sediment control measures will be installed prior to construction whenever possible.

All control measures will be maintained in effective condition throughout the construction period.

Additional control measures will be installed during construction if necessary or required.

All erosion control measures shall be inspected weekly and within 24 hours of a rainfall event of 0.5 inches or greater.

CONSTRUCTION SEQUENCE FOR THREE-SIDED BOX CULVERT INSTALLATION

1. The limits of clearing shall be located in the field by a licensed surveyor and trees and brush shall be removed within these limits.

2. Silt fence shall be installed at the location shown on the site plan. All erosion control measures will be constructed in accordance with the standards and specifications of the Connecticut DEP Soil Erosion and Sediment Control Manual - 2002.

3. All erosion and sediment control measures will be maintained during the construction period.

4. Sediment received from the control structures will be disposed of in a manner which is consistent with the plan.

5. Location of footings for box culvert shall be staked in the field with offsets by a licensed surveyor.

6. The wood turtle protection program as noted on Sheet C-602 shall be implemented.

7. Excavate trench for footings. Ground water in the footing excavation shall be controlled by pumping. All water pumped out of the excavation shall be discharged to the dewatering sump during construction or to temporary sediment trap #4. A temporary timber bridge will be used to allow construction equipment to cross stream without disturbing the streambed during construction.

8. If necessary the watercourse may be temporarily piped through the construction area using sandbags at uphill end to keep construction area dry. Installation of the bridge and footings shall occur between July 1 and September 30.

9. Install precast footings for bridge and wing walls. Sandbags shall be placed alongside the excavation to protect the work. Once footings are set place intermediate riprap along footings to prevent scour per detail.

10. Place concrete bridge & wing walls on footings & anchor sections together.

11. Install headwalls and backfill footings using coarse sand & gravel.

12. Backfill around box culvert in 12" lifts using coarse sand & gravel. Fill shall be compacted to a minimum of 92% modified optimum density ASTM 1555 method "C" until the required elevation is obtained. (Spec. to be confirmed by geotechnical engineer prior to construction).

13. Place 6" of topsoil on all disturbed areas. Seed & mulch immediately. Erosions control netting shall be used to stabilize slopes as needed.

Note: Erosion control measures are to be maintained & monitored continuously until vegetative cover has been established.

NO.	REVISION	DATE
	Previous Editions Obsolete	

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

EROSION CONTROL NARRATIVE & CONSTRUCTION SEQUENCE

WIND COLEBROOK NORTH
ROCK HALL ROAD
COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266 - 0778 CONNECTICUT

DRAWN: BB APPROVED: CJ
SCALE: AS NOTED
DATE: 23 SEP 11
PROJ. NO.: 3093
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DRAWING NO.:
C-601

UPLAND RESTORATION AND THIRD PARTY MONITORING NARRATIVE

UPLAND RESTORATION PLAN CONSTRUCTION SEQUENCE AND PLANTING SCHEDULE

Disturbed upland areas will be restored following construction with New England Conservation/Wildlife Mix, a native herbaceous seed mixture that will form a permanent, maintenance free cover of grasses, forbs, wildflowers and legumes. This seed mixture will provide erosion control and wildlife habitat value. Areas that will not be subject to annual mowing will revert to forest through the natural process of succession.

1. Prior to all work, erosion control barriers will be installed as detailed on the Erosion Control Plan.

2. Where adequate topsoil (±6 inches) does not exist, disturbed areas shall be backfilled to a minimum depth of 6 inches with clean topsoil. Once final topsoil is in place, these areas will be planted with New England Conservation/Wildlife Mix after the completion of final grading. The seed mix will be applied at a rate of 1 lb/1,750 square feet. Soil conditioning activities, including raking, will be combined with the seed application process.

3. Where 2:1 slopes are utilized for final grading, or in areas specified on the plan sheets, biodegradable erosion control matting will be installed over the seed mixture to promote establishment of vegetation and aid in stabilization. The contractor will use "SC2" erosion control matting, available at New England Wetland Plants Inc. (413) 548-8000 or an approved equivalent.

4. The contractor will be responsible for the careful installation, maintenance (including watering) and establishment of native plant material in these areas.

5. The erosion control barriers shall be disassembled following successful stabilization of these areas. Sediment collected by these devices will be removed and disposed of in a manner that prevents erosion and transport to a wetland or watercourse.

6. Monitoring of revegetated areas will be conducted as follows by a qualified third party inspector. These areas will be monitored the first three growing seasons following establishment. Monitoring reports will be submitted to the Connecticut Siting Council no later than December 15 of each year. The reports will provide details on the three success standards described below. In the event that remediation measures are required, recommendations will be provided. The first year of monitoring will be the first year that the site has been through a full growing season after completion of construction and planting. For monitoring purposes, a growing season starts no later than May 31.

7. Revegetated areas will be assessed using three success standards. Each standard is described below. Success Standard 1: At least 75% of the surface area of these areas should be reestablished with indigenous species within three growing seasons. Success Standard 2: Vegetation should be checked to ensure that no invasive species colonize in these areas. Success Standard 3: Slopes within and adjacent to the revegetated areas are stabilized.

8. In the event that remediation measures are recommended, BNE Energy, Inc. will initiate these measures with the assistance of the qualified third party inspector.

9. If necessary to control invasive species, herbicide applications will be conducted by a state-licensed individual. If applications are required in proximity to site wetlands, the herbicide RODEO® [glyphosate (53.8% active ingredient)] shall be utilized as it is the only herbicide approved by CTDEP for application in aquatic environments.

10. Fertilizers will not be used to promote growth within these areas. The proposed seed mixture contains a variety of native herbaceous species adept at colonizing recently disturbed areas.

    Planting Schedule 1: Upland Restoration Areas

    Disturbed areas will be planted with New England Conservation/Wildlife Mix (or equivalent) at 1750 sq.ft./lb. or as recommended by manufacturer. This mix includes the following species: big bluestem (Andropogon gerardii), fringed brome grass (Bromus ciliates), creeping red fescue (Festuca rubra), Canada wild rye (Elymus Canadensis), Virginia wild rye (Elymus virginicus), switchgrass (Panicum virgatum), deer tongue grass (Panicum clandestinum), little bluestem (Schizachyrium scoparium), Indian grass (Sorghastrum nutans), common milkweed (Asclepias syriaca), New England aster (Aster novae-angliae), partridge pea (Chamaecrista fasciculate), showy tick-trefoil (Desmodium Canadense), grass leaved goldenrod (Euthamia graminifolia), gray goldenrod (Solidago nemoralis).

STREAMBANK RESTORATION PLAN CONSTRUCTION SEQUENCE AND PLANNING SCHEDULE

To ensure that the proposed culverts are installed in accordance with the natural stream crossing standards, a qualified wetland scientist will provide inspections both during and following the construction of these crossings. Box culverts will be backfilled with natural substrate material matching upstream and downstream streambed substrate and provide for unimpeded passage of fish and other aquatic organisms. The qualified wetland scientist will also inspect the plantings of native wetland shrubs (live stakes) in wetland areas and/or stream banks temporarily impacted by construction activities (Streambank Restoration Area).

1. Prior to all work, erosion control barriers are to be installed as detailed on the Erosion Control Plan.

2. A qualified wetland scientist responsible for the Streambank Restoration Area shall be notified a minimum of seven (7) business days prior to any phase of the project including excavation and grading, soil transfer and planting, to monitor and oversee implementation of the plan.

3. The Streambank Restoration Area shall then be backfilled to a minimum depth of 8 inches with clean topsoil where necessary. Once final topsoil is in place, it shall be graded to achieve a relatively smooth surface.

4. Streambank Restoration Area plantings shall take place once the above listed tasks have been completed. This area will be planted with native shrubs and herbaceous vegetation as noted in the planting schedule and under sown with New England Conservation/Wildlife or Wetmix grass seed mix after the grading is completed. The seed mix will be applied to the Enhancement Area at a rate of 1 lb/1,750 or 1lb/2,500 square feet respectively. Soil conditioning activities, including raking, will be combined with the seed application process.

5. All plant materials installed shall meet or exceed the specifications of the "American Standards for Nursery Stock" by the American Association of Nurserymen. All plant materials shall be guaranteed for one year following date of final acceptance.

6. All plantings to be spaced randomly at the direction of the wetland scientist to simulate natural growth patterns.

7. The Contractor shall be responsible for the careful installation, maintenance (including watering), and establishment of native plant material in the Restoration Area. All plants shall be guaranteed by the contractor to remain alive and healthy for a full twenty four (24) month period.

8. Rocks and boulders, uncovered during earthwork, may be distributed throughout the Streambank Restoration Area. These rocks and boulders shall be placed in such a way as to provide crevices and cavities suitable for use by wildlife.

9. Fallen logs, branches, stumps and other natural debris will be relocated to the Restoration Area to provide beneficial habitat features for wildlife. This will include downed and uncovered material that is acquired on site by the wetland scientist and will be distributed to cover 2% of the area's substrate surface. The natural debris should be of varying sizes and in varying degrees of decomposition.

10. The erosion control barriers shall be disassembled following successful stabilization of this area. Sediment collected by these devices will be removed and disposed of in a manner that prevents erosion and transport to a waterway or wetland.

11. Long-term monitoring of the Streambank Restoration Area will be conducted as follows. The Restoration Area will be monitored the first three growing seasons following its construction. Monitoring reports will be submitted to the permitting agency no later than December 15 of each year. The reports will provide details on the three success standards described below. The first year of monitoring will be the first year that the site has been through a full growing season after completion of construction and planting. For monitoring purposes, a growing season starts no later than May 31. However, if there are problems that need to be addressed and if the measures to correct them require prior approval from the agencies, the permittee will contact the agencies as soon as the need for corrective action is discovered.

12. The Streambank Restoration Area will be assessed using three success standards. Each standard is described below. Success Standard 1: At least 75% of the surface area of the mitigation area should be reestablished with indigenous species within two growing seasons. Success Standard 2: Vegetation should be checked to ensure that no invasive species colonize in the Restoration Area. Success Standard 3: Slopes within and adjacent to the Restoration Area are stabilized

Planting Schedule 2: Streambank Restoration Area

Quantity	Botanical Name	Common Name	Size
Shrubs			
TBD	Salix discolor	Pussy Willow	Live Stakes @12" OC"

The streambank restoration area will be undersown with New England Conservation/Wildlife Mix seed mixture at a rate of 1lb/1750 square feet as supplied by New England Wetland Plants, Inc. (413-548-8000) or appropriate substitute. Where wetland hydrology is present, New England New England Wetmix seed mixture will be used at a rate of 1lb/2,500 square feet

THIRD PARTY EROSION AND SEDIMENTATION CONTROL AND ENVIRONMENTAL INSPECTIONS

1. A qualified third party erosion and sedimentation control (E&S) inspector shall inspect the installation of erosion and sedimentation controls prior to the start of construction activities. A pre-construction meeting shall be held with the third party inspector and general contractor prior to the start of construction.

2. The qualified third party inspector will monitor E&S controls throughout the construction period to ensure that controls are properly maintained and any recommendations to remediate failing controls or removal of accumulated sediment are implemented by the contractor in a timely fashion.

3. The qualified third party inspector shall monitor E&S controls on a weekly basis or within 24 hours of a rainfall event of 0.5 inches or greater.

4. E&S control monitoring reports will be prepared by the third party inspector on a bi-weekly basis and submitted to the Connecticut Siting Council.

5. The on-site erosion and sediment controls shall be monitored by a qualified third party environmental inspector to ensure establishment of appropriate environmental safeguards protective of amphibian and reptile species.

WOOD TURTLE PROTECTION PROGRAM

The following is a methodological plan that will avoid unintentional mortality (take) of the wood turtle, a State-listed Special Concern species, as a result of construction activities for the site improvements proposed.

It is of the utmost importance that the contractor complies with the requirement for the installation of protective measures and the education of employees and subcontractors performing work on the project site if work will occur during the wood turtle's terrestrially active period (April 1 to November 1). A third party environmental monitor for this project should be hired to ensure that these measures are implemented properly. The contractor shall contact the environmental monitor for a pre-construction meeting.

The proposed wood turtle protection program consists of several components: isolation of the project perimeter; periodic inspection and maintenance of isolation structures; education of all contractors and sub-contractors prior to initiation of work on the site; protective measures; and, reporting.

1. Isolation Measures
   a. Installation of conventional silt fencing, which will also serve as an isolation of the work zone from surrounding areas and required for erosion control compliance, shall be performed by the Contractor prior to any earthwork. A third party environmental monitor will inspect the work zone area prior to and following barrier installation to ensure the area is free of wood turtles.

   b. The fencing will consist of conventional erosion control woven fabric, installed approximately six inches below surface grade using a Ditch-Witch or similar machine and staked at seven to ten-foot intervals using four-foot oak stakes or approved equivalent. In addition to required daily inspection by the Contractor, the fencing will be inspected for tears or breeches in the fabric following installation and at approximately one- week intervals or after storm events of 0.5 inch or greater by the third party environmental monitor. Inspections will be conducted by the third party environmental monitor throughout the course of the construction project.

   c. Bi-Weekly inspection reports (brief narrative and applicable photos) will be submitted to the Connecticut Siting Council for compliance verification. Any observations of wood turtle will be reported to the Connecticut Department of Environmental Protection Wildlife Division.

   d. The extent of the barrier fencing will be as shown on the site plans.

   e. No equipment, vehicles or construction materials shall be stored outside of barrier fencing.

2. Contractor Education
   a. Prior to work on site, the Contractor shall attend an educational session at the pre-construction meeting with the third party environmental monitor. This orientation and educational session will consist of an introductory session with photos stressing the non-aggressive nature of wood turtles, the absence of need to destroy animals that might be encountered, the importance of adult survivorship to the population, and the need to follow Protective Measures as described in Section 3.

   b. Also stressed in the education session will be means to discriminate between the species of concern and other native species to avoid unnecessary, "false alarms".

   c. The Contractor will be provided with cell phone and email contacts for the third party environmental monitor to immediately report any encounters with Wood Turtle. Illustrated poster materials will be posted on the job site to maintain worker awareness as the season progresses.

3. Protective Measures
   a. Prior to the start of construction each day, the Contractor shall search the entire work area for wood turtles.

   b. If a turtle is found, it should be carefully grasped in both hands, one on each side of the shell, between the turtle's forelimbs and the hind limbs, and placed just outside of the isolation barrier in the approximate direction it was heading.

   c. Special care shall be taken by the Contractor during early morning and evening hours so that possible basking or foraging turtles are not harmed by construction activities.

4. Reporting
   a. Following completion of the construction project, the third party environmental monitor will provide a summary report to CTDEP documenting the monitoring and maintenance of the barrier fence.

   b. Any observations of wood turtle will be reported to CTDEP by the third party environmental monitor with photo-documentation (if possible) and with specific information on the size, sex, location and disposition of the animal and any other data that DEP may require to be collected

The Wood Turtle protection program detailed above will adequately protect this Special Concern species in the unlikely event that this species is encountered on the subject property during construction activities. With adherence to these protective measures, BNE's proposed development at this property will not have an adverse affect on the wood turtle.

NO.	REVISION	DATE

Previous Editions Obsolete

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

RESTORATION AND MONITORING NARRATIVE

WIND COLEBROOK NORTH
ROCK HALL ROAD
COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

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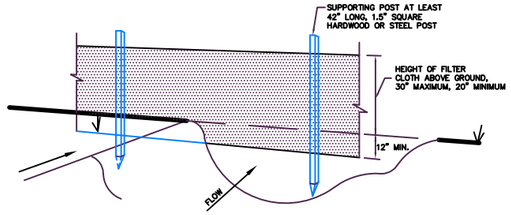
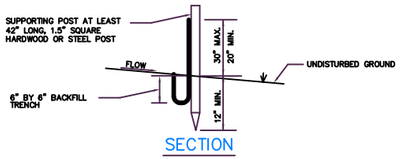


PERSPECTIVE VIEW



SECTION

CONSTRUCTION NOTES FOR SILT FENCE

1. EXCAVATE A TRENCH A MINIMUM OF 6 INCHES DEEP AND 6 INCHES WIDE ON THE UP SIDE OF THE FENCE LOCATION.

2. DRIVE SUPPORT POSTS ON THE DOWN SLOPE SIDE OF THE TRENCH TO A DEPTH OF AT LEAST 12 INCHES INTO ORIGINAL GROUND.

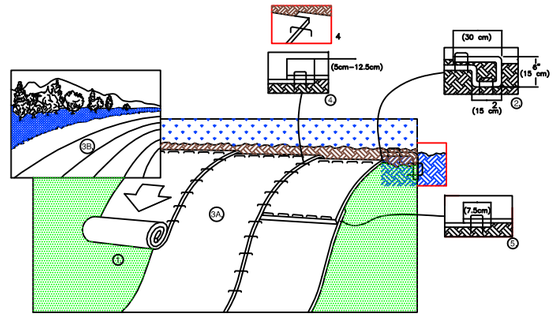
3. STAPLE OR SECURE THE GEOTEXTILE TO THE SUPPORT POSTS PER MANUFACTURER'S INSTRUCTIONS SUCH THAT AT LEAST 6 INCHES OF GEOTEXTILE LIES WITHIN THE TRENCH.

4. BACKFILL THE TRENCH WITH TAMPED SOIL OR AGGREGATE OVER THE GEOTEXTILE.

POSTS: 1.5" SQUARE HARDWOOD OR STEEL

FILTER CLOTH: MIRAFI 100X, ENVIROFENCE OR APPROVED EQUAL

SILT FENCE/WOOD TURTLE EXCLUSIONARY FENCING DETAIL



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30cm) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30cm) APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS (A) DOWN OR (B) HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING OPTIONAL DOT SYSTEM™ STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2"-5" (5cm-12.5cm) OVERLAP DEPENDING ON BLANKET TYPE. TO ENSURE PROPER SEAM ALIGNMENT, PLACE THE EDGE OF THE OVERLAPPING BLANKET (BLANKET BEING INSTALLED ON TOP) EVEN WITH THE COLORED SEAM STITCH ON THE PREVIOUSLY INSTALLED BLANKET.
5. CONSECUTIVE BLANKETS SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5cm) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30cm) APART ACROSS ENTIRE BLANKET WIDTH.

NOTE:
*IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15cm) MAY BE NECESSARY TO PROPERLY SECURE THE BLANKETS.

EROSION CONTROL BLANKETS

S150: Material:

Straw fiber matrix sewn between two photo-degradable nets.
Straw: 5 lbs/sq. yd.
Net: Temporary lightweight degradable (Both sides)

SC250 (North American Green): Material:

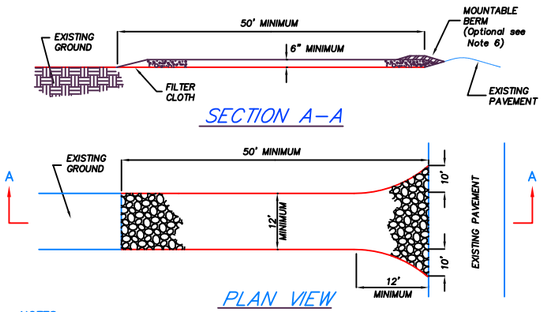
Straw & coconut fiber matrix sewn between three polypropylene nets.
Net: Permanent Turf Reinforcement, for maximum slopes up to 1.1:1.

CRITICAL POINTS
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDE SLOPE VERTICES

NOTE
* HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE.
** IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS IN EXCESS OF 6" (15 CM) MAY BE NECESSARY TO PROPERLY ANCHOR THE BLANKETS.

EROSION CONTROL BLANKET

N.T.S.



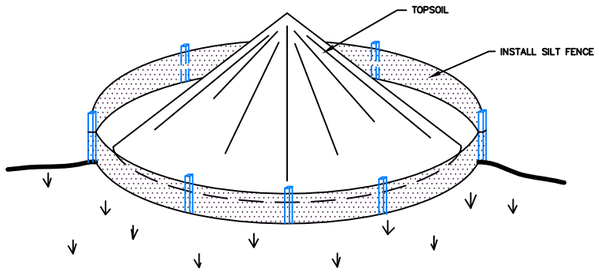
SECTION A-A

PLAN VIEW

NOTES:

1. STONE SIZE - USE 1" - 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - AS REQUIRED, BUT NOT LESS THAN 50 FEET.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - 12 FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. 24 FOOT MINIMUM IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH - TO BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURE USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DRIPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

STABILIZED CONSTRUCTION ENTRANCE

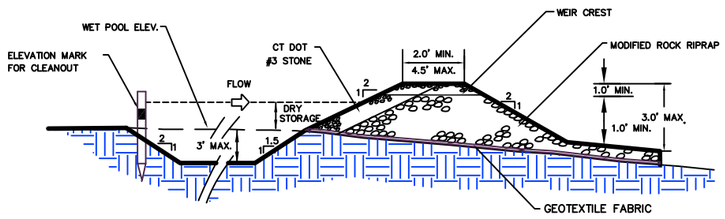


STOCKPILE MANAGEMENT PER 2002 CT GUIDELINES FOR E & S CONTROL:

1. LOCATE STOCKPILE SO THAT NATURAL DRAINAGE IS NOT OBSTRUCTED.
2. DIVERT RUNOFF WATER AWAY FROM OR AROUND THE STOCKPILE.
3. INSTALL A GEOTEXTILE SILT FENCE OR HAY BALE BARRIER AROUND THE STOCKPILE AREA APPROXIMATELY 10 FEET FROM PROPOSED TOE OF THE SLOPE.
4. THE SIDE SLOPES OF STOCKPILED MATERIAL SHOULD BE NO STEEPER THAN 2:1.
5. STOCKPILES THAT ARE NOT TO BE USED WITHIN 30 DAYS NEED TO BE SEEDED AND MULCHED IMMEDIATELY AFTER FORMATION OF THE STOCKPILE.
6. AFTER STOCKPILE HAS BEEN REMOVED, THE SITE SHOULD BE GRADED AND PERMANENTLY STABILIZED.

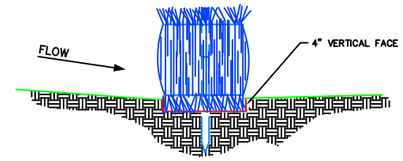
TEMPORARY TOPSOIL STOCKPILE

N.T.S.

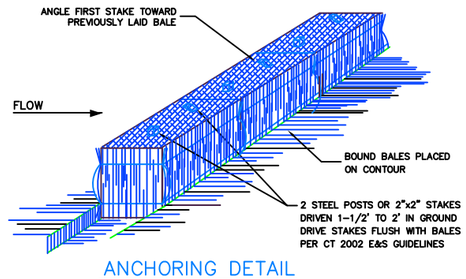


TEMPORARY SEDIMENT TRAP OUTLET

N.T.S.



BEDDING DETAIL



ANCHORING DETAIL

NOTES:

1. BALES SHALL BE EITHER STRAW OR HAY.
2. BALES SHALL BE PLACED AT THE TOE OF SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
3. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4 INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
4. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
5. INSPECTION SHALL BE FREQUENT, AND REPAIR AND/OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED TO MAINTAIN EFFECTIVENESS OF INSTALLATION.
6. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

BALED EROSION FENCE

NO.	REVISION	DATE
	Previous Editions Obsolete	

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

DETAILS

WIND COLEBROOK NORTH
ROCK HALL ROAD
COLEBROOK CONNECTICUT

CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN:	BB
APPROVED:	CJ
SCALE:	AS NOTED
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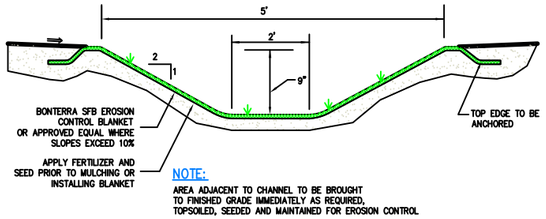
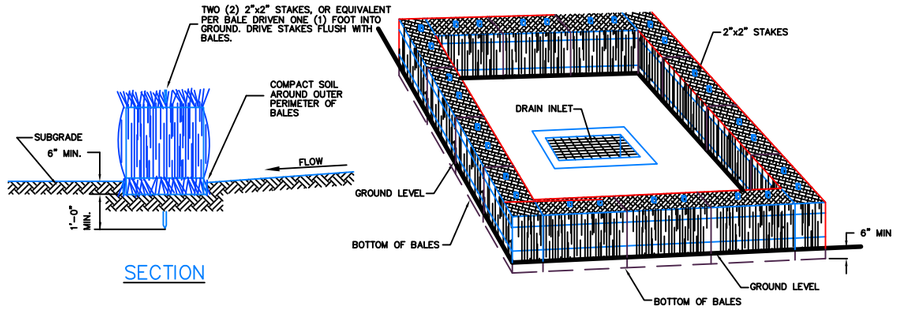


NOTE:
AREA ADJACENT TO CHANNEL TO BE BROUGHT TO FINISHED GRADE IMMEDIATELY AS REQUIRED, TOPSOILED, SEEDED AND MAINTAINED FOR EROSION CONTROL

TEMPORARY DIVERSION SWALE
N.T.S.

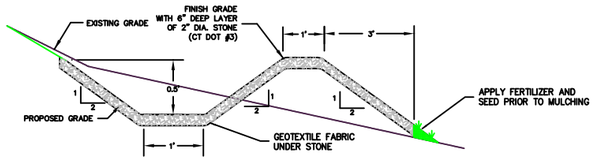


SECTION

PERSPECTIVE VIEW

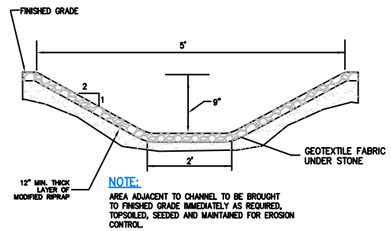
NOTES:
1. ALL BALES ARE TO BE TIGHTLY BUTTED TOGETHER.
2. BALES SHALL BE EITHER STRAW OR HAY.
3. PROVIDE FREQUENT INSPECTION AND MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AND REPLACE CLOGGED BALES TO RESTORE EFFECTIVENESS OF INSTALLATION.

BALED FILTER



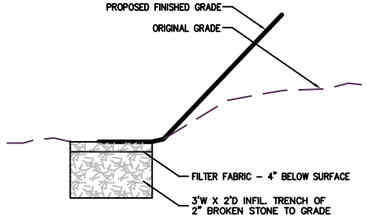
NOTE:
AREA ADJACENT TO SWALE TO BE BROUGHT TO FINISHED GRADE IMMEDIATELY AS REQUIRED, TOPSOILED, SEEDED AND MAINTAINED FOR EROSION CONTROL.

LEVEL SPREADER DETAIL
N.T.S.



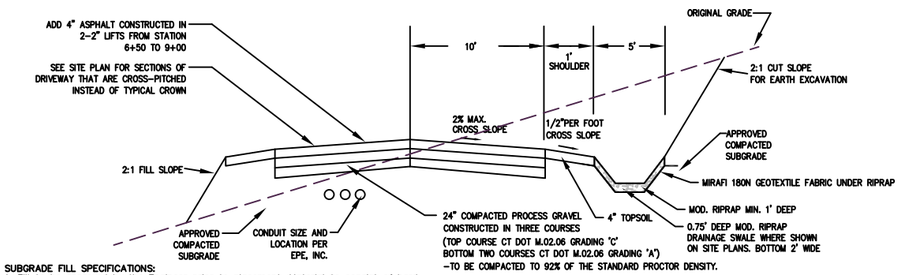
NOTE:
AREA ADJACENT TO CHANNEL TO BE BROUGHT TO FINISHED GRADE IMMEDIATELY AS REQUIRED, TOPSOILED, SEEDED AND MAINTAINED FOR EROSION CONTROL.

RIPRAP DIVERSION/CONVEYANCE SWALE
N.T.S.



NOTE:
TRENCH IS TO BE PROTECTED FROM SEDIMENTATION DURING CONSTRUCTION.
SHOULD SEDIMENTATION OCCUR REMOVE FILTER FABRIC AND CLEAN OR REPLACE TOP 4" OF STONE.

WATER QUALITY TRENCH
(N.T.S.)

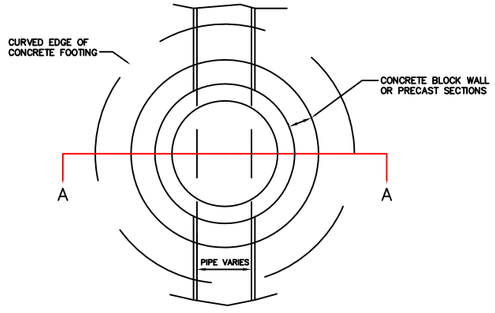


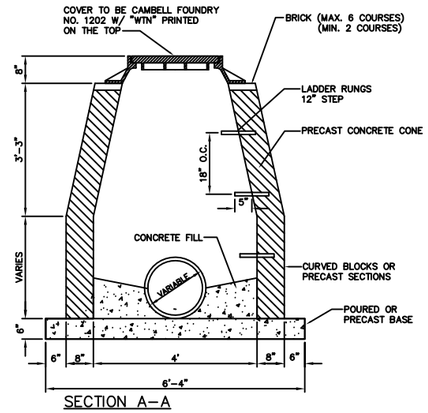
SUBGRADE FILL SPECIFICATIONS:
1. Fill to be approved by the Engineer prior to placement. Material to consist of hard and durable particles or fragments and shall be free of frozen material, sod, brush, roots, stumps, organic matter and other objectionable materials.

2. Subbase fill material shall be compacted to 90% of the standard proctor density until the required elevation is obtained.

3. Subbase and fill specifications to be confirmed and modified as necessary after site analysis by geotechnical engineer. Access drive design must be able to accommodate all proposed construction vehicles including crawler crane.

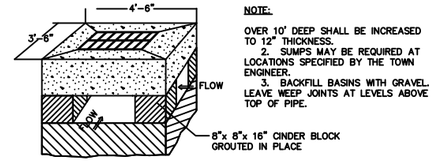
ACCESS DRIVE CROSS SECTION
N.T.S.





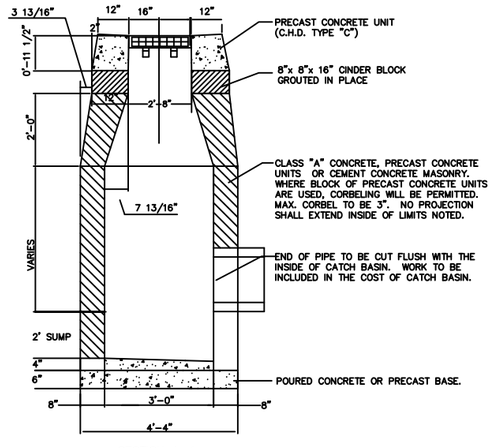
SECTION A–A

DRAINAGE MANHOLE
without sump



NOTE:
OVER 10' DEEP SHALL BE INCREASED TO 12" THICKNESS.
2. SUMPS MAY BE REQUIRED AT LOCATIONS SPECIFIED BY THE TOWN ENGINEER.
3. BACKFILL BASINS WITH GRAVEL. LEAVE WEEP JOINTS AT LEVELS ABOVE TOP OF PIPE.

PLAN VIEW



SECTION A–A

STANDARD TYPE "CL" CATCH BASIN
NO SUMP

NO.	REVISION	DATE
	Previous Editions Obsolete	

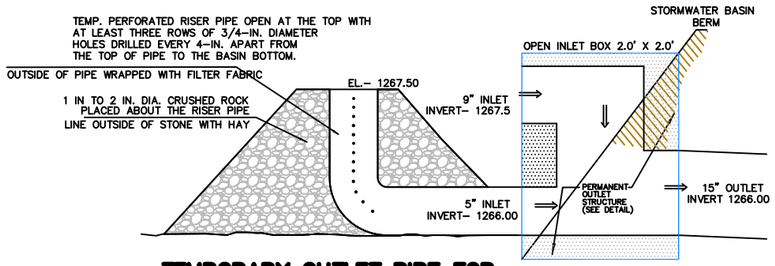
BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

DETAILS

WIND COLEBROOK NORTH
ROCK HALL ROAD
COLEBROOK CONNECTICUT

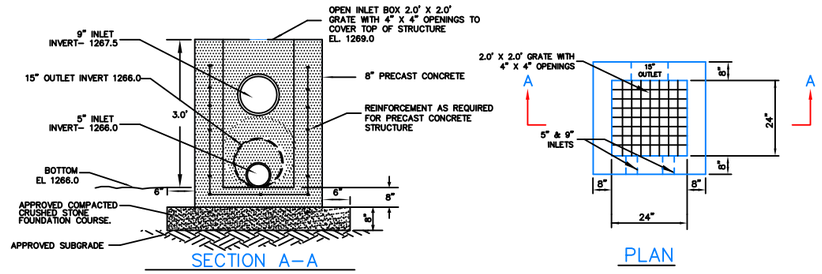
CIVIL C1
CORNERSTONE PROFESSIONAL PARK, SUITE D-101
43 SHERMAN HILL ROAD
WOODBURY (203) 266-0778 CONNECTICUT

DRAWN:	BB
APPROVED:	CJ
SCALE:	AS NOTED
DATE:	23 SEP 11
PROJ. NO.:	3093
CADD FILE NAME:	3093
DRAWING NO.:	C-604



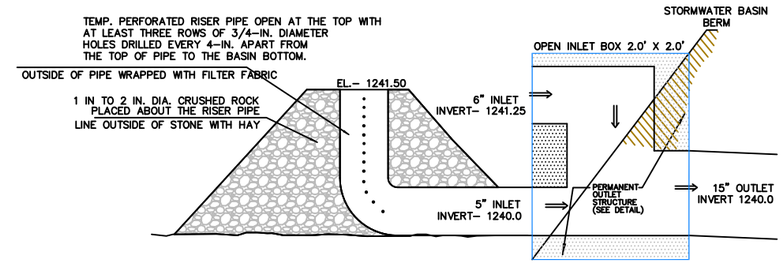
TEMPORARY OUTLET PIPE FOR SEDIMENT CONTAINMENT STORMWATER POND 1

N.T.S.



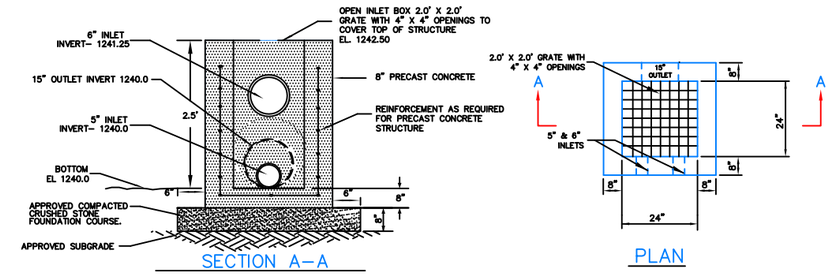
STORMWATER POND 1 OUTLET CONTROL STRUCTURE

N.T.S.



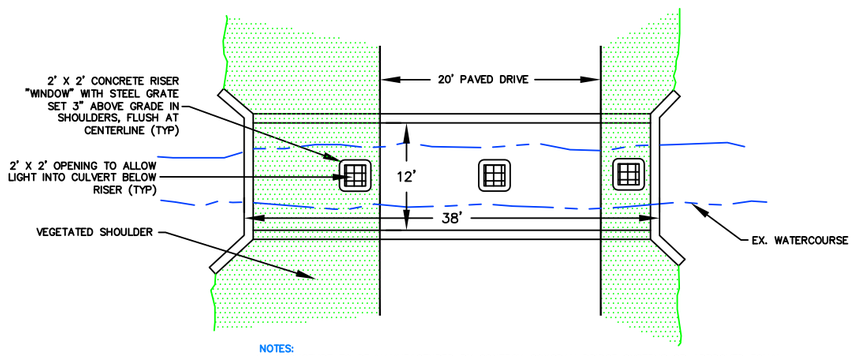
TEMPORARY OUTLET PIPE FOR SEDIMENT CONTAINMENT STORMWATER POND 2

N.T.S.



STORMWATER POND 2 OUTLET CONTROL STRUCTURE

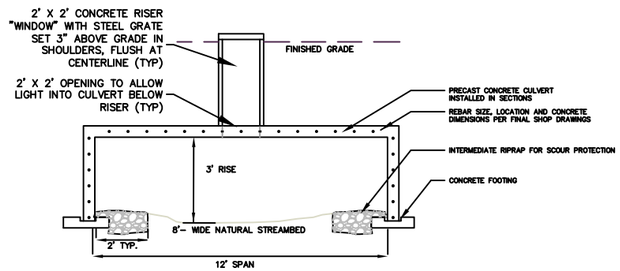
N.T.S.



NOTES:
1. STRUCTURE TO BE MANUFACTURED BY CONTECH CONSPAN BRIDGE SYSTEMS OR APPROVED EQUAL.
2. STRUCTURE TO BE DESIGNED TO HAVE MINIMUM OF 1' OF COVER AND MAXIMUM OF 9.0' OF COVER.
3. STRUCTURE IS TO BE DESIGNED TO HANDLE HS 20 LIVE LOADS AS WELL AS CRAWLER CRANE LOADS.
4. SHOP DRAWINGS TO BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
5. DRIVEWAY TO BE PAVED FROM STATION 6+50 TO 9+00 TO ACCOMMODATE FENESTRATION CULVERT.

PRECAST CONCRETE CULVERT

PLAN VIEW
N.T.S.



NOTES:
1. STRUCTURE TO BE MANUFACTURED BY CONTECH CONSPAN BRIDGE SYSTEMS OR APPROVED EQUAL.
2. STRUCTURE TO BE DESIGNED TO HAVE MINIMUM OF 1' OF COVER AND MAXIMUM OF 9.0' OF COVER.
3. STRUCTURE IS TO BE DESIGNED TO HANDLE HS 20 LIVE LOADS AS WELL AS CRAWLER CRANE LOADS.
4. SHOP DRAWINGS TO BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
5. DRIVEWAY TO BE PAVED FROM STATION 6+50 TO 9+00 TO ACCOMMODATE FENESTRATION CULVERT.

PRECAST CONCRETE CULVERT

CROSS SECTION
N.T.S.

NO.	REVISION	DATE

Previous Editions Obsolete

BNE ENERGY, INC.
29 SOUTH MAIN STREET
TOWN CENTER SUITE 200
WEST HARTFORD, CT 06107

DETAILS

WIND COLEBROOK NORTH
ROCK HALL ROAD

COLEBROOK CONNECTICUT

CIVIL C1
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DRAWN: BB APPROVED: CJ
SCALE: AS NOTED
DATE: 23 SEP 11
PROJ. NO.: 3093
CADD FILE NAME: 3093
DRAWING NO.: C-605

Appendix B

INSPECTION AND MAINTENANCE RECORDS

INSPECTOR CERTIFICATION

Project:	Wind Colebrook North
Project Location:	Winsted- Norfolk Road Colebrook North
Contractor:	
Address:	
Phone:	
Fax:	

CONSTRUCTION INSPECTION & MAINTENANCE LOG

Date	Activity	Description	(1) Report No.
	❑ Inspection ❑ Maintenance	By: ______________________	
	❑ Inspection ❑ Maintenance	By: ______________________	
	❑ Inspection ❑ Maintenance	By: ______________________	
	❑ Inspection ❑ Maintenance	By: ______________________	
	❑ Inspection ❑ Maintenance	By: ______________________	
	❑ Inspection ❑ Maintenance	By: ______________________	
	❑ Inspection ❑ Maintenance	By: ______________________	
	❑ Inspection ❑ Maintenance	By: ______________________	
	❑ Inspection ❑ Maintenance	By: ______________________	
	❑ Inspection ❑ Maintenance	By: ______________________	

CONSTRUCTION SITE INSPECTION REPORT

General Information				
Project Name:	Wind Colebrook North			
Location:	Winsted- Norfolk Road Colebrook, Connecticut			
CT DEP Tracking No.		(1) Report No.		
Date of Inspection:		Start / End Time:		
Inspector's Name(s):				
Inspector's Title(s):				
Inspector's Contact Information:				
Describe present phase of construction:				
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event				
Weather Information				
Has it rained since the last inspection? ❑Yes ❑No If yes, provide: Storm Start Date & Time: Storm Duration (hrs): Approximate Rainfall (in):				
Weather at time of this inspection?				
Discharge Information (A)				
Do you suspect that discharges may have occurred since the last inspection? ❑Yes ❑No				
Are there any discharges at the time of inspection? ❑Yes ❑No				
Describe location of any discharges from the site:				

SITE-SPECIFIC BMPs

(B)	BMP Description	BMP Installed and Operating Properly?	Corrective Action Needed	Date for corrective action / responsible party
1		❑Yes ❑No		
2		❑Yes ❑No		
3		❑Yes ❑No		
4		❑Yes ❑No		
5		❑Yes ❑No		
6		❑Yes ❑No		
7		❑Yes ❑No		
8		❑Yes ❑No		
9		❑Yes ❑No		
10		❑Yes ❑No		
11		❑Yes ❑No		
12		❑Yes ❑No		
13		❑Yes ❑No		
14		❑Yes ❑No		
15		❑Yes ❑No		
16		❑Yes ❑No		
17		❑Yes ❑No		
18		❑Yes ❑No		
19		❑Yes ❑No		

OVERALL SITE ISSUES

(C)	BMP/activity	Implemented?	Maintained?	Corrective Action	Date for corrective action/responsible person
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No		
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No		
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No		
4	Are discharge points and receiving waters free of sediment deposits?	❑Yes ❑No	❑Yes ❑No		
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No		
6	Is there evidence of sediment being tracked into the street?	❑Yes ❑No	❑Yes ❑No		
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No		

(C)	BMP/activity	Implemented?	Maintained?	Corrective Action	Date for corrective action/responsible person
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No		
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No		
10	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No		
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No		
12	(Other)	❑Yes ❑No	❑Yes ❑No		
13	(Other)	❑Yes ❑No	❑Yes ❑No		

(C)	BMP/activity	Implemented?	Maintained?	Corrective Action	Date for corrective action/responsible person

GENERAL INSPECTION COMMENTS AND EXPLANATION

General Inspection Comments (D)
Is other descriptive information attached to this inspection report? ❑Yes ❑No

Plan Information (E)
Were all current plan BMP's in place at the time of inspection? ❑Yes ❑No
Are additional BMP's required? ❑Yes ❑No
Does the plan need to be updated? ❑Yes ❑No
Explanation of additional BMP and Plan update requirements:

Certification statement:
I certify that I have thoroughly and completely reviewed the Stormwater Pollution Control Plan for the site. I further certify, based on such review and in my professional judgment, that the

Stormwater Pollution Control Plan has been prepared in accordance with the Connecticut Guidelines for Soil Erosion and Sediment Control, as amended, and the conditions for the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities issued on October 1, 2002 (or as reissued or modified), and the controls required for such Plan are appropriate for the site. I am aware that there are significant penalties for false statements in this certification, including the possibility of fine and imprisonment for knowingly making false statements.

Name: _____
(Please print)
Signature: _____

Title: _____ Date: _____

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CONSTRUCTION SITE MAINTENANCE REPORT

General Information				
Project Name:	Wind Colebrook North			
Location:	Winsted- Norfolk Road Colebrook, Connecticut			
CT DEP Tracking No.:		(1) Report No.		
Date of Maintenance:		Start / End Time:		
Describe present phase of construction:				
Type of Maintenance: ❑ Regular ❑ Pre-storm event ❑ Post-storm event ❑ Plan Update				
Maintenance Information				
Inspection Report Reference (No., Item)	Maintenance performed:			
Performed by:				
Inspection Report Reference (No., Item)	Maintenance performed:			
Performed by:				
Inspection Report Reference (No., Item)	Maintenance performed:			
Performed by:				
Inspection Report Reference (No., Item)	Maintenance performed:			
Performed by:				
Inspection Report Reference (No., Item)	Maintenance performed:			
Performed by:				

Inspection Report Reference (No., Item)	Maintenance performed:
Performed by:	
Inspection Report Reference (No., Item)	Maintenance performed:
Performed by:	
Inspection Report Reference (No., Item)	Maintenance performed:
Performed by:	
Inspection Report Reference (No., Item)	Maintenance performed:
Performed by:	
Inspection Report Reference (No., Item)	Maintenance performed:
Performed by:	
Inspection Report Reference (No., Item)	Maintenance performed:
Performed by:	
Inspection Report Reference (No., Item)	Maintenance performed:
Performed by:	
Inspection Report Reference (No., Item)	Maintenance performed:
Performed by:	

Certification statement:
I certify that I have thoroughly and completely reviewed the Stormwater Pollution Control Plan for the site. I further certify, based on such review and in my professional judgment, that the Stormwater Pollution Control Plan has been prepared in accordance with the Connecticut Guidelines for Soil Erosion and Sediment Control, as amended, and the conditions for the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities issued on October 1, 2002 (or as reissued or modified), and the controls required for such Plan are appropriate for the site. I am aware that there are significant penalties for false statements in this certification, including the possibility of fine and imprisonment for knowingly making false statements.

Name: _____

Signature: _____

Title: _____ Date: _____

Appendix C

SUPPORTING CALCULATIONS

CALCULATIONS FOR SWALES, CULVERTS, RIP RAP AND TEMPORARY SEDIMENT TRAPS

Wind Colebrook North
Winsted-Norfolk Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR TEMPORARY DIVERSION #1 (TD1)

10-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 2.23 ac.
Proposed Land Cover
Grass = 0.15 ac.
Wooded = 2.08 ac.

C = [(.3*.15)+(.2*2.08)]/2.23 = 0.21
Time of Concentration = 20 minutes ∴ I = 3.6 in/hr

Q = C*I*A = .21 * 3.6 * 2.23 = 1.69 cfs

Velocity in grass-lined swale at 5% slope = 3.4 fps.

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	TD1
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	050000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	1.69	cfs

Results		
Depth	0.21	ft
Flow Area	0.5	ft²
Wetted Perim	2.92	ft
Top Width	2.82	ft
Critical Depth	0.26	ft
Critical Slope	0.023191	ft/ft
Velocity	3.40	ft/s ← GRASS LINED SWALE
Velocity Head	0.18	ft
Specific Energ	0.39	ft
Froude Numb	1.43	
Flow Type	Supercritical	

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37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Wind Colebrook North
Winsted-Norfolk Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR TEMPORARY DIVERSION #2 (TD2)

10-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 0.73 ac.
Proposed Land Cover
Grass = 0.05 ac.
Wooded = 0.68 ac.

C = [(.3*.05)+(.2*0.68)]/.73 = 0.21
Time of Concentration = 12 minutes $\therefore$ I = 4.5 in/hr

Q = C*I*A = .21 * 4.5 * 0.73 = 0.70 cfs

Velocity in grass-lined swale at max 14% slope = 3.51 fps.

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	TD2
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	140000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	0.70	cfs

Results		
Depth	0.09	ft
Flow Area	0.2	ft²
Wetted Perim	2.41	ft
Top Width	2.37	ft
Critical Depth	0.15	ft
Critical Slope	0.026813	ft/ft
Velocity	3.51	ft/s ← GRASS-LINED SWALE
Velocity Head	0.19	ft
Specific Energ	0.28	ft
Froude Numb	2.13	
Flow Type	Supercritical	

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Wind Colebrook North
Winsted-Norfolk Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR TEMPORARY DIVERSION #3 (TD3)

10-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 0.62 ac.
Proposed Land Cover
Grass = 0.06 ac.
Wooded = 0.56 ac.

C = [(.3*.06)+(.2*0.56)]/0.62 = 0.21
Time of Concentration = 25 minutes ∴ I = 3.2 in/hr

Q = C*I*A = .21 * 3.2 * 0.62 = 0.42 cfs

Velocity in grass-lined swale at 12% slope = 2.78 fps.

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	TD3
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	120000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	0.42	cfs

Results		
Depth	0.07	ft
Flow Area	0.2	ft²
Wetted Perim	2.32	ft
Top Width	2.28	ft
Critical Depth	0.11	ft
Critical Slope	0.029456	ft/ft
Velocity	2.78	ft/s
Velocity Head	0.12	ft
Specific Energ	0.19	ft
Froude Numb	1.91	
Flow Type	Supercritical	

← GRASS LINED SWALE

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Wind Colebrook North
Winsted-Norfolk Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR PERMANENT DIVERSION SWALE #1(PDS1)

25-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 2.91 ac.
Proposed Land Cover
Grass = 0.25 ac.
Wooded = 2.66 ac.

C = [(.3*.25)+(.2*2.66)]/2.91= 0.21
Time of Concentration = 18 minutes ∴ I = 4.4 in/hr

Q = C*I*A = .21 * 4.4 * 2.91 = 2.69 cfs

Velocity in riprap-lined swale at 9.0% slope = 3.97 fps.

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	PDS1
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	090000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	2.69	cfs

Results		
Depth	0.27	ft
Flow Area	0.7	ft²
Wetted Perim	3.20	ft
Top Width	3.07	ft
Critical Depth	0.34	ft
Critical Slope	0.038339	ft/ft
Velocity	3.97	ft/s
Velocity Head	0.24	ft
Specific Energ	0.51	ft
Froude Numb	1.49	
Flow Type	Supercritical	

← MOD RIPRAP SIZE

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Wind Colebrook North
Winsted-Norfolk Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR PERMANENT DIVERSION SWALE #2(PDS2)

25-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 5.73 ac.
Proposed Land Cover
Grass = .10 ac.
Wooded = 5.63 ac.

C = [(.3*.10)+(.2*5.63)]/5.73= 0.20
Time of Concentration = 21 minutes ∴ I = 4.1 in/hr

Q = C*I*A = .20 * 4.1 * 5.73 = 4.70 cfs

Velocity in riprap-lined swale at 4.5% slope = 3.69 fps.

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	PDS2
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	045000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	4.70	cfs

Results		
Depth	0.44	ft
Flow Area	1.3	ft²
Wetted Perim	3.97	ft
Top Width	3.77	ft
Critical Depth	0.47	ft
Critical Slope	0.035378	ft/ft
Velocity	3.69	ft/s ← MOD. RIPRAP SWALE
Velocity Head	0.21	ft
Specific Energ	0.65	ft
Froude Numb	1.12	
Flow Type	Supercritical	

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Wind Colebrook North
Winsted-Norfolk Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR CROSS CULVERT TO LEVEL SPREADER TURBINE 2 ACCESS ROAD STATION 0+60L

25-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

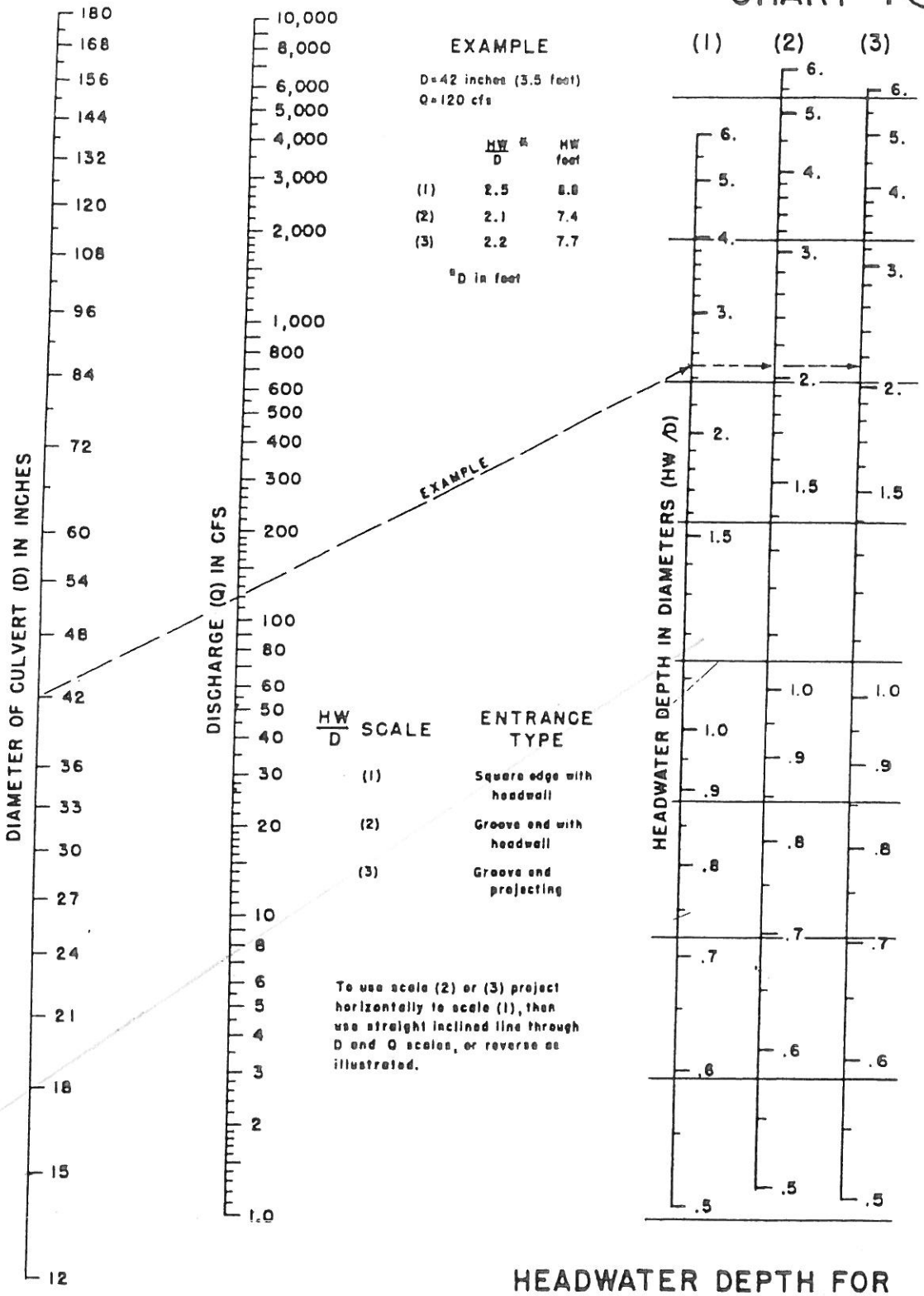
Total area contributing to swale: 8.64 ac.
Proposed Land Cover
Grass = 0.35 ac.
Wooded = 8.29 ac.

C = [(.3*.35)+(.2*8.29)]/8.29= 0.20
Time of Concentration = 21 minutes ∴ I = 4.1 in/hr

Q = C*I*A = .20 * 4.1 * 8.64 = 7.08 cfs

For 18" culvert - HW/D = 1.07

CHART 1



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2 & 3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

CROSS CULVERT TURBINE 2
ACCESS ROAD STA. 0+60L

OUTLET PROTECTION - OUTLET VELOCITY ≤ 14 feet/sec

DISCHARGE (cfs)	OUTLET PIPE DIAMETER OR SPAN (in)									
	12	15	18	24	30	36	42	48	54	60
0-5	***10***	***10***		***USE***						
6	12	11								
7		13	***12***							
8		14	13	***12***		***MINIMUM***				
9			14	13						
10			15	13						
11			16	14				***LENGTH***		
12				14						
14				16	***14***					
16				17	15	***14***			***OUTLINED***	
18				18	16	15				
20					17	15	***14***			
22		***USE***			18	16	15			
24						17	15	***14***		
26						17	16	15		
28						18	16	15		
30						19	17	16		
35						20	18	17	***16***	
40			***PREFORMED***				20	18	17	***16***
45							21	19	18	16
50							22	20	18	17
55								21	19	18
60								22	20	19
65								24	21	20
70					***SCOUR***			25	22	20
75								26	23	21
80									24	22
90									26	24
100									28	25
110										27
125							***HOLE***			29
130										30

Table 8-6.1 - Length - L_a (feet)
Type A Riprap Apron

Notes: 1. Bold face outlined boxes indicate minimum L_a to be used for a given pipe diameter or span.
2. Rounding and interpolating are acceptable.

$W = 3(S_p) + 0.4(L_a) = 9.3'$, use 10'

USE 10'W × 12'L MOD. RIPRAP PAD

Cross culvert - Turbine 2 Access Road
Worksheet for Circular Channel

STA. 0+60L

Project Description	
Worksheet	Circular Channel
Flow Element	Circular Channel
Method	Manning's Formu
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Channel Slope	010000	ft/ft
Diameter	18.0	in
Discharge	7.01	cfs

Results		
Depth	0.90	ft
Flow Area	1.1	ft²
Wetted Perime	2.65	ft
Top Width	0.00	ft
Critical Depth	1.03	ft
Percent Full	59.7	%
Critical Slope	0.006774	ft/ft
Velocity	6.37	ft/s ← USE MOD. RIPRAP
Velocity Head	0.63	ft
Specific Energ	1.53	ft
Froude Numbe	1.30	
Maximum Disc	11.30	cfs
Discharge Full	10.50	cfs
Slope Full	0.004454	ft/ft
Flow Type	Supercritical	

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Wind Colebrook North
Winsted-Norfolk Road

DRAINAGE CALCULATIONS FOR PERMANENT DIVERSION SWALE #3(PDS3)

25-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 8.86 ac.
Proposed Land Cover
Grass = 0.70 ac.
Wooded = 8.16 ac.

C = [(.3*.70)+(.2*8.16)]/8.86= 0.21
Time of Concentration = 22 minutes ∴ I = 4.0 in/hr

Q = C*I*A = .21 * 4.0 * 8.86 = 7.44 cfs

Velocity in riprap-lined swale at max 17.0% slope = 6.75 fps.

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	PDS3
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	170000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	7.44	cfs

Results		
Depth	0.40	ft
Flow Area	1.1	ft²
Wetted Perim	3.77	ft
Top Width	3.58	ft
Critical Depth	0.61	ft
Critical Slope	0.033251	ft/ft
Velocity	6.75	ft/s
Velocity Head	0.71	ft
Specific Ener	1.10	ft
Froude Numb	2.14	
Flow Type	Supercritical	

← MOD. RIPRAP SUOALE

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Worksheet
Worksheet for Circular Channel

STORMWATER POND 1 OUTLET

Project Description	
Worksheet	Pond 1 outlet
Flow Element	Circular Chann
Method	Manning's For
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Channel Slope	050000	ft/ft
Diameter	15.0	in
Discharge	2.65	cfs

Results		
Depth	0.36	ft
Flow Area	0.3	ft²
Wetted Perime	1.42	ft
Top Width	0.00	ft
Critical Depth	0.65	ft
Percent Full	29.0	%
Critical Slope	0.005816	ft/ft
Velocity	8.97	ft/s
Velocity Head	1.25	ft
Specific Energ	1.61	ft
Froude Numbe	3.10	
Maximum Disc	15.54	cfs
Discharge Full	14.44	cfs
Slope Full	0.001683	ft/ft
Flow Type	Supercritical	

← USE INT. RIPRAP PAD

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OUTLET PROTECTION - OUTLET VELOCITY ≤ 14 feet/sec

DISCHARGE (cfs)	OUTLET PIPE DIAMETER OR SPAN (in)									
	12	15	18	24	30	36	42	48	54	60
0-5	***10***	***10***		***USE***						
6	12	11								
7		13	***12***							
8		14	13	***12***		***MINIMUM***				
9			14	13						
10			15	13						
11			16	14				***LENGTH***		
12				14						
14				16	***14***					
16				17	15	***14***			***OUTLINED***	
18				18	16	15				
20					17	15	***14***			
22		***USE***			18	16	15			
24						17	15	***14***		
26						17	16	15		
28						18	16	15		
30						19	17	16		
35						20	18	17	***16***	
40			***PREFORMED***				20	18	17	***16***
45							21	19	18	16
50							22	20	18	17
55								21	19	18
60								22	20	19
65								24	21	20
70					***SCOUR***			25	22	20
75								26	23	21
80									24	22
90									26	24
100									28	25
110										27
125							***HOLE***			29
130										30

Table 8-6.1 - Length - L_a (feet)
Type A Riprap Apron

Notes: 1. Bold face outlined boxes indicate minimum L_a to be used for a given pipe diameter or span.
2. Rounding and interpolating are acceptable.

$W = 3(S_p) + 0.4\,L_a = 7.75'$, USE 8'

8'W × 10'L INT. RIPRAP PAD

Wind Colebrook North
Winsted-Norfolk Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR CROSS CULVERT UNDER MAIN ACCESS DRIVE STATION 19+53

25-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 1.24 ac.
Proposed Land Cover
Impervious = 0.05
Grass = 0.33 ac.
Wooded = 0.86 ac.

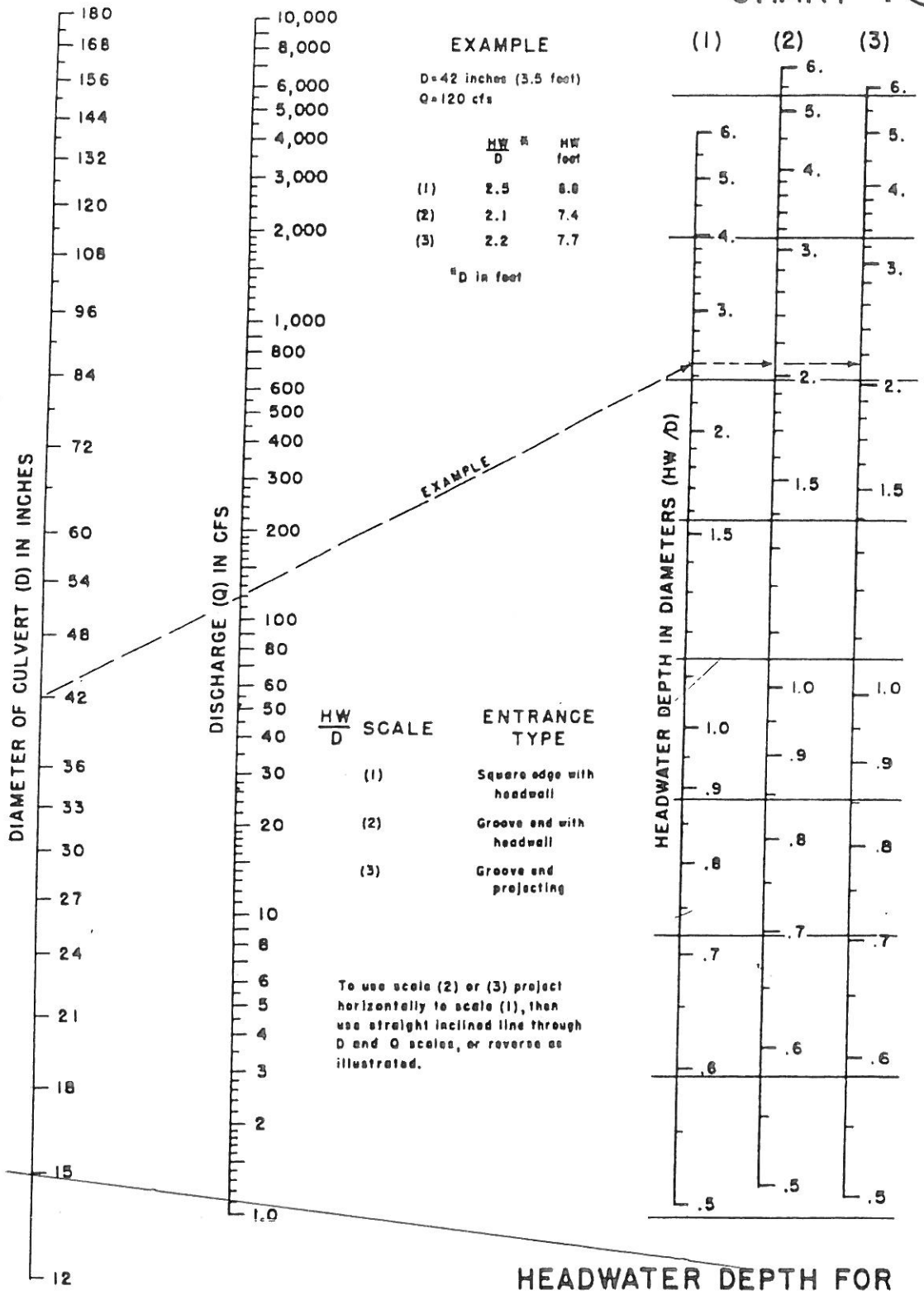
C = [(.9*.05)+(.3*.33)+(.2*.86)]/1.24 = 0.24
Time of Concentration = 20 minutes ∴ I = 3.6 in/hr

Q = C*I*A = .25 * 3.6 * 1.24 = 1.14 cfs

For 15" culvert - HW/D = <0.5

Use 5' X 5' modified riprap pad at outlet into swale

CHART 1



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2 & 3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

CROSS CULVERT MAIN ACCESS DRIVE STA. 19+53

Wind Colebrook North
Winsted-Norfolk Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR PERMANENT CONVEYANCE SWALE #1 (PCS1) AND CROSS CULVERT UNDER MAIN ACCESS DRIVE AT STATION 15+10

25-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 0.35 ac.
Proposed Land Cover
Grass = 0.07 ac.
Impervious = 0.28 ac.

C = [(.3*.07)+(.9*.28)]/.35= 0.79
Time of Concentration = 5 minutes $\therefore$ I = 6.7 in/hr

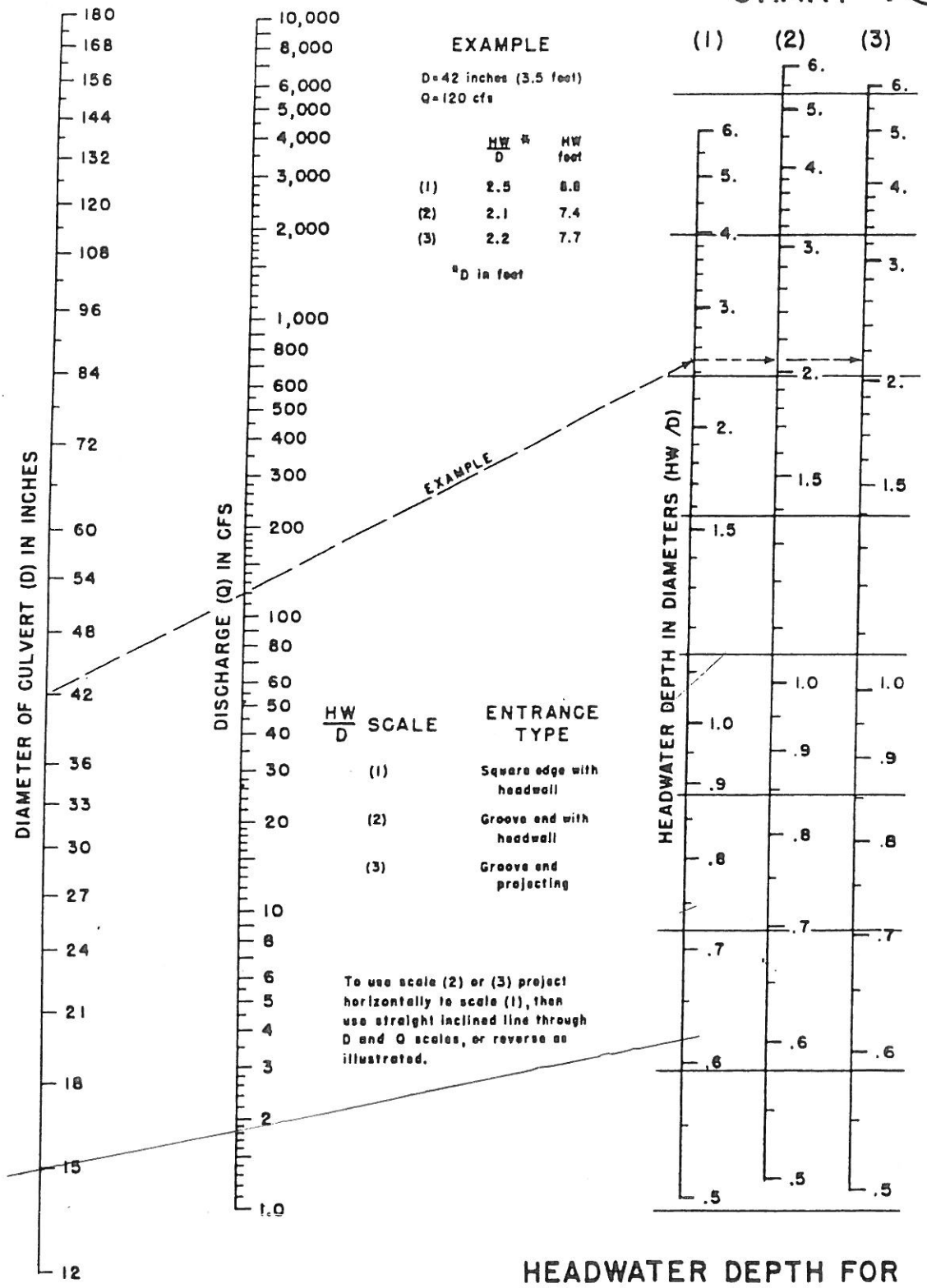
Q = C*I*A = .79 * 6.7 * 0.35 = 1.86 cfs

Velocity in riprap swale at max 8% slope = 3.39 fps

For 15" culvert - HW/D = 0.65

Use 5' X 5' modified riprap pad at outlet into swale

CHART 1



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

CROSS CULVERT
MAIN ACCESS DRIVE
STA. 15+10

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	PCS1
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	080000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	1.86	cfs

Results		
Depth	0.22	ft
Flow Area	0.5	ft²
Wetted Perim	3.00	ft
Top Width	2.90	ft
Critical Depth	0.27	ft
Critical Slope	0.040520	ft/ft
Velocity	3.39	ft/s ← MOD. RIPRAP SWALE
Velocity Head	0.18	ft
Specific Ener	0.40	ft
Froude Numb	1.37	
Flow Type	Supercritical	

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Colebrook, CT

DRAINAGE CALCULATIONS FOR PERMANENT CONVEYANCE SWALE #2 (PCS2)

25-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 4.65 ac.
Proposed Land Cover
Impervious = 0.75 ac.
Grass = 0.40 ac.
Wooded = 3.50 ac.

C = [(.9*.75)+(.3*.40)+(.2*3.50)]/4.65 = 0.32
Time of Concentration = 21 minutes $\therefore$ I = 4.1 in/hr

Q = C*I*A = .32 * 4.1 * 4.65 = 6.10 cfs

Velocity in riprap-lined swale at max 15% slope = 6.09 fps

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	PCS2
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	150000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	6.10	cfs

Results		
Depth	0.37	ft
Flow Area	1.0	ft²
Wetted Perim	3.64	ft
Top Width	3.47	ft
Critical Depth	0.55	ft
Critical Slope	0.034142	ft/ft
Velocity	6.09	ft/s
Velocity Head	0.58	ft
Specific Energ	0.94	ft
Froude Numb	2.00	
Flow Type	Supercritical	

← MOD. RIPRAP SWALE

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Wind Colebrook North
Winsted-Norfolk Road
Colebrook, CT

DRAINAGE CALCULATIONS FOR PERMANENT CONVEYANCE SWALE #3 (PCS3)

25-YEAR DESIGN STORM
9-23-11

Rational Method:
Q = CIA
Where:
Q = flow rate (cfs)
C = runoff coefficient
I = rainfall intensity (in/hr)
A = area (ac.)

Total area contributing to swale: 1.70 ac.
Proposed Land Cover
Impervious = 0.25 ac.
Grass = 0.85 ac.
Wooded = 0.60 ac.

C = [(.9*.25)+(.3*0.85)+(.2*.60)]/1.70 = 0.60
Time of Concentration = 25 minutes ∴ I = 3.2 in/hr

Q = C*I*A = .60 * 3.2 * 1.70 = 3.26 cfs

Velocity in riprap-lined swale at max 8.5% slope = 4.13 fps

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	PCS3
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.040	
Channel Slope	085000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	2.00	ft
Discharge	3.26	cfs

Results		
Depth	0.30	ft
Flow Area	0.8	ft²
Wetted Perim	3.36	ft
Top Width	3.21	ft
Critical Depth	0.38	ft
Critical Slope	0.037280	ft/ft
Velocity	4.13	ft/s
Velocity Head	0.26	ft
Specific Ener	0.57	ft
Froude Numb	1.47	
Flow Type	Supercritical	

← MOD. RIPRAP SWALE

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STORMWATER POND 2 OUTLET

Worksheet
Worksheet for Circular Channel

Project Description	
Worksheet	Pond 2 outlet
Flow Element	Circular Chann
Method	Manning's For
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.013	
Channel Slope	066700	ft/ft
Diameter	15.0	in
Discharge	1.88	cfs

Results		
Depth	0.28	ft
Flow Area	0.2	ft²
Wetted Perime	1.24	ft
Top Width	0.00	ft
Critical Depth	0.55	ft
Percent Full	22.7	%
Critical Slope	0.005436	ft/ft
Velocity	9.00	ft/s
Velocity Head	1.26	ft
Specific Energ	1.54	ft
Froude Numbe	3.55	
Maximum Disc	17.95	cfs
Discharge Full	16.68	cfs
Slope Full	0.000847	ft/ft
Flow Type	Supercritical	

← USE INT. RIPRAP PAD

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STORMWATER POND 2 OUTLET

OUTLET PROTECTION - OUTLET VELOCITY ≤ 14 feet/sec

DISCHARGE (cfs)	OUTLET PIPE DIAMETER OR SPAN (in)									
	12	15	18	24	30	36	42	48	54	60
0-5	***10***	***10***		***USE***						
6	12	11								
7		13	***12***							
8		14	13	***12***		***MINIMUM***				
9			14	13						
10			15	13						
11			16	14				***LENGTH***		
12				14						
14				16	***14***					
16				17	15	***14***			***OUTLINED***	
18				18	16	15				
20					17	15	***14***			
22		***USE***			18	16	15			
24						17	15	***14***		
26						17	16	15		
28						18	16	15		
30						19	17	16		
35						20	18	17	***16***	
40			***PREFORMED***				20	18	17	***16***
45							21	19	18	16
50							22	20	18	17
55								21	19	18
60								22	20	19
65								24	21	20
70					***SCOUR***			25	22	20
75								26	23	21
80									24	22
90									26	24
100									28	25
110										27
125							***HOLE***			29
130										30

Table 8-6.1 - Length - L_a (feet)
Type A Riprap Apron

Notes: 1. Bold face outlined boxes indicate minimum L_a to be used for a given pipe diameter or span.
2. Rounding and interpolating are acceptable.

$W = 3(S_p) + 0.4(L_a) = 7.75'$, use 8'

8'W × 10'L INT. RIPRAP PAD

TEMPORARY SEDIMENT TRAP SIZING
PER 2002 CT DEP E&S MANUAL
9-23-11

TST 1 (MAIN ACCESS DRIVE - STATION 20+00 – TURBINE 3 LOCATION):

Initial Storage Volume = 134 cubic yards per acre of drainage area
V = 134 cubic yards x 0.85 acres = 114 cubic yards
Half of Storage Volume will be wet and half dry = 114 / 2 = 57 cubic yards = 1,539 cubic feet

Vwet = 0.85 x Awet x Dwet
If trap is 2.0' deep: 1,539 cubic feet = 0.85 x Awet x 2.0'
Awet required = 905 square feet
Use dimension of 20' x 46' for Wet Surface Area = Awet = 920 square feet

Vdry = (Awet + Adry)/2 x Ddry
If dry area is 1.5' high, Adry = 26' x 52' = 1,352 sf
Vdry = (920 + 1,352)/2 x 1.5' = 1,704 cubic feet
Use dimension of 26' x 52' for Dry Surface Area

TST 2 (TURBINE 2 LOCATION):

Initial Storage Volume = 134 cubic yards per acre of drainage area
V = 134 cubic yards x 0.89 acres = 119 cubic yards
Half of Storage Volume will be wet and half dry = 119 / 2 = 59.5 cubic yards = 1,606 cubic feet

Vwet = 0.85 x Awet x Dwet
If trap is 2.0' deep: 1,606 cubic feet = 0.85 x Awet x 2.0'
Awet required = 945 square feet
Use dimension of 20' x 50' for Wet Surface Area = Awet = 1,000 square feet

Vdry = (Awet + Adry)/2 x Ddry
If dry area is 1.5' high, Adry = 26' x 56' = 1,456 sf
Vdry = (1,000 + 1,456)/2 x 1.5' = 1,842 cubic feet
Use dimension of 26' x 56' for Dry Surface Area

TST 3 (MAIN ACCESS DRIVE - STATION 10+00 – STORNWATER POND 1 LOCATION):

Initial Storage Volume = 134 cubic yards per acre of drainage area
V = 134 cubic yards x 4.85 acres = 650 cubic yards
Half of Storage Volume will be wet and half dry = 650/2 = 325 cubic yards = 8,775 cubic feet

Vwet = 0.85 x Awet x Dwet
If trap is 3.0' deep: 8,775 cubic feet = 0.85 x Awet x 3.0'
Awet required = 3,441 square feet
Use dimension of 38' x 98' for Wet Surface Area = Awet = 3,724 square feet

Vdry = (Awet + Adry)/2 x Ddry
If dry area is 3.0' high, Adry = 56' x 116' = 6,496 sf
Vdry = (3,724 + 6,496)/2 x 3.0' = 15,330 cubic feet
Use dimension of 56' x 116' for Dry Surface Area

*Note – TST3 is significantly oversized because area will be rough graded to be used as Stormwater Pond post-construction.

TST 4 (MAIN ACCESS DRIVE - STATION 6+00 – STORMWATER POND 2 LOCATION):

Initial Storage Volume = 134 cubic yards per acre of drainage area
V = 134 cubic yards x 1.62 acres = 217 cubic yards
Half of Storage Volume will be wet and half dry = 217/2 = 108.5 cubic yards = 2,930 cubic feet

Vwet = 0.85 x Awet x Dwet
If trap is 3.0' deep: 2,930 cubic feet = 0.85 x Awet x 3.0'
Awet required = 1,149 square feet
Use dimension of 24' x 86' for Wet Surface Area = Awet = 2,064 square feet

Vdry = (Awet + Adry)/2 x Ddry
If dry area is 2.5' high, Adry = 39' x 101' = 3,939 sf
Vdry = (2,064 + 3,939)/2 x 2.5' = 7,504 cubic feet
Use dimension of 39' x 101' for Dry Surface Area

*Note – TST4 is significantly oversized because area will be rough graded to be used as Stormwater Pond post-construction.