CONNECTICUT EXPANSION PROJECT

CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION

STATE POLLUTION DISCHARGE ELIMINATION SYSTEM GENERAL PERMIT FOR DISCHARGE OF STORMWATER AND DEWATERING WASTEWATERS FORM CONSTRUCTION ACTIVITIES (PERMIT NO. DEEP-WPD-GP-015)

STORMWATER POLLUTION CONTROL PLAN

Suffield and East Granby, Connecticut

Submitted by:

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Table of Contents

1.0 General Project (Site) Description 1-1

1.1 Location and Description of Facilities 1-1
1.1.1 Pipeline Facilities 1-1
1.1.2 Appurtenant Facilities 1-2

1.2 Land Requirements 1-3
1.2.1 Operation / Permanent Easement 1-4
1.2.2 Temporary Workspace / Additional Temporary Workspace 1-5
1.2.3 Pipe / Equipment Storage Yards and Contractor Yards 1-5
1.2.4 Access Roads 1-5
1.2.5 Pipeyards and Contractor Yards 1-5
1.2.6 Additional Temporary Workspace 1-5

2.0 Existing Conditions 2-7

2.1 Ground Water Resources 2-7
2.1.1 Aquifers 2-7
2.1.2 Public and Private Water Supply Wells 2-7
2.1.3 Groundwater Hazards 2-8

2.2 Surface Water Resources 2-10
2.2.1 Watersheds 2-10
2.2.2 Sensitive Surface Waters 2-10
2.2.3 Waterbodies 2-12
2.2.4 Wetlands 2-16
2.2.5 Hydrostatic Test Water 2-17

2.3 Soils 2-17
2.3.1 Estimate of Runoff Coefficient 2-18

2.4 Threatened and Endangered Species 2-18

2.5 Cultural Resources 2-18

3.0 Construction Sequencing and Description of Major Construction Activity 3-20

3.1 Sequence of Major Activities 3-20

3.2 Minimizing Disturbance 3-21

3.3 Marking the Corridor 3-21

3.4 Clearing and Grading 3-21

3.5 Erosion and Sediment Control 3-22

3.6 Trenching 3-22

3.7 Additional Pipeline Construction Activities 3-22
3.8 Trench Dewatering, Pipe Preparation and Lowering-In 3-23
3.9 Backfilling and Grade Restoration 3-23
3.10 Clean-up and Restoration 3-23
3.11 Hydrostatic Testing and Tie-Ins 3-24

4.0 Erosion and Sediment Control Measures 4-25
4.1 Limiting of Clearing 4-25
4.2 Sediment Barriers 4-25
4.2.1 Geotextile Silt Fence 4-26
4.2.2 Hay/Straw Bale Barriers 4-26
4.3 Surface Roughening 4-26
4.4 Slope Breakers (Waterbars) 4-27
4.5 Trench Breakers (Trench Plug) 4-27
4.6 Temporary Diversion Swales 4-27
4.7 Soil Stabilization Measures 4-27
4.7.1 Soil Binders 4-27
4.7.2 Mulching 4-27
4.8 Temporary and Permanent Stabilization 4-29
4.8.1 Temporary and Permanent Seeding 4-29
4.9 Construction Entrances 4-30
4.10 Waterbody Construction and Mitigation Procedures 4-30
4.10.1 Waterbody Crossings 4-30
4.10.2 Waterbody Construction and Mitigation Procedures 4-31
4.10.3 Construction Timing Restrictions 4-31
4.10.4 Waterbody Setbacks 4-32
4.11 Wetland Construction and Mitigation Procedures 4-33
4.11.1 Crossing Methods and Best Management Practices 4-33
4.11.2 Minimization of Impacts 4-35
4.12 Dewatering 4-36
4.13 Equipment Crossings 4-36
4.14 Hydrostatic Pressure Testing 4-36
4.15 Other Pollution Control Measures 4-36
4.15.1 Waste Management Plan 4-36
4.15.2 Spill Prevention and Response Plan 4-36
4.15.3 Groundwater Impact and Avoidance 4-37

5.0 INSPECTION, REPORTING, AND RECORD KEEPING 5-39

5.1 Inspection and Maintenance 5-39

5.2 Plan Implementation Inspections 5-39

5.3 Inspection Frequency 5-39

5.4 Reports 5-40

5.5 Recordkeeping 5-40

5.6 Changes and Amendments to the SWPCP 5-41

5.7 Termination Notice 5-41

5.7.1 Post-Construction Inspections 5-41

6.0 MONITORING 6-42

6.1 Monitoring Requirements 6-42

6.2 Monitoring Reports 6-42

6.3 Sampling Points 6-42

7.0 Post Construction Stormwater Management.....7-46

7.1 Post-construction Guidelines 7-46

7.2 Post-construction Performance Standards 7-46

8.0 REFERENCES 8-47

List of Attachments

Attachment A - General Permit Registration Form

Attachment B - Project Contact List

Attachment C - Contractor Certification Statements and Qualifications

Attachment D - Inspection Forms

D1 - Template Inspection Report

D2 - Stormwater Monitoring Reports

Attachment E – Soils Description and Map

Attachment F - Project Mapping and Site Plans

F1 - USGS Site Topographic Maps

F2 - Alignment Sheets

F3 - Pipeyard Plans

F4 - Access Road Plans

F5 - Forested Wetland Restoration Planting Plans

Attachment G - Agency Correspondence

Attachment H - Record of Revisions Form

Attachment I - Spill Form

Attachment J - Notice of Termination Form

Attachment K - FERC Plans and Procedures

Attachment L - Waste Management Plan

Attachment M - Spill Prevention and Response Plan

Attachment N - Tennessee's Best Management Practice Drawings

Attachment O - Hydrologic and Hydraulic Calculations

O1 - Access Roads Report

O2 - Diversion Swales Report

O3 - Access Road Silt Fence Reports

O4 - Silt Fence Design Summary Report

LIST OF TABLES

TABLE 1.1-1 PROPOSED PIPELINE FACILITIES FOR THE PROJECT IN CONNECTICUT 1-2
TABLE 1.1-2 PROPOSED APPURTENANT FACILITIES OF THE PROJECT IN CONNECTICUT 1-3
TABLE 1.2-1 SUMMARY OF CONNECTICUT LAND REQUIREMENTS FOR THE PROJECTS' CONNECTICUT LOOP SEGMENT 1-4
TABLE 1.2-2 PROPOSED PIPEYARDS / CONTRACTOR YARDS FOR THE PROJECT IN CONNECTICUT 1-6
TABLE 2.1-1 PUBLIC AND PRIVATE WATER SUPPLY WELLS PROTECTION AREAS WITHIN 150 FEET OF THE PROJECT IN CONNECTICUT 2-8
TABLE 6 2.1-2 DATABASE LISTINGS OF KNOWN HAZARDOUS WASTE RELEASE SITES WITHIN 0.25 MILE OF THE PROJECT IN CONNECTICUT 2-8
TABLE 2.2-1 - WATERSHEDS CROSSED BY THE PROJECT IN CONNECTICUT 2-10
TABLE 2.2-2 FEMA 100-YEAR FLOODPLAINS CROSSED BY THE PROJECT IN CONNECTICUT 2-12
TABLE 2.2-3 - WATERBODIES ASSOCIATED WITH THE PROJECT IN CONNECTICUT 2-14
TABLE 2.2-4 POTENTIAL SOURCES OF HYDROSTATIC PRESSURE TEST WATER FOR THE PROJECT IN CONNECTICUT 2-17
TABLE 6.1-1 - STORMWATER SAMPLING LOCATIONS 6-44

LIST OF ACRONYMS and ABBREVIATIONS

Acronym	Full Name
ASME	American Society of Mechanical Engineers
ATWS	additional temporary workspace
BMPs	Best Management Practices
CFR	Code of Federal Regulations
Commission or FERC	Federal Energy Regulatory Commission
Connecticut Guidelines	CTDEEP's 2002 Connecticut Guidelines for Soil Erosion and Sediment Control
Connecticut Loop	new, 24-inch OD pipeline looping totaling 8.10 miles in Massachusetts and Connecticut
CTDEEP	Connecticut Department of Energy and Environmental Protection
Connecticut SHPO	Historic Preservation & Museum Division of the Connecticut Department of Economic and Community Development
DOT	Department of Transportation
ECP	Environmental Construction Plan
EI	Environmental Inspector
EPA	Environmental Protection Agency
ER	Environmental Report
FEMA	Federal Emergency Management Agency
FERC or Commission	Federal Energy Regulatory Commission
ft2	square foot
GP	General Permit
HDD	horizontal directional drill
INGAA	Interstate Natural Gas Association of America
ISMP	Invasive Species Management Plan
lbs./acre	pounds per acre
LEI	Lead Environmental Inspector
MAOP	maximum allowable operating pressure
MLV	mainline valve
MP	milepost
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System

Acronym	Full Name
NRCS	Natural Resources Conservation Service
OD	Outside diameter
OHM	Oil and Hazardous Material
PAM	polyacrylamide
Plan or SWPCP	Stormwater Pollution Control Plan
the Plan	FERC'S Upland Erosion Control, Revegetation and Maintenance Plan
Project	Connecticut Expansion Project
psig	pounds per square inch
ROW	right-of-way
SFHA	FEMA Special Flood Hazard Areas
Spill Plan	Spill Prevention and Response Plan
SHPO	State Historic Preservation Office
SWPCP or Plan	Stormwater Pollution Control Plan
Tennessee	Tennessee Gas Pipeline Company, L.L.C.
The Act	Inland Wetlands and Watercourses Act, (Section 22a-36 through 45 of the Connecticut General Statutes)
TWS	temporary workspace
U.S.	United States
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USDOT PHMSA	United States Department of Transportation Pipeline and Hazardous Materials Safety Administration
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1.0 General Project (Site) Description

The Project involves (1) the construction of two sections of new, 36-inch outside diameter ("OD") pipeline looping totaling 1.35 miles in New York, 3.81 miles in Massachusetts and one section of new, 24-inch OD pipeline looping totaling 8.26 miles in Massachusetts and Connecticut ("Connecticut Loop"); approximately 0.11 miles of the "Connecticut Loop" is proposed in Massachusetts, the remaining 8.15 miles is proposed in Connecticut. (2) minor modifications at the existing Agawam Compressor Station in Massachusetts ("Station 261"), and (3) appurtenant facilities, including a main line valve ("MLV"), cathodic protection, and pig launchers and receivers. To the extent that it is practicable, feasible, and in compliance with existing law, Tennessee proposes to locate the pipeline loops within or adjacent to the right-of-way ("ROW") associated with its existing pipeline designated as the 200 Line in New York and Massachusetts and 300 Line in Connecticut. Tennessee proposes to begin construction of the Project facilities in the spring of 2016 and to place the facilities in-service by November 1, 2016.

Tennessee's existing pipeline infrastructure consists of approximately 11,900 miles of pipeline designated as the 100, 200, 300, 400, 500, and 800 Lines, based on the region they serve. The proposed Project focuses on the existing 200 and 300 Lines. The 200 Line consists of multiple pipelines varying from 24-inch to 36-inch in diameter beginning at the suction of Compressor Station 200 in Greenup County, Kentucky, and extends east through Ohio, Pennsylvania, New York, Massachusetts, and New England. The 300 Line system consists of a 24-inch and 30-inch diameter pipeline starting at the discharge of Compressor Station 219 in Mercer County, Pennsylvania, traveling east through Pennsylvania, New Jersey, New York, Connecticut and ending as a 16-inch-diameter pipeline at Compressor Station 261 in Hampden County, Massachusetts. In New York, the Project involves the section of existing 200 Line originating approximately 2.72 miles southeast of MLV 251; in Massachusetts, the Project involves the section of existing 200 Line originating at MLV 258 and extending southeastward; and in Massachusetts and Connecticut, the Project involves the section of the existing 300 Line from the meter station in East Granby, Connecticut upstream to Compressor Station 261 in Hampden County, Massachusetts.

1.1 Location and Description of Facilities

1.1.1 Pipeline Facilities

Facilities in Connecticut consist of approximately 8.15 miles of new 24-inch OD pipeline co-located within or adjacent to Tennessee's existing 16-inch 300-1 Line ROW.

The loop segment commences in Massachusetts and extends approximately 8.15 miles southward from the Massachusetts border to the East Granby Meter Station at the terminus of the loop. The proposed pipeline is designed for a maximum allowable operating pressure ("MAOP") of 800 pounds per square inch ("psig") and will be constructed of carbon steel. One new bi-directional pig launcher/receiver with valves will be installed at the terminus point within Tennessee's existing East Granby Meter Station, located in East Granby, Connecticut. The new 24-inch pipeline loop segment will tie into Tennessee's existing 300-1 Line. A new MLV will also be installed at approximate MP 4.15 south of Mountain Road in Suffield, Connecticut. A summary of the proposed facilities in Connecticut is provided in Table 1.1-1.

TABLE 1.1-1 PROPOSED PIPELINE FACILITIES FOR THE PROJECT IN CONNECTICUT

Facility ID	Outside Diameter ("OD")	Milepost [a]		Length (miles)	Town	County	State
		Begin	End				
Connecticut Loop	24-inch	0.11	6.85	6.74	Suffield	Hartford	CT
		6.85	8.26	1.41	East Granby		
			Total	**8.15**	**-**	**-**	**-**

[a] Milepost location is based upon the existing Tennessee facilities.

1.1.2 Appurtenant Facilities

As discussed above, in Connecticut, one new MLV assembly will be installed at MP 4.15, as well as one new bi-directional pig launchers/receiver and pig receiver valve at the terminus of the Connecticut Loop. Table 1.1-2 provides a summary, by location, of the appurtenant aboveground facilities associated with the Project. Each of the appurtenant facilities (pig launchers and receivers, and MLV) will have an associated blowdown valve. These facility locations are depicted on the Project Site Plans in Attachment F.

The MLV installed on the Project will be manually operated. To limit environmental and landowner impacts, appurtenant aboveground facilities will be installed within the proposed permanent ROW. The Project has been designed to incorporate appurtenant facilities to accommodate internal inspection of the proposed pipeline loops. New bi-directional pig launcher/receivers will be installed on the Connecticut Loop. The pig launcher/receivers will be designed in accordance with 49 CFR Part 192 (U.S. Department of Transportation regulations), Kinder Morgan[1] specifications and standards for pipeline launcher and receiver assemblies, and other applicable safety and environmental regulations. The pig launcher/receivers also will be designed with dimensions adequate to accommodate PII MagneScan, TranScan, or other in-line inspection tools.

The launcher/receiver facilities to be installed will consist of items listed below. In addition, the launchers/receivers will be installed within Tennessee's ROW and will include gravel bases, site access, chain-link fence enclosures for security purposes, and identification and emergency signage.

The design MAOP of the pig launchers/receivers will be 880 psig, and the facilities will include:

[1] Tennessee is an indirect wholly-owned subsidiary of Kinder Morgan, Inc. ("Kinder Morgan") and is a member of Kinder Morgan's natural gas pipeline group.

- Launcher/receiver barrel assembly, complete with American Society of Mechanical Engineers (ASME)-stamped quick-opening closures;
- Pig passage indicators;
- Pig launcher/receiver isolation valve complete with actuator and power gas piping;
- Block-valve blowdown assembly;
- Side valve complete with actuator and power-gas piping;
- Barrel blowdown assembly;
- Kicker line/drawdown line;
- Drain lines;
- Associated piping and valves;
- Pipe supports, piers, and clamps;
- Protective coatings for both above/below ground piping;
- Full bore pig launcher/receiver isolation-valves on the mainline; and
- Barred-tees on all branch connections from the mainline.

TABLE 1.1-2 PROPOSED APPURTENANT FACILITIES OF THE PROJECT IN CONNECTICUT

Facility [a]	Milepost	Approximate Area (acres)	Town	County	State
Pipeline Facility Appurtenances					
Bi-directional pig launcher/receiver	8.10	0.06	East Granby	Hartford	CT
New MLV #1	4.15	0.01	Suffield	Hartford	CT
	Total	**0.07**	**-**	**-**	**-**

[a] All proposed appurtenant facilities are new. Land impacts for the appurtenant facilities are included in workspace totals for the pipeline facilities.

1.2 Land Requirements

The construction workspace (including temporary workspace ("TWS"), additional temporary workspace ("ATWS"), permanent ROW, access roads, and contractor/pipeyards) for the Connecticut Loop Segment will total approximately 106.78 acres, of which 100.97 acres are in Connecticut and the remaining 5.81 acres are located in Agawam, Massachusetts. Operation of the Project facilities will require approximately 35.49 acres that will be maintained as new permanent ROW. 35.00 acres of the new permanent ROW will be in Connecticut and the remaining 0.49 acres will be in Massachusetts. Table 1.2-1 includes a summary of the Connecticut Pipeline Loop Segment land requirements that will be affected by construction and operation, including temporary access roads and staging areas. The photo-based alignment sheets depict the location and configuration of all temporary and permanent construction workspace and access roads required for the Project (see Attachment F).

TABLE 1.2-1 SUMMARY OF CONNECTICUT LAND REQUIREMENTS FOR THE PROJECTS' CONNECTICUT LOOP SEGMENT

Facility [a]	Land Affected During Construction [b] (acres)	Land Affected During Operation [c] (acres)
Pipeline Loop	77.60	34.58
Additional Temporary Workspace	3.76	0.00
Pipeline Loop Subtotal	**81.36**	**34.58**
Access Roads	5.36	0.42
Contractor/Pipeyards	14.25	0.00
Total	**100.97**	**35.00**

[a] Appurtenant facilities are located within the operational ROW of the pipeline and do not contribute additional acres affected.
[b] Land Affected During Construction for the Pipeline Loops includes Land Affected During Operations.
[c] Land Affected During Operation includes only the new permanent ROW that is in addition to the existing easement of Tennessee's existing pipeline.

Typically, pipeline construction will require up to 100 feet of workspace for a 24-inch pipeline. The proposed construction ROW widths are based on guidelines for safe construction of similarly sized pipelines developed by the Interstate Natural Gas Association of America ("INGAA") (INGAA 1990). The proposed standard construction ROW widths are expected to allow for safe installation of the pipeline facilities based on the variable topographic terrain and diverse land use types crossed by the Project. Currently, Tennessee does not anticipate the need for the expansion of the construction ROW workspace widths in excess of those currently identified for the Project. However, should the need for ATWS occur due to unforeseen occurrences such as implementing full ROW topsoil segregation outside of currently identified locations, or complications during construction due to unstable terrain, excessive bedrock, soil limitations, or safety concerns, Tennessee will submit additional requests for workspace modifications in compliance with Section IV.A.2 of the FERC's Upland Erosion Control, Revegetation and Maintenance Plan (the "Plan", May 2013 version). Pipeline ROW workspace configurations and dimensions are indicated on the aerial alignment sheets (Attachment F).

Vegetation within the permanent ROW will be maintained in an herbaceous state, except in wetlands and adjacent to perennial streams, where maintenance clearing of woody vegetation will be limited. Here, a 10-foot wide corridor centered over the pipeline loops will be permanently maintained in an herbaceous state and trees within a 30-foot wide corridor centered over the pipeline loops will be selectively removed while the remaining temporary and permanent ROW will revert to its pre-construction land use/land cover once construction is complete. Crop production will be allowed to continue in agricultural areas.

1.2.1 Operation / Permanent Easement

Approximately 35.49 acres of new permanent easement in Connecticut and Massachusetts (of which 35.00 acres will be in CT and 0.49 will be in MA), will be maintained by Tennessee after construction for the operation of the Connecticut Loop segment. In general, Tennessee is seeking to co-locate the new loop segment within the existing permanent ROW established for Tennessee's existing pipeline

facilities. Along portions of the proposed loop segment, Tennessee proposes to acquire additional new permanent ROW due to insufficient space within the existing ROW to co-locate the additional pipeline.

1.2.2 Temporary Workspace / Additional Temporary Workspace

Tennessee is proposing TWS and ATWS areas totaling approximately 48.93 acres along the Connecticut Loop segment. 46.78 acres of TWS and ATWS will be in CT while the remaining 2.15 acres will be in MA. These areas will not be permanently maintained after construction, but will be returned to landowners for their use or allowed to revegetate naturally after construction and restoration is complete. TWS for the segment will account for 45.17 acres of this total and ATWS will account for the remaining 3.76 acres (see Table 1.2-1). 43.02 acres of TWS will be in CT with the remaining 2.15 acres will be in MA. All of the ATWS will be located in CT.

1.2.3 Pipe / Equipment Storage Yards and Contractor Yards

The proposed pipeyards and storage/staging yards will total approximately 17.42 acres of temporary land use. Locations of proposed pipeyards and contractor yards are included in Attachment F3.

1.2.4 Access Roads

Tennessee plans to utilize temporary and permanent access roads to facilitate installation of the facilities. Access road travel lanes in straight sections are anticipated to be approximately 20 feet wide, except where required for corners and entrances off main roads. Upon completion of construction activities the temporary access roads will restored to pre-construction conditions. Locations of proposed access roads are included in Attachments F2, F4 and F6.

1.2.5 Pipeyards and Contractor Yards

Locations in the vicinity of the proposed pipeline loop have been identified for potential use as pipeyards and contractor yards during construction of the Project. Tennessee has determined and identified the approximate acreage necessary for use as staging areas and pipeyards and has included these acreages in the overall land requirements for the Project, as detailed in Table 2.2-1 above. These areas will be used for equipment, pipe, and material storage, as well as temporary field offices and pipe preparation/field assembly areas. Tennessee will advise all contractors that they shall not establish a staging or warehouse yard for this Project without Tennessee first being advised and the Commission granting permission to use the area. Table 2.2-2 below lists the proposed pipeyards and contractor yards associated with the Project in Connecticut. Locations of proposed pipeyards and contractor yards are included in Attachments F3.

1.2.6 Additional Temporary Workspace

ATWS areas are typically required at road, railroad, wetlands, and waterbody crossing locations and for areas requiring specialized construction techniques, including steep slopes. The configuration of ATWS areas are based upon site-specific conditions and vary in accordance with the construction methodology and crossing type. Locations of proposed ATWS areas are included on the alignments sheets located in Attachment F.

TABLE 1.2-2 PROPOSED PIPEYARDS / CONTRACTOR YARDS FOR THE PROJECT IN CONNECTICUT

Name/ Purpose	Approximate Location	Address	Existing Land Use Classification	Size [a] (Acres)	Comments
Connecticut Loop #1 Contractor Yard	250 feet east of pipeline loop at MP 0.11-0.37	Hickory Street Suffield, CT	Agricultural Forest	11.28	Temporary site improvements anticipated are the installation of soil erosion and sediment control devices (as needed), topsoil segregation (for agricultural locations), site grading, and the installation of a construction entrance and gravel base
Connecticut Loop #2 Contractor Yard	Crosses pipeline loop at MP 7.07-7.26	49 Russell Road East Granby, CT	Open land Forest	6.14	Temporary site improvements anticipated are the installation of soil erosion and sediment control devices (as needed), topsoil segregation (for agricultural locations), site grading, and the installation of a construction entrance and gravel base
			Total	**17.42**	**-**

a: Acreage impact refers to construction acreage (TWS, ATWS and operational).

2.0 Existing Conditions

2.1 Ground Water Resources

2.1.1 Aquifers

The groundwater areas crossed by and/or in the vicinity of the Connecticut Loop have been classified as "GA" and "to GA, GAA", meaning the groundwater in this area will be maintained or restored to a classification of GA or GAA. No public wells, aquifer protection public supply wells, or Connecticut Aquifer Protection Areas are crossed by or within the vicinity of the proposed Project corridor. Review of the USEPA Sole Source Aquifer data layers did not identify any USEPA-designated Sole Source Aquifers or any State designated aquifers or aquifer protection areas crossed by the Project alignment (USEPA 2007; CTDEEP 2014a).

Tennessee does not anticipate any Project-related impacts to groundwater water quality. Adherence to the Commission's Plan and Procedures and Tennessee's Construction BMPs will minimize any potential impacts to groundwater quality.

2.1.2 Public and Private Water Supply Wells

Residents in the vicinity of the Connecticut Loop rely on public water supply and private wells for drinking water. Consultation with the Drinking Water Section of the Connecticut Department of Public Health indicated that the Project area is not located within any public drinking water or aquifer protection areas (McPhee 2014).

The identification of any private drinking water wells within 150 feet of any Project workspace area was requested from affected landowners and local officials in 2013 as part of Tennessee's initial discussions with affected landowners to acquire survey permission discussions with landowners and through consultation with local officials. Two private drinking water wells and one monitoring well have been identified within 150 feet of the Project workspace. No springs or Wellhead Protection Areas (WHPAs) have been identified within 150 feet of Project workspace. Table 2.1-1 provides Public and Private Water Supply Well Protection Areas within 150 feet of the Project in Connecticut.

Tennessee does not anticipate any impacts to public watershed areas in Connecticut from construction or operation of the proposed pipeline loop. Tennessee will utilize the erosion control and spill prevention measures as described within the Commission's Plan and Procedures (Attachment K) to ensure that construction activities do not adversely affect drinking water sources.

TABLE 2.1-1 PUBLIC AND PRIVATE WATER SUPPLY WELLS PROTECTION AREAS WITHIN 150 FEET OF THE PROJECT IN CONNECTICUT

Approximate Milepost	Well	Town/County	Distance from Centerline (feet)	Distance from Construction Work Area (feet)	Private or Public	Drinking Water (Yes or No)
2.82	Water Well	Suffield / Hartford	135 SE	110 SE	private	Yes
2.73	Water Well	Suffield / Hartford	165 SE	141 SE	private	Yes
7.9	Monitoring well	East Granby / Hartford	18 SW	33 SW	private	No

Sources: Individual landowners, field surveys conducted in 2013 and 2014, Deyoe 2014, Brady 2014, Skiba 2014, Hawkins 2014.

2.1.3 Groundwater Hazards

Tennessee commissioned field and database research to identify, to the extent feasible, properties within 0.25 mile of the proposed route in Connecticut having the potential to impact the proposed workspace with Oil and hazardous material ("OHM") (EDR 2014). Tennessee obtained a federal and state database search report from EDR for the area within 0.25 mile of the corridor boundaries. The database search performed by EDR identified 12 sites with the potential for soil and/or groundwater contamination, which are listed in Table 2.1-2 below. The majority of these sites are listed due to fuel spills or leaking underground storage tanks, and are associated with the industrial area near the Project in East Granby, Connecticut. Tennessee has contacted affected landowners regarding the presence of private septic systems along the proposed alignment and will continue to consult landowners on the location of wells and septic systems. Tennessee will implement standards set forth in the Commission's Plan and Procedures (Attachment K) to minimize or avoid any potential disturbances to contaminated materials encountered during construction and will dispose of or mitigate for any hazardous materials uncovered, in accordance with federal, state, and local requirements.

TABLE 6 2.1-2 DATABASE LISTINGS OF KNOWN HAZARDOUS WASTE RELEASE SITES WITHIN 0.25 MILE OF THE PROJECT IN CONNECTICUT

Site Name/ Address	Location	Relevant Database(s)[a]	Status and Contamination Issues	Comments
1529 North Street Suffield, CT	340 feet west of MP 0.86	CT RGA LUST CT Spills	20 Gallons of hydraulic oil spilled; spill was cleaned and incident closed (08/25/2000)	No Impact based on status
Mr. Swanson 91 Wendover Drive Suffield, CT 06078	873 feet west of MP 2.26	CT LUST CT RGA LUST CT CPCS	LUST completed (06/01/1995)	No Impact based on status
McQuillan 357 Russell Avenue Suffield, CT	174 feet west of MP 2.60	CT LUST CT Spills CT CPCS CT RGA LUST	LUST completed (08/07/1998) Fuel oil spill in well water area; soil was removed and well water tested	No Impact based on status

Site Name/ Address	Location	Relevant Database(s)[a]	Status and Contamination Issues	Comments
06078				
Richard Deane 378 Russell Avenue Suffield, CT 06078	114 feet west of MP 2.53	CT LUST CT Spills CT CPCS CT RGA LUST	LUST completed (11/04/1994) Fuel oil spilled; tank and soil removed	No Impact based on status
Suffield High School 350 Mountain Road Suffield, CT	572 feet east of MP 3.73	CT Spills FTTS / Hist FTTS	Mercury spill from barometer, spill contained (02/01/2001) 10 gallon diesel fuel spill; spill was sanded and cleaned. Incident closed (11/08/1997) 50 gallons vehicle fluids spill; spill sanded and cleaned. Incident closed (05/18/2009) Pesticide enforcement action	Soil contamination may be present at this property
Bradley International Airport Windsor Locks, CT 06096	1,050 feet east of MP 6.80	CT SHWS CT CPCS CT RGA HWS CT Spills	Solvents, Hydraulic oil, Disposal UST, drums, burial – site ongoing clean up Concourse C. 3 gallons diesel fuel. Spill was sanded and cleaned (7/1/2006)	Soil contamination may be present at this property
DELTA Industries 39 Bradley Park Rd East Granby, CT	567 feet east of MP 8.06	CT LWDS CERCLIS CT CPCS CT SHWS CT SDADB CT ENF	Status of the Discharge Activity: Inactive Low priority for further assessment Formerly occupied by Thiokol Chemical Corp – VOC, metals, solvents released (superfund) Notice of violation (11/5/2010)	Soil contamination may be present at this property
Federal Express Corp 46 Bradley Park Road East Granby, CT	626 feet east of MP 7.16	CT LUST RGA LUST CPCS	Fuel spill; LUST Complete (2/1/1995)	No Impact based on status
Cerbec Ceramic 10 Airport Park Road East Granby, CT	614 feet east of MP 7.78	CT Spills	Liquid nitrogen spill; dissipated (12/04/2006)	No Impact based on status
Saint Gobain Ceramics & Plastics, Inc 10 Airport Park Road East Granby, CT 06026	614 feet east of MP 7.78	CT Spills	Hydraulic oil spill; cleaned and closed (09/26/2013)	No Impact based on status
DSD Magnatech 6 Kripes Road East Granby, CT	933 feet south of MP 8.08	CT LWDS CERC-NFRAP CT CPCS CT SHWS CT SDADB CT VCP	Status of discharge: active Site does not qualify for NPL Acid/base, metals – disposal to ground Superfund Voluntary remediation	Soil contamination may be present at this property

Site Name/ Address	Location	Relevant Database(s)[a]	Status and Contamination Issues	Comments
Hoover Group, Inc. 35 Kripes Road East Granby, CT 06026	573 feet west of MP 7.84	CT AUL	Environmental land use restriction for part of property	Soil contamination may be present at this property

2.2 Surface Water Resources

2.2.1 Watersheds

The proposed pipeline in Connecticut traverses one major river basin (i.e., 4-digit Hydrologic Unit Codes ("HUCs") as defined by the Natural Resources Conservation Service ("NRCS"): the Connecticut River basin. A hydrologic unit can accept surface water directly from upstream drainage areas, and indirectly from associated surface areas such as remnant, non-contributing, and diversions to form a drainage area with single or multiple outlet points. Each hydrologic unit is identified by a unique HUC consisting of two to twelve digits based on the six levels of classification: 2-digit HUC first-level (region), 4-digit HUC second-level (subregion), 6-digit HUC third-level (accounting unit), 8-digit HUC fourth-level (cataloguing unit), 10-digit HUC fifth-level (watershed), and 12-digit HUC sixth-level (subwatershed) (NRCS 2007). These major basins (i.e., 4-digit HUCs) are further divided into smaller drainage areas by state water management agencies (CTDEEP) for water management, monitoring, and assessment activities. Table 3.2-1 summarizes watersheds within the Project area and the sections to follow provide a detailed description of watersheds and waterbody crossings by pipeline loop.

TABLE 2.2-1 - WATERSHEDS CROSSED BY THE PROJECT IN CONNECTICUT

Facility ID	County	Major Basin	HUC 8	HUC 10	HUC 12
Connecticut Loop	Hampden, MA Hartford, CT	Connecticut (0108)	Lower Connecticut (01080205)	Mill River-Connecticut River (0108020501)	Muddy Brook (010802050103) Pecousic Brook-Connecticut River (010802050102) Stony Brook (010802050104)

Source: HUC Watershed Data - USGS National Hydrography Dataset (USGS 2011).

2.2.2 Sensitive Surface Waters

The CTDEEP has established Water Quality Standards and Classifications (CTDEEP 2013), which identify the water quality management objectives for each stream and are central to the state's clean water program. Connecticut's water quality policies are to protect surface and groundwater from degradation; restore degraded surface waters to conditions suitable for fishing and swimming; restore degraded surface and groundwater to protect existing and designated uses; and provide a framework for establishing priorities for pollution abatement. Water use designations have been established for surface waters as follows:

- Class AA: Existing or proposed drinking water supplies; habitat for fish and other aquatic life and wildlife; recreation; and water supply for industry and agriculture;

- Class A: Habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for industry and agriculture; and

- Class B: Habitat for fish and other aquatic life and wildlife; recreation; navigation; and industrial and agricultural water supply.

Muddy Brook (SCT-19) is currently listed on the Connecticut List of Waterbodies Not Meeting Water Quality Standards and as a USEPA impaired stream (USEPA 2014), due to elevated bacteria levels. The impaired section of Muddy Brook is Class A and designated uses include potential drinking water supply, habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply. The elevated bacteria levels impair recreational uses. There are no designated beaches in the impaired segment of Muddy Brook and this segment is not designated for swimming or other water contact related activities (CTDEEP 2012).

No waterbodies are designated as part of the Federal Wild and Scenic Rivers System or the Federal Wild and Scenic Rivers Partnership (NPS 2014).

Tennessee reviewed National Flood Insurance Program, Flood Insurance Rate Maps (FIRMs) issued by FEMA to identify proposed crossings of areas subject to flooding and high volume flows. As listed in Table 2.2-2 below, the Connecticut Loop crosses the flood zones of Muddy Brook, Degrayes Brook, Stony Brook, and Devine Brook. Tennessee will continue to consult with federal, state, and local agencies to identify any additional areas where flooding is a concern that may not be currently mapped by FEMA. SFHAs are those areas subject to flooding by the one percent annual chance flood (100-year flood).

The following restrictions are required by the Connecticut floodplain management regulations shall pertain to the storage of materials and equipment within the floodplain. The Storage of materials that are buoyant, hazardous, flammable, explosive, soluble, expansive radioactive or which could be injurious to human, animal or plant live is prohibited. Other material or equipment may be stored below the elevation of the base flood for a critical activity provided that such material or equipment is not subject to major damage by floods, and provided that such material or equipment is firmly anchored, restrained or enclosed to prevent it from floating away.

For construction and restoration of the Project facilities, Tennessee will implement the Commission's Plan and Procedures and Tennessee's Construction BMPs, which are intended to be used to avoid, minimize, and/or mitigate impacts from the Project. BMPs applicable to floodplains include the control of erosion and sedimentation through installation of structural erosion and sedimentation facilities within and at the limits of the Project workspace. BMPs will comply with Connecticut standards for erosion and sediment control, including specifications for flooding frequency and volume. Additionally, the amount of vegetation cleared during construction will be limited to the removal of the minimum amount necessary for safe construction. Tennessee will restore and revegetate temporary workspace areas to minimize impacts on vegetated areas. Restoration and revegetation will comply with state and federal regulations and monitoring requirements. The construction workspace will be restored to pre-construction contours after construction and will not result in increased flood heights or encroachment within floodways. Tennessee will apply for and obtain applicable regulatory permits and approvals related to land use regulations prior to construction of the proposed facilities.

To protect the integrity of the pipeline during flood events, the Project facilities will be designed, constructed, tested, operated, and maintained to conform with applicable federal, state, and local requirements, including DOT regulations at 49 CFR Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards" and Commission regulations at 18 CFR Section 380.15, "Siting and Maintenance Requirements." To increase the overall safety of the pipeline facilities and protect the public from any system failures due to natural catastrophes including severe flooding, the pipeline will include a variety of design and equipment features.

Temporary and permanent impacts associated with construction will be minimized to the greatest extent practicable, and Tennessee and its contractors will comply with mitigation measures detailed in the Commission's Plan and Procedures (Attachment K) and required as part of the permits and orders or conditions required for the Project.

TABLE 2.2-2 FEMA 100-YEAR FLOODPLAINS CROSSED BY THE PROJECT IN CONNECTICUT

Facility ID	County	Flood Zone	Begin MP	End MP	Crossing Length (feet)
Connecticut Loop	Hartford	Muddy Brook	2.93	2.96	143.62
		Muddy Brook	2.96	3.03	396.96
		Muddy Brook	3.03	3.04	52.74
		Devine Brook	5.43[a]	5.43	204.92
		Devine Brook	5.49	5.54	229.15
		Stony Brook	5.54	5.61	396.05
		Stony Brook	5.61	5.63	93.49
		Stony Brook	5.65	5.69	209.26
		Stony Brook	5.69	5.82	726.96
		DeGrayes Brook	7.25[a]	7.25	169.23
				Total Crossing Length	**2,622.38**

a: Access road crossing only, MP is where access road enters ROW.

2.2.3 Waterbodies

Connecticut is divided geographically into eight major drainage basins/watersheds, and the Connecticut Loop of the Project is within the Connecticut River Basin. CTDEEP promotes watershed management efforts to improve water quality.

The Project crosses a total of 14 surface waters in Connecticut, as detailed in Table 2.2-3. The table identifies each waterbody crossing location by approximate milepost, waterbody identification number, perennial or intermittent flow, bank to bank crossing width, state water and fishery classifications (where applicable) and proposed crossing methodology. The information presented in the table was collected through field surveys conducted by AECOM during the fall of 2013 and the spring of 2014 and examination of the USGS 7.5-minute topographic quadrangle, National Wetland Inventory mapping.

The fisheries resources in the watercourses along the Connecticut Loop can generally be classified as cool-water or warm-water, according to consultation with CTDEEP (Hagstrom 2014).

TABLE 2.2-3 - WATERBODIES ASSOCIATED WITH THE PROJECT IN CONNECTICUT

Waterbody ID	Waterbody Name[a]	Approximate MP[b]	Latitude Longitude	Town / County	Quadrangle	Type[c]	Water Crossing Length[d] (feet)	FERC Class[e]	Water Quality Designation / Fishery Classification[f]	Timing Restriction[g]	Crossing Method[hi]	Comment
SCT-56	Unknown	0.79	42.02304 -72.63899	Suffield / Hartford	West Springfield	I	10	I	Unknown	June 1 - Sept 30	I	
SCT-11	Clay Brook	1.59	42.01264 -72.64508	Suffield / Hartford	West Springfield	P	7	MI	A / Cool water fishery	None	II	
SCT-12	Clay Brook	1.70	42.01069 -72.64604	Suffield / Hartford	West Springfield	P	24	I	A / Cool water fishery	None	II	
SCT-19	Muddy Brook	2.98	41.99555 -72.65913	Suffield / Hartford	Windsor Locks	P	55	I	A / Cool water fishery	None	II	
SCT-37	Stony Brook	5.56	41.96379 -72.68815	Suffield / Hartford	Windsor Locks	P	29	I	A / Warm water fishery	None	II	
SCT-45	Unnamed tributary to Stony Brook	6.52	41.95294 -72.69553	Suffield / Hartford	Windsor Locks	I	2	MI	A / Warm water fishery	June 1 - Sept 30	I	
SCT-46	Unnamed tributary to DeGrayes Brook	6.85	41.94883 -72.69906	East Granby / Hartford	Windsor Locks	P	3	MI	A / Warm water fishery	None	II	
SCT-46A	Unnamed tributary to DeGrayes Brook	6.90	41.94697 -72.70082	East Granby / Hartford	Windsor Locks	I	3	MI	A / Warm water fishery	June 1 - Sept 30	I	
SCT-47	Unnamed tributary to DeGrayes Brook	7.11	41.94598 -72.70238	East Granby / Hartford	Windsor Locks	I	1	MI	A / Warm water fishery	June 1 - Sept 30	I	
SCT-50	Unnamed tributary to DeGrayes Brook	7.27	41.94382 -72.70574	East Granby / Hartford	Windsor Locks	I	1	MI	A / Warm water fishery	June 1 - Sept 30	I	
SCT-50B	Unnamed tributary to DeGrayes Brook	7.30	41.9442 -72.70508	East Granby / Hartford	Windsor Locks	I	2	MI	A / Warm water fishery	June 1 - Sept 30	I	
SCT-53	Unnamed tributary to DeGrayes Brook	7.50	41.94181 -72.70772	East Granby / Hartford	Windsor Locks	I	2	MI	A / Warm water fishery	June 1 - Sept 30	I	

Waterbody ID	Waterbody Name[a]	Approximate MP[b]	Latitude Longitude	Town / County	Quadrangle	Type[c]	Water Crossing Length[d] (feet)	FERC Class[e]	Water Quality Designation / Fishery Classification[f]	Timing Restriction[g]	Crossing Method[hi]	Comment
SCT-53A	Unnamed tributary to DeGrayes Brook	7.51	41.94186 -72.707697	East Granby / Hartford	Windsor Locks	I	2	MI	A / Warm water fishery	June 1 - Sept 30	I	
SCT-55	Unnamed tributary to DeGrayes Brook	8.08	41.935175 -72.709242	East Granby / Hartford	Windsor Locks	I	23	MI	A / Warm water fishery	June 1 - Sept 30	I	
Pipeline Facilities Crossing Length Total							**164**					
Waterbodies Associated With Access Roads												
SCT-50C	Unnamed tributary to DeGrayes Brook	7.34	41.94502 -72.70679	East Granby / Hartford	Windsor Locks	P	0	MI	A / Warm water fishery	N/A	N/A	Culverted under existing access road, no impacts anticipated
SCT-50D	Unnamed tributary to DeGrayes Brook	7.34	41.94510 -72.70677	East Granby / Hartford	Windsor Locks	P	0	MI	A / Warm water fishery	N/A	N/A	Culverted under existing access road, no impacts anticipated
Access Road Crossing Length Total							**0**					
Connecticut Total Crossing Length							**164**					

N/A = Not Applicable
a: Unnamed tributary: waterbody is not mapped as a tributary on available GIS datalayers; tributary name was identified based on review of USGS topographical mapping.
b: MP = milepost; MP provided for access roads indicate the point at which the access road meets the proposed pipeline.
c: P = perennial; I = intermittent
d: 0 = waterbody is not crossed but is in workspace. For minor waterbodies less than 3 feet in width delineated in the survey area and shown as a single line feature on the Project alignment sheets, an assumed 3 foot width has been used for this analysis.
e: MI = Minor (<10 feet); I = Intermediate (10 - 100 feet); MA = Major (>100 feet).
f: State Water Quality Designation:
A-Known or presumed to meet water quality criteria that support potential drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply, and other legitimate uses, including navigation. Surface waters which are not specifically classified shall be considered Class A or Class AA (CTDEEP 2013). None of the waterbodies crossed by the Project are listed in DEEP fisheries management activities. Fisheries classifications supplied by CTDEEP (Hagstrom 2014).
Water quality classifications were identified by AECOM through a desktop review of available GIS datalayers. Waterbodies that were not assigned a water quality classification on the GIS datalayer were given the same classification of the waterbody it drains into.
g: Open cut crossings must occur between June 1-September 30, no timing restriction for dry crossing methods (Mysling 2014). Timing restrictions for fisheries are based on CTDEEP state fishery classification restrictions. Potential timing restrictions reflect dates during which construction activities may occur and are subject to CTDEEP review. Tennessee will adhere to the CTDEEP fishery timing restriction during construction; state fishery timing restrictions are designed by the state to protect the resources during the time period that the state has determined is critical.
h: I = Conventional, Wet Crossing Method; II = Dry Crossing Method including Flume and Dam and Pump; HDD=Horizontal Directional Drill. Intermittent streams containing discernable flow at the time of construction will be crossed using a dry crossing method.
i: Tennessee will implement a dry-crossing construction technique on all waterbody crossings with discernable flow at the time of construction unless an alternative crossing method is approved by the CTDEEP, USACE, and Commission.
J: SCT-54 Degrayes Brook is no longer impacted due to the Connecticut Loop re-route.

2.2.4 Wetlands

There are numerous wetlands and waterbodies on and adjacent to the site. There has been coordination with the State of Connecticut Department of Energy and Environmental Protection regarding the construction of this pipeline and associated facilities. The wetlands on and adjacent to the site ae depicted on the plans provided in Attachment F.

2.2.4.1 Construction and Operation Impacts

Pipeline Facilities

Construction of the Project pipeline facilities will temporarily impact approximately 44.61 acres of wetlands in Connecticut, of which 6.85 acres of palustrine forested and scrub-shrub wetlands will be permanently maintained post-construction in an emergent or low scrub-shrub vegetated cover type These impact estimates are conservative and represent a worst case scenario from forested conversion using current forested cover. Actual impacts to wetlands are likely to be less than these estimated values due to impacts generated from aerial imaging of the tree canopy, which may not result in the removal of all trees as estimated. Temporary wetland impacts may include soil disturbance, temporary alteration of hydrology, and loss of vegetation during construction. Upon completion of construction, topsoil, contour elevations and hydrologic patterns will be restored, and all disturbed areas will be reseeded or replanted to promote the re-establishment of native hydrophytic vegetation. All TWS and ATWS areas will be restored to pre-construction grades and contours, and reseeded and/or replanted during restoration activities.

Following construction and restoration, all TWS and ATWS areas will not be maintained during operation of the proposed facilities and will be allowed to revert back to their pre-construction land use and vegetation cover type.

No permanent filling or other loss of wetlands is proposed for any of the pipeline loops. All wetlands will be substantially restored to their pre-construction grades, contours, and drainage patterns, and reseeded or replanted with native hydrophytic vegetation species.

Pipeyards and Contractor Yards

Modifications to pipeyard and contractor yard boundaries will ensure that wetland areas will be avoided and all activities will occur outside of wetland resources. Therefore, no wetland impacts are expected from activities associated with the pipeyards and contractor yards.

2.2.5 Hydrostatic Test Water

In compliance with United States Department of Transportation ("DOT") specifications, Tennessee will conduct, or cause to be conducted, hydrostatic testing on all pipeline loops prior to placing those loops in service. Sources of hydrostatic test water for the proposed Project are identified in Tables 2.2-4 below. Upon completion of the hydrostatic tests, the wastewater will be discharged to an upland area through a dewatering structure consisting of an energy dissipation device and water filtration structure. Environmental impacts from withdrawal and discharge of test water will be minimized by utilizing the measures outlined in the Commission's Plan and Procedures (Attachment K) as well as by complying with all applicable state and federal permit requirements.

In accordance with Sections VII.C.2 and VII.D.2 of the Commission's Procedures, hydrostatic test water will not be obtained from, or discharged to, designated high quality streams unless approved by the applicable state permitting agency. Tennessee does not anticipate the use of any additives within the hydrostatic test water. Should it be determined that additives are necessary based on the source and composition of the test water, Tennessee shall submit detailed information on any chemicals to the Commission for review and approval prior to use.

TABLE 2.2-4 POTENTIAL SOURCES OF HYDROSTATIC PRESSURE TEST WATER FOR THE PROJECT IN CONNECTICUT

Potential Source(s)	Approximate Milepost	Water Quantity (Gallons)	Manifold / Discharge Location
Municipality; Hydrant 1529 North Street, Suffield and/or Kripes Road on premises of Ross Express in East Granby	N/A	1,000,391	Upland area within workspace at beginning or terminus of proposed loop
	TOTAL	**1,000,391**	**--**

2.3 Soils

The Connecticut Loop is located within the New England Uplands Section of the New England physiographic province. The Connecticut Loop lies within the Central Valley of the New England Uplands, a north-south trending area between the Western and Eastern Uplands (Fenneman 1938). It is a broad, flat valley developed on fairly weak, tilted, stratified rocks, which are Triassic in age. The topography in the area is the product of continental glaciers moving through the region. As these glaciers melted, they dropped sediments resulting in a large amount of till remaining throughout the Connecticut Valley. The Connecticut Valley consists of flood plains along the Connecticut and Farmington Rivers, with nearly level to sloping terraces, low glacial upland hills, and narrow ridges of basalt. Elevations in the region range from 10 feet above sea level on the flood plain of the Connecticut River to 500 feet on the highest basalt ridges (USDA 2008).

The soil series map units crossed by the Connecticut Loop within Hartford County, Connecticut are provided in the Attachment P along with the USDA-NRCS web soil survey mapping. This information was obtained from the USDA-NRCS's Web Soil Survey information for the Hampden and Hartford County Soil Survey Areas available on-line (USDA-NRCS 2014).

2.3.1 Estimate of Runoff Coefficient

The estimated runoff coefficients were not determined for the site. For the construction of the pipeline facilities and permanent gravel access road will slightly increase the impervious cover for the site. Therefore the poste development runoff characteristics will not differ significantly from pre-development conditions.

The Hydrologic and Hydraulic calculations for the Project are included in Attachment O.

2.4 Threatened and Endangered Species

Beginning with written requests dated September 9, 2013 and continuing through 2014, at the federal level, Tennessee consulted with the USFWS and the National Marine Fisheries Service ("NMFS"). At the state level, Connecticut DEEP (Natural Diversity Database) was consulted on state-listed endangered, threatened, or species of special concern, rare plant and animal species. Based upon the information subsequently received from these agencies, Tennessee has identified areas of the Project alignment where the potential exists for the occurrence of federal- and/or state-listed threatened and endangered species. Tennessee has worked cooperatively with the agencies in developing approved field survey protocols to identify and document occurrences of rare plant and animal species in the Project area. Qualified biologists performed field surveys, at the appropriate times of the field seasons, in 2013 and 2014.

Agency responses regarding threatened and endangered species are included in Attachment G.

2.5 Cultural Resources

The Project requires approvals and permits from federal, state, and local entities. The primary Project approval at the federal level is a Certificate of Public Convenience and Necessity ("Certificate") from the Commission. Consequently, the Project is being reviewed under Section 106 of the National Historic Preservation Act ("NHPA") of 1966, as amended. Prior to authorizing an undertaking (e.g., the issuance of an approval or certificate by a federal agency), Section 106 of the NHPA requires federal agencies to take into account the effect of that undertaking on historic properties listed or eligible for listing in the National Register of Historic Places ("National Register") and afford the Advisory Council on Historic Preservation an opportunity to comment on the undertaking. The Section 106 process is coordinated at the state level with the State Historic Preservation Office ("SHPO"), represented in Connecticut by the Historic Preservation & Museum Division of the Connecticut Department of Economic and Community Development ("Connecticut SHPO"). The Commission, as the lead federal agency, must consult with the Connecticut SHPO regarding the effects of the Project on historic properties.

The primary goals of cultural resource investigations conducted as part of the Section 106 review are to:

- Locate, document, and evaluate buildings, structures, objects, landscapes, and archaeological sites that are listed, or eligible for listing, in the National Register;
- Assess potential effects of the Project on those resources; and
- Provide recommendations for subsequent treatment, if necessary, to assist in complying with Section 106.

In addition to Section 106, the cultural resources investigation was conducted in accordance with

the Commission's Office of Energy Project's Guidelines for Reporting on Cultural Resources Investigations (2002); the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 Fed. Reg. 44716-42, Sept. 29, 1983); Section 380.3 of the FERC's regulations, 18 CFR § 380.3 (2014); the Connecticut SHPO's Environmental Review Primer for Connecticut's Archaeological Resources (1987) and Connecticut Historic Resource Survey Manual (Donohue 1990).

The initial archaeological survey resulted in the identification of 7 archaeological deposits in Connecticut, all characterized as insignificant find spots warranting no further evaluation. The archeological survey for the proposed re-route at Bradley Airport also concluded that the proposed reroute construction will not impact any potentially significant archaeological resources.

Historic architectural properties overview and identification survey technical memoranda have been submitted to the Connecticut SHPO and other consulting parties. No historic architectural properties that are listed in the National Register are located within the area of potential effect ("APE") for the Project. A total of 14 properties in Connecticut and Massachusetts that are potentially eligible for listing were identified during the historic architectural properties overview and identification surveys within the established study area. The effects assessments performed as part of the surveys indicates that the Project will have no adverse effect on the 14 identified properties that are potentially eligible for listing in the National Register.

Agency correspondences regarding cultural resources are included in Attachment G.

3.0 Construction Sequencing and Description of Major Construction Activity

This section presents details regarding the sequence of major construction activities as well as detailed descriptions of pipeline specific construction activities.

3.1 Sequence of Major Activities

Installation of the pipeline will typically proceed from one end of the construction spread to the other in an assembly line or "mainline" fashion. The spacing between the individual crews responsible for each interdependent activity is based on anticipated rate of progress. The activities listed below are normally performed in the following sequence:

1. Pre-Construction meeting to be held by project manager, a representative from conservation district, CT DEEP, all contractors involved in earth disturbance activities and the operator's engineer prior to land disturbing activities. Provide the required 7 day notice for scheduling of the pre-construction meeting. All parted listed are required to attend.
2. Install temporary construction fence, construction entrance, perimeter sediment barriers, water bars, trench plugs, temporary diversion swales, broad based dips and cross trenches where applicable.
3. Where construction matting is called for in the plans it shall be installed simultaneously with other required sedimentation control such that the creation of erodible surfaces are minimized.
4. Schedule an inspection with CT DEEP or CD at least 3 days prior to start of other construction activities. CT DEEP shall conduct and assessment of the site prior to the commencement of construction and certify in an inspection report that the appropriate erosion and sedimentation controls shown on the erosion and sediment control plans sheet have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.
5. Trench only area that can be installed in the same workday. At end of workday, contractor shall ensure all temporary stabilization BMPs and measures are installed properly.
6. Install bedding material and pipelines.
7. Install stream and wetland crossings as needed.
8. Install erosion control blankets in conjunction with installation of pipe on steep slopes.
9. Immediately after earth disturbance activities cease loner than 4 days in any area or subarea of the project, the operator shall stabilize all disturbed areas.
10. During non-germination months, mulch or protective blanketing shall be applied as described in the plan. Areas not at finished grade, which will be reactivated within one (1) year shall be stabilized in accordance with the permanent stabilization specifications.
11. Finish Grading: Place 4" minimum topsoil on slopes after final grading is completed. Fertilize seed and mulch. Seed mixture to be installed April 1 – Jun 1 or September 1-November 30. For temporary stabilization beyond seeding dates use seed mixture and fertilization as specified in plans.
12. All areas that have been disturbed which have reached final grade shall be permanently stabilized.

13. Remove silt sacks and/or fence only after all pipeline has been installed and exposed surfaces are stabilized. Remove temporary construction fencing, water bars, and temporary diversion swales, cross trenches, timber mats and any pipes and stone associated with stream crossings.
14. An area shall be considered to have achieved final stabilization when it has a minimum uniform 80% perennial vegetative cover or other permanent non-vegetative cover with a density sufficient to resist accelerated surface erosion and subsurface characteristics sufficient to resist sliding and other movements.

3.2 Minimizing Disturbance

Due to the linear progression of construction and spacing between the individual crews responsible for each interdependent activity, as well as the use of the contractor yards and access roads throughout construction, greater than five acres will be disturbed at one time. As identified in Table 1.2-1, approximately 81.36 acres of land will be affected curing construction of the pipeline loop and additional temporary workspace along the entire 8.26-mile ROW. Tennessee does not anticipate the sequencing of crews to affect the entire 8.26 miles at one time, but multiple miles of ROW may be disturbed at any given time as each interdependent activity progresses. This will generally limited to approximately 20 acres, however, will not be left exposed for long durations due to the linear progression of the distinct construction elements including excavation/trenching, pipeline installation, backfilling, stabilization / restoration, etc. Disturbed areas will be stabilized within the timeframes required by this permit. Should restoration be required outside of the prescribed planting seasons, temporary stabilization measures will be implemented. Tennessee will attempt to phase construction activities in a timely manner in order to minimize the extent to the area disturbed at any given time to the maximum extent practicable."

3.3 Marking the Corridor

Land survey crews will mark the centerline of Tennessee's existing 300 Line pipeline with stakes prior to construction. The centerline will be marked at frequent intervals as well as at known crossings of foreign lines and utilities, at road crossings, and at points of inflection. Additionally, avoidance areas including wetland boundaries, cultural resource sites, and rare species habitat, as applicable, will be marked with appropriate fencing, signage, and/or flagging, based on environmental and archaeology surveys and environmental permit conditions, prior to construction.

3.4 Clearing and Grading

The construction corridor will be cleared and graded to remove brush, trees, roots, and other obstructions such as large rocks and stumps. Non-woody vegetation may be mowed to ground level. Temporary fences and gates will be installed as needed. No cleared material will be placed within wetland areas.

Grading activities will be scheduled to minimize the time between initial clearing operations and the actual installation of pipe. Access to the construction corridor will normally be obtained via public roads that intersect the ROW. Permission will be obtained from landowners for the use/upgrade of access roads across their property to the construction corridor. At the request of a landowner, Tennessee shall erect temporary gates along access roads where necessary.

Grading of the construction workspace will allow for the movement of heavy equipment and the safe passage of work crews. Grading will include removing rock outcrops, tree stumps, ridges and

topographic irregularities. Generally, machinery will operate on one side of the trench (working side) with excavated materials stockpiled on the other (non-working side).

As appropriate, the clearing and grading operations will incorporate special construction procedures to minimize the amount of vegetation removed from stream banks and slopes, prevent undue disturbance of the soil profile, restore the original contours of the natural ground, and prevent topsoil erosion. To minimize impact to the soil profile on agricultural lands, up to 12 inches of topsoil will be segregated from subsoil during trenching and will remain segregated during construction to avoid loss due to mixing with subsoil material. Tennessee will utilize either full ROW topsoil segregation or ditch plus spoil side topsoil segregation, as requested by the landowner, as required by the applicable USDA Natural Resources Conservation Service ("NRCS") District, or as appropriate based upon site-specific conditions. Upon the completion of backfilling operations, the topsoil will be properly replaced over the graded area. Grading activities will be scheduled to minimize the time between initial clearing operations and the actual installation of pipe.

3.5 Erosion and Sediment Control

Temporary soil erosion and sediment control measures will be installed along the proposed construction ROW, ATWS areas, access roads, and other work areas, as applicable, in accordance with the Commission's Plan and Procedures. Typically, staked straw bales and/or silt fence barriers are positioned along the limit of wetland boundaries within the construction workspace. Inspection and maintenance of erosion and sediment controls are discussed in Section 5.0.

3.6 Trenching

In most areas characterized by normal soils, the trench for the pipeline is excavated by crawler-mounted, rotary wheel-type trenching machines or track-mounted excavators. The trench generally will be approximately 14 inches wider than the diameter of the pipe and of sufficient depth to allow for the minimum cover requirements to the top of the pipe in accordance with DOT regulations pursuant to the Natural Gas Pipeline Safety Act of 1968. Landowner requests or permitting requirements may dictate greater depth.

Except as depicted on site-specific plans, the depth of cover for the proposed pipeline loops, as well as the depth of cover for other, non-typical conditions, such as horizontal directional drill ("HDD"), will be in accordance with Tennessee's minimum specifications. Scour analysis and potential for external damage may increase these depths. In actively cultivated agricultural lands, Tennessee plans to install the pipeline with 48 inches of cover, except where rock prevents this depth. In these cases, Tennessee's minimum specifications for depth of cover will be used.

In accordance with the Commission's Plan and Procedures (Attachment K), measures will be employed to minimize erosion during trenching operations and construction activities. Measures also will be taken to minimize the free flow of water into the trench and through the trench into waterbodies. Compacted earth for temporary trench breakers and sandbags or foam for permanent trench breakers may be installed within the trench to reduce erosion.

3.7 Additional Pipeline Construction Activities

- Pipe Stringing
- Pipe Bending

- Pipe Assembly Welding
- X-Ray and Weld Repair
- Coating Field Welds Inspection and Repair

3.8 Trench Dewatering, Pipe Preparation and Lowering-In

Once the pipeline has been welded together, coated and inspected, the pipe is lowered into the trench. If the bottom of the trench is rocky, methods to protect the pipe will be used, including the possible use of sandbags or support pillows at designated intervals along the trench. Trench dewatering may be required in certain locations to prevent the pipe from floating and also to perform certain limited activities in the trench.

Trench dewatering will be performed in accordance with the GP and the Commission's Plan and Procedures (Attachment K). Where feasible and appropriate, dewatering wastewaters will be infiltrated into the ground using a filter bag or a dewatering structure. Dewatering wastewaters discharged to surface waters shall be discharged in a manner that minimizes the discoloration of the receiving waters. Tennessee's BMPs for trench dewatering, dewatering structures and filter bags are provided in Attachment N, Figures 38, 39 and 44, respectively.

3.9 Backfilling and Grade Restoration

After lowering the pipe into the trench, the trench will be backfilled. Backfill usually consists of the material originally excavated from the trench; however, in some cases, additional backfill from other sources may be required. Any excess excavated materials or materials unsuitable for backfill will be handled, as approved by landowner or land management agency, or disposed of in accordance with applicable regulations. In areas where topsoil has been segregated, the subsoil will be placed in the trench first and then the topsoil will be placed over the subsoil. Backfilling will occur to approximate grade. However, a soil crown may be placed above the trench at the discretion of the Tennessee inspector to accommodate any future soil settlement.

3.10 Clean-up and Restoration

After the completion of backfilling, disturbed areas will be graded, and any remaining construction material will be properly disposed of in compliance with federal, state, and local regulations. The construction corridor will be protected through the implementation of erosion control measures including site specific contouring, permanent slope breakers, mulching, and reseeding or sodding with soil-holding vegetation. Contouring will be accomplished using acceptable excess soils from construction. If sufficient soils are not available, additional soil will be imported and inspected by Tennessee prior to use.

Tennessee will restore the construction workspace in accordance with the Commission's Plan and Procedures, applicable seed mix requirements from the NRCS, Connecticut Guidelines or applicable agency recommendations and relevant landowner agreements (see Attachment G). Seed mixes and protocol for restoring forested wetlands are included in Tennessee's site-specific Forested Wetland Restoration Planting plans are included in Attachment F7.

3.11 Hydrostatic Testing and Tie-Ins

Hydrostatic testing procedures are described in Section VII of the Commission's Procedures (see Attachment K). Tennessee will seek coverage under the Connecticut Hydrostatic Pressure Test Permit (DEEP-PERD-GP-011). Hydrostatic test water will be discharged within an upland area through a filter structure.

The pipeline will be tested hydrostatically in accordance with the DOT's regulations, 49 CFR Part 192. The pipeline will be filled with water and maintained at a test pressure and duration in compliance with Tennessee's engineering standards and applicable federal regulations. After the completion of a satisfactory test, the water will be discharged to the ground through a containment structure to a vegetated upland area. The discharge rate of the test water will be regulated using valves and energy dissipation devices to prevent erosion. Tie-in locations will be cleaned and restored after hydrostatic testing.

4.0 Erosion and Sediment Control Measures

Section 5.0 identifies erosion control measures and soil and groundwater handling procedures to assure compliance with the Connecticut Guidelines, the Commission's Plans and Procedures and the conditions of the GP. These control measures will be used to reduce and/or eliminate erosion and sedimentation to the extent they are technologically available, economically practicable and achievable in light of best industry practices.

The following timelines will be followed for the proposed construction activities:

- If construction activities are complete or have been temporarily halted for more than seven (7) days, stabilization activities will be implemented within three (3) days.
- Areas that remain disturbed but inactive for at least 30 days shall receive temporary seeding or soil protection within seven (7) days.
- Disturbed areas that do not establish a vegetative cover within 30 days of seeding shall have erosion control blankets installed. Prior to the erosion control blanket installation, the soil would be prepared with the application of lime, fertilizer, and seed.
- Areas that will be disturbed past the planting season will be covered with a long-term, non-vegetative stabilization method that will provide protection through the winter.
- Stabilization practices will be implemented as quickly as possible in accordance with the Guidelines.
- The Contractor shall stabilize disturbed areas with temporary or permanent measures as quickly as possible after the land is disturbed.

4.1 Limiting of Clearing

Clearing consists of the removal of vegetation and other obstructions from the ROW. Clearing will be restricted to only that portion of the ROW necessary for actual construction. Trees, brush, and other obstructions will be cleared to allow safe and efficient use of machinery and other construction equipment. Various clearing methods may be employed, depending on tree size, topography, and the ability of the ground to support clearing equipment. Temporary BMPs will be installed as necessary, and in accordance with approved plans, to prevent erosion within the ROW prior to any soil disturbances. Clearing will be conducted in accordance with the Commission's Plans and Procedures (Attachment K).

4.2 Sediment Barriers

A sediment barrier is a temporary barrier installed across or at the toe of a slope or upslope of a wetland or waterbody to intercept and retain small amounts of sediment from disturbed or unprotected areas. Sediment barriers may consist of geotextile silt fence, staked straw or hay bale barriers, compacted earth water bars (e.g., drivable berms across travel ways), sand bags, or other appropriate materials. Tennessee will utilize sediment barriers in the following situations:

- Locations where sedimentation could pollute or degrade adjacent wetland and/or watercourses;
- At the outlet of a slope breaker (water bars) when vegetation is not adequate to control erosion;
- Along banks of waterbodies between the graded construction ROW and waterbody after clearing and before grading;
- Downslope of any stockpiled soil in the vicinity of waterbodies and wetlands;
- At the base of slopes adjacent to road and railroad crossings until disturbed vegetation has been re-established;
- At side slope and downslope boundaries of the construction area where run-off is not otherwise directed by a slope breaker (a.k.a. water bar or diversion terrace);
- Within the construction ROW at boundaries between wetlands and adjacent disturbed upland areas;
- As necessary to prevent the potential siltation of ponds, wetlands, or other waterbodies adjacent to/downslope of the construction ROW; and
- At the edge of the construction ROW as needed to contain spoil and sediment.

Sediment barriers will be installed in accordance with the Commission's Plans and Procedures (Attachment K) and the Connecticut Guidelines. After final stabilization, all post-construction stormwater structures shall be cleaned of construction sediment and any remaining silt fence shall be removed.

4.2.1 Geotextile Silt Fence

Silt fences may be used to control runoff from small disturbed areas when they are in the form of sheet flow, and the discharge is to a stable area. Only those fabric types specified for such use by the manufacturer will be used. To provide sufficient fabric for proper anchoring of the fence, standard filter fabric width will be a minimum of 30 inches; reinforced and super filter fabric width will be a minimum of 42 inches. Tennessee's BMP typical drawing for silt fence is included in Attachment N.

4.2.2 Hay/Straw Bale Barriers

Hay/straw bale barriers may be used to control runoff from small disturbed areas provided that runoff is in the form of sheet flow. Hay/straw bales will be considered a short-term control measure on this Project because they tend to deteriorate within approximately three (3) months after installation. Tennessee will not use hay/straw bale barriers in areas of concentrated flows (e.g., channels, swales, erosion gullies, across pipe outfalls, as inlet protection, etc.) or in areas where they cannot be properly staked (e.g., paved areas) or in areas where rock prevents full and uniform anchoring of the bales. Tennessee's BMP typical drawing for hay/straw bale barriers is included in Attachment N.

4.3 Surface Roughening

Tennessee will apply surface and slope roughening to help prevent erosion and surface runoff from channelizing. Roughening the soil surface will also occur between the slope breakers to decrease surface runoff velocity. Slope roughening will aid in the establishment of vegetative cover from seed, reduce runoff velocity, increase infiltration and reduce erosion by providing for trapping of sediment. Slope roughening methods may include; tracking, grooving, and stair-stepping. Roughening will be conducted in accordance with the Connecticut Guidelines.

4.4 Slope Breakers (Waterbars)

Tennessee will install slope breakers on all disturbed areas as necessary to avoid excessive erosion. Slope breakers are intended to minimize the concentration of sheet flow across and down sloping roadways and access ways, or similar sloping and unstable areas and to shorten the continuous flow length within a sloping right-of-way. Silt fence, staked hay, straw bales and sandbags will not be used to construct temporary slope breakers in upland areas, as these barriers are not intended to convey concentrated flow, only minimal sheet flow. Permanent slope breakers will be installed after final grading occurs and will be constructed of soil, gravel or graded stone and appropriately stabilized with seed and mulch. Tennessee's BMP typical drawing for slope breakers is included in Attachment N.

4.5 Trench Breakers (Trench Plug)

Temporary trench breakers (trench plugs) are intended to slow the flow of subsurface water along the trench. Temporary trench breakers may be constructed of materials such as sandbags, foam, unexcavated portions of the ditch, subsoil earth filled bags or equivalent. Topsoil and concrete will not be used for filling trench breaker bags. Tennessee's BMP typical drawing for trench breakers is included in Attachment N.

4.6 Temporary Diversion Swales

Temporary swales will be proposed along the uphill side of the Project workspace where the contributing drainage areas are too large for sediment barriers alone to handle on their own. Swales will generally consist of a trapezoidal cross-section with a supporting ridge on the lower side that is constructed across the slope in order to intercept and convey runoff to stable outlets at non-erosive velocities. Temporary swales will be installed in accordance with the Commission's Plans and Procedures (Attachment K) and the Connecticut Guidelines. Locations and supporting calculations for the size and length of temporary diversion swales is included in Attachment O.

4.7 Soil Stabilization Measures

4.7.1 Soil Binders

There are a number of soil binders, chemical stabilizers, or soil palliatives available from various manufacturers that provide temporary stabilization. Most of these are designed to be sprayed onto the soil surface with little or no preparation. Water-soluble anionic polyacrylamide ("PAM") may be applied to a disturbed area as a temporary soil-binding agent to reduce erosion due to wind and water. This practice is recommended for areas where timely establishment of a vegetative cover is not feasible (e.g., non-germinating season), wherever soils have high clay content, or where the vegetative cover is inadequate to provide protection from erosion. Soil binders will be applied in accordance with the Commission's Plans and Procedures (Attachment K).

4.7.2 Mulching

Mulch absorbs rainfall impact, increases the rate of infiltration, reduces soil moisture loss due to evaporation, moderates soil temperatures, provides a suitable environment for germination, and protects the seedling from intense sunlight. Seeded areas will be mulched or blanketed to minimize the potential for failure to establish an adequate vegetative cover, except in wetland areas, unless

otherwise approved by applicable regulatory agencies. Mulching may also be used as a temporary stabilization measure for some disturbed areas in non-germinating seasons. Mulch will be applied in accordance with the Commission's Plans and Procedures (Attachment K).

- Mulch will be applied on all slopes (except in cultivated cropland) concurrent with or immediately after seeding, where necessary to stabilize the soil surface and to reduce wind and water erosion. Mulch will be spread uniformly to cover at least 75 percent of the ground surface at a rate of 2 tons/acre of straw or its equivalent, unless the local soil conservation authority, landowner, or land managing agency approves otherwise in writing.
- Mulch will consist of weed-free straw or hay, wood fiber hydromulch, erosion control fabric, or some functional equivalent.
- Tennessee will mulch all disturbed upland areas (except cultivated cropland) before seeding if:
    - Final grading and installation of permanent erosion control measures will not be completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas); or
    - Construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.
- If mulching before seeding, mulch application will be increased on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre of straw or equivalent.
- If wood chips are used as mulch, no more than 1 ton/acre will be applied and the equivalent of 11 lbs./acre available nitrogen (at least 50 percent of which is slow release) will be added.
- Mulch will be adequately anchored to minimize loss due to wind and water.
- If utilized, liquid mulch binders will be applied at the rates recommended by the manufacturer. Liquid mulch binders will not be applied within 100 feet of wetlands or waterbodies, except where the product is certified environmentally non-toxic by the appropriate state or federal agency or independent standards-setting organization.
- Synthetic monofilament mesh/netted erosion control materials will not be used in areas designated as sensitive wildlife habitat, unless the product is specifically designed to minimize harm to wildlife.

4.7.2.1 Erosion Control Blankets

Matting or netting consists of jute, wood excelsior, or similar materials, and is used to anchor mulch and stabilize the surface of the soil during the critical period of vegetative re-establishment.

4.7.2.2 Dust Control

Dust control measures are practices that help reduce surface and air movement of dust from disturbed soil surfaces. The Contractor will coordinate with the EI to develop a dust control plan that will be implemented throughout the construction process. There are a number of methods that may be used to control dust including, but not limited to:

- Spraying/Irrigation – The Contractor may spray the ground surface with water until it is moist.

- Vegetative Cover – In areas not expected to handle vehicle traffic, the Contractor may reestablish permanent or temporary vegetative cover as a dust control measure. The vegetative cover will be in accordance with guidance provided in this Plan.
- Mulch – The Contractor may elect to mulch an area to control dust. Mulching will be in accordance with this Plan.
- Wind Breaks – The Contractor may construct wind breaks to reduce wind velocity through the ROW. The wind breaks may be trees or shrubs left in place during site clearing or constructed barriers such as a wind fence, snow fence, tarp curtain, hay bale, crate wall, or sediment wall.
- Tillage – The Contractor may perform deep tillage in large open areas such as agricultural lands to bring soil clods to the surface to rest on top of dust.
- Stone – The Contractor will be required to install stone construction entrances at all paved road crossings to prevent sediment transport onto the pavement surface.
- Spray-on Dust Suppressant Treatments – The Contractor may utilize spray-on dust suppressant treatments to suppress dust. Utilized chemicals will be required to be bio-degradable or water soluble and are not anticipated to have a negative impact on the surrounding environment, including waterbodies and wildlife. Spray-on dust suppressant treatments will not be utilized within organic farm properties.

Other suppressants may be used as long as they have been shown to be environmentally safe and effective for their intended use. The Contractor will coordinate with the EI to determine which dust control method best accommodates their needs based on specific site and weather conditions. Tennessee will consult with applicable regulatory agencies prior to use of chemical dust suppressants. Dust control will be performed in accordance with the Connecticut Guidelines.

4.8 Temporary and Permanent Stabilization

4.8.1 Temporary and Permanent Seeding

Disturbed areas will be temporarily stabilized within the first 7 days of suspending work on a grading operation that exposes after grading and excavation is completed within an area, vegetation will be sown promptly after ceasing earthwork in those areas. Hay, straw mulch, or other similar material will be applied to newly seeded areas to protect against erosion until the vegetation is established.

Disturbed areas will be temporarily stabilized within the first 7 days of suspending work on a grading operation that exposes erodible soils where such suspension is expected to last for 1 to 12 months, or in locations that have not been restored by October 15. Disturbed areas will be seeded with using the following:

- Ryegrass (annual or perennial) at 40 pounds per acre ("lbs./acre") (approximately 1.0 lb./100 square foot ["ft2"]) or use 1 lb./1,000 ft2) during spring, summer or early fall; or
- Aroostook (if available) winter rye (cereal rye) at a rate of 120 lbs./acre (3.0 lbs./1,000 ft2).

Clean straw mulch will be applied at a rate of 2 tons/acre. No soil amendments will be used in wetland areas unless otherwise approved in writing by

4.9 Construction Entrances

A construction entrance pad will be located at all locations where construction traffic enters or exits the ROW onto or from a public roadway or other paved surface. An entrance pad is intended to reduce off-site sedimentation by eliminating the tracking of excess soil onto paved roadways. The entrance pad serves as the designated point at which all construction traffic can access and exit the ROW. The entrance pad is typically constructed of stone or gravel placed on top of a durable geotextile fabric. The fabric facilitates the removal of the stone or gravel to more easily restore the area to its pre-construction condition. Topsoil will be stripped and segregated from the access points and roads in agricultural and residential lands prior to entrance pad installation.

Entrance pads will be installed prior to any clearing, grubbing, and topsoil stripping and segregation. All required entrance pads along the Project area will be installed as the construction crews progress to locations where pads are needed. Entrance pads will be installed in accordance with the Connecticut Guidelines.

4.10 Waterbody Construction and Mitigation Procedures

4.10.1 Waterbody Crossings

The conventional trenching (wet) crossing technique will only be used on intermittent streams or streams with no discernable flow at the time of crossing, except for those waterbodies identified in Table 2.3-1, due to specific conditions that make a dry crossing impractical. Dry crossings will be used for all perennial streams and any stream with discernable flow at the time of crossing, unless otherwise authorized by applicable regulatory agencies. Intermittent streams with a scheduled wet crossing that have a discernible flow at the time of crossing will be crossed using a dry crossing method.

In cases where standing water is present but no discernable flow, a dry method will be implemented in the field to allow for excavation and installation of the pipe under dry conditions. The necessary equipment to perform a dry crossing will be available during construction for implementation, should a stream with a scheduled wet crossing have discernible flow at the time of crossing. All waterbodies crossed by the pipeline loops or within the construction workspace will be protected by adherence to the Commission's Plan and Procedures, as well as any additional specific permit conditions required by federal, state and local agencies. The measures to protect and minimize potential adverse impacts to streams include:

- Expediting construction and limiting the amount of equipment and activities in waterbodies;
- Coordinating construction activities to avoid high flow and spawning periods;
- Installing erosion controls to prevent sediment and siltation from entering streams;
- Constructing waterbody crossings perpendicular to the axis of the waterbody channel as engineering and routing conditions allow;
- Maintaining ambient downstream flow rates;
- Removing construction material and structures from the waterbody after construction;
- Restoring stream channels and bottoms to their original configurations and contours;
- Permanently stabilizing stream banks and adjacent upland areas after construction;

- Inspecting ROWs regularly during and after construction and repairing any erosion controls and/or performing restoration, as needed, in a timely manner; and
- Reducing the amount of clearing and maintaining existing vegetation in place on stream banks to the extent practicable.

4.10.2 Waterbody Construction and Mitigation Procedures

Tennessee will avoid, minimize, and mitigate for potential impacts during wetlands and waterbody crossings by adhering to the Commission's Plans and Procedures, Tennessee's BMPs, the Project's Spill Prevention and Response Procedures ("SPRP") and all applicable state and federal permit conditions. Where temporary impacts to surface waterbodies cannot be avoided during construction, Tennessee will restore and stabilize these areas upon completion of pipeline installation to pre-construction conditions.

For this Project, Tennessee plans to install either a dam and pump system or flume pipes in all waterbodies with perceptible flow at the time of construction to pass water across the disturbed areas and maintain downstream flow to further minimize impacts to the stream and fishery resources as opposed to using this method of crossing only for designated fisheries. Further, stream crossings will be treated as an independent activity, and therefore, constructed separately from the rest of the pipeline loops. A separate construction crew will begin and complete each stream crossing before moving on so that construction is completed as quickly as possible, allowing for restoration of the stream immediately following pipeline installation. Once installation activities for all pipeline loops are complete, all disturbed areas will be restored to pre-construction conditions and stabilized as necessary to mitigate erosion of exposed soils and sedimentation to on- and off-site resource areas.

Post-construction or operational impacts to fisheries will be minimal. Restoration and maintenance of the vegetation within the ROW will minimize the erosion potential relative to the stream. Tennessee will limit vegetation maintenance of the permanent ROW to the Commission-mandated 10-foot wide corridor centered over the proposed new pipeline within wetlands and across waterbodies. In addition, trees that are located within 15 feet of the pipeline that could damage the pipeline coating, may be selectively cut and removed from the permanent ROW. This will allow for the re-establishment of woody and herbaceous species along the stream banks that will provide needed shading and crucial cover habitat to sufficiently maintain cold-water fisheries habitat characteristics. During ROW vegetation maintenance activities, Tennessee will comply with the Commission's Procedures and will leave vegetation in place within 15-feet adjacent to a waterbody, as measured from the waterbodies' high water mark, to allow for a riparian strip adjacent to waterbodies. Vegetation removal within this 15-foot riparian strip will be limited to a 10 foot corridor centered over the proposed new pipeline centerline as necessary for temporary equipment crossings and emergency access.

4.10.3 Construction Timing Restrictions

No impact on fisheries is anticipated relative to the timing of construction. In accordance with the Commission's Procedures, Tennessee has consulted with the applicable state fisheries agency relative to timing restrictions associated with sensitive fisheries. Tennessee will construct the crossings in compliance with the restrictions provided by the state fisheries agency, unless state permit conditions relative to wetland and waterbody permits require more stringent timeframes for crossings. Tennessee will adhere to the Commission's Plan and Procedures to mitigate sedimentation and erosion within and adjacent to all waterbodies crossed by the pipeline.

All waterbodies crossed by the pipeline loops or within the construction workspace will be protected by adherence to the Commission's Plan and Procedures (Attachment K) as well as any additional, specific, permit conditions required by federal, state and local agencies. The measures to protect and minimize potential adverse impacts to streams include:

- Expediting construction and limiting the amount of equipment and activities in waterbodies;
- Coordinating construction activities to avoid high flow and spawning periods;
- Installing erosion controls to prevent sediment and siltation from entering streams;
- Constructing waterbody crossings perpendicular to the axis of the waterbody channel as engineering and routing conditions allow;
- Maintaining ambient downstream flow rates;
- Removing construction material and structures from the waterbody after construction;
- Restoring stream channels and bottoms to their original configurations and contours;
- Permanently stabilizing stream banks and adjacent upland areas after construction;
- Inspecting ROWs regularly during and after construction and repairing any erosion controls and/or performing restoration, as needed, in a timely manner; and
- Reducing the amount of clearing and maintaining existing vegetation in place on stream banks to the extent practicable.

Tennessee is proposing waterbody crossing procedures that are more stringent than those set forth in the Commission's Procedures. Section V.B.6 of the Commission's Procedures requires that a pipeline must be installed using a dry-ditch method for waterbody crossings up to 30 feet wide (at the water's edge at the time of construction) and that are state-designated as either cold-water or significant cool water or warm water fisheries. Based on consultations with the CTDEEP, Tennessee will cross all jurisdictional perennial waters (excluding upland conveyances, such as roadside ditches and hillside drainage ways) with discernible flow at the time of construction using a dry crossing method, regardless of fishery classification and crossing width. The use of dry crossing methods, together with the proposed timing restrictions and restoration methods, are expected to minimize the extent and duration of potential impacts to fisheries and associated habitat. Intermittent or ephemeral streams shall be crossed in accordance with the Commission's Plan and Procedures and applicable federal and state permit conditions. CTDEEP has indicated that all open-cut stream crossings must occur between June 1 and September 30, but CTDEEP requires no timing restriction for stream crossings using a dry crossing method (Mysling 2014).

4.10.4 Waterbody Setbacks

Where applicable, waterbody setbacks will be maintained at all times. The setback distances vary based on the type of activity being performed. Activities such as stacking cut lumber, discharging water from trenches, ATWS areas, and fueling equipment have different setback distance requirements. All waterbody setbacks (e.g., ATWS setbacks, refueling restrictions, etc.) will be clearly marked in the field with signs and/or highly visible flagging prior to pipeline construction and will be maintained until construction-related ground disturbing activities are complete.

Tennessee and its Contractor will structure their operations in accordance with the following setback requirements adjacent to waterbodies:

- Employees handling fuels and other hazardous materials are properly trained;
- Equipment is in good operating order and inspected on a regular basis;
- Fuel trucks transporting fuel to on-site equipment travel only on approved ARs;
- Equipment will be parked overnight and/or fueled and maintained at least 100 feet from a waterbody boundary. These activities may occur closer only if the EI determines that there is no reasonable alternative, and after Tennessee, and its contractors, have taken appropriate steps to prevent spills (including secondary containment structures) and provide for prompt cleanup in the event of a spill;
- Hazardous materials, including chemicals, fuels, and lubricating oils, are not stored within 100 feet of a waterbody boundary, unless the location is designated for such use by an appropriate governmental authority. This applies to storage of these materials only, it does not apply to normal operation or use of equipment in these areas;
- Concrete coating activities are not performed within 100 feet of a waterbody boundary, unless the location is an existing industrial site designated for such use. These activities can occur closer only if the EI determines that there is no reasonable alternative, and the Contractor has taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;
- ATWS areas will be located a minimum of 50 feet from the edge of a waterbody except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. A variance will be requested on a site-specific basis for all areas where a 50-foot setback is not maintained;
- Pumps operating within 100 feet of a waterbody or wetland boundary utilize appropriate secondary containment systems to prevent spills;
- Where pipelines parallel a waterbody, maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the construction right-of-way, except where maintaining this offset will result in greater environmental impact; and
- Any excavated material from the trench line will be placed a minimum of 10 feet from the top of the waterbody bank.

4.11 Wetland Construction and Mitigation Procedures

Tennessee will protect and minimize potential adverse impacts on wetlands using construction procedures specified within the Commission's Plan and Procedures (Attachment K) and Tennessee's construction BMPs for this Project (Attachment N).

4.11.1 Crossing Methods and Best Management Practices

Tennessee will utilize one of the following methods for installing the pipeline within wetlands during construction. The proposed construction methods within wetlands include:

- Standard Pipeline Construction (Method I);
- Conventional Wetland Construction (Method II); and
- Push-Pull Technique.

4.11.1.1 Standard Pipeline Construction (Method I)

The Standard Pipeline Construction method will be utilized in wetlands where soils are non-saturated and able to support construction equipment at the time of crossing. This method requires segregation of topsoil from subsoil along the trench line. Where present, a maximum of 12 inches of topsoil will be segregated from the area disturbed by trenching, except where standing water is present or if soils are super-saturated. Topsoil segregation is followed by trench excavation, pipe laying, backfilling, and grade restoration. Immediately after backfilling is complete, the segregated topsoil is restored to its original location. Erosion control measures including site-specific contouring, silt fence, hay-bale barriers, permanent slope breakers, mulching, and reseeding or sodding with soil-holding vegetation will be implemented. Contouring will be accomplished using acceptable excess soils from construction. Where this method is to be implemented for construction, the EI will measure the pre- and post-construction soil density using a penetrometer to determine if the soil has been inadvertently compacted during construction or access. If the soils have been found to be compacted, de-compaction of the soil will be conducted using a harrow, paraplow, paratill or other equipment. Deep subsoil shattering shall be performed with a subsoiler tool having angled legs.

4.11.1.2 Conventional Wetland Construction (Method II)

The Conventional Wetland Construction method will be used for crossing wetlands with saturated soils or soils unable to support construction equipment without significant soil disturbance.

Prior to crossing and movement of construction equipment through these wetlands, the ROW will be stabilized using timber mats to allow for a stable, safe working condition. Unless soils are inundated or super-saturated, up to the top 12 inches of wetland topsoil over the trench line will be segregated. Trench spoil will be temporarily stockpiled in a ridge along the pipeline trench. Gaps in the spoil pile will be left at appropriate intervals to provide for natural circulation or drainage of water. Before the trench is dug, the pipeline will be assembled in a staging area located in an upland area. After the pipeline is lowered into the trench, wide track bulldozers or backhoes supported on timber mats will be used for backfill, final cleanup, and grading. This method will minimize the amount of equipment and travel in wetland areas.

4.11.1.3 Push-Pull Technique

Construction in saturated/inundated wetland areas may involve the “push-pull technique”. The push-pull technique is used in large wetland areas where sufficient water is present for floating the pipeline in the trench and grade elevation over the length of the push/pull area will not require damming to maintain adequate water levels for floatation of the pipe. Push and pull techniques involve pushing the prefabricated pipe from the edge of the wetland or pulling the pipe with a winch from the opposite bank of the wetland into the trench. During implementation of this technique, initial clearing within the wetland will be minimized. The width of the ROW cleared will be limited to only that necessary to install the pipeline. Grading in inundated wetlands will be held to a minimum and generally will not be necessary due to the typically level topography and the absence of rock outcrops in such areas. Timber mats may be placed over existing vegetation where grading is not required. Trees and brush will be cut at ground level by hand, with low ground pressure equipment, or with equipment supported by timber mats. Tennessee will not use dirt, rock, pulled tree stumps or brush rip-rap to stabilize the travel lane and sediment barriers will be installed prior to grading, as needed, to protect adjacent wetland areas.

The trench will be excavated using amphibious excavators (pontoon mounted backhoes) or tracked backhoes (supported by fabricated timber mats or floats). The excavated material will be stored adjacent to the trench (if possible). If storage of excavated material next to the trench is not possible, the material will be temporarily stored in one of the following locations: (1) in upland areas of the ROW as near to the trench as possible, (2) in construction vehicles, or (3) transported to an approved off-site staging location until needed for backfilling. The pipe will be stored and joined at staging areas (push and pull sites) located outside the wetland. Floats may be attached temporarily to give the pipe positive buoyancy. After floating the pipe into place, these floats will be cut and the negatively buoyant pipe will settle to the bottom of the ditch. This operation will be repeated, with pipe sections fabricated, pushed into place, and welded together, until the wetland crossing is complete. The excavated material will then be placed over the pipe to backfill the trench.

4.11.2 Minimization of Impacts

To minimize impacts to wetlands, Tennessee will implement the wetland construction procedures described in the Commission's Plan and Procedures (Attachment K). The Commission limits workspace within wetlands to 75 feet in width, unless topographic conditions or other safety concerns require additional workspace. These site-specific areas will be identified and approved by the Commission prior to construction. During operation of the Project, 10 feet of the permanent ROW, centered over the pipeline, will be maintained within wetlands as emergent wetland in accordance with Commission requirements. In forested wetlands, Tennessee will minimize tree clearing to the maximum extent practicable while maintaining safe construction conditions. Tree clearing within wetlands during operation of the pipeline will be limited to selectively clearing trees within 15 feet of the pipeline that may damage the pipeline coating.

Typically workspace within wetlands will be reduced to a width of 75 feet or less.

Access within the ROW across wetlands will only be permitted where soils are non-saturated and able to support construction equipment at the time of crossing, during frozen soil conditions (for winter tree clearing) or with the use of timber mats to avoid rutting of the wetland soil. If mats are not used, the EI will record the pre- and post-construction soil density using a penetrometer to determine if the soil has been inadvertently compacted during construction or access.

Impacts to wetlands will be minimized by segregating up to the top 12 inches of soil from the area disturbed by trenching activities, except in super saturated areas or when soils are frozen. The topsoil will be restored to its original location immediately after backfilling is complete to preserve the existing seedbank and promote revegetation of the disturbed area. Seed mixes spread on the restored topsoil for temporary stabilization will include annual rye grass (*Lolium multiflorum*) at a rate of 40 pounds per acre (unless standing water is present) or appropriate mixes recommended by the landowner, state agency or county conservation districts. The use of fertilizers will not be permitted. Mulch will only be used within wetlands as required by state agencies. Utilizing recommended seed mixes containing native plants will control the import of invasive and/or exotic plant species to the site. Erosion controls including silt fence and/or staked hay bales will also be installed to protect wetlands from sediment disturbed in adjacent uplands during construction. Post-construction, the disturbed area will be monitored to ensure long-term stabilization of the site.

Tennessee will protect and minimize potential adverse impacts to wetlands by expediting construction in and around wetlands, by restoring wetlands to their original configurations and contours, by segregating topsoil during excavation, by permanently stabilizing upland areas near

wetlands as soon as possible after backfilling, by inspecting the ROW periodically during and after construction, and by repairing any erosion control or restoration features until permanent revegetation is successful. Tennessee will comply with the applicable permit conditions issued by federal, state, and local permitting agencies with respect to construction and operation of the Project facilities within wetlands.

4.12 Dewatering

Trench dewatering is the process of removing excess runoff and groundwater that has accumulated within the trench excavation to allow for the installation of the pipe and backfilling of the trench. All dewatering will be conducted in accordance with the Commission's Plan and Procedures (Attachment K), Tennessee's BMPs and the Connecticut Guidelines.

4.13 Equipment Crossings

Construction of equipment crossings will be required during Project construction. The equipment crossings will include existing paved roadway crossings, waterbody crossings and wetland crossings. All crossings will be conducted in accordance with the Commission's Plan and Procedures (Attachment K), Tennessee's BMPs and the Connecticut Guidelines, as well as any additional, specific, permit conditions required by federal, state and local agencies.

4.14 Hydrostatic Pressure Testing

Hydrostatic pressure testing verifies the structural integrity of the constructed pipeline segments to withstand the MAOP proposed for the pipeline. Integrity is tested by capping pipeline segments with test manifolds and filling the capped segments with water. The water is then pressurized to at or above the maximum allowable operating pressure of the pipeline and held for eight hours (four hours for pre-tested, pre-fabricated units or short visible sections). Any significant loss of pressure indicates that the pipeline needs to be repaired and re-tested prior to being put into service.

All hydrostatic testing activities will be performed in compliance with the Commission's Procedures as well as applicable USDOT requirements. A summary of potential sources of hydrostatic test water for the pipeline facilities is included in Table 2.2-4.

4.15 Other Pollution Control Measures

4.15.1 Waste Management Plan

Tennessee has prepared a Waste Management Plan to be used as a Contractor's guidance tool when generating wastes for the Project and to assist the Contractor in developing a waste management plan, which must be submitted to the Company before the Project begins. The Waste Management Plan can be found in Attachment L.

4.15.2 Spill Prevention and Response Plan

Tennessee has prepared a Spill Prevention and Response Plan ("Spill Plan") to assist in prevention of any spills that may occur during the Project and to respond to any spills that do occur. The Contractor will be required to adhere to the Spill Plan at all times during construction. The Spill Plan can be found as Attachment M.

4.15.3 Groundwater Impact and Avoidance

The Project is not anticipated to adversely impact groundwater quality or supply. Tennessee proposes to implement construction practices designed to reduce and/or mitigate potential impacts on groundwater during construction as detailed within the Commission's Plan and Procedures (Attachment K) and Tennessee's Best Management Practices Typical Construction Drawings ("Construction BMPs") (Attachment N). Tennessee and its contactors will adhere to these practices related to groundwater protection including specifications for trench breakers and dewatering as well as restrictions on refueling and storage of hazardous substances. In the unlikely event that construction of the proposed Project temporarily impacts private or public well quality or yield, Tennessee will provide alternative water sources or other compensation to the well owner. Should permanent well damage be sustained, Tennessee will either compensate the well owner or make arrangements for a new well to be drilled.

All equipment used in construction of the pipeline will be refueled and lubricated within the limits of the ROW at a minimum distance of 100 feet from all wetlands, waterbodies, and identified wells. Auxiliary fuel tanks will be used to reduce the frequency of refueling operations, and refueling will not take place within 400 feet of identified municipal or community water supplies including groundwater and surface water as per state requirements. The impact minimization measures will prevent the discharge of hydraulic fluids or fuels from leaving the ROW and/or leaching into the groundwater.

During the initial landowner contacts to acquire survey access permission, Tennessee's land representatives requested information on the location of wells, septic systems and springs from landowners. Tennessee's land representatives will again request information on the location of wells and septic systems prior to the commencement of construction to prepare and inventory for any required pre- and post-construction monitoring and tests. To the extent that any septic systems or wells encroach into Tennessee's existing permanent easement, Tennessee will work with the landowner to resolve the encroachment.

During field surveys, no springs utilized for drinking water were specifically identified during initial landowner consultations. Additional surveys and landowner contact to re-confirm the location of wells are ongoing. If requested by the landowner, any seeps or springs located within 150 feet of construction workspaces would be reviewed by an expert in the field to make a determination as to whether the normally planned construction activities would have any impact. If any impacts are anticipated to occur, the expert will recommend construction alterations to avoid impacting such seep or spring areas.

Owners of wells located within 200 feet of the Project workspace or within 200 feet of blasting activities shall be offered pre- and post-construction well testing. This testing shall be conducted by a qualified independent inspection service and shall include tests of water quality and in the case of shallow dug wells or springs, sufficient analysis on quantity to determine if pipeline construction has created an impact. In the unlikely event that construction of the Project temporarily impacts private or public well quality or yield, Tennessee will provide alternative water sources or other compensation to the well owner(s). In the event it is determined that permanent impacts have occurred to a well as a result of construction activities, Tennessee shall repair or replace the well, to as near pre-construction condition as possible.

4.15.3.1 Washout Areas

Washout of applicators, containers, vehicles and equipment for concrete, paint and other materials will be conducted in designated washout areas. There will be no surface discharge of washout wastewaters from this area. Washout will be conducted:

- Outside of any buffers and at least 50 feet from any stream, wetland or other sensitive resource; or
- In an entirely self-contained washout system.

In accordance with the GP, Tennessee will clearly flag off and designate areas to be used for washing and conduct such activities only in these areas. Tennessee will direct all wash water into a container or pit designed such that no overflows can occur during rainfall or after snowmelt. At least once per week, Tennessee will inspect any containers or pits used for washout to ensure structural integrity, adequate holding capacity, and to check for leaks or overflows. If there are signs of leaks, holes or overflows in the containers or pits that could lead to a discharge, Tennessee will repair them prior to further use. For concrete washout areas, Tennessee shall remove hardened concrete waste whenever the hardened concrete has accumulated to a height of ½ of the container or pit or as necessary to avoid overflows. A record of maintenance and inspections will be included in Attachment D.

5.0 INSPECTION, REPORTING, AND RECORD KEEPING

Section 5.0 discusses inspection and maintenance of erosion and sediment control measures, record keeping and reporting procedures, changes and amendments to the SWPCP and termination of permit coverage.

5.1 Inspection and Maintenance

Tennessee will maintain erosion and sedimentation controls in accordance with the GP and the Connecticut Guidelines. A minimum of one qualified (as defined in the GP), full-time EI, as well as a minimum of one LEI to oversee the EI staff, will be assigned to monitor on-site construction activities associated with the Project along the construction spread for compliance with this SWPCP. The responsibilities of the EIs will be consistent with those contained in Section II.B of the FERC Plan (Attachment K) and will include ensuring compliance with environmental conditions from the FERC Certificate, Tennessee's environmental designs and specifications, and other permits or authorizations.

Tennessee conducts in-house Environmental Inspector training to ensure that the EIs will be able to carry out their duties and that construction activities will be in compliance with the requirements of applicable federal, state, and local environmental permits and approvals and environmental requirements in landowner easement agreements. Additionally, Tennessee will conduct environmental training in advance of construction. The level of training will be commensurate with the type of duties of the Project personnel.

5.2 Plan Implementation Inspections

In accordance with the GP, within the first 30 days following commencement of the construction activity on the site, Tennessee will contact either the appropriate District or qualified soil erosion and sediment control professional or a qualified professional engineer to inspect the site.

The site shall be inspected at least once and no more than three times during the first 90 days to confirm compliance with the general permit and proper initial implementation of all controls measures designated in the Plan for the site for the initial phase of construction. For sites not inspected by District personnel, Tennessee will adhere to the conditions set forth in Section 5(b)(4)(a) of the GP. A copy of the Plan review certification will be maintained with this SWPCP.

5.3 Inspection Frequency

The EI will inspect disturbed areas of the construction activity that have not been finally stabilized, all erosion and sedimentation control measures, structural control measures, soil stockpile areas, washout areas, and locations where vehicles enter or exit the site, at a minimum:

- At least once a week;
- Within 24 hours of the end of a storm that that generates a discharge; and
- Where sites have been temporarily or finally stabilized, inspections will be conducted at least once every month for three months.

All areas will be inspected for evidence of, or the potential for, pollutants entering the drainage system and impacts to the receiving waters. Locations where vehicles enter or exit the site shall also be inspected for evidence of off-site sediment tracking. For storms that end on a weekend, holiday or other time after which normal working hours will not commence within 24 hours, an inspection is required within 24 hours only for storms that equal or exceed 0.5 inches. For storms of less than 0.5 inches, an inspection shall occur immediately upon the start of the subsequent normal working hours. Tennessee will maintain a rain gauge on-site to document rainfall amounts.

5.4 Reports

Inspections should be conducted at the required frequency to provide the information detailed below:

- The scope of the inspection;
- The date and time of inspection;
- Names, titles, and qualifications of personnel making the inspection;
- Weather conditions including precipitation information;
- Major observations relating to the implementation of this Plan,
- A statement that, in the judgment of the EI conducting the site inspection, the site is either in compliance or out of compliance with the terms and conditions of the Plan and permit;
- If the site inspection indicates that the site is out of compliance, the inspection report shall include a summary of the remedial actions required to bring the site back into compliance;
- Corrective action(s) required to install, repair, replace or maintain erosion and sediment control practices including any changes to the SWPCP necessary and implementation dates;
- A description of the stormwater discharge(s) from the site;
- Any water quality monitoring performed during the inspection; and
- Signature of permittee of authorized representative.

Non-engineered corrective actions will be implemented on site within 24 hours and incorporated into a revised Plan within three (3) calendar days of the date of inspection unless another schedule is specified in the GP. Engineered corrective actions shall be implemented on site within seven (7) days and incorporated into a revised Plan within ten (10) days of the date of inspection, unless another schedule is specified in the GP or is approved by the commissioner. During the period in which any corrective actions are being developed and have not yet been fully implemented, interim measures will be implemented to minimize the potential for the discharge of pollutants from the site

5.5 Recordkeeping

In accordance with Section 5(d) of the GP, Tennessee will:

- Retain copies of this Plan and all reports required by the GP, and records of all data used to complete the registration to be authorized by this general permit, for a period of at least five years from the date that construction at the site is completed unless the commissioner specifies another time period in writing; and

- Retain an updated copy of this Plan at the construction site from the date construction is initiated at the site until the date construction at the site is completed.

5.6 Changes and Amendments to the SWPCP

The SWPCP will be amended and updated as appropriate during the term of the Project. At a minimum, the SWPCP will be amended whenever:

- There is a change in contractors or subcontractors at the site;
- A change in design, construction, operation, or maintenance at the site which has the potential for the discharge of pollutants to the waters of the state and which has not otherwise been addressed in this Plan; or
- If the actions required by the Plan fail to prevent pollution.

If notified by the commissioner that the Plan and/or the site do not meet one or more of the minimum requirements of this general permit, within 7 days of such notice, or such other time as the commissioner may allow, Tennessee will make the required changes to the Plan and perform all actions required by such revised Plan. Within 15 days of such notice, or such other time as the commissioner may allow, Tennessee will submit to the commissioner a written certification that the requested changes have been made and implemented and such other information as the commissioner requires.

5.7 Termination Notice

At the completion of the project, a Notice of Termination shall be filed with the CTDEEP commissioner. The project shall be considered complete after the site has been stabilized for at least three (3) months following cessation of construction activities. It shall not be considered stabilized until there is no active erosion or sedimentation present or no disturbed areas remain exposed. The Notice of Termination, included as Attachment J, shall be completed by the Contractor, signed by the Permittee, and filed with the CTDEEP commissioner at the following address:

Permit Coordinator
Bureau of Materials Management & Compliance Assurance
Department of Energy & Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

5.7.1 Post-Construction Inspections

Once all post-construction stormwater measures have been installed in accordance with the Post-Construction Stormwater Management section (subsection 5(b)(2)(C)) of the GP and cleaned of any construction sediment or debris, Tennessee will contact the appropriate Conservation District or a qualified soil erosion and sediment control professional and/or a qualified professional engineer, as appropriate, who will inspect the site to confirm compliance with these post-construction stormwater measures.

Once the site has been stabilized for at least three months, Tennessee will have the site inspected by a qualified inspector to confirm final stabilization. The registrant shall indicate compliance with this requirement on the Notice of Termination form.

6.0 MONITORING

Stormwater sampling is required for monitoring turbidity. Sampling shall occur on a monthly basis, during storm events that generate a discharge of stormwater from the site while construction activity is ongoing, until final stabilization of the drainage areas associated with each outfall is achieved. Sampling shall continue on a monthly basis until final stabilization of the drainage area associated with each outfall is achieved.

Sampling is only required during normal working hours, as defined by the General Permit. If sampling is discontinued due to the end of normal working hours, it shall be resumed the next working day as long as the discharge continues. Sampling may be temporality suspended if at any time conditions exist that may reasonable pose a threat to the safety of the person taking the sample (e.g. high winds, lighting, flooding, intense rainfall etc.). Sampling shall resume once the unsafe conditions are no longer present.

If there is no stormwater discharge during a month, sampling is not required.

6.1 Monitoring Requirements

All samples shall be collected from discharges resulting from a storm event that occurs at least 24 hours after any previous storm event that generated a discharge. Sampling of snow or ice melt in the absence of a storm event is not a valid sample.

Samples shall be grab samples taken at least three separate times during a storm event. The samples shall be representative of the flow and characteristics of the discharge. The first sample shall be taken within the first hour of stormwater discharge from the site. In cases where discharges begin outside of normal working hours, the first sample shall be taken at the start of normal working hours. Normal working hours for the project are Monday through Saturday 8AM to 6PM.

Sampling is required of areas of concentrated runoff of stormwater from disturbed areas. Sampling shall be done in accordance with 40 CFR Part 136/ASTM D1889-00. Sampling locations are shown on the Erosion and Sedimentation Control Plans found in Attachment F6 and shall be identified in the field with a flag, stake, or other visible marker.

6.2 Monitoring Reports

The stormwater turbidity value for each sampling point shall be determined by taking the average of the turbidity values of all samples at that sampling point during a given storm. Any samples containing snow or ice melt must be noted. A blank copy of the stormwater monitoring report for submitting turbidity sampling data is provided in Appendix D.

Monitoring reports shall be submitted to CT DEEP in accordance with the provisions outlined in the General Permit.

6.3 Sampling Points

The plans showing the proposed sampling points are provided in Attachment F. The project is considered a linear project according to the General Permit. As such, "…up to 10 substantially

identical outfalls may be identified for one representative discharge". The proposed work does not create new outfalls and will not promote channeled or concentrated flow. Therefore, sampling points have been designated adjacent to work areas and along access roads where there is some chance of measurable runoff being generated. Based on similarities of exposed soils, slope, and stormwater controls used, 34 potential sampling points were identified for the Project. Each sampling point was determined based on areas down gradient of proposed work areas. Sample locations are listed in Table 7.1-1 and depicted on the Erosion Control Drawings (Attachment F). Four of these locations will be selected for sampling in order to comply with the one representative discharge per 10 substantially identical outfalls requirement.

Where there are wetlands located downgradient of work areas, sampling points are located immediately adjacent to the wetland. The EI will review each work site and take a sample if concentrated runoff is observed leaving the work area. The EI may update the potential sampling points and proposed sampling locations concurrently with the start of construction and will submit revised mapping showing the locations of any revised potential sampling points and the proposed sampling locations with the first Stormwater Monitoring Report. The four sample locations will rotate between the 34 sampling points twice a year so different sampling locations will be sampled every six months.

TABLE 6.1-1 - STORMWATER SAMPLING LOCATIONS

Sampling Point	Approximate Milepost	Map Sheet	Project Facility	Description
1	0.25	TO-T13-300-2-109	PY	Western edge of the pipeyard adjacent to eastern boundary of WCT-01.
2	0.75	TO-T13-300-2-109	ROW	East side of ROW, adjacent to the southern portion of WCT-56, east of the North St (SR 75).
3	1.20	TO-T13-300-2-109A	AR	Northern edge of Temporary Access Road #3, adjacent to southern boundary of WCT-03.
4	1.25	TO-T13-300-2-109A	ROW	East side of ROW, adjacent to the southern boundary of WCT-04.
5	1.35	TO-T13-300-2-109A	ROW	East side of ROW, adjacent to the southern boundary WCT-06.
6	1.40	TO-T13-300-2-109A	ROW	West side of ROW, adjacent to the northern boundary WCT-08.
7	1.65	TO-T13-300-2-109A	ROW	East side of ROW, adjacent to the northern-facing boundary in the central portion of WCT-12.
8	2.35	TO-T13-300-2-109B	ROW	East side of the ROW, within the central portion of WCT-16, near the point of inflection.
9	2.45	TO-T13-300-2-109B	ROW	Eastern side of the ROW, adjacent to the western border of WCT-16.
10	2.50	TO-T13-300-2-109B	ROW	East side of the ROW, adjacent to the eastern boundary of WCT-16, north of Russel Avenue.
11	2.65	TO-T13-300-2-109B	ROW	East side of the ROW, adjacent to the northern boundary of WCT-18, south of Russel Avenue.
12	2.70	TO-T13-300-2-109B	ROW	East side of the ROW, within the northern portion of WCT-18, at point of inflection south of Russel Avenue.
13	2.90	TO-T13-300-2-109B	ROW	West side of ROW, adjacent to north-facing boundary within the southern portion of WCT-18. Also adjacent to SCT-19 (Muddy Brook).
14	3.05	TO-T13-300-2-110	ROW	West side of ROW, adjacent to southern boundary of WCT-18.
15	3.30	TO-T13-300-2-110	ROW	East side of ROW, adjacent to southern-facing boundary within the central portion of WCT-21.
16	3.40	TO-T13-300-2-110	AR	Eastern edge of Temporary Access Road #4, adjacent to western boundary of WCT-21.
17	3.45	TO-T13-300-2-110	AR	Northern edge of Temporary Access Road #4, adjacent to southern boundary of WCT-21.
18	3.60	TO-T13-300-2-110	ROW	East side of ROW, within the southern portion of WCT-22, north of Hill Street.
19	3.95	TO-T13-300-2-110	ROW	East side of ROW, adjacent to northern-facing boundary within the central portion of WCT-25, north of Mountain Rd (SH 168).
20	4.65	TO-T13-300-2-110A	ROW	East side of ROW, adjacent to the southern boundary of WCT-31.

Sampling Point	Approximate Milepost	Map Sheet	Project Facility	Description
21	4.85	TO-T13-300-2-110A	ROW	West side of ROW, adjacent to the northern boundary of WCT-33.
22	5.30	TO-T13-300-2-110B	ROW	West side of ROW, adjacent to the northern boundary of WCT-36.
23	5.55	TO-T13-300-2-110B	ROW	East side of ROW, adjacent to the northern boundary of WCT-37.
24	5.65	TO-T13-300-2-110B	ROW	West side of ROW, adjacent to the southern boundary of WCT-37.
25	5.75	TO-T13-300-2-110B	ROW	East side of ROW, adjacent to the western boundary of WCT-38.
26	5.85	TO-T13-300-2-110B	ROW	East side of ROW, adjacent to the southern boundary of WCT-38.
27	6.35	TO-T13-300-2-110C	ROW	East side of ROW, adjacent to the southern boundary of WCT-41.
28	6.20	TO-T13-300-2-110C	AR	Southern edge of Temporary Access Road #7, adjacent to the northern boundary of WCT-41C.
29	6.50	TO-T13-300-2-110C	ROW	West side of ROW, within WCT-45 and adjacent to SCT-45 (unnamed tributary to Stony Brook).
30	6.85	TO-T13-300-2-110C	ROW	West side of ROW, within WCT-46 and adjacent to SCT-46 (unnamed tributary to DeGrayes Brook).
31	7.15	TO-T13-300-2-110D	ROW	West side of ROW, adjacent to WCT-47 and SCT-47 (unnamed tributary to DeGrayes Brook).
32	7.30	TO-T13-300-2-110D	ROW	West side of ROW, adjacent to the northern boundary of WCT-50.
33	7.50	TO-T13-300-2-110D	ROW	East side of ROW, adjacent to the northern boundary of WCT-53.
34	7.70	TO-T13-300-2-110D	ROW	North side of ROW, adjacent to the eastern boundary of WCT-53.

AR = Access Road; PY = Pipeyard; ROW = Right-of-Way
Note: All 34 locations will not be sampled during sampling events. Four locations will be selected for sampling to comply with the one representative discharge per 10 substantially identical outfalls requirement.

7.0 Post Construction Stormwater Management

7.1 Post-construction Guidelines

After the project is complete Tennessee operations and maintenance personnel will perform the following maintenance and restorative measures:

- Litter/debris will be removed from the above ground facilities.
- Mowing clearing of brush will occur in the ROW as needed.

7.2 Post-construction Performance Standards

The project is a linear project with very limited impacts to the surrounding area. As a linear natural gas pipeline project, the post-development runoff characteristics will not differ significantly from pre-development conditions, therefore retention of the water quality volume is not required.

Improvements associated with the construction of Permanent Access Road 5 (PAR 5) include the installation of the gravel surface for the access road. PAR 5 will experience extremely limited traffic for maintenance and operations of the pipeline and the runoff from the road is expected to be pollutant free due to the limited traffic volumes. The alignment of PAR 5 follows an existing farm road which is surrounded by wetlands on both sides. There will be no new point discharges resulting from the construction of PAR 5. The runoff from PAR 5 is directed via sheet flow to the surrounding vegetated areas and allowed to infiltrate prior to discharge from the site. No structural BMPs are proposed adjacent to PAR 5 to minimize potential impacts to the adjacent wetland systems.

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Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT A

General Permit Registration Form

Connecticut Department of
Energy & Environmental Protection
Bureau of Materials Management & Compliance Assurance
Water Permitting & Enforcement Division

General Permit Registration Form for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, effective 10/1/13 (electronic form)

Prior to completing this form, you **must** read the instructions for the subject general permit at **DEEP-WPED-INST-015**.
This form must be filled out electronically before being printed.
You must submit the registration fee along with this form.

The status of your registration can be checked on the DEEP's ezFile. Portal. Please note that DEEP will no longer mail certificates of registration.

CPPU USE ONLY	
App #:	
Doc #:	
Check #:	
Program:	Stormwater

Part I: Registration Type

Select the appropriate boxes identifying the registration type and registration deadline.

Registration Type			Registration Timeline	
☐	**Re-registration** **Existing Permit No. GSN** _____		**On or before February 1, 2014*** *Note: Failure to renew a permit by this date will require submission of new registration. Re-registrants must only complete Parts I, II, III, IV - Question 1, VII and submit Attachment A.	
☑	**New Registration** (Refer to Section 2 of the permit for definitions of Locally Exempt and Locally Approvable Projects)	☐ **Locally Approvable** **Size of soil disturbance:** _____	**New registration - Sixty (60) days prior to the initiation of the construction activity for:** For sites with a total soil disturbance area of 5 or more acres	
		☑ **Locally Exempt** **Size of soil disturbance:** 100.97	☐	**New registration - Sixty (60) days prior to the initiation of the construction activity for:** Sites with a total disturbance area of one (1) to twenty (20) acres except those with discharges to impaired waters or tidal wetlands
			☑	**New registration - Ninety (90) days prior to the initiation of the construction activity for:** (i) Sites with a total soil disturbance area greater than twenty (20) acres, or (ii) Sites discharging to a tidal wetland (that is not fresh-tidal and is located within 500 feet), or (iii) Sites discharging to the impaired water listed in the "Impaired Waters Table for Construction Stormwater Discharges"

Part II: Fee Information

1. New Registrations

   a. Locally approvable projects (registration only):

☐ $625

   b. Locally exempt projects (registration and Plan):

☐ $3,000 total soil disturbance area ≥ one (1) and < twenty (20) acres.

☐ $4,000 total soil disturbance ≥ twenty (20) acres and < fifty (50) acres.

☑ $5,000 total soil disturbance ≥ fifty (50) acres.

2. Re-Registrations

☐ $625 (sites previously registered prior to September 1, 2012)

☐ $0 (sites previously registered between to September 1, 2012 and effective date of this permit)

Total Fee: $5,000.00

The fees for municipalities shall be half of those indicated in subsections (a), (b) and (c) above pursuant to Section 22a-6(b) of the Connecticut General Statutes. State and Federal agencies shall pay the full fees specified in this subsection. The registration will not be processed without the fee. The fee shall be non-refundable and shall be paid by certified check or money order payable to the Department of Energy and Environmental Protection.

Part III: Registrant Information

- If a registrant is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of the State. If applicable, the registrant's name shall be stated **exactly** as it is registered with the Secretary of the State. This information can be accessed at **CONCORD**
- If a registrant is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).

1. Registrant /Client Name: TENNESSEE GAS PIPELINE COMPANY, L.L.C.

   Registrant Type: Business Entity

   Secretary of the State business ID #: 1050955

   Mailing Address: 8 ANNGINA DR

   City/Town: ENFIELD State: CT Zip Code: 06082

   Business Phone: (860) 763-6015 ext.:

   Example:(xxx) xxx-xxxx

   Contact Person: Brian Benito Title :

   E-Mail: brian_benito@kindermorgan.com

2. List billing contact:

   Name: TENNESSEE GAS PIPELINE COMPANY, L.L.C.

   Mailing Address: 8 ANNGINA DR

   City/Town: ENFIELD State: CT Zip Code: 06082

   Business Phone: (860) 763-6015 ext.:

   Contact Person: Brian Benito Title :

3. List primary contact for departmental correspondence and inquiries:

Name: TENNESSEE GAS PIPELINE COMPANY, L.L.C.

Mailing Address: 8 ANNGINA DR

City/Town: ENFIELD State: CT Zip Code: 06082

Business Phone: (860) 763-6015 ext.

Contact Person: Brian Benito Title:

4. List owner of the property on which the activity will take place:

Name: TENNESSEE GAS PIPELINE COMPANY, L.L.C.

Mailing Address: PO Box 4372

City/Town: Houston State: TX Zip Code: 77210

Business Phone: (713) 420-2600 ext.

Contact Person: unknown

5. List preparer:

Name: AECOM ENVIRONMENT, INC.

Mailing Address: 10 Orms St

City/Town: Providence State: RI Zip Code: 02904

Business Phone: 4015212730 ext.

Contact Person: Michael Evans Title: Environmental Scientist, CPESC

6. List design professional:

Name: BL COMPANIES, INC.

Mailing Address: 150 Trumbull St

City/Town: Hartford State: CT Zip Code: 06103

Business Phone: (860) 249-2200 ext.

Contact Person: DEREK A. KOHL Title:

7. List Reviewing Qualified Professional (for locally approvable projects only):

Name:

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext.

Contact Person: Title:

Part IV: Site Information

1. Site Name: Connecticut Expansion Project

Street Address or Description of Location: Multiple

City/Town: Suffield and East Granby State: CT Zip Code: multiple

Brief Description of construction activity:

Construction of 8.26 miles (8.15 miles in CT) of 24-inch natural gas pipeline loop co-located or adjacent to Tennessee's existing ROW.

Project Start Date: 3 Jun 2016 Anticipated Completion Date: 1 Nov 2016

Normal working hours: 7 to 5

Additional Contacts

1. Name: AECOM ENVIRONMENT, INC.
   Mailing Address: 10 Orms St
   City/Town: Providence State: RI Zip Code: 02904
   Business Phone: 4015212730 ext. _____
   Contact Person: Mark Gardella Title: Vice President
   Association (e.g. developer, general or site contractor, etc.): Environmental Consultant
2. Name: AECOM ENVIRONMENT, INC.
   Mailing Address: 10 Orms St
   City/Town: Providence State: RI Zip Code: 02904
   Business Phone: 4015212730 ext. _____
   Contact Person: Eric Olson Title: Senior Staff Specialist
   Association (e.g. developer, general or site contractor, etc.): Consultant
3. Name: _____
   Mailing Address: _____
   City/Town: _____ State: _____ Zip Code: _____
   Business Phone: _____ ext. _____
   Contact Person: _____ Title: _____
   Association (e.g. developer, general or site contractor, etc.): _____
4. Name: _____
   Mailing Address: _____
   City/Town: _____ State: _____ Zip Code: _____
   Business Phone: _____ ext. _____
   Contact Person: _____ Title: _____
   Association (e.g. developer, general or site contractor, etc.): _____
5. Name: _____
   Mailing Address: _____
   City/Town: _____ State: _____ Zip Code: _____
   Business Phone: _____ ext. _____
   Contact Person: _____ Title: _____
   Association (e.g. developer, general or site contractor, etc.): _____
6. Name: _____
   Mailing Address: _____
   City/Town: _____ State: _____ Zip Code: _____
   Business Phone: _____ ext. _____
   Contact Person: _____ Title: _____
   Association (e.g. developer, general or site contractor, etc.): _____
7. Name: _____
   Mailing Address: _____
   City/Town: _____ State: _____ Zip Code: _____
   Business Phone: _____ ext. _____
   Contact Person: _____ Title: _____
   Association (e.g. developer, general or site contractor, etc.): _____

2. **MINING** : Is the activity on the site in question part of mining operations (i.e. sand and gravel)? ☐Yes ☑No

If yes, mining is not authorized by this general permit. You must submit the Registration Form for the General Permit for the Discharge of Stormwater Associated with Industrial Activity.

3. **COMBINED OR SANITARY SEWER:** Does all of the stormwater from the proposed activity discharge to a combined or sanitary sewer (i.e. a sewage treatment plant)? ☐ Yes ☑No

If yes, this activity is not regulated by this permit. Contact the Water Permitting & Enforcement Division at 860-424-3018.

4. **INDIAN LANDS:** Is or will the facility be located on federally recognized Indian lands? ☐ Yes ☑No

5. **COASTAL BOUNDARY:** Is the activity which is the subject of this registration located within the coastal boundary as delineated on DEEP approved coastal boundary maps? ☐ Yes ☑No

The coastal boundaries fall within the following towns: Branford, Bridgeport, Chester, Clinton, Darien, Deep River, East Haven, East Lyme, Essex, Fairfield, Greenwich, Groton (City and Town), Old Lyme, Guilford, Hamden, Ledyard, Lyme, Madison, Milford, Montville, New London, New Haven, North Haven, Norwalk, Norwich, Old Saybrook, Orange, Preston, Shelton, Stamford, Stonington (Borough and Town), Stratford, Waterford, West Haven, Westbrook and Westport.

If "yes", and this registration is for a new authorization or a modification of an existing authorization where the physical footprint of the subject activity is modified, you must provide documentation to the DEEP Office of Long Island Sound Programs or the local governing authority has issued a coastal site plan approval or determined the project is exempt from coastal site plan review. Provide this documentation with your registration as Attachment B. See guidance in Appendix D of the general permit. Information on the coastal boundary is available at the local town hall or on the **Connecticut Coastal Resources Map** . Additional DEEP Maps and Publications are available by contacting DEEP Staff at 860-424-3555.

6. **ENDANGERED OR THREATENED SPECIES:**

In order to be eligible to register for this General permit, each registrant must either perform a self-assessment, obtain a limited one-year determination, or obtain a safe-harbor determination regarding threatened and endangered species. This may include the need to develop and implement a mitigation plan. While each alternative has different limitations, the alternatives are not mutually exclusive; a registrant may register for this General Permit using more than one alternative, See Appendix A of the general Permit. Each registrant must complete this AND Attachment C to this Registration form and a registrant who does not or cannot do so is not eligible to register under this General Permit.

Each registration must perform a review of the Department's Natural Diversity Database maps to determine if the site of the construction activity is located within or in proximity (within ¼ mile) to a shaded area.

a. Provide the date of the NDDB maps were reviewed: 15 Mar 2016 (Print a copy of the NDDB map you viewed since it must be submitted with this registration as part of Attachment C.)

b. For a registrant using a limited one-year determination or safe harbor determination to register for this General Permit, provide the Department's Wildlife Division NDDB identification number for any such determination:

2013304121 (The number is on the determination issued by the Department's Wildlife Division).

For more information on threatened and endangered species requirements, refer to Appendix A and section 3(b)(2) of this General Permit, Visit the DEEP website at **Natural Diversity Data Base** or call the NDDB at 860-424-3011.

c. I verify that I have completed Attachment C to this Registration Form. ☑ Yes

7. **WILD AND SCENIC RIVERS:** Is the proposed project within the watershed of a designated Wild and Scenic River? (See Appendix H for guidance) ☐ Yes ☑ No

8. **AQUIFER PROTECTION AREAS:** Is the site located within a mapped **Aquifer Protection Area** , as defined in Section 22a-354h of the CT General Statutes? (For additional guidance, please refer to Appendix C of the General Permit) ☐ Yes ☑ No

9. **Connecticut Guidelines for Soil Erosion and Sediment Control Guidelines:** Is the activity in accordance with Connecticut Guidelines for Soil Erosion and Sediment Control Guidelines and local erosion & sediment control ordinances, where applicable? ☑ Yes ☐ No

10. **HISTORIC AND/OR ARCHAEOLOGICAL RESOURCES:**

Has the site of the proposed activity been reviewed (using the process outlined in Appendix G of this permit) for historic and/or archaeological resources? ☑ Yes ☐ No

a. The review indicates the proposed site does not have the potential for historic/ archaeological resources, OR ☑ Yes ☐ No

b. The review indicated historic and/ or archaeological resource potential exists and the proposed activity is being or has been reviewed by the Offices of Culture and Tourism, OR ☐ NA ☐ Yes ☑ No

c. The proposed activity has been reviewed and authorized under an Army Corps of Engineers Section 404 wetland permit. ☐ NA ☐ Yes ☑ No

11. **CONSERVATION OR PRESERVATION RESTRICTION:**

Is the property subject to a conservation or preservation restriction? ☐ Yes ☑ No

If Yes, proof of written notice of this registration to the holder of such restriction or a letter from the holder of such restriction verifying this registration is in compliance with the terms of the restriction, must be submitted as Attachment D.

Part V: Stormwater Discharge Information

Table 1

Outfall #	a) Type	b) Pipe Material	c) Pipe Size	d) Note: To find lat/long, go to: CT ECO . A decimal format is required here. Directions on how to use CT ECO to find lat. /long. and conversions can be found in in Part V, section d of the DEEP-WPED-INST-015 .		e) What method was used to obtain your latitude/longitude information?
				Longitude *(Format: -xx.xxxxx)*	Latitude *(Format: xx.xxxxx)*	
1	Other(Please fill in below) Other BMP/site runoff			-72.632963	42.029258	ezFile Portal Map
2	Other(Please fill in below) Other BMP/site runoff			-72.638842	42.021894	ezFile Portal Map
3	Other(Please fill in below) Other BMP/site runoff			-72.641658	42.018022	ezFile Portal Map
4	Other(Please fill in below) Other BMP/site runoff			-72.642876	42.016920	ezFile Portal Map
5	Other(Please fill in below) Other BMP/site runoff			-72.643091	42.016091	ezFile Portal Map

Part V: Stormwater Discharge Information Continued

Table 2

2. Provide the following information about the receiving water(s)/wetland(s) that receive stormwater runoff from your site, either directly or through the storm sewer system:							
Outfall #	Dates when this outfall will be active:	a) To what system or receiving water does your stormwater runoff discharge? either "storm sewer or wetlands" or "waterbody" (If you select storm sewer or wetlands, columns c.1&2 of this table are not required to be completed)	b) What is your watershed ID (freshwater) or 305b ID (estuary)? (Section 3.b, of the DEP-GP-INST-015 explains how to find this information)	c.1) Is your receiving water identified as an impaired water in the "Impaired Waters Table for Construction Stormwater Discharges"?	*If you answered yes to question c.1, then answer the question below* c.2) Has any Total Maximum Daily Load (TMDL) been approved for your receiving waterbody?	For the drainage area associated with each outfall: Effective Impervious Area Before Construction (sq ft)	For the drainage area associated with each outfall: Effective Impervious Area After Construction (sq ft)
1	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
2	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
3	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
4	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
5	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
Provide the total effective impervious area for the entire site(sq ft):						0	0

Part V: Stormwater Discharge Information

Table 1

Outfall #	a) Type	b) Pipe Material	c) Pipe Size	d) Note: To find lat/long, go to: CT ECO . A decimal format is required here. Directions on how to use CT ECO to find lat. /long. and conversions can be found in in Part V, section d of the DEEP-WPED-INST-015 .		e) What method was used to obtain your latitude/longitude information?
				Longitude *(Format: -xx.xxxxx)*	Latitude *(Format: xx.xxxxx)*	
6	Other(Please fill in below) Other BMP/site runoff			-72.643348	42.015613	ezFile Portal Map
7	Other(Please fill in below) Other BMP/site runoff			-72.645623	42.011436	ezFile Portal Map
8	Other(Please fill in below) Other BMP/site runoff			-72.652275	42.004389	ezFile Portal Map
9	Other(Please fill in below) Other BMP/site runoff			-72.653434	42.002284	ezFile Portal Map
10	Other(Please fill in below) Other BMP/site runoff			-72.653798	42.001152	ezFile Portal Map

Part V: Stormwater Discharge Information Continued

Table 2

2. Provide the following information about the receiving water(s)/wetland(s) that receive stormwater runoff from your site, either directly or through the storm sewer system:							
Outfall #	Dates when this outfall will be active:	a) To what system or receiving water does your stormwater runoff discharge? either "storm sewer or wetlands" or "waterbody" (If you select storm sewer or wetlands, columns c.1&2 of this table are not required to be completed)	b) What is your watershed ID (freshwater) or 305b ID (estuary)? (Section 3.b, of the DEP-GP-INST-015 explains how to find this information)	c.1) Is your receiving water identified as an impaired water in the "Impaired Waters Table for Construction Stormwater Discharges"?	*If you answered yes to question c.1, then answer the question below* c.2) Has any Total Maximum Daily Load (TMDL) been approved for your receiving waterbody?	For the drainage area associated with each outfall: Effective Impervious Area Before Construction (sq ft)	For the drainage area associated with each outfall: Effective Impervious Area After Construction (sq ft)
6	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
7	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
8	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
9	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
10	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
Provide the total effective impervious area for the entire site(sq ft):						0	0

Part V: Stormwater Discharge Information

Table 1

Outfall #	a) Type	b) Pipe Material	c) Pipe Size	d) Note: To find lat/long, go to: CT ECO . A decimal format is required here. Directions on how to use CT ECO to find lat. /long. and conversions can be found in in Part V, section d of the DEEP-WPED-INST-015 .		e) What method was used to obtain your latitude/longitude information?
				Longitude *(Format: -xx.xxxxx)*	Latitude *(Format: xx.xxxxx)*	
11	Other(Please fill in below) Other BMP/site runoff			-72.655086	41.999908	ezFile Portal Map
12	Other(Please fill in below) Other BMP/site runoff			-72.655772	41.999350	ezFile Portal Map
13	Other(Please fill in below) Other BMP/site runoff			-72.659013	41.996511	ezFile Portal Map
14	Other(Please fill in below) Other BMP/site runoff			-72.659442	41.995363	ezFile Portal Map
15	Other(Please fill in below) Other BMP/site runoff			-72.662703	41.990292	ezFile Portal Map

Part V: Stormwater Discharge Information Continued

Table 2

2. Provide the following information about the receiving water(s)/wetland(s) that receive stormwater runoff from your site, either directly or through the storm sewer system:							
Outfall #	Dates when this outfall will be active:	a) To what system or receiving water does your stormwater runoff discharge? either "storm sewer or wetlands" or "waterbody" (If you select storm sewer or wetlands, columns c.1&2 of this table are not required to be completed)	b) What is your watershed ID (freshwater) or 305b ID (estuary)? (Section 3.b, of the DEP-GP-INST-015 explains how to find this information)	c.1) Is your receiving water identified as an impaired water in the "Impaired Waters Table for Construction Stormwater Discharges"?	*If you answered yes to question c.1, then answer the question below* c.2) Has any Total Maximum Daily Load (TMDL) been approved for your receiving waterbody?	For the drainage area associated with each outfall: Effective Impervious Area Before Construction (sq ft)	For the drainage area associated with each outfall: Effective Impervious Area After Construction (sq ft)
11	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
12	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
13	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
14	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
15	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
Provide the total effective impervious area for the entire site(sq ft):						0	0

Part V: Stormwater Discharge Information

Table 1

Outfall #	a) Type	b) Pipe Material	c) Pipe Size	d) Note: To find lat/long, go to: CT ECO . A decimal format is required here. Directions on how to use CT ECO to find lat. /long. and conversions can be found in in Part V, section d of the DEEP-WPED-INST-015 .		e) What method was used to obtain your latitude/longitude information?
				Longitude *(Format: -xx.xxxxx)*	Latitude *(Format: xx.xxxxx)*	
16	Other(Please fill in below) Other BMP/site runoff			-72.663100	41.990483	ezFile Portal Map
17	Other(Please fill in below) Other BMP/site runoff			-72.663508	41.989765	ezFile Portal Map
18	Other(Please fill in below) Other BMP/site runoff			-72.664431	41.987907	ezFile Portal Map
19	Other(Please fill in below) Other BMP/site runoff			-72.669130	41.984000	ezFile Portal Map
20	Other(Please fill in below) Other BMP/site runoff			-72.676769	41.975561	ezFile Portal Map

Part V: Stormwater Discharge Information Continued

Table 2

2. Provide the following information about the receiving water(s)/wetland(s) that receive stormwater runoff from your site, either directly or through the storm sewer system:							
Outfall #	Dates when this outfall will be active:	a) To what system or receiving water does your stormwater runoff discharge? either "storm sewer or wetlands" or "waterbody" (If you select storm sewer or wetlands, columns c.1&2 of this table are not required to be completed)	b) What is your watershed ID (freshwater) or 305b ID (estuary)? (Section 3.b, of the DEP-GP-INST-015 explains how to find this information)	c.1) Is your receiving water identified as an impaired water in the "Impaired Waters Table for Construction Stormwater Discharges"?	*If you answered yes to question c.1, then answer the question below* c.2) Has any Total Maximum Daily Load (TMDL) been approved for your receiving waterbody?	For the drainage area associated with each outfall: Effective Impervious Area Before Construction (sq ft)	For the drainage area associated with each outfall: Effective Impervious Area After Construction (sq ft)
16	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
17	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
18	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
19	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
20	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
Provide the total effective impervious area for the entire site(sq ft):						0	0

Part V: Stormwater Discharge Information

Table 1

Outfall #	a) Type	b) Pipe Material	c) Pipe Size	d) Note: To find lat/long, go to: CT ECO . A decimal format is required here. Directions on how to use CT ECO to find lat. /long. and conversions can be found in in Part V, section d of the DEEP-WPED-INST-015 .		e) What method was used to obtain your latitude/longitude information?
				Longitude *(Format: -xx.xxxxx)*	Latitude *(Format: xx.xxxxx)*	
21	Other(Please fill in below) Other BMP/site runoff			-72.678872	41.973711	ezFile Portal Map
22	Other(Please fill in below) Other BMP/site runoff			-72.683893	41.968957	ezFile Portal Map
23	Other(Please fill in below) Other BMP/site runoff			-72.686983	41.965989	ezFile Portal Map
24	Other(Please fill in below) Other BMP/site runoff			-72.687669	41.964777	ezFile Portal Map
25	Other(Please fill in below) Other BMP/site runoff			-72.689000	41.962607	ezFile Portal Map

Part V: Stormwater Discharge Information Continued

Table 2

2. Provide the following information about the receiving water(s)/wetland(s) that receive stormwater runoff from your site, either directly or through the storm sewer system:							
Outfall #	Dates when this outfall will be active:	a) To what system or receiving water does your stormwater runoff discharge? either "storm sewer or wetlands" or "waterbody" (If you select storm sewer or wetlands, columns c.1&2 of this table are not required to be completed)	b) What is your watershed ID (freshwater) or 305b ID (estuary)? (Section 3.b, of the DEP-GP-INST-015 explains how to find this information)	c.1) Is your receiving water identified as an impaired water in the "Impaired Waters Table for Construction Stormwater Discharges"?	*If you answered yes to question c.1, then answer the question below* c.2) Has any Total Maximum Daily Load (TMDL) been approved for your receiving waterbody?	For the drainage area associated with each outfall: Effective Impervious Area Before Construction (sq ft)	For the drainage area associated with each outfall: Effective Impervious Area After Construction (sq ft)
21	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
22	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
23	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
24	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
25	Start: 3 Jun 2016 End: 1 Nov 2016	Storm Sewer or Wetlands		☐ Y ☐ N ☑ NA	☐ Y ☐ N ☑ NA	0	0
Provide the total effective impervious area for the entire site(sq ft):						0	0

Part V: Stormwater Discharge Information (continued)

Impaired waters: If you answered "yes" to Table 2, question 2.c.1, **verify** that the project's Pollution Control Plan (Plan) addresses the control measures below in Question 1 or 2, as appropriate.

1. **If the impaired water does not have a TMDL,** confirm compliance by selecting 1.a. or 2.b. below:

   a. No more than 3 acres is disturbed at any time; ☐ Yes

   OR

   b. Stormwater runoff from a 2 yr, 24 rain event is **retained.** ☐ Yes

2. **If the impaired water has a TMDL,** confirm compliance by selecting 2.a. and 2.b. below and either question 2.c.1. or 2.c.2. below:

   a. The Plan documents there is sufficient remaining Waste Load Allocations (WLA) in the TMDL for the proposed discharge, ☐ Yes

   AND

   b. Control measures shall be implemented to assure the WLA will not be exceeded, ☐ Yes

   AND

   c. 1. Stormwater discharges will be monitored for the indicator pollutant identified in the TMDL, ☐ Yes

   OR

   2. The Plan documents specific requirements for stormwater discharges specified in the TMDL. ☐ Yes

Part VI: Pollution Control Plan Availability (check one of the following four categories)

☑ I am registering a Locally Exempt project and submitting the required electronic Plan (in Adobe™ PDF or similarly publically available format) pursuant to Section 3(c)(2)(E) of this permit.

- ☑ Plan is attached to this registration form
- ☐ Plan is available at the following Internet Address (URL): _____

☐ I am registering a Locally Approvable project and have chosen not to submit the Plan with this registration pursuant to Section 3(c)(1) of this permit.

☐ I am registering a Locally Approvable project and have chosen to make my Plan electronically available pursuant to Section 4(c)(2)(N) of this permit.

- ☐ Plan is attached to this registration form
- ☐ Plan is available at the following Internet Address (URL): _____

☐ I am registering a Locally exempt project and do not have the capability to submit the Plan electronically. Therefore, I am submitting a paper copy with this registration as Attachment E.

Part VII: Registrant Certification

The registrant ***and*** the individual(s) responsible for actually preparing the registration must sign this part. A registration will be considered incomplete unless all required signatures are provided.

For New Registrants:

"I hereby certify that I am making this certification in connection with a registration under such general permit, submitted to the commissioner by TENNESSEE GAS PIPELINE COMPANY, L.L.C. for an activity located at Multiple, Suffield and East Granby, CT multiple and that all terms and conditions of the general permit are being met for all discharges which have been initiated and such activity is eligible for authorization under such permit. I further certify that a system is in place to ensure that all terms and conditions of this general permit will continue to be met for all discharges authorized by this general permit at the site. I certify that the registration filed pursuant to this general permit is on complete and accurate forms as prescribed by the commissioner without alteration of their text. I certify that I have personally examined and am familiar with the information that provides the basis for this certification, including but not limited to all information described in Section 3(b)(8)(A) of such general permit, and I certify, based on reasonable investigation, including my inquiry of those individuals responsible for obtaining such information, that the information upon which this certification is based is true, accurate and complete to the best of my knowledge and belief. I certify that I have made an affirmative determination in accordance with Section 3(b) (8) (B) of this general permit. I understand that the registration filed in connection with such general permit is submitted in accordance with and shall comply with the requirements of Section 22a-430b of Connecticut General Statutes, as amended by Public Act 12-172. I also understand that knowingly making any false statement made in the submitted information and in this certification may be punishable as a criminal offense, including the possibility of fine and imprisonment, under Section 53a-157b of the Connecticut General Statutes and any other applicable law."

For Re-registrants:

"I hereby certify that I am making this certification in connection with a registration under the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, submitted to the commissioner by _____ for an activity located at _____ and that all terms and conditions of the general permit are being met for all discharges which have been initiated and such activity is eligible for authorization under such permit. I further certify that all designs and plans for such activity meet the current terms and conditions of the general permit in accordance with Section 5(b)(5)(C) of such general permit and that a system is in place to ensure that all terms and conditions of this general permit will continue to be met for all discharges authorized by this general permit at the site. I verify that the registration filed pursuant to this general permit is on complete and accurate forms as prescribed by the commissioner without alteration of their text. I certify that I have personally examined and am familiar with the information that provides the basis for this certification, including but not limited to all information described in Section 3(b)(8)(A) of such general permit, and I certify, based on reasonable investigation, including my inquiry of those individuals responsible for obtaining such information, that the information upon which this verification is based is true, accurate and complete to the best of my knowledge and belief. I also understand that knowingly making any false statement made in the submitted information and in this certification may be punishable as a criminal offense, including the possibility of fine and imprisonment, under Section 53a-157b of the Connecticut General Statutes and an other applicable law."

Signature of Registrant	
Brian Benito	
Name of Registrant (print or type)	Title (if applicable)
Signature of Preparer and Date (if different than above)	
Michael Evans	Environmental Scientist, CPESC
Name of Preparer (print or type)	Title (if applicable)

Part VIII: Professional Engineer (or Landscape Architect, where appropriate) Design Certification (for publically approvable and exempt projects)

The following certification must be signed by a Professional Engineer, or Landscape Architect where appropriate.

"I hereby certify that I am a _____ licensed in the State of Connecticut.
I am making this certification in connection with a registration under such general permit, submitted to the commissioner by TENNESSEE GAS PIPELINE COMPANY, L.L.C. for an activity located at Multiple, Suffield and East Granby, CT multiple.
I certify that I have thoroughly and completely reviewed the Stormwater Pollution Control Plan for the project or activity covered by this certification. I further certify, based on such review and on the standard of care for such projects, that the Stormwater Pollution Control Plan has been prepared in accordance with the Connecticut Guidelines for Soil Erosion and Sediment Control, as amended, the Stormwater Quality Manual, as amended, and the conditions of the general permit, and that the controls required for such Plan are appropriate for the site. I further certify, based on reasonable investigation, including my inquiry of those individuals responsible for obtaining such information, that the information upon which this certification is based is true, accurate and complete to the best of my knowledge and belief. I also understand that knowingly making any false statement in this certification may subject me to sanction by the Department and/or be punishable as a criminal offense, including the possibility of fine and imprisonment, under Section 53a-157b of the Connecticut General Statutes and any other applicable law."

_____	
Signature of Design Professional and Date	
DEREK A. KOHL	_____
Name of Professional (print or type)	License Number
Affix P.E/L.A Stamp Here	

Part IX: Reviewing Qualified Professional Certification

The following certification must be signed by a) a Conservation District reviewer OR, b) a qualified soil erosion and sediment control and/ or professional engineer

☐ **Review Certification by Conservation District:**

1.) District: _____

Date of Affirmative Determination: _____

" I am making this certification in connection with a registration under General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, submitted to the commissioner by _____ for an activity located at _____.
I have personally examined and am familiar with the information that provides the basis for this certification, and I affirm, based on the review described in Section 3(b)(11)(C) of this general permit and on the standard of care for such projects, that the Stormwater Pollution Control Plan is adequate to assure that the activity authorized under this general permit will comply with the terms and conditions of such general permit and that all stormwater management systems: (i) have been designed to control pollution to the maximum extent achievable using measures that are technologically available and economically practicable and that conform to those in the Guidelines and the Stormwater Quality Manual; (ii) will function properly as designed; (iii) are adequate to ensure compliance with the terms and conditions of this general permit; and (iv) will protect the waters of the state from pollution."

_____

Signature of District Professional and Date

_____ _____

Name of District Professional License Number (if applicable)

Or

☐ **Review Certification by Qualified Professional:**

Company Name: _____

Name: _____

License #: _____

Level of independency of professional:

Required for all projects disturbing over 1 acre:

1. I verify I am not an employee of the registrant. ☐ Yes
2. I verify I have no ownership interest of any kind in the project for which the registration is being submitted. ☐ Yes

Required for projects with 15 or more acres of site disturbance (in addition to questions 1&2):

3. I verify I did not engage in any activities associated with the preparation, planning, designing or engineering of the soil erosion and sediment control plan or stormwater management systems plan for this registrant. ☐ Yes
4. I verify I am not under the same employ as any person associated with the preparation, planning, designing or engineering of the soil erosion and sediment control plan or stormwater management systems plan for this registrant. ☐ Yes

Part IX: Reviewing Qualified Professional Certification (continued)

"I hereby certify that I am a qualified professional engineer or qualified soil erosion and sediment control professional, or both, as defined in the General Permit for Discharge of Stormwater and Dewatering Wastewaters from Construction Activities and as further specified in Sections 3(b)(11)(A) and (B) of such general permit. I am making this certification in connection with a registration under such general permit, submitted to the commissioner by _____ for an activity located at _____ .
I have personally examined and am familiar with the information that provides the basis for this certification, including but not limited to all information described in Section 3(b)(11)(C) of such general permit, and I certify, based on reasonable investigation, including my inquiry of those individuals responsible for obtaining such information, that the information upon which this certification is based is true, accurate and complete to the best of my knowledge and belief. I certify, based on my review of all information described in Section 3(b)(11)(C) of such general permit and on the standard of care for such projects, that I have made an affirmative determination in accordance with Sections 3(b)(11)(D)(i) and (ii) of this general permit. I understand that this certification is part of a registration submitted in accordance with Section 22a-430b of Connecticut General Statutes, as amended by Public Act 12-172, and is subject to the requirements and responsibilities for a qualified professional in such statute. I also understand that knowingly making any false statement in this certification may be punishable as a criminal offense, including the possibility of fine and imprisonment, under Section 53a-157b of the Connecticut General Statutes and any other applicable law."

_____

Signature of Reviewing Qualified Professional

_____ _____

Name of Reviewing Qualified Professional License No.

Affix P.E./ L.A. Stamp Here

Note: Please submit the fee along with a completed, printed and signed Registration Form and all additional supporting documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT B

Project Contact List

CONNECTICUT EXPANSION PROJECT

PROJECT CONTACT LIST

NAME	TITLE	COMPANY	CONTACT NUMBER
Jim Flynn	Project Manager	Tennessee Gas	713-420-2536
Brian Benito	Project Manager	Tennessee Gas	860-763-6052
Mark Gardella	Project Manager	AECOM	401-854-2807
Michael Evans	Project Scientist	AECOM	401-854-2804
Derek Kohl, PE	Director, Engineering	BL Companies	860-249-2200
AJ Pisana	Project Manager	BL Companies	281-671-5131
Kevin Pedigo	Director	Henkles & McCoy	610-404-3631
Jonathan Correro	Project Manager	Henkles & McCoy	610-404-3631

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT C

Contractor Certification Statements and Qualifications

CONTRACTOR CERTIFICATION STATEMENT

I certify under penalty of the law that I have read and understand the terms and conditions of the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities. I understand that as a contractor or subcontractor at the site, I am authorized by this general permit, and must comply with the terms and conditions of this general permit, including, but not limited to, the requirements of the Stormwater Pollution Control Plan prepared for the Connecticut Expansion Project located in Suffield and East Granby, Connecticut.

Signature	Company Information	Responsible For
(Name)	(Company)	
(Position)	(Street/P.O. Box)	
(Signature)	(City, State, Zip)	
(Date)	(Phone)	(Activity)
(Name)	(Company)	
(Position)	(Street/P.O. Box)	
(Signature)	(City, State, Zip)	
(Date)	(Phone)	(Activity)
(Name)	(Company)	
(Position)	(Street/P.O. Box)	
(Signature)	(City, State, Zip)	
(Date)	(Phone)	(Activity)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT D

Inspection Forms

D1 – Template Inspection Report
D4 – Stormwater Monitoring Reports

Environmental Inspection Report

Project Name:
Report Run Date:

General Information

Inspection Report #:

Compliance Level:

Inspector Name:

Follow-up Required:

Date Inspected:

Proposed Follow-Up Date:

Time Inspected:

Stop Work Order Issued:

Record Status:

Record Date/Time: 0

Location and Activity Information

Project Facility: **Access**

State/County: **Town:**

Road:

Spread:

Access Road Comment:

Nearest Cross Street:

Aboveground Facility:

Inspection Type(s):

Mile Post Begin:

Mile Post End:

Stationing Begin:

Restoration Complete:

Stationing End:

If Yes:

GPS Latitude Coord:

GPS Longitude Coord:

SWPPP Inspection Required:
☐ Yes No

If Yes:

Activity:

Site Visitor:

Visitor Name(s):

Activity Other:

Feature Association (Wetland):

Feature Association (Waterbody):

Weather Information

Weather Conditions:

ROW Conditions:

Temperature:

Wind Speed (MPH):

Environmental Inspection Report

Project Name:
Report Run Date:

Precipitation (last 24 hrs):

Wind Direction:

Precipitation Source:

Inspection Notes

Specification Requirements:

Specifications Requirements (Other):

Discussed with Contractor?

☐ Yes No

Contractor Name(s):

Inspection Notes and Comments:

Inspection Photos

Label:
Direction:
Comments:

Label:
Direction:
Comments:

Environmental Inspection Report

Project Name:
Report Run Date:

Label:
Direction:
Comments:

Label:
Direction:
Comments:

Label:
Direction:
Comments:

Certification Statement

I hereby certify that I meet the qualifications of a Qualified Inspector and this inspection report is a true and accurate representation of the site conditions at the time of inspection. I further understand that there are significant penalties under existing state and federal law for submitting false information or statements on files or documents required to be maintained under this permit, including possibility of fine or imprisonment for knowing violations.

I agree ☑

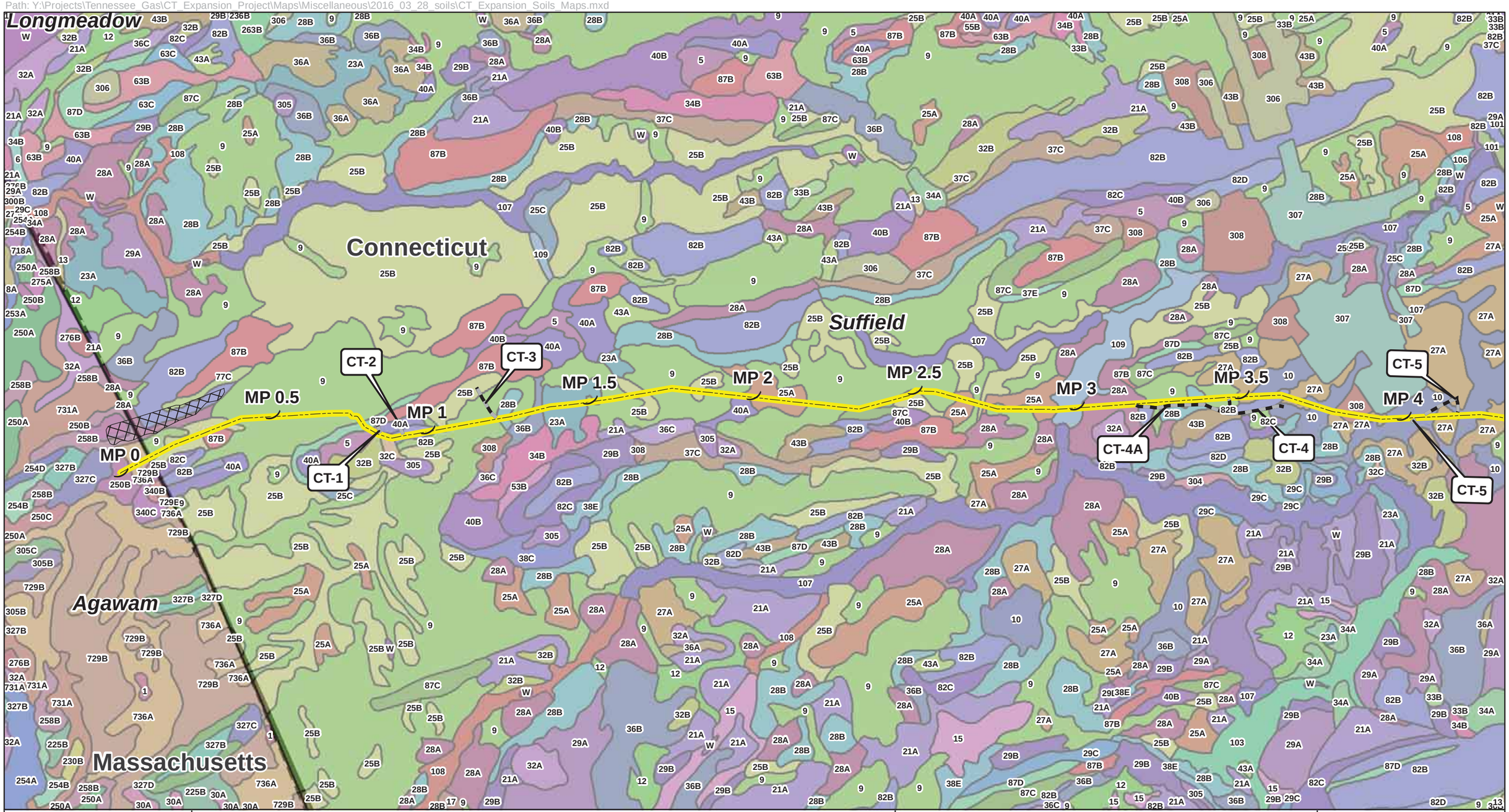
Inspector Name: _____

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

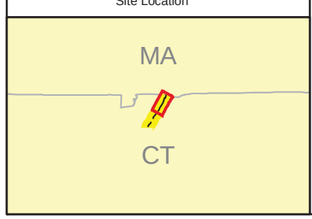
ATTACHMENT E

Soils Description and Map

Path: Y:\Projects\Tennessee_Gas\CT_Expansion_Project\Maps\Miscellaneous\2016_03_28_soils\CT_Expansion_Soils_Maps.mxd



Site Location



Legend

- Mileposts
- Proposed Project Centerline
- Access Roads
- Pipeyards
- MLV Locations
- Town Boundary

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Connecticut Expansion Project

SSURGO Soils Map

CT Loop

0 750 1,500 3,000 Feet

1 inch = 1,500 feet

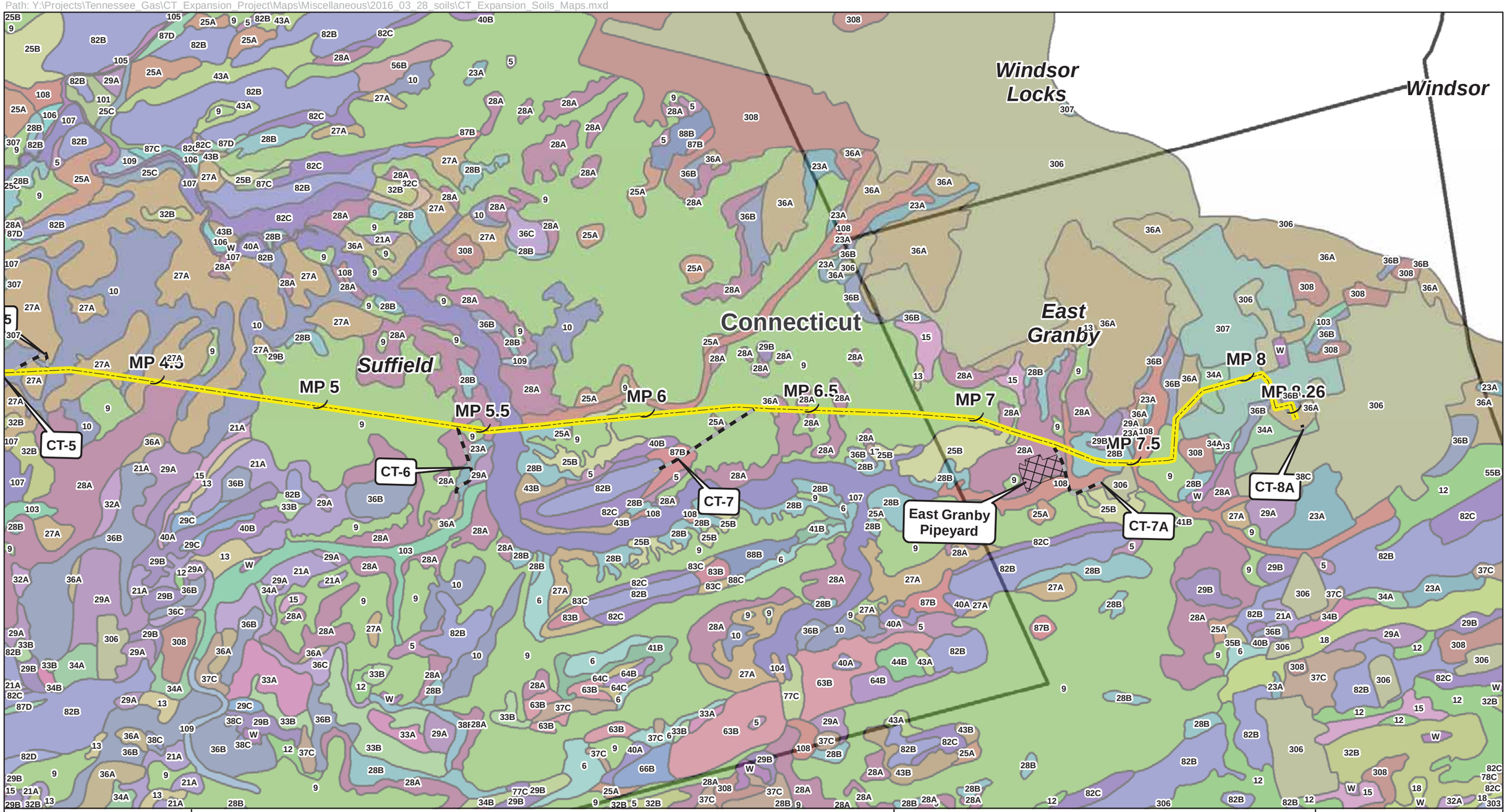
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Figure 1

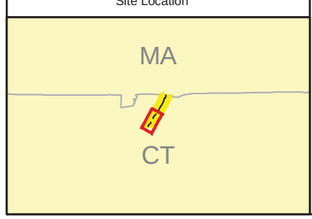
March 2016

Page 1 of 3

Path: Y:\Projects\Tennessee_Gas\CT_Expansion_Project\Maps\Miscellaneous\2016_03_28_soils\CT_Expansion_Soils_Maps.mxd



Site Location



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Connecticut Expansion Project

SSURGO Soils Map

CT Loop

0 750 1,500 3,000 Feet

1 inch = 1,500 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Figure 1

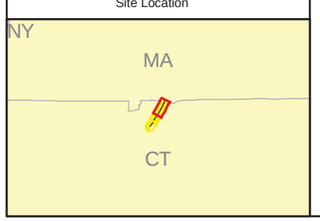
March 2016

Soil Code	Soil Description
99n8	Water
99q1	Merrimac sandy loam, 0 to 3 percent slopes
99r3	Raynham silt loam, 0 to 3 percent slopes
99pr	Meckesville loam, 3 to 8 percent slopes
99ms	Amostown fine sandy loam, 0 to 6 percent slopes
99nz	Enosburg loamy sand, 0 to 3 percent slopes
99qx	Pollux fine sandy loam, 0 to 3 percent slopes
99rs	Wareham loamy sand, 0 to 3 percent slopes
99pl	Limerick silt loam, 0 to 3 percent slopes
99q2	Merrimac sandy loam, 3 to 8 percent slopes
99ql	Paxton fine sandy loam, 3 to 8 percent slopes
99mt	Belgrade silt loam, 0 to 8 percent slopes
99rn	Unadilla very fine sandy loam, 3 to 8 percent slopes
99qk	Ninigret fine sandy loam, 0 to 6 percent slopes
99n7	Buxton Variant silt loam, 0 to 8 percent slopes
99q5	Montauk fine sandy loam, 3 to 8 percent slopes
99rb	Scantic Variant silt loam, 0 to 3 percent slopes
99qm	Paxton fine sandy loam, 8 to 15 percent slopes
99qz	Pollux fine sandy loam, 8 to 15 percent slopes
99mr	Agawam fine sandy loam, 8 to 15 percent slopes
99pt	Meckesville loam, 15 to 25 percent slopes
99q4	Merrimac sandy loam, 15 to 25 percent slopes
99ps	Meckesville loam, 8 to 15 percent slopes
99pb	Hinckley loamy sand, 0 to 3 percent slopes
99qy	Pollux fine sandy loam 3 to 8 percent slopes
99mw	Broadbrook gravelly silt loam, 8 to 15 percent slopes
99mp	Agawam fine sandy loam, 0 to 3 percent slopes
99r9	Saco Variant silt loam, 0 to 3 percent slopes
99mv	Broadbrook gravelly silt loam, 3 to 8 percent slopes
9lm0	Elmridge fine sandy loam, 0 to 3 percent slopes
9lrq	Scitico, Shaker, and Maybid soils
9ll7	Brancroft silt loam, 3 to 8 percent slopes
9lm6	Agawam fine sandy loam, 3 to 8 percent slopes
9lm5	Agawam fine sandy loam, 0 to 3 percent slopes
9lnh	Ludlow silt loam, 0 to 3 percent slopes
9lr3	Broadbrook silt loam, 3 to 8 percent slopes
9lr4	Broadbrook silt loam, 8 to 15 percent slopes

Soil Code	Soil Description
9ll6	Brancroft silt loam, 0 to 3 percent slopes
9lk6	Ninigret and Tisbury soils, 0 to 5 percent slopes
9ljx	Raypol silt loam
9ljy	Walpole sandy loam
9ln3	Windsor loamy sand, 3 to 8 percent slopes
9lmx	Merrimac sandy loam, 0 to 3 percent slopes
9ljv	Saco silt loam
9lm7	Agawam fine sandy loam, 8 to 15 percent slopes
9lkv	Sudbury sandy loam, 0 to 5 percent slopes
9lmy	Merrimac sandy loam, 3 to 8 percent slopes
9lt6	Water
9lpm	Wilbraham and Menlo soils, extremely stony
9lmr	Haven and Enfield soils, 0 to 3 percent slopes
9lpw	Cheshire fine sandy loam, 3 to 8 percent slopes
9lqs	Cheshire-Holyoke complex, 3 to 15 percent slopes, very rocky
9lm1	Elmridge fine sandy loam, 3 to 8 percent slopes
9lrh	Wethersfield loam, 3 to 8 percent slopes
9lrj	Wethersfield loam, 8 to 15 percent slopes
9lk2	Timakwa and Natchaug soils
9lrk	Wethersfield loam, 15 to 25 percent slopes
9lms	Haven and Enfield soils, 3 to 8 percent slopes
9lpx	Cheshire fine sandy loam, 8 to 15 percent slopes
9lmg	Udorthents-Urban land complex
9ll8	Brancroft silt loam, 8 to 15 percent slopes
9lp1	Wilbraham silt loam
9ln4	Windsor loamy sand, 8 to 15 percent slopes
9ljt	Limerick and Lim soils
9lnn	Rainbow silt loam, 3 to 8 percent slopes
9lmf	Udorthents-Pits complex, gravelly
9lmt	Haven and Enfield soils, 8 to 15 percent slopes
9ln9	Hinckley gravelly sandy loam, 3 to 15 percent slopes
9lnj	Ludlow silt loam, 3 to 8 percent slopes
9lnm	Rainbow silt loam, 0 to 3 percent slopes
9lk0	Scarboro muck
9lp7	Wapping very fine sandy loam, 3 to 8 percent slopes
9lmj	Udorthents, smoothed
9lld	Cheshire-Urban land complex, 3 to 8 percent slopes

Soil Code	Soil Description
9ln2	Windsor loamy sand, 0 to 3 percent slopes
9lkp	Windsor-Urban land complex, 0 to 8 percent slopes
9lnb	Hinckley gravelly sandy loam, 15 to 45 percent slopes
9llr	Belgrade silt loam, 0 to 5 percent slopes
9ln6	Manchester gravelly sandy loam, 3 to 15 percent slopes
9ljw	Fluvaquents-Udifluvents complex, frequently flooded
9lr5	Broadbrook silt loam, 15 to 25 percent slopes
9ljk	Raynham silt loam
9lmw	Hartford sandy loam, 3 to 8 percent slopes
9ljp	Rippowam fine sandy loam
9ln7	Manchester gravelly sandy loam, 15 to 45 percent slopes
9lmd	Udorthents, loamy, very steep
9lpb	Watchaug fine sandy loam, 3 to 8 percent slopes
9lmh	Urban land
9lmv	Hartford sandy loam, 0 to 3 percent slopes
9ljs	Winooski silt loam
9ljm	Occum fine sandy loam
9ljr	Hadley silt loam
9lnk	Ludlow silt loam, 2 to 8 percent slopes, very stony
9lq3	Narragansett silt loam, 2 to 8 percent slopes
9lr7	Broadbrook silt loam, 8 to 15 percent slopes, very stony
9lr6	Broadbrook silt loam, 3 to 8 percent slopes, very stony
9lq0	Cheshire fine sandy loam, 8 to 15 percent slopes, very stony
9lpz	Cheshire fine sandy loam, 3 to 8 percent slopes, very stony
9lpc	Watchaug fine sandy loam, 2 to 8 percent slopes, very stony
9ljq	Bash silt loam
9lrm	Wethersfield loam, 8 to 15 percent slopes, very stony
9lrl	Wethersfield loam, 3 to 8 percent slopes, very stony
9lnp	Rainbow silt loam, 2 to 8 percent slopes, very stony
9lk3	Catden and Freetown soils
9lmc	Pits, quarries
9ln1	Penwood loamy sand, 3 to 8 percent slopes
9lqv	Holyoke-Rock outcrop complex, 3 to 15 percent slopes

Site Location



Legend

- Mileposts
- Proposed Project Centerline
- Access Roads
- Pipeyards
- MLV Locations
- Town Boundary

N W E S

Tennessee Gas Pipeline Company, L.L.C.

Connecticut Expansion Project

SSURGO Soils Map

CT Loop

0 750 1,500 3,000 Feet

1 inch = 1,500 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Figure 1

March 2016

1.1.1 Soil Descriptions

Agawam fine sandy loam, 0 to 3 percent slopes (29A)

The Agawam component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on outwash plains on valleys, terraces on valleys. The parent material consists of coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Non-irrigated land capability classification is 1. This soil does not meet hydric criteria.

Bancroft silt loam, 0 to 3 percent slopes (25A)

The Brancroft component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on terraces on lake plains. The parent material consists of fine-silty glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during January, February, March, April, October, November, and December. Organic matter content in the surface horizon is about 5 percent. Non-irrigated land capability classification is 2w. This soil does not meet hydric criteria.

Bancroft silt loam, 3 to 8 percent slopes (25B)

The Brancroft component makes up 80 percent of the map unit. Slopes are 3 to 8 percent. This component is on terraces on lake plains. The parent material consists of fine-silty glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is very high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during January, February, March, April, October, November, and December. Organic matter content in the surface horizon is about 5 percent. Non-irrigated land capability classification is 2e. This soil does not meet hydric criteria.

Belgrade silt loam, 0 to 5 percent slopes (27A)

The Belgrade component makes up 80 percent of the map unit. Slopes are 0 to 5 percent. This component is on terraces on lake plains. The parent material consists of silty glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during January, February, March, April, November, and December. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 2w. This soil does not meet hydric criteria.

Broadbrook silt loam, 3 to 8 percent slopes (82B)

The Broadbrook component makes up 80 percent of the map unit. Slopes are 3 to 8 percent. This component is on drumlins on uplands, hills on uplands, till plains on uplands. The parent material consists of eolian deposits over coarse-loamy lodgment till derived from gneiss and/or schist and/or sandstone and/or basalt.

Depth to a root restrictive layer, densic material, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during March and and April. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 2e. This soil does not meet hydric criteria.

Cheshire-Holyoke complex, 3 to 15 percent slopes, very rocky (77C)

The Cheshire component makes up 45 percent of the map unit. Slopes are 3 to 15 percent. This component is on hills on uplands, till plains on uplands. The parent material consists of coarse-loamy melt-out till derived from basalt and/or sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 6s. This soil does not meet hydric criteria.

The Holyoke component makes up 35 percent of the map unit. Slopes are 3 to 15 percent. This component is on hills on uplands, ridges on uplands. The parent material consists of loamy eolian deposits over melt-out till derived from basalt and/or sandstone and shale. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. I t is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 70 percent. Non-irrigated land capability classification is 6s. This soil does not meet hydric criteria.

Elmridge fine sandy loam, 0 to 3 percent slopes (28A)

The Elmridge component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on terraces on lake plains. The parent material consists of coarse-loamy eolian sands over clayey glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, November, and December. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 2w. This soil does not meet hydric criteria.

Elmridge fine sandy loam, 3 to 8 percent slopes (28B)

The Elmridge component makes up 80 percent of the map unit. Slopes are 3 to 8 percent. This component is on terraces on lake plains. The parent material consists of coarse-loamy eolian sands over clayey glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, November, and December. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 2w. This soil does not meet hydric criteria.

Fluvaquents-Udifluvents complex, frequently flooded (109)

The Fluvaquents, Frequently Flooded component makes up 50 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 4 inches during January, February, March, April, May, October, November, and December. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 6w. This soil meets hydric criteria.

The Udifluvents, Frequently Flooded component makes up 35 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 72 inches all year. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 6w. This soil does not meet hydric criteria.

Haven and Enfield Soils, 3 to 8 percent slopes (32B)

The Haven component makes up 60 percent of the map unit. Slopes are 3 to 8 percent. This component is found on outwash plains on valleys and terraces. The parent material consists of coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 2e. This soil does not meet hydric criteria.

The Enfield component makes up 25 percent of the map unit. Slopes are 3 to 8 percent. This component is found on outwash plains on valleys and terraces. The parent material consists of coarse-silty eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 70 percent. Non-irrigated land capability classification is 2e. This soil does not meet hydric criteria.

Haven and Enfield soils, 8 to 15 percent slopes (32C)

The Haven component makes up 60 percent of the map unit. Slopes are 8 to 15 percent. This component is on outwash plains on valleys, terraces on valleys. The parent material consists of coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 3e. This soil does not meet hydric criteria.

The Enfield component makes up 25 percent of the map unit. Slopes are 8 to 15 percent. This component is on outwash plains on valleys, terraces on valleys. The parent material consists of coarse-silty eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss. Depth to a

root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 70 percent. Non-irrigated land capability classification is 3e. This soil does not meet hydric criteria.

Limerick and Lim soils (107)

The Limerick component makes up 50 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains. The parent material consists of coarse-silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, June, September, October, November, and December. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 4w. This soil meets hydric criteria.

The Lim component makes up 30 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions on flood plains. The parent material consists of coarse-loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, June, September, October, November, and December. Organic matter content in the surface horizon is about 5 percent. Non-irrigated land capability classification is 4w. This soil meets hydric criteria.

Ludlow silt loam, 0 to 3 percent slopes (40A)

The Ludlow component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on drumlins on uplands, hills on uplands. The parent material consists of coarse-loamy lodgment till derived from basalt and/or sandstone and shale. Depth to a root restrictive layer, densic material, is 20 to 40 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, November, and December. Organic matter content in the surface horizon is about 5 percent. Non-irrigated land capability classification is 2w. This soil does not meet hydric criteria.

Merrimac sandy loam, 0 to 3 percent slopes (34A)

The Merrimac component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on kames on valleys, outwash plains on valleys, terraces on valleys. The parent material consists of sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Non-irrigated land capability classification is 1. This soil does not meet hydric criteria.

Rainbow silt loam, 3 to 8 percent slopes (43B)

The Rainbow component makes up 80 percent of the map unit. Slopes are 3 to 8 percent. This component is on drumlins on uplands, hills on uplands. The parent material consists of eolian deposits over coarse-loamy lodgment till derived from gneiss and/or schist and/or sandstone and/or basalt. Depth to a root restrictive layer, densic material, is 20 to 40 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, November, and December. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 2e. This soil does not meet hydric criteria.

Raynham silt loam (10)

The Raynham component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions on lake plains, drainageways on lake plains. The parent material consists of coarse-silty glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, November, and December. Organic matter content in the surface horizon is about 6 percent. Non-irrigated land capability classification is 4w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent.

Rippowam fine sandy loam (103)

The Rippowam component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains. The parent material consists of coarse-loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, June, September, October, November, and December. Organic matter content in the surface horizon is about 6 percent. Non-irrigated land capability classification is 4w. This soil meets hydric criteria.

Saco silt loam (108)

The Saco component makes up 80 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains. The parent material consists of coarse-silty alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 3 inches all year. Organic matter content in the surface horizon is about 6 percent. Non-irrigated land capability classification is 6w. This soil meets hydric criteria.

Scitico, Shaker, and Maybid (9)

The Scitico component makes up 40 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions on lake plains, drainageways on lake plains, terraces. The parent material consists of clayey glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, June, October, November, and

December. Organic matter content in the surface horizon is about 5 percent. Non-irrigated land capability classification is 4w. This soil meets hydric criteria.

The Shaker component makes up 30 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions on lake plains, drainageways on lake plains, terraces on lake plains. The parent material consists of coarse-loamy eolian deposits over clayey glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, June, October, November, and December. Organic matter content in the surface horizon is about 70 percent. Non-irrigated land capability classification is 4w. This soil meets hydric criteria.

The Maybid component makes up 15 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions on lake plains, drainageways on lake plains, terraces on lake plains. The parent material consists of clayey glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is high. Shrink-swell potential is high. This soil is not flooded. It is occasionally ponded. A seasonal zone of water saturation is at 3 inches during January, February, March, April, May, June, July, August, October, November, and December. Organic matter content in the surface horizon is about 7 percent. Non-irrigated land capability classification is 6w. This soil meets hydric criteria.

Sudbury sandy loam, 0 to 5 percent slopes (23A)

The Sudbury component makes up 80 percent of the map unit. Slopes are 0 to 5 percent. This component is on outwash plains on valleys, terraces on valleys. The parent material consists of sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during January, February, March, April, and December. Organic matter content in the surface horizon is about 70 percent. Non-irrigated land capability classification is 2w. This soil does not meet hydric criteria.

Wethersfield loam, 3 to 8 percent slopes (87B)

The Wethersfield component makes up 80 percent of the map unit. Slopes are 3 to 8 percent. This component is on drumlins on uplands, hills on uplands. The parent material consists of coarse-loamy lodgment till derived from basalt and/or sandstone and shale. Depth to a root restrictive layer, densic material, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during February, March, and April. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 2e. This soil does not meet hydric criteria.

Wethersfield loam, 8 to 15 percent slopes (87C)

The Wethersfield component makes up 80 percent of the map unit. Slopes are 8 to 15 percent. This component is on drumlins on uplands, hills on uplands. The parent material consists of coarse-loamy lodgment till derived from basalt and/or sandstone and shale. Depth to a root restrictive layer, densic material, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during February, March, and April. Organic matter

content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 3e. This soil does not meet hydric criteria.

Wethersfield loam,15 to 25 percent slopes (87D)

The Wethersfield component makes up 80 percent of the map unit. Slopes are 15 to 25 percent. This component is on drumlins on uplands, hills on uplands. The parent material consists of coarse-loamy lodgment till derived from basalt and/or sandstone and shale. Depth to a root restrictive layer, densic material, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during February, March, and April. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Wilbraham silt loam (5)

The Wilbraham component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions on uplands, drainageways on uplands. The parent material consists of coarse-loamy lodgment till derived from basalt and/or sandstone and shale. Depth to a root restrictive layer, densic material, is 20 to 36 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during January, February, March, April, May, November, and December. Organic matter content in the surface horizon is about 6 percent. Non-irrigated land capability classification is 4w. This soil meets hydric criteria.

Windsor loamy sand, 0 to 3 percent slopes (36A)

The Windsor component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on kames on valleys, outwash plains on valleys, terraces on valleys. The parent material consists of eolian sands over sandy glaciofluvial deposits derived from granite and/or schist and/or gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 70 percent. Non-irrigated land capability classification is 2s. This soil does not meet hydric criteria.

Windsor loamy sand, 3 to 8 percent slopes (36B)

The Windsor component makes up 80 percent of the map unit. Slopes are 3 to 8 percent. This component is on kames on valleys, outwash plains on valleys, terraces on valleys. The parent material consists of eolian sands over sandy glaciofluvial deposits derived from granite and/or schist and/or gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 70 percent. Non-irrigated land capability classification is 2s. This soil does not meet hydric criteria.

Udorthents, smothed (308)

The Udorthents component makes up 80 percent of the map unit. Slopes are 0 to 35 percent. This component is on fills, leveled land. The parent material consists of drift. Depth to a root restrictive layer is greater than

60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 39 inches during January, February, March, April, November, and December. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 4e. This soil does not meet hydric criteria.

Udorthents-Urban land complex (306)

The Udorthents component makes up 50 percent of the map unit. Slopes are 0 to 25 percent. This component is on urban land. The parent material consists of drift. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 59 inches during January, February, March, April, November, and December. Organic matter content in the surface horizon is about 4 percent. Non-irrigated land capability classification is 3e. This soil does not meet hydric criteria.

The Urban land component makes up 35 percent of the map unit. Urban land is a miscellaneous area.

TABLE 3.3-1 - SOIL SERIES MAP UNITS CROSSED BY THE PROJECT IN CONNECTICUT

Soil Series Map Unit	Begin Milepost	End Milepost	Erosion Potential1	Capability Class[2]	Drainage Characteristics	Wind Erodibility Group[3]
736A	0.04	0.10	Slight	4w	Poorly drained	8
9	0.10	0.14	Very Severe	4w	Poorly drained	5
25B	0.14	0.28	Very Severe	2e	Moderately well drained	6
87B	0.28	0.33	Moderate	2e	Well drained	5
25B	0.33	0.37	Very Severe	2e	Moderately well drained	6
9	0.37	0.78	Very Severe	4w	Poorly drained	5
87D	0.78	0.82	Severe	4e	Well drained	5
5	0.82	0.85	Slight	4w	Poorly drained	8
32B	0.85	0.85	Very Severe	2e	Well drained	5
40A[4]	0.85	0.85	Very Severe	2w	Moderately well drained	5
5[4]	0.85	0.85	Slight	4w	Poorly drained	8
32C	0.85	0.90	Very Severe	3e	Well drained	5
82B	0.90	1.02	Moderate	2e	Well drained	5
40A[4]	0.93	0.93	Very Severe	2w	Moderately well drained	5
82B[4]	0.93	0.93	Moderate	2e	Well drained	5

TABLE 3.3-1 - SOIL SERIES MAP UNITS CROSSED BY THE PROJECT IN CONNECTICUT

Soil Series Map Unit	Begin Milepost	End Milepost	Erosion Potential1	Capability Class[2]	Drainage Characteristics	Wind Erodibility Group[3]
87B[4]	0.93	0.93	Moderate	2e	Well drained	5
9	1.02	1.04	Very Severe	4w	Poorly drained	5
25B	1.04	1.06	Very Severe	2e	Moderately well drained	6
9	1.06	1.22	Very Severe	4w	Poorly drained	5
25B[4]	1.22	1.22	Very Severe	2e	Moderately well drained	6
9[4]	1.22	1.22	Very Severe	4w	Poorly drained	5
28B	1.22	1.25	Very Severe	2w	Moderately well drained	3
9	1.25	1.32	Very Severe	4w	Poorly drained	5
36B	1.32	1.36	Very Severe	2s	Excessively drained	2
23A	1.36	1.49	Very Severe	2w	Moderately well drained	3
9	1.49	1.51	Very Severe	4w	Poorly drained	5
23A	1.51	1.54	Very Severe	2w	Moderately well drained	3
9	1.54	1.62	Very Severe	4w	Poorly drained	5
25B	1.62	1.68	Very Severe	2e	Moderately well drained	6
9	1.68	1.81	Very Severe	4w	Poorly drained	5
25B	1.81	1.85	Very Severe	2e	Moderately well drained	6
9	1.85	1.95	Very Severe	4w	Poorly drained	5
40A	1.95	1.98	Very Severe	2w	Moderately well drained	5
25A	1.98	2.16	Very Severe	2w	Moderately well drained	6
9	2.16	2.30	Very Severe	4w	Poorly drained	5
87C	2.30	2.34	Severe	3e	Well drained	5

TABLE 3.3-1 - SOIL SERIES MAP UNITS CROSSED BY THE PROJECT IN CONNECTICUT

Soil Series Map Unit	Begin Milepost	End Milepost	Erosion Potential1	Capability Class[2]	Drainage Characteristics	Wind Erodibility Group[3]
9	2.34	2.43	Very Severe	4w	Poorly drained	5
25B	2.43	2.51	Very Severe	2e	Moderately well drained	6
9	2.51	2.63	Very Severe	4w	Poorly drained	5
25A	2.63	2.69	Very Severe	2w	Moderately well drained	6
9	2.69	2.70	Very Severe	4w	Poorly drained	5
25B	2.70	2.72	Very Severe	2e	Moderately well drained	6
25A	2.72	2.73	Very Severe	2w	Moderately well drained	6
9	2.73	2.86	Very Severe	4w	Poorly drained	5
25A	2.86	2.94	Very Severe	2w	Moderately well drained	6
109	2.94	3.02	Very Severe	6w	Poorly drained	8
28A	3.02	3.19	Very Severe	2w	Moderately well drained	3
28A[4]	3.18	3.18	Very Severe	2w	Moderately well drained	3
28B[4]	3.18	3.18	Very Severe	2w	Moderately well drained	3
43B[4]	3.18	3.18	Moderate	2e	Moderately well drained	5
82B[4]	3.18	3.18	Moderate	2e	Well drained	5
9[4]	3.18	3.18	Very Severe	4w	Poorly drained	5
82B	3.19	3.21	Moderate	2e	Well drained	5
9	3.21	3.34	Very Severe	4w	Poorly drained	5
28B	3.34	3.39	Very Severe	2w	Moderately well drained	3
9	3.39	3.49	Very Severe	4w	Poorly drained	5
10	3.46	3.46	Very Severe	4w	Poorly drained	5

TABLE 3.3-1 - SOIL SERIES MAP UNITS CROSSED BY THE PROJECT IN CONNECTICUT

Soil Series Map Unit	Begin Milepost	End Milepost	Erosion Potential1	Capability Class[2]	Drainage Characteristics	Wind Erodibility Group[3]
43B	3.46	3.46	Moderate	2e	Moderately well drained	5
82B	3.46	3.46	Moderate	2e	Well drained	5
9	3.46	3.46	Very Severe	4w	Poorly drained	5
27A	3.49	3.51	Very Severe	2w	Moderately well drained	5
10	3.51	3.59	Very Severe	4w	Poorly drained	5
82B	3.59	3.64	Moderate	2e	Well drained	5
27A	3.64	3.67	Very Severe	2w	Moderately well drained	5
10	3.67	3.78	Very Severe	4w	Poorly drained	5
27A	3.78	3.80	Very Severe	2w	Moderately well drained	5
308	3.80	3.88	Severe	4e	Moderately well drained	5
27A	3.88	3.95	Very Severe	2w	Moderately well drained	5
10	3.95	4.09	Very Severe	4w	Poorly drained	5
27A	4.09	4.16	Very Severe	2w	Moderately well drained	5
10[4]	4.16	4.16	Very Severe	4w	Poorly drained	5
27A[4]	4.16	4.16	Very Severe	2w	Moderately well drained	5
10	4.16	4.25	Very Severe	4w	Poorly drained	5
27A	4.25	4.39	Very Severe	2w	Moderately well drained	5
10	4.39	4.44	Very Severe	4w	Poorly drained	5
23A[4]	5.43	5.43	Very Severe	2w	Moderately well drained	3
28A[4]	5.43	5.43	Very Severe	2w	Moderately well drained	3
29A[4]	5.43	5.43	Very Severe	1	Well drained	3

TABLE 3.3-1 - SOIL SERIES MAP UNITS CROSSED BY THE PROJECT IN CONNECTICUT

Soil Series Map Unit	Begin Milepost	End Milepost	Erosion Potential1	Capability Class[2]	Drainage Characteristics	Wind Erodibility Group[3]
27A	4.44	4.54	Very Severe	2w	Moderately well drained	5
28A	4.54	4.60	Very Severe	2w	Moderately well drained	3
10	4.60	4.64	Very Severe	4w	Poorly drained	5
27A	4.64	4.71	Very Severe	2w	Moderately well drained	5
10	4.71	4.82	Very Severe	4w	Poorly drained	5
9	4.82	5.41	Very Severe	4w	Poorly drained	5
28A	5.41	5.44	Very Severe	2w	Moderately well drained	3
9	5.44	5.51	Very Severe	4w	Poorly drained	5
28A	5.51	5.55	Very Severe	2w	Moderately well drained	3
107	5.55	5.61	Very Severe	4w	Poorly drained	5
28B	5.61	5.67	Very Severe	2w	Moderately well drained	3
108	5.67	5.70	Very Severe	6w	Very poorly drained	8
28B	5.70	5.76	Very Severe	2w	Moderately well drained	3
108	5.76	5.77	Very Severe	6w	Very poorly drained	8
9	5.77	5.85	Very Severe	4w	Poorly drained	5
25B	5.85	5.89	Very Severe	2e	Moderately well drained	6
9	5.89	6.08	Very Severe	4w	Poorly drained	5
108	6.08	6.12	Very Severe	6w	Very poorly drained	8
9	6.12	6.37	Very Severe	4w	Poorly drained	5
82B[4]	6.33	6.33	Moderate	2e	Well drained	5
87B[4]	6.33	6.33	Moderate	2e	Well drained	5

TABLE 3.3-1 - SOIL SERIES MAP UNITS CROSSED BY THE PROJECT IN CONNECTICUT

Soil Series Map Unit	Begin Milepost	End Milepost	Erosion Potential1	Capability Class[2]	Drainage Characteristics	Wind Erodibility Group[3]
9[4]	6.33	6.33	Very Severe	4w	Poorly drained	5
36A	6.37	6.40	Very Severe	2s	Excessively drained	2
28A	6.40	6.43	Very Severe	2w	Moderately well drained	3
9	6.43	6.47	Very Severe	4w	Poorly drained	5
28A	6.47	6.48	Very Severe	2w	Moderately well drained	3
9	6.48	6.50	Very Severe	4w	Poorly drained	5
28A	6.50	6.50	Very Severe	2w	Moderately well drained	3
9	6.50	6.56	Very Severe	4w	Poorly drained	5
28A	6.56	6.57	Very Severe	2w	Moderately well drained	3
9	6.57	6.58	Very Severe	4w	Poorly drained	5
28A	6.58	6.60	Very Severe	2w	Moderately well drained	3
9	6.60	7.07	Very Severe	4w	Poorly drained	5
28A	7.07	7.11	Very Severe	2w	Moderately well drained	3
9	7.11	7.13	Very Severe	4w	Poorly drained	5
25B	7.13	7.14	Very Severe	2e	Moderately well drained	6
28A	7.14	7.29	Very Severe	2w	Moderately well drained	3
108[4]	7.25	7.25	Very Severe	6w	Very poorly drained	8
28A[4]	7.25	7.25	Very Severe	2w	Moderately well drained	3
9[4]	7.25	7.25	Very Severe	4w	Poorly drained	5
108	7.29	7.31	Very Severe	6w	Very poorly drained	8

TABLE 3.3-1 - SOIL SERIES MAP UNITS CROSSED BY THE PROJECT IN CONNECTICUT

Soil Series Map Unit	Begin Milepost	End Milepost	Erosion Potential1	Capability Class[2]	Drainage Characteristics	Wind Erodibility Group[3]
28B	7.31	7.49	Very Severe	2w	Moderately well drained	3
108	7.49	7.53	Very Severe	6w	Very poorly drained	8
9	7.53	7.71	Very Severe	4w	Poorly drained	5
36B	7.71	7.75	Very Severe	2s	Excessively drained	2
36A	7.75	7.85	Very Severe	2s	Excessively drained	2
34A	7.85	7.91	Very Severe	1	Somewhat excessively drained	3
307	7.91	8.15	Not rated	8	--	--
34A[4]	8.03	8.03	Very Severe	1	Somewhat excessively drained	3
36A	8.15	8.20	Very Severe	2s	Excessively drained	2
36B	8.20	8.26	Very Severe	2s	Excessively drained	2
306[4]	8.26	8.26	Severe	3e	Well drained	5
34A[4]	8.26	8.26	Very Severe	1	Somewhat excessively drained	3
36A[4]	8.26	8.26	Very Severe	2s	Excessively drained	2
250B[5]	--	--	Moderate	2e	Well drained	3
108[5]	--	--	Very Severe	6w	Very poorly drained	8
28A[5]	--	--	Very Severe	2w	Moderately well drained	3
28A[5]	--	--	Very Severe	2w	Moderately well drained	3
77C[5]	--	--	Moderate	6s	Well drained	3
82B[5]	--	--	Moderate	2e	Well drained	5
9[5]	--	--	Very Severe	4w	Poorly drained	5

TABLE 3.3-1 - SOIL SERIES MAP UNITS CROSSED BY THE PROJECT IN CONNECTICUT

Soil Series Map Unit	Begin Milepost	End Milepost	Erosion Potential1	Capability Class[2]	Drainage Characteristics	Wind Erodibility Group[3]

[1] The erosion potential for each of the soils was determined by reviewing the erosion properties provided by the NRCS's Web Soil Survey. The NRCS has evaluated soils based on slope and soil erosion factor K.
•A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions.
•A rating of "moderate" indicates that some erosion is likely and that erosion control measures may be needed.
•A rating of "severe" indicates that erosion is very likely and that erosion control measures, including revegetation of bare areas are advised.
•A rating of "very severe" indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion control measures are costly and generally impractical.
[2] Capability class refers to the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. Soil Capability Subclasses are designated by adding e, w, or s to the Capability Class designation. The letter "e" shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; the letter "s" denotes that the soil is limited mainly because it is shallow, droughty, or stony' "w" indicates that water in or on the soil interferes with plant growth or cultivation.
•Capability Class 1: Soils have slight limitations that restrict their use.
• Capability Class 2: Soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
• Capability Class 3: Soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.
•Capability Class 4: Soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.
• Capability Class 5: Soils are not likely to erode but have other limitations, impractical to remove, that limit their use.
• Capability Class 6: Sols have severe limitations that make them generally unsuitable for cultivation.
• Capability Class 7: Soils have very severe limitations that make them unsuitable for cultivation.
•Capability Class 8: Soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.
[3] The wind erodibility group classification for each of the soils was determined by reviewing the physical soil properties data provided by the NRCS's Web Soil Survey. The NRCS has grouped soils that have similar properties affecting their susceptibility to wind erosion. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.
[4] Soil within access road only, MP is where access road enters ROW.
[5] Soil within pipeyard only, no MP associated.

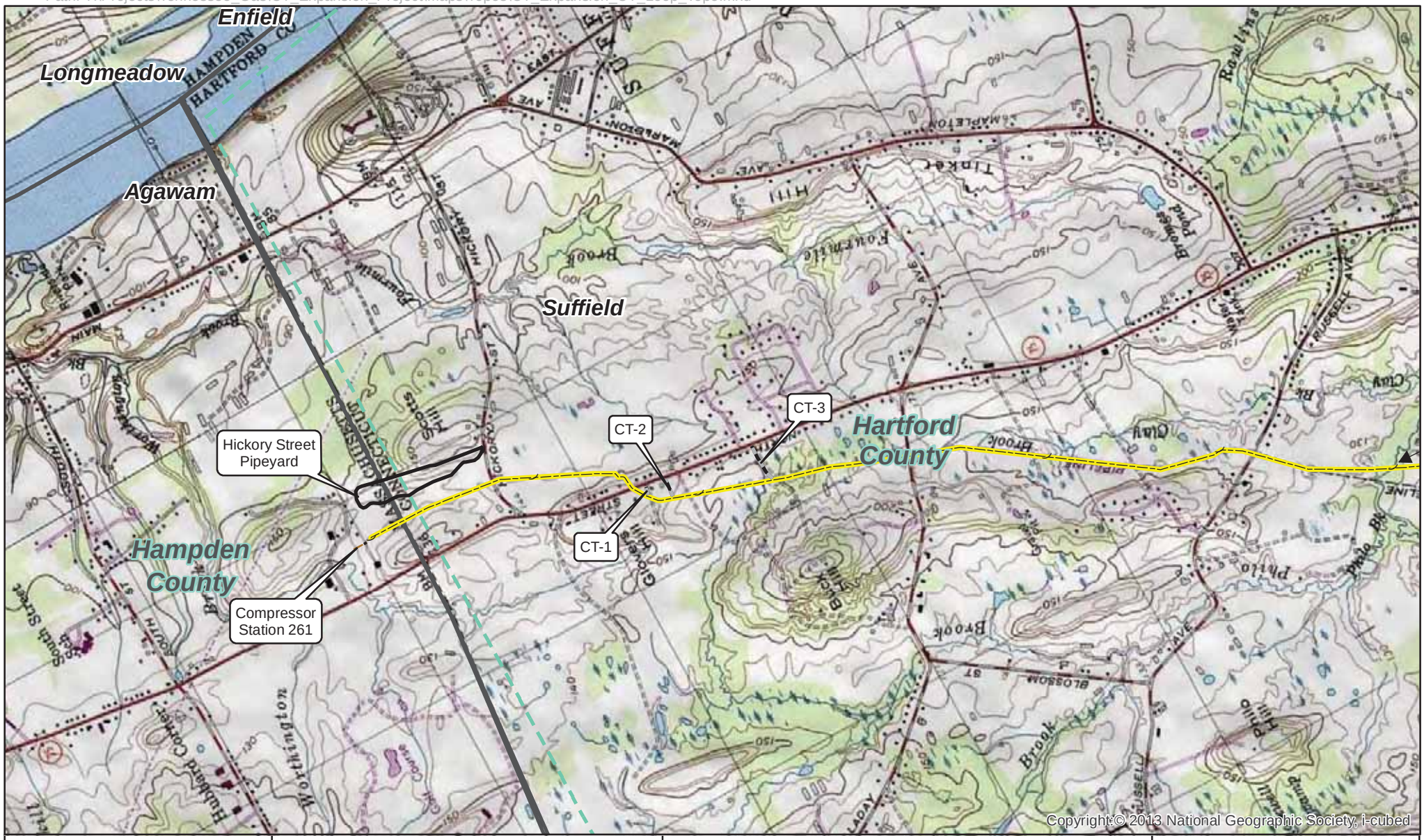
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT F

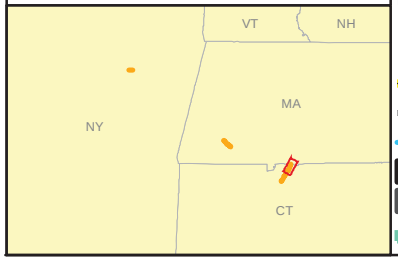
Project Mapping and Site Plans

F1 - USGS Site Topographic Maps
F2 - Alignment Sheets
F3 - Pipeyard Plans
F4 - Access Road Plans
F5 - Forested Wetland Restoration Planting Plans

Path: Y:\Projects\Tennessee_Gas\CT_Expansion_Project\Maps\Topos\CT_Expansion_CT_Loop_Topo.mxd



Site Location



Legend

- Mileposts
- Existing Compressor Station
- Centerline Route
- Access Roads
- Rivers and Streams
- Pipeyards
- Town Boundary
- County Boundary

Tennessee Gas Pipeline Company, L.L.C.
Connecticut Expansion Project
USGS Site Topographic Map
Connecticut

0 1,000 2,000 4,000 Feet

1 inch = 2,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Figure 1

April 15, 2015

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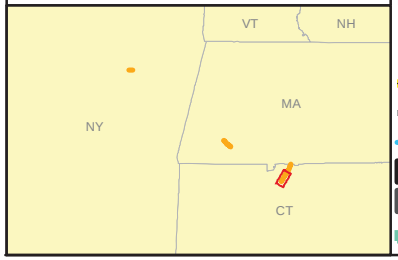
Site Location



Legend

- Mileposts
- Existing Compressor Station
- Centerline Route
- Access Roads
- Rivers and Streams
- Pipeyards
- Town Boundary
- County Boundary

Tennessee Gas Pipeline Company, L.L.C.
Connecticut Expansion Project
USGS Site Topographic Map
Connecticut

0 1,000 2,000 4,000 Feet

1 inch = 2,000 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Figure 1

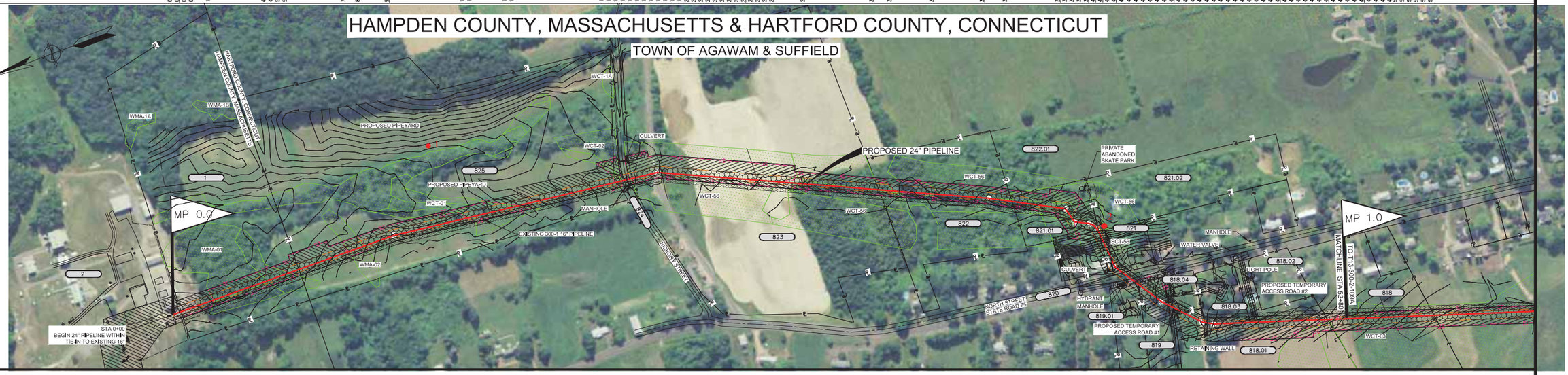
April 15, 2015

PROTECTION EASEMENT	822.01 · 821.02
LINE LIST (RODS)	0+00 (2) 2.2 · 0+37 (1) 32.1 · 5+67 (825) 84.9 · 13+67 (824) 4.0 · 20+32 (823) 63.6 · 30+82 (822) 34.3 · 36+50 (821.01) 24.1 · 40+66 (821) 10.4 · 42+38 (820) 6.2 · 43+41 (819.01) 0.6 · 43+52 (819) 10.7 · 45+28 (818.04) 2.9 · 45+76 (818.05) 6.1 · 46+77 (818.03) 8.3 · 48+13 (818.01) 23.3 · 51+97 (818) 5.0 · 52+80

PIPELINE STATIONING

0+00 BEGIN STA.
0+28 P.I. < 68°03'12" RT.
0+30 FENCE LINE CROSSING
0+37 PROPERTY LINE
1+86 ENTER WETLAND WMA-01
4+40 HEDGE ROW / BRUSH
4+43 TREE LINE CROSSING
5+23 EXIT WETLAND WMA-01
5+67 PROPERTY LINE / STATE LINE
7+95 ENTER WETLAND WMA-02
8+61 EXIT WETLAND WMA-02
9+94 P.I. < 6°15'38" RT.
13+21 ENTER WETLAND WCT-01
13+79 HEDGE ROW / BRUSH
15+07 HEDGE ROW / BRUSH
15+32 EXIT WETLAND WCT-01
19+67 ENTER WETLAND WCT-02
19+67 PROPERTY LINE
19+77 FIELD ENTRANCE 48' RT.
19+81 FIELD ENTRANCE 31' RT.
19+86 EXIT WETLAND WCT-02
19+86 POWER LINE CROSSING
19+87 TOE OF SLOPE
19+88 POWER LINE CROSSING (16' TIE TO POLE #23212)
19+91 EDGE OF STORAGE 26' RT.
19+91 TOP OF SLOPE
19+93 FIELD ENTRANCE 15' RT.
19+97 EDGE OF ROAD
20+00 MANHOLE 75' LT.
20+09 ℄ OF HICKORY STREET
20+20 EDGE OF ROAD
20+22 MANHOLE 24' RT.
20+25 TOP OF SLOPE
20+27 ENTER WETLAND WCT-56
20+31 TOE OF SLOPE
20+32 PROPERTY LINE
21+44 ENTER WETLAND WCT-56
21+60 CROP LINE CROSSING
25+67 CROP LINE CROSSING
25+98 TREE LINE CROSSING
26+64 EXIT WETLAND WCT-56
27+54 ENTER WETLAND WCT-56
30+82 PROPERTY LINE
31+45 EXIT WETLAND WCT-56
33+30 ENTER WETLAND WCT-56
35+51 P.I. < 31°03'6" RT.
36+49 PROPERTY LINE
38+77 P.I. < 46°04'51" RT.
39+11 EXISTING PIPELINE CROSSING
39+33 PRIVATE ABANDONED SKATE PARK 24' LT.
39+36 EXIT WETLAND WCT-56
40+44 PROPERTY LINE
40+10 P.I. < 16°07'06" RT.
40+28 P.I. < 23°40'24" RT.
40+49 ENTER WETLAND WCT-56
40+57 PROPERTY LINE
40+57 EXIT WETLAND WCT-56
41+66 PROPERTY LINE
41+74 TOP OF BANK
41+80 ℄ OF STREAM
41+89 ℄ OF STREAM SCT-56
42+04 TOP OF BANK
42+06 HEDGE ROW / BRUSH
42+20 P.I. < 22°29'11" LT.
42+34 12" CULVERT 19' LT. (WITH CONCRETE HEADWALL)
42+39 PROPERTY LINE
42+67 EDGE OF ROAD
42+86 ℄ OF NORTH STREET (STATE ROAD 75)
42+87 MAIL BOX 28 LT.
42+95 FIRE HYDRANT 35' RT.
43+10 MANHOLE (SANITARY SEWER) 19' RT.
43+10 EDGE OF ROAD
43+25 POWER LINE CROSSING (71' TIE TO POLE #4160)
43+27 DATA LINE UNDER ONE 2" LT.
43+41 PROPERTY LINE
43+52 PROPERTY LINE
43+71 TREE LINE CROSSING
44+23 P.I. < 10°12'24" LT.
44+63 EDGE OF PROPOSED ROAD
45+13 ℄ OF PROPOSED TEMPORARY ACCESS ROAD #1
45+20 EDGE OF ACCESS ROAD
45+28 TREE LINE CROSSING
45+28 PROPERTY LINE
45+76 PROPERTY LINE
46+66 P.I. < 17°21'00" LT.
46+77 PROPERTY LINE
46+79 FENCE LINE CROSSING
46+80 FENCE CORNER (WOOD) 3' RT.
46+88 FENCE LINE CROSSING
46+95 P.I. < 17°05'21" LT.
48+13 PROPERTY LINE
48+20 FENCE CORNER (WIRE) 32' LT.
48+62 CROP LINE CROSSING
48+80 EDGE OF PROPOSED TEMPORARY ACCESS ROAD #2
51+71 HEDGE ROW / BRUSH
51+97 PROPERTY LINE
51+98 FENCE LINE CROSSING
52+08 HEDGE ROW / BRUSH
52+41 ENTER WETLAND WCT-03

ALIGNMENT STRIP MAP



MATERIAL

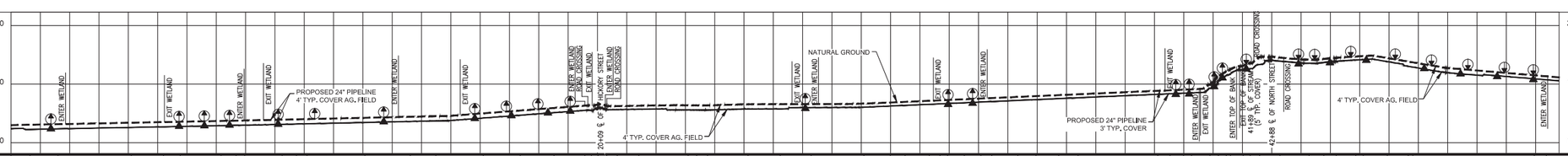
COATING

DESIGN FACTOR

CLASS LOCATION

PROFILE

GENERAL NOTES
1. THE BEST MANAGEMENT PRACTICE (BMP) NUMBERS NOTED ABOVE CORRESPOND TO SPECIFIC DETAILS FOUND ON THE BEST MANAGEMENT PRACTICE DETAIL SHEETS. THE BMP DETAILS INCLUDE GENERAL LAYOUT, LOCATION, DIMENSIONS, CONSTRUCTION NOTES, MATERIALS, ETC. THAT SHOULD BE FOLLOWED DURING CONSTRUCTION OF THE PIPELINE.
2. THE APPROXIMATE LOCATION AND TYPE OF SEDIMENT BARRIERS TO BE INSTALLED ALONG THE CONSTRUCTION WORKSPACE ARE LOCATED IN TABLES IN THE SILT FENCE DESIGN CRITERIA FOR CONNECTICUT. THE ACTUAL LOCATION SHALL BE DETERMINED IN THE FIELD BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.
3. TEMPORARY AND PERMANENT SLOPE BREAKER SPACING IS THE SAME. SLOPE BREAKERS SHALL BE MAINTAINED IN PLACE AT ALL TIMES.



THE LOCATIONS OF TRENCH BREAKERS AND SLOPE BREAKERS SHOWN ON THE PROFILE SHALL BE REVIEWED AND DEFINED BY THE ACTUAL LOCATION OF THE PIPELINE SHALL BE DETERMINED IN THE FIELD BASED ON FIELD CONDITIONS BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT SLOPE BREAKERS (ARROW INDICATES FLOW VIEW FLOW DIRECTION)

PERMANENT TRENCH BREAKER

NOTE: A MINIMUM TRENCH BREAKERS AND SLOPE BREAKERS SHALL BE LOCATED WITHIN 50 FEET OF THE EDGE (BOTH SIDES) OF WETLANDS AND WATERBODIES. ACTUAL LOCATION SHALL BE DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT TRENCH PLUG SPACING	
SLOPE (%)	SPACING (FT)
<5	125
5–10	100
>10–20	75
>20–35	50
>35	25

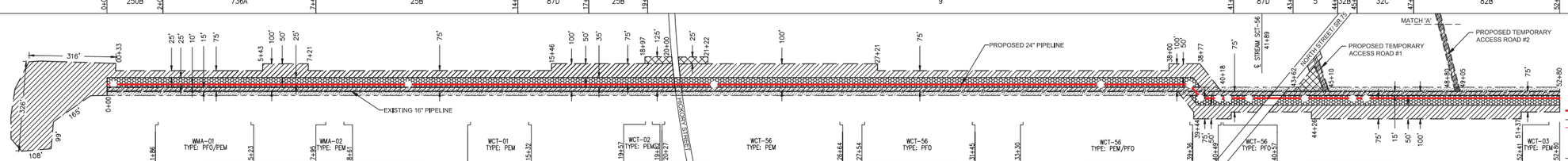
PERMANENT WATER BAR SPACING	
SLOPE (%)	SPACING (FT)
<1	400
2	245
3–5	125
>6–10	78
11–15+	58

GENERAL E&S FIGURES	
19 20 29 30 31 34 41	
65 81 82 83 84 118	

ENVIRONMENTAL: 0% 3% 1% 2% 1% 3% 0% 2% 3% 1% 3% 0% 1% 1% 4% 1% 3% 1% 2% 1% 2% 3% 4% 2% 8% 1% 0% 1% 6% 2% 3% 1% 2% 0% 2% 1% 1% 4% 8% 1% 0% 18% 5% 2% 1% 1% 3% 4% 2% 0% 7% 5% 1% 4% 5% 1%
W W W W W R W W S R W

SOIL TYPE: 0+00 250B 2+07 736A 7+44 25B 14+91 87D 17+53 25B 19+71 9 41+32 87D 43+12 5 44+63 32B 45+10 32C 47+40 82B 52+80

WORKSPACE SCHEMATIC



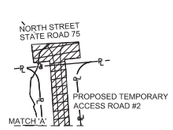
LEGEND

- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)

LIMITS OF DISTURBANCE
- ℄ Proposed 24" Pipeline
- ℄ Existing Pipeline
- Silt Fence
- Delineated Wetlands
- Delineated Vernal Pools
- ℄ Stream

L.L. NO.	OWNERSHIP
2	
1	
825	
824	
823	
822.01	
822	
821.02	
821.01	
821	
820	
819.01	
819	
818.05	
818.04	
818.03	
818.01	
818	

WORKSPACE INSETS



● Stormwater monitoring location

REFERENCE DRAWINGS

TO-T13-300-2-WMA1	WMA-1
TO-T13-300-2-WMA2	WMA-2
TO-T13-300-2-WCT1	WCT-1
TO-T13-300-2-WCT2	WCT-2
TO-T13-300-2-WCT56	WCT-56
TO-T13-300-2-WCT3	WCT-3
TO-T13-300-2-RX1	HICKORY STREET
TO-T13-300-2-RX2	NORTH ST/ SR75
TO-T13-300-2-AR1	TEMPORARY ACCESS ROAD 1
TO-T13-300-2-AR2	TEMPORARY ACCESS ROAD 2

BMP GROUP LEGEND

SYMBOL	BMP GROUP	ASSOCIATED BMP FIGURE NUMBERS
W	WETLANDS CROSSING	2,11,12,13,19,20,29,34,37,40,46,58A,90,91
S	WATERBODY CROSSING	1,2,5,6,7,19,20,30,31,36,37,38,39,41,44,63,80
R	ROAD CROSSING	3,15,49,50

SOIL TYPE LEGEND

250B	Pollux fine sandy loam 3 to 8 percent slopes
736A	Scantic Variant silt loam, 0 to 3 percent slopes
25B	Brancroft silt loam, 3 to 8 percent slopes
87D	Weithersfield loam, 15 to 25 percent slopes
9	Scitico, Shaker, and Maybid soils
5	Wilbraham silt loam
32B	Haven and Enfield soils, 3 to 8 percent slopes
32C	Haven and Enfield soils, 8 to 15 percent slopes
82B	Broadbrook silt loam, 3 to 8 percent slopes

ISSUED FOR BID

NOTE: MAOP IS 800 PSIG, OPERATING 719 PSIG

SCALE

200 100 0 200 400

IMAGERY DATE: JULY, 2012

REVISIONS

NO	PROJ. ID	DESCRIPTION	DATE	BY	CK	APPR
D	67159 & 67170	ISSUED FOR CTDEEP	11/13/15	AP	BL	
C	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	6/22/15	AP	RE	
B	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	3/20/15	AP	RE	
A	67159 & 67170	ISSUED FOR FERC	7/21/14	MS	BP	RG

AREA: NASSAU	DIV.: NORTHERN		
DRAFTER: MS	DATE: 06/27/14		
DRAFT. COORD: JD	DATE: 06/30/14		

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
EROSION & SEDIMENTATION CONTROL PLAN
HARTFORD COUNTY, CONNECTICUT
HAMPDEN COUNTY, MASSACHUSETTS

DESIGN COORD:	DATE:	SCALE: 1" = 200'	AFE: 67190 & 67159
PROJECT COORD:	DATE:	TO-T13-300-2-109	D
OPER. APPR:	DATE:		

PROTECTION EASEMENT

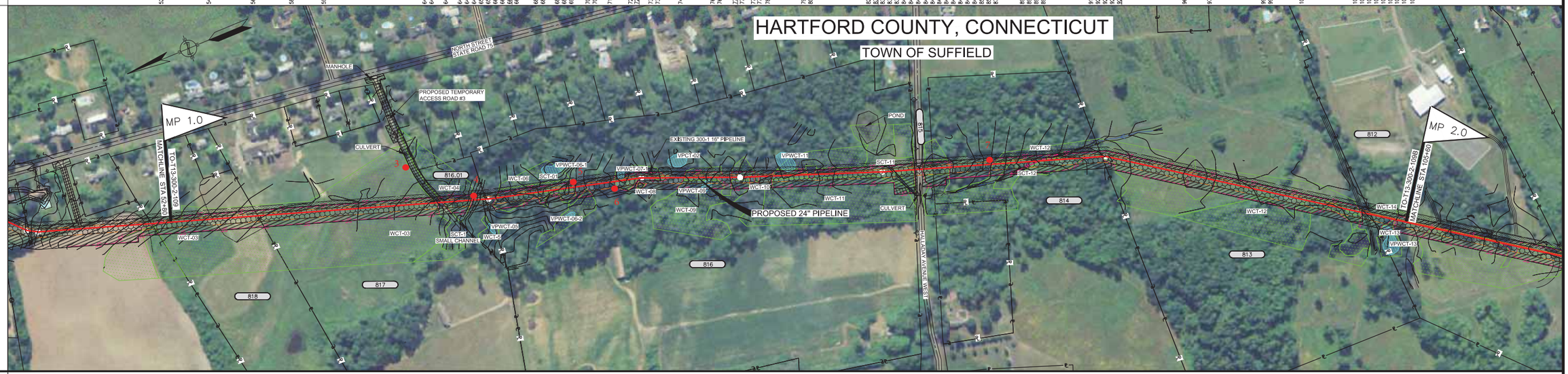
LINE LIST
RODS

818 — 22.4 (52+80 – 56+49)
817 — 47.7 (56+49 – 64+37)
816.01 — 10.9 (64+37 – 66+17)
816 — 110.4 (66+17 – 84+39)
815 — 5.0 (84+39 – 85+22)
814 — 43.5 (85+22 – 92+40)
813 — 70.7 (92+40 – 104+07)
812 — 9.2 (104+07 – 105+60)

PIPELINE STATIONING

52+80 MATCHLINE STATION
54+61 CROP LINE CROSSING
56+49 PROPERTY LINE
58+13 CROP LINE CROSSING
59+50 TOP OF SLOPE
64+06 EXIT WETLAND WCT-03
64+16 EDGE OF DRIVEWAY AND PROPOSED TEMPORARY ACCESS ROAD #3
64+32 EDGE OF DRIVEWAY AND PROPOSED TEMPORARY ACCESS ROAD #3
64+37 FENCE LINE CROSSING
64+37 PROPERTY LINE
64+37 ENTER WETLAND WCT-04
65+41 TOE OF SLOPE
65+58 EXIT WETLAND WCT-04
66+13 TOP OF SLOPE
66+17 PROPERTY LINE
66+30 P.I. < 3°42'2" LT.
66+68 ENTER WETLAND WCT-06
68+53 TOP OF BANK
68+54 TOE OF BANK
68+55 TOE OF BANK
68+65 TOP OF BANK
69+93 EXIT WETLAND WCT-06
70+76 OLD CAR 41 LT.
70+95 FENCE LINE CROSSING
71+72 ENTER WETLAND WCT-07
72+21 EXIT WETLAND WCT-07
72+84 P.I. < 72°20'6" RT.
73+32 ENTER WETLAND WCT-07
73+85 EXIT WETLAND WCT-07
74+67 ENTER WETLAND WCT-09
76+07 EXIT WETLAND WCT-09
76+69 ENTER WETLAND WCT-09
77+02 P.I. < 1°46'21" LT.
77+44 EXIT WETLAND WCT-09
77+66 ENTER WETLAND WCT-10
77+81 ENTER WETLAND WCT-10
78+39 ENTER WETLAND WCT-11
79+88 EXIT WETLAND WCT-11
80+21 ENTER WETLAND WCT-11
82+68 TREE LINE CROSSING
83+07 P.I. < 21°33'2" LT.
83+47 TOP OF BANK
83+54 ℄ OF STREAM SCT-11
83+58 TOE OF BANK
83+64 TREE LINE CROSSING
84+39 PROPERTY LINE
84+39 EXIT WETLAND WCT-11
84+42 TOE OF SLOPE
84+46 P.I. < 102°10'2" LT.
84+48 POWER LINE CROSSING (102' TIE TO POLE #4192)
84+53 EDGE OF ROAD
84+76 EDGE OF ROAD
84+80 HALLADAY AVENUE WEST
84+81 TOE OF SLOPE
84+85 TOE OF SLOPE
84+81 ENTER WETLAND WCT-12
85+01 PROPERTY LINE
85+22 EXIT WETLAND WCT-12
87+79 ENTER WETLAND WCT-12
89+21 TOP OF BANK
89+30 ℄ OF STREAM SCT-12
89+37 TOE OF BANK
89+96 TREE LINE CROSSING
91+86 EXIT WETLAND WCT-12
92+35 ENTER WETLAND WCT-12
92+45 PROPERTY LINE
92+52 TREE LINE CROSSING
92+52 P.I. < 16°21'3" RT.
96+19 EXIT WETLAND WCT-12
97+24 ENTER WETLAND WCT-12
99+61 TREE LINE CROSSING
99+69 TREE LINE CROSSING
101+28 TREE LINE CROSSING
103+57 EXIT WETLAND WCT-12
103+79 ℄ OF FIELD ROAD
103+86 EDGE OF FIELD ROAD
104+07 PROPERTY LINE
104+07 ENTER WETLAND WCT-13
105+14 16" CULVERT (CMP)
105+16 EXIT WETLAND WCT-13
105+42 TREE LINE CROSSING

ALIGNMENT STRIP MAP



MATERIAL

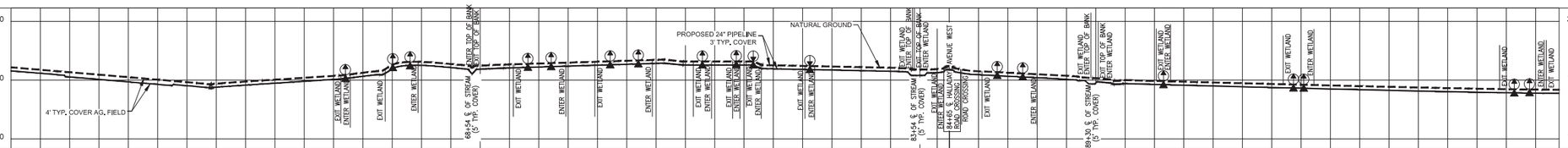
COATING

DESIGN FACTOR

CLASS LOCATION

PROFILE

GENERAL NOTES
1. THE BEST MANAGEMENT PRACTICE (BMP) NUMBERS NOTED ABOVE CORRESPOND TO SPECIFIC DETAILS FOUND ON THE BEST MANAGEMENT PRACTICE DETAIL SHEETS. THE BMP DETAILS INCLUDE GENERAL LAYOUT, LOCATION, DIMENSIONS, CONSTRUCTION NOTES, MATERIALS, ETC. THAT SHOULD BE FOLLOWED DURING CONSTRUCTION OF THE PIPELINE.
2. THE APPROXIMATE LOCATION AND TYPE OF SEDIMENT BARRIERS TO BE INSTALLED ALONG THE CONSTRUCTION WORKSPACE ARE LOCATED IN TABLES IN THE SILT FENCE DESIGN CRITERIA FOR CONNECTICUT. THE ACTUAL LOCATION SHALL BE DETERMINED IN THE FIELD BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.
3. TEMPORARY AND PERMANENT SLOPE BREAKER SPACING IS THE SAME. SLOPE BREAKERS SHALL BE MAINTAINED IN PLACE AT ALL TIMES.



THE LOCATIONS OF TRENCH BREAKERS AND SLOPE BREAKERS SHOWN ON THE PROFILE SHALL BE USED AS A GUIDELINE ONLY. THE ACTUAL LOCATION OF THE BREAKERS SHALL BE DETERMINED IN THE FIELD BASED ON FIELD CONDITIONS BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT SLOPE BREAKERS (DIRECTION INDICATES FLOW VIEW FLOW DIRECTION)

PERMANENT TRENCH BREAKER

NOT A MANUAL TRENCH BREAKERS AND SLOPE BREAKERS SHALL BE LOCATED WITHIN 50 FT. OF THE EDGE (BOTH SIDES) OF WETLANDS AND WATERBODIES. ACTUAL LOCATION SHALL BE DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT TRENCH BREAKER SPACING

SLOPE (%)	SPACING (FT)
<5	125
5–10	100
>10–20	75
>20–35	50
>35	25

PERMANENT SLOPE BREAKER SPACING

SLOPE (%)	SPACING (FT)
1	400
2	245
3–5	125
6–10	78
11–15+	58

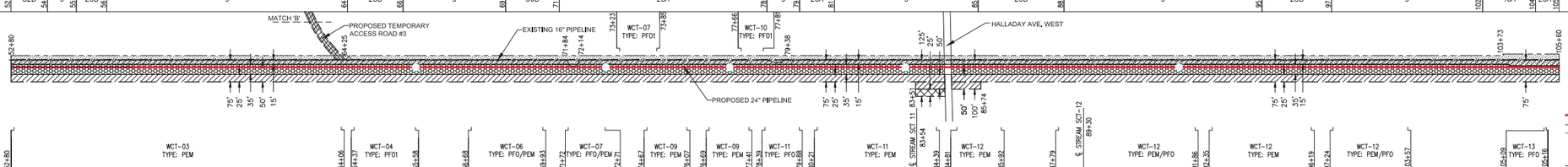
ENVIRONMENTAL

GENERAL E&S FIGURES: 19, 20, 29, 30, 31, 34, 41; 65, 81, 82, 83, 84, 118

SOIL TYPE

52+80 82B; 54+05 9; 56+04 25B; 56+49 9; 64+35 28B; 66+26 9; 69+79 36B; 71+63 23A; 78+76 9; 79+88 23A; 81+08 9; 85+45 25B; 88+59 9; 90+40 25B; 97+79 9; 102+97 40A; 104+79 25A; 105+60

WORKSPACE SCHEMATIC

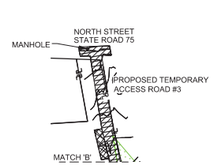


LEGEND
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)

LIMITS OF DISTURBANCE
- ℄ Proposed 24" Pipeline
- ℄ Existing Pipeline
- Silt Fence
- Delineated Wetlands
- Delineated Vernal Pools
- ℄ Stream

L.L. NO.	OWNERSHIP
818	
817	
816.01	
816	
815	
814	
813	
812	

WORKSPACE INSETS



● Stormwater monitoring location

REFERENCE DRAWINGS

TO-T13-300-2-WCT.3	WCT-3
TO-T13-300-2-WCT4	WCT-4
TO-T13-300-2-WCT6	WCT-6
TO-T13-300-2-WCT7	WCT-7&8
TO-T13-300-2-WCT9	WCT-9&10
TO-T13-300-2-WCT11	WCT/SCT-11
TO-T13-300-2-WCT12	WCT/SCT-12
TO-T13-300-2-WCT13	WCT-13&14
TO-T13-300-2-AR3	TEMPORARY ACCESS ROAD 3
TO-T13-300-2-RX3	HALLADAY AVENUE

BMP GROUP LEGEND

SYMBOL	BMP GROUP	ASSOCIATED BMP FIGURE NUMBERS
W	WETLANDS CROSSING	2,11,12,13,19,20,29,34,37,40,46,58A,90,91
S	WATERBODY CROSSING	1,2,5,6,7,19,20,30,31,36,37,38,39,41,44,63,80 111,115,116,119
R	ROAD CROSSING	3,15,49,50

SOIL TYPE LEGEND

82B	Broadbrook silt loam, 3 to 8 percent slopes
9	Scitico, Shaker, and Mayfield soils
25B	Brancroft silt loam, 3 to 8 percent slopes
28B	Elmridge fine sandy loam, 3 to 8 percent slopes
36B	Windsor loamy sand, 3 to 8 percent slopes
23A	Sudbury sandy loam, 0 to 5 percent slopes
40A	Ludlow silt loam, 0 to 3 percent slopes
25A	Brancroft silt loam, 0 to 3 percent slopes

ISSUED FOR BID

NOTE: MAOP IS 800 PSIG, OPERATING 719 PSIG

SCALE

200 100 0 200 400

IMAGERY DATE: JULY, 2012

REVISIONS

NO	PROJ ID	DESCRIPTION	DATE	BY	CK	APPR
D	67159 & 67170	ISSUED FOR CTDEEP	11/13/15	AP	BL	
C	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	6/22/15	AP	RE	
B	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	3/20/15	AP	RE	
A	67159 & 67170	ISSUED FOR FERC	7/21/14	MS	BP	RG

AREA: NASSAU	DIV.: NORTHERN		
DRAFTER: MS	DATE: 06/27/14		
DRAFT. COORD: JD	DATE: 06/30/14		
DESIGN COORD:	DATE:	SCALE: 1" = 200'	AFE: 67159
PROJECT COORD:	DATE:	TO-T13-300-2-109A	D
OPER. APPR:	DATE:		

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
EROSION & SEDIMENTATION CONTROL PLAN
HARTFORD COUNTY, CONNECTICUT

PROTECTION EASEMENT

LINE LIST

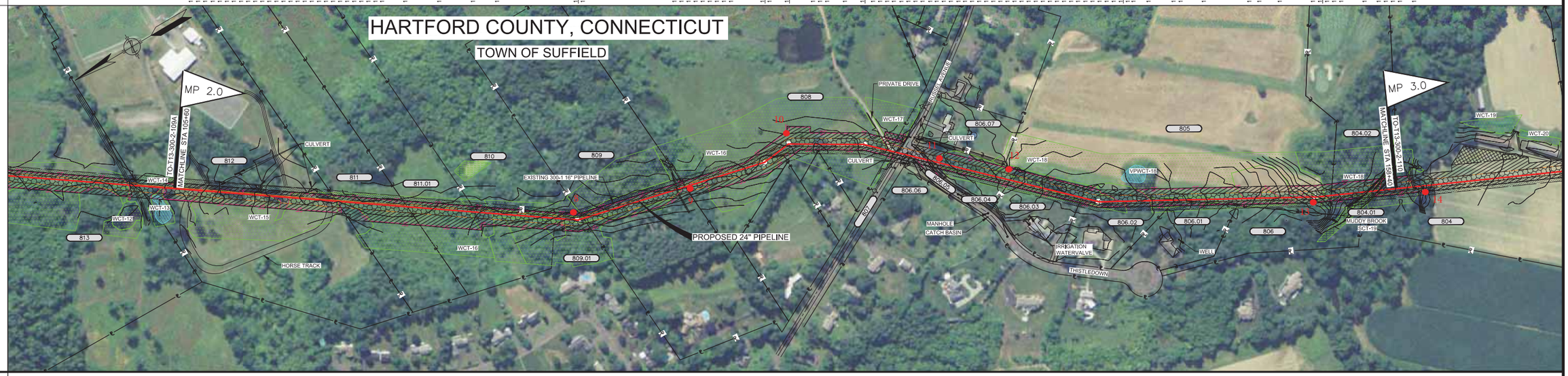
RODS

Line	Rods
812	41.7
811	18.2
811.01	45.5
809	27.4
808	55.4
807	5.4
806.05	5.0
806.04	21.4
806.03	18.8
806.02	24.3
806.01	0.7
805	39.4
804.02	10.6
804.01	6.2
804	

PIPELINE STATIONING

105+60 106+37 INSIDE EDGE OF TRACK 50' RT.
106+43 OUTSIDE EDGE OF TRACK 3' LT.
106+73 INSIDE EDGE OF TRACK 9' RT.
107+04 OUTSIDE EDGE OF TRACK 37' LT.
107+32 INSIDE EDGE OF TRACK 9' LT.
107+02 ENTER WETLAND-15
107+50 12" CULVERT (PLASTIC) 5' O/S LT.
107+99 OUTSIDE EDGE OF TRACK 41' LT.
108+74 INSIDE EDGE OF TRACK 41' LT.
109+03 FENCE CORNER, (PLASTIC) 37' LT.
109+23 FENCE CORNER, (PLASTIC) 10' LT.
109+28 12" CULVERT (PLASTIC) 6' O/S LT.
109+32 FENCE CORNER, (PLASTIC) 10' LT.
109+34 FENCE CORNER, (PLASTIC) 39' LT.
109+54 EXIT WETLAND WCT-15
109+89 OUTSIDE EDGE OF TRACK 42' LT.
110+41 EXIT WETLAND WCT-15
110+84 INSIDE EDGE OF TRACK 24' LT.
111+21 12" CULVERT (PLASTIC) 26' O/S LT.
111+58 INSIDE EDGE OF TRACK 43' LT.
111+69 ENTER WETLAND WCT-15
111+84 EDGE OF DRIVEWAY
112+09 INSIDE EDGE OF TRACK 42' RT.
112+25 OUTSIDE EDGE OF TRACK 36' RT.
112+49 PROPERTY LINE
112+54 EXIT WETLAND WCT 15
112+68 ENTER WETLAND WCT-16
115+49 PROPERTY LINE
116+93 TREE LINE CROSSING
118+37 FENCE LINE CROSSING
119+23 TREE LINE CROSSING
122+24 P.I. = 21°34'01" LT.
123+00 PROPERTY LINE
127+12 EDGE OF ROAD
127+15 ℄ OF ROAD
127+18 EDGE OF ROAD
127+27 TREE LINE CROSSING
127+47 EXIT WETLAND WCT-16
127+51 PROPERTY LINE
127+55 FENCE LINE CROSSING
127+66 OUTSIDE EDGE OF TRACK 46' LT.
128+85 TREE LINE CROSSING
131+02 P.I. = 19°34'54" LT.
131+76 EXISTING PIPELINE CROSSING
132+32 P.I. = 37°25'45" RT.
133+43 FENCE CORNER, (BARB WIRE) 34' RT.
133+58 FENCE CORNER, (BARB WIRE) 39' RT.
134+26 TREE LINE CROSSING
134+78 TREE LINE CROSSING
135+53 P.I. = 13°13'38" RT.
136+57 EXIT WETLAND WCT-16
136+65 EDGE OF DRIVEWAY
136+85 PROPERTY LINE
136+98 POWER LINE CROSSING (65' TIE TO POLE #4392)
137+03 EDGE OF ROAD
137+15 ℄ OF RUSSEL AVENUE
137+27 MAIL BOX 11' RT.
137+29 POWER POLE 79' RT.
137+42 12" CULVERT (PLASTIC)
137+44 TELEPHONE PEDESTAL
137+53 MONUMENT, IND. 6" CONCRETE 3' RT.
137+57 EDGE OF CURB
137+69 MONUMENT, IND. 6" CONCRETE 44' LT.
137+70 EDGE OF ROAD
137+71 EDGE OF CURB
137+75 ℄ OF THISTLEDOWN
138+01 MONUMENT, IND. 6" CONCRETE 35' RT.
138+19 EDGE OF ROAD
138+20 EDGE OF CURB
138+34 MONUMENT, IND. 6" CONCRETE 2' LT.
138+37 PROPERTY LINE
138+38 TOP OF SLOPE
138+82 TREE LINE CROSSING
139+34 EXIT WETLAND WCT-18
139+91 TOE OF SLOPE
141+20 TREE LINE CROSSING
141+65 15" CULVERT (CMP) 53' LT.
144+14 TOE OF SLOPE
144+28 TREE LINE CROSSING
145+01 TREE LINE CROSSING
145+40 ENTER WETLAND WCT-18
145+75 P.I. = 15°56'43" LT.
146+63 TREE LINE CROSSING
147+94 ENTER WETLAND WCT-18
149+01 PROPERTY LINE
149+13 PROPERTY LINE
150+30 TREE LINE CROSSING
151+90 EXIT WETLAND WCT-18
152+05 ENTER WETLAND WCT-18
153+46 EXIT WETLAND WCT-18
154+92 ENTER WETLAND-18
154+96 P.I. = 5°19'38" LT.
155+54 TOE OF SLOPE
155+62 PROPERTY LINE
156+11 TREE LINE CROSSING
157+13 TOP OF BANK
157+21 TOE OF BANK
157+38 ℄ OF SCT-19 (MUDDY BROOK)
157+38 ℄ OF BANK
157+44 TOE OF BANK
157+69 TOP OF BANK

ALIGNMENT STRIP MAP



MATERIAL

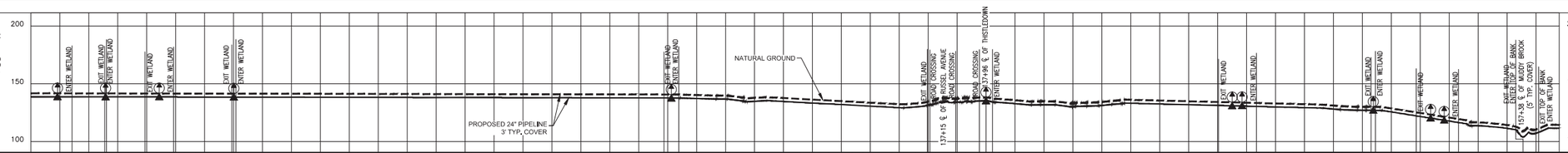
COATING

DESIGN FACTOR

CLASS LOCATION

PROFILE

GENERAL NOTES
1. THE BEST MANAGEMENT PRACTICE (BMP) NUMBERS NOTED ABOVE CORRESPOND TO SPECIFIC DETAILS FOUND ON THE BEST MANAGEMENT PRACTICE DETAIL SHEETS. THE BMP DETAILS INCLUDE GENERAL LAYOUT, LOCATION, DIMENSIONS, CONSTRUCTION NOTES, MATERIALS, ETC. THAT SHOULD BE FOLLOWED DURING CONSTRUCTION OF THE PIPELINE.
2. THE APPROXIMATE LOCATION AND TYPE OF SEDIMENT BARRIERS TO BE INSTALLED ALONG THE CONSTRUCTION WORKSPACE ARE LOCATED IN TABLES IN THE SILT FENCE DESIGN CRITERIA FOR CONNECTICUT. THE ACTUAL LOCATION SHALL BE DETERMINED IN THE FIELD BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.
3. TEMPORARY AND PERMANENT SLOPE BREAKER SPACING IS THE SAME. SLOPE BREAKERS SHALL BE MAINTAINED IN PLACE AT ALL TIMES.



THE LOCATIONS OF TRENCH BREAKERS AND SLOPE BREAKERS SHOWN ON THE PROFILE SHALL BE USED AS A GUIDELINE ONLY. THE ACTUAL LOCATION OF THE BREAKERS SHALL BE DETERMINED IN THE FIELD BASED ON FIELD CONDITIONS BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT SLOPE BREAKERS (ARROW INDICATES FLOW VIEW FLOW DIRECTION)

PERMANENT TRENCH BREAKER

*AT A MINIMUM, TRENCH BREAKERS AND SLOPE BREAKERS SHALL BE LOCATED WITHIN 50' OF THE EDGE (BOTH SIDES) OF WETLANDS AND WATERBODIES. ACTUAL LOCATION SHALL BE DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT TRENCH BREAKER SPACING	
SLOPE (%)	SPACING (FT)
<5	125
5–10	100
>10–20	75
>20–35	50
>35	25

PERMANENT SLOPE BREAKER SPACING	
SLOPE (%)	SPACING (FT)
1	400
2	245
3–5	125
6–10	76
11–15+	58

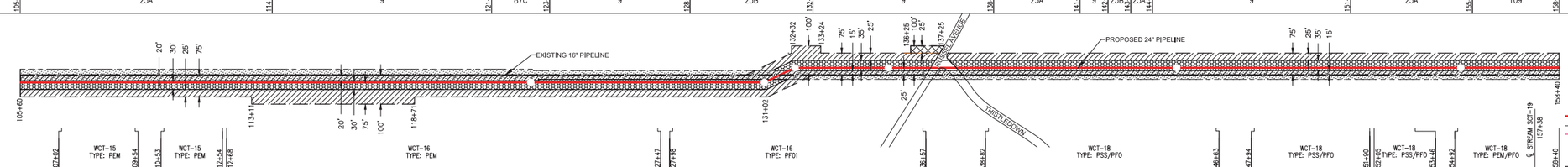
ENVIRONMENTAL

GENERAL E&S FIGURES: 19 20 29 30 31 34 41 / 65 81 82 83 84 118

SOIL TYPE

105+60 25A 114+25 9 121+68 87C 123+69 9 128+56 25B 132+52 9 138+79 25A 141+78 9 142+75 25B 143+38 25A 144+29 9 151+17 25A 156+39 109 158+40

WORKSPACE SCHEMATIC



LEGEND

- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)

LIMITS OF DISTURBANCE
- ℄ Proposed 24" Pipeline
- ℄ Existing Pipeline
- Silt Fence
- Delineated Wetlands
- Delineated Vernal Pools
- ℄ Stream

L.L. NO.	OWNERSHIP	WORKSPACE INSETS
812		
811		
811.01		
810		
809.01		
809		
808		
807		
806.05		
806.04		
806.03		
806.02		
806.01		
806		
805		
804.02		
804.01		
804		

● Stormwater monitoring location

REFERENCE DRAWINGS

TO-T13-300-2-WCT15	WCT-15
TO-T13-300-2-WCT16	WCT-16
TO-T13-300-2-WCT18	WCT-18
TO-T13-300-2-RX4	RUSSEL AVENUE
TO-T13-300-2-RX5	THISTLEDOWN ROAD

BMP GROUP LEGEND

SYMBOL	BMP GROUP	ASSOCIATED BMP FIGURE NUMBERS
W	WETLANDS CROSSING	2,11,12,13,19,20,29,34,37,40,46,58A,90,91
S	WATERBODY CROSSING	1,2,5,6,7,19,20,30,31,36,37,38,39,41,44,63,80 111,115,116,119
R	ROAD CROSSING	3,15,49,50

SOIL TYPE LEGEND

25A	Brancroft silt loam, 0 to 3 percent slopes
9	Scitico, Shaker, and Maybid soils
87C	Wethersfield loam, 8 to 15 percent slopes
25B	Brancroft silt loam, 3 to 8 percent slopes
25A	Brancroft silt loam, 0 to 3 percent slopes
109	Fluvaquents-Udifluvents complex, frequently flooded

ISSUED FOR BID

NOTE: MAOP IS 800 PSIG, OPERATING 719 PSIG

SCALE

200 100 0 200 400

IMAGERY DATE: JULY, 2012

REVISIONS

NO	PROJ ID	DESCRIPTION	DATE	BY	CK	APPR
D	67159 & 67170	ISSUED FOR CTDEEP	11/13/15	AP	BL	
C	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	6/22/15	AP	RE	
B	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	3/20/15	AP	RE	
A	67159 & 67170	ISSUED FOR FERC	7/21/14	MS	BP	RG

AREA: NASSAU	DIV.: NORTHERN		
DRAFTER: MS	DATE: 06/27/14		
DRAFT. COORD: JD	DATE: 06/30/14		

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

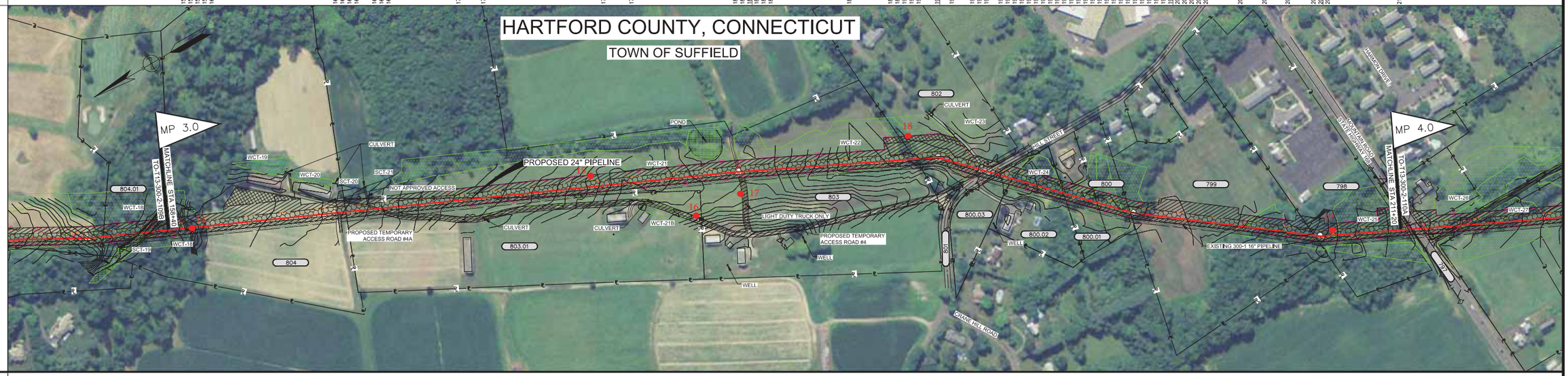
CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
EROSION & SEDIMENTATION CONTROL PLAN
HARTFORD COUNTY, CONNECTICUT

DESIGN COORD:	DATE:	SCALE: 1" = 200'	AFE: 67159
PROJECT COORD:	DATE:	TO-T13-300-2-109B	D
OPER. APPR:	DATE:		

PROTECTION EASEMENT	
LINE LIST	
RODS	
PIPELINE STATIONING	
ALIGNMENT STRIP MAP	
MATERIAL	
COATING	
DESIGN FACTOR	
CLASS LOCATION	
PROFILE	
ENVIRONMENTAL	
SOIL TYPE	
WORKSPACE SCHEMATIC	

LINE LIST (RODS): 804 — 45.9 (158+40 – 165+96); 803.01 — 35.7 (165+96 – 171+86); 803 — 111.3 (171+86 – 192+22); 802 — 16.9 (192+22 – 191+18); 801 — 5.3 (191+18 – 192+05); 800.03 — 3.7 (192+05 – 192+67); 800.02 — 13.5 (192+67 – 196+71); 800.01 — 8.9 (196+71 – 198+19); 800 — 8.9 (198+19 – 199+65); 799 — 47.7 (199+65 – 207+52); 798 — 22.3 (207+52 – 211+20)

PIPELINE STATIONING: 158+40 TO-T13-300-2-110B MATCHLINE STA 158+40; 159+07 TOE OF SLOPE; 159+10 EXIT WETLAND WCT-18; 159+23 TOP OF SLOPE; 159+79 TREE LINE CROSSING; 160+00 CROP LINE CROSSING; 165+45 CROP LINE CROSSING; 165+59 TOE OF SLOPE; 165+75 TOP OF SLOPE; 165+96 PROPERTY LINE; 167+21 EDGE OF ACCESS ROAD; 167+21 ℄ OF PROPOSED TEMPORARY ACCESS ROAD #4A; 167+41 EDGE OF ACCESS ROAD; 170+76 ENTER WETLAND WCT-21; 171+86 PROPERTY LINE; 176+93 EXIT WETLAND WCT-21; 178+14 ENTER WETLAND WCT-21; 182+61 EXIT WETLAND WCT-21; 182+70 EDGE OF ACCESS ROAD; 182+73 ℄ OF PROPOSED TEMPORARY ACCESS ROAD #4; 182+80 EDGE OF ACCESS ROAD; 182+90 ENTER WETLAND WCT-22; 187+45 TOE OF SLOPE; 189+19 TOE OF SLOPE; 189+55 EXIT WETLAND WCT-22; 189+62 EDGE OF ACCESS ROAD; 190+22 PROPERTY LINE; 190+52 TREE LINE CROSSING; 191+18 P.I. = 192°52'2" RT; 191+79 ENTER WETLAND WCT-22; 192+67 EXIT WETLAND WCT-22; 192+95 TOE OF SLOPE; 193+01 PROPERTY LINE; 193+03 TOP OF SLOPE; 193+09 MAIL BOX 19 RT.; 193+07 EDGE OF DRIVEWAY; 193+28 EDGE OF ROAD; 193+41 ℄ OF HILL STREET; 193+61 EDGE OF ROAD; 193+75 POWER LINE CROSSING (4' TIE TO POLE #4798); 193+78 POWER POLE 3' RT.; 193+85 PROPERTY LINE; 193+88 TOE OF SLOPE; 194+23 ENTER WETLAND WCT-24; 194+43 TOE OF SLOPE; 194+47 PROPERTY LINE; 195+47 TREE LINE CROSSING; 197+21 PROPERTY LINE; 197+03 TOE OF SLOPE; 198+09 HEDGE ROW / BRUSH; 198+18 PROPERTY LINE; 199+49 TOE OF SLOPE; 199+58 TOE OF SLOPE; 199+65 PROPERTY LINE; 199+61 EXIT WETLAND WCT-24; 199+77 TREE LINE CROSSING; 200+72 ℄ OF EXISTING 300-1 LT.; 200+78 SOCCER GOAL POST 22 LT.; 200+96 SOCCER GOAL POST 34 LT.; 202+03 TOP OF SLOPE; 202+53 TOE OF SLOPE; 202+59 SOCCER GOAL POST 39 LT.; 204+40 ENTER WETLAND WCT-25; 205+43 TREE LINE CROSSING; 206+36 EXIT WETLAND WCT-25; 207+52 PROPERTY LINE; 207+28 P.I. = 11°23'35" LT; 208+11 ENTER WETLAND WCT-25; 211+18 TREE LINE CROSSING; 211+20 TO-T13-300-2-110A MATCHLINE STA 211+20



PROFILE — GENERAL NOTES

1. THE BEST MANAGEMENT PRACTICE (BMP) NUMBERS NOTED ABOVE CORRESPOND TO SPECIFIC DETAILS FOUND ON THE BEST MANAGEMENT PRACTICE DETAIL SHEETS. THE BMP DETAILS INCLUDE GENERAL LAYOUT, LOCATION, DIMENSIONS, CONSTRUCTION NOTES, MATERIALS, ETC. THAT SHOULD BE FOLLOWED DURING CONSTRUCTION OF THE PIPELINE.
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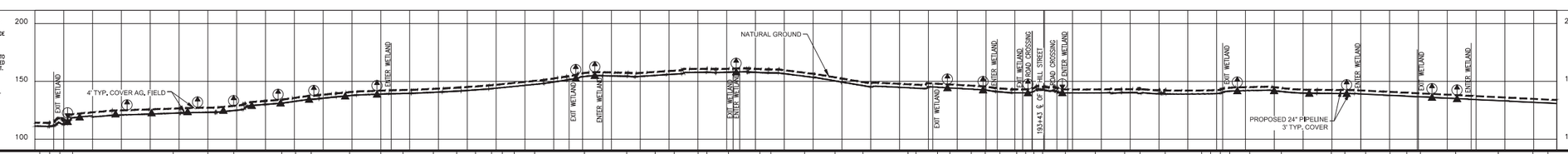
3. TEMPORARY AND PERMANENT SLOPE BREAKER SPACING IS THE SAME. SLOPE BREAKERS SHALL BE MAINTAINED IN PLACE AT ALL TIMES.



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PERMANENT SLOPE BREAKERS (ARROW INDICATES FLOW FLOW DIRECTION)

PERMANENT TRENCH BREAKER

*AT A MINIMUM, TRENCH BREAKERS AND SLOPE BREAKERS SHALL BE LOCATED WITHIN 50 FT. OF THE EDGE (BOTH SIDES) OF WETLANDS AND WATERBODIES. ACTUAL LOCATION SHALL BE DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

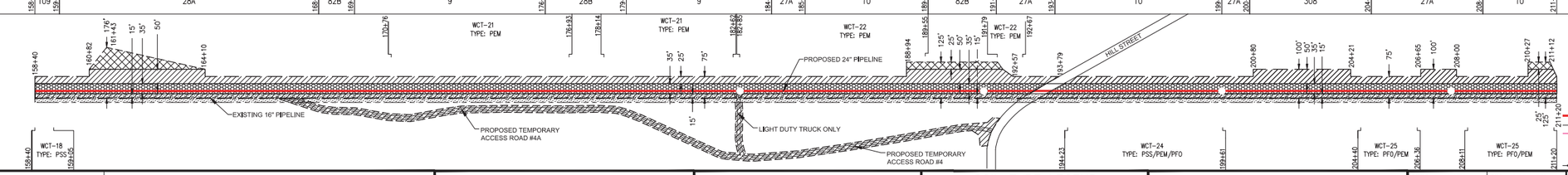
PERMANENT TRENCH BREAKER SPACING	
SLOPE (%)	SPACING (FT)
<5	125
5–10	100
>10–20	75
>20–35	50
>35	25

PERMANENT SLOPE BREAKER SPACING	
SLOPE (%)	SPACING (FT)
1	400
2	245
3–5	125
6–10	78
11–15+	58

ENVIRONMENTAL: 1% 10% 8% 10% 2% 0% 3% 8% 5% 3% 2% 1% 0% 1% 2% 2% 1% 2% 3% 3% 3% 1% 2% 3% 1% 1% 1% 0% 3% 3% 4% 1% 3% 1% 3% 2% 2% 5% 5% 5% 2% 3% 6% 2% 3% 4% 1% 1% 1% 5% 2% 3% 1% 1% 1% 5% 1% 0% 2% 3% 3% 0% 2% 15%

GENERAL E&S FIGURES: 19 20 29 30 31 34 41; 65 81 82 83 84 118

SOIL TYPE: 158+40 105 159+26 28A 168+30 82B 169+55 9 176+20 28B 179+03 9 184+10 27A 185+27 10 189+55 82B 191+94 27A 193+98 10 199+61 27A 200+58 308 204+73 27A 208+62 10 211+20



LEGEND

- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- LIMITS OF DISTURBANCE
- ℄ Proposed 24" Pipeline
- ℄ Existing Pipeline
- Silt Fence
- Delineated Wetlands
- Delineated Vernal Pools
- ℄ Stream

L.L. NO.	OWNERSHIP	WORKSPACE INSETS
804		
803.01		
803		
802		
801		
800.03		
800.02		
800.01		
800		
799		
798		

● Stormwater monitoring location

REFERENCE DRAWINGS

TO-T13-300-2-WCT18	WCT-18
TO-T13-300-2-WCT21	WCT-21
TO-T13-300-2-WCT22	WCT-22
TO-T13-300-2-WCT24	WCT-24
TO-T13-300-2-WCT25	WCT-25
TO-T13-300-2-WCT18	SCT-19
TO-T13-300-2-AR4A	TEMPORARY ACCESS ROAD 4A
TO-T13-300-2-AR4	TEMPORARY ACCESS ROAD 4
TO-T13-300-2-RX6	HILL STREET

BMP GROUP LEGEND

SYMBOL	BMP GROUP	ASSOCIATED BMP FIGURE NUMBERS
W	WETLANDS CROSSING	2,11,12,13,19,20,29,34,37,40,46,58A,90,91
S	WATERBODY CROSSING	1,2,5,6,7,19,20,30,31,36,37,38,39,41,44,63,80 111,115,116,119
R	ROAD CROSSING	3,15,49,50

SOIL TYPE LEGEND

109	Fluvaquents-Udifluvents complex, frequently flooded
28A	Elmridge fine sandy loam, 0 to 3 percent slopes
82B	Broadbrook silt loam, 3 to 8 percent slopes
9	Scitico, Shaker, and Maybid soils
28B	Elmridge fine sandy loam, 3 to 8 percent slopes
27A	Belgrade silt loam, 0 to 5 percent slopes
10	Raynham silt loam
308	Udorthents, smoothed

ISSUED FOR BID

NOTE: MAOP IS 800 PSIG, OPERATING 719 PSIG

SCALE

200 100 0 200 400

IMAGERY DATE: JULY, 2012

REVISIONS

NO	PROJ ID	DESCRIPTION	DATE	BY	CK	APPR
D	67159 & 67170	ISSUED FOR CTDEEP	11/13/15	AP	BL	
C	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	6/22/15	AP	RE	
B	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	3/20/15	AP	RE	
A	67159 & 67170	ISSUED FOR FERC	7/21/14	MS	BP	RG

AREA: NASSAU	DIV.: NORTHERN		
DRAFTER: MS	DATE: 06/27/14		
DRAFT. COORD: JD	DATE: 06/30/14		

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
EROSION & SEDIMENTATION CONTROL PLAN
HARTFORD COUNTY, CONNECTICUT

DESIGN COORD:	DATE:	SCALE: 1" = 200'	AFE: 67159
PROJECT COORD:	DATE:	TO-T13-300-2-110	D
OPER. APPR:	DATE:		

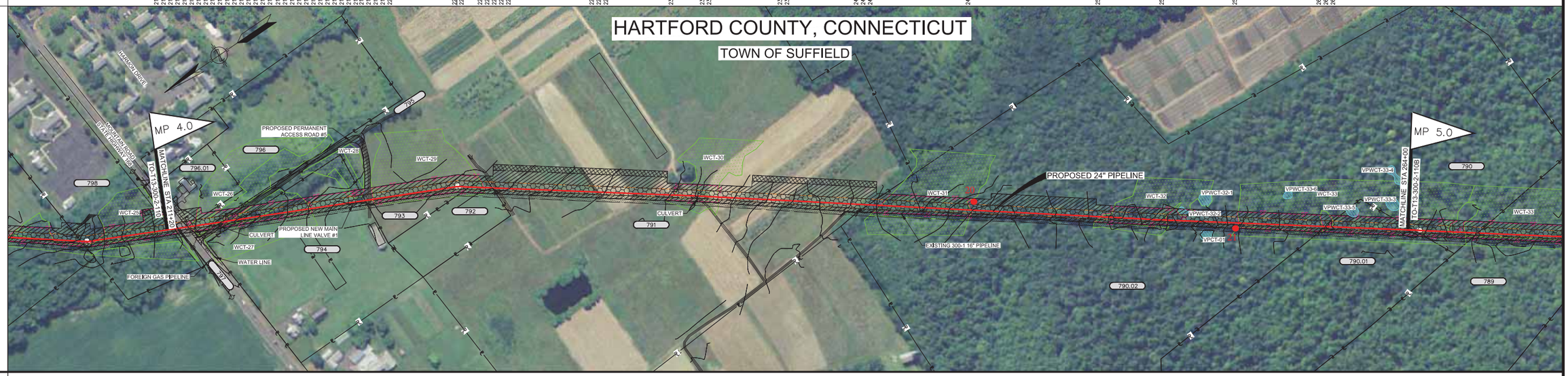
PROTECTION EASEMENT

LINE LIST

RODS

PIPELINE STATIONING

ALIGNMENT STRIP MAP



MATERIAL

COATING

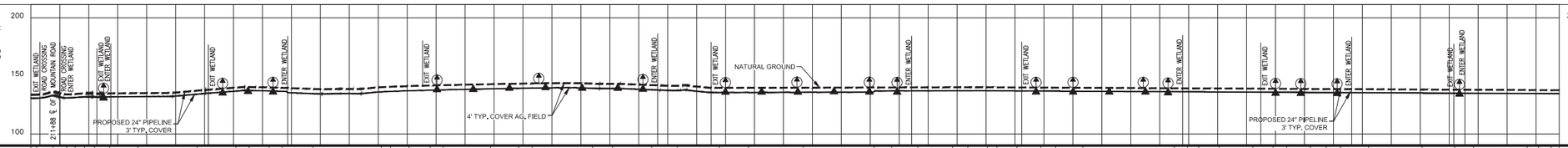
DESIGN FACTOR

CLASS LOCATION

PROFILE

GENERAL NOTES:

1. THE BEST MANAGEMENT PRACTICE (BMP) NUMBERS NOTED ABOVE CORRESPOND TO SPECIFIC DETAILS FOUND ON THE BEST MANAGEMENT PRACTICE DETAIL SHEETS. THE BMP DETAILS INCLUDE GENERAL LAYOUT, LOCATION, DIMENSIONS, CONSTRUCTION NOTES, MATERIALS, ETC. THAT SHOULD BE FOLLOWED DURING CONSTRUCTION OF THE PIPELINE.
2. THE APPROXIMATE LOCATION AND TYPE OF SEDIMENT BARRIERS TO BE INSTALLED ALONG THE CONSTRUCTION WORKSPACE ARE LOCATED IN TABLES IN THE SILT FENCE DESIGN CRITERIA FOR CONNECTICUT. THE ACTUAL LOCATION SHALL BE DETERMINED IN THE FIELD BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.
3. TEMPORARY AND PERMANENT SLOPE BREAKER SPACING IS THE SAME. SLOPE BREAKERS SHALL BE MAINTAINED IN PLACE AT ALL TIMES.



THE LOCATIONS OF TRENCH BREAKERS AND SLOPE BREAKERS SHOWN ON THE PROFILE SHALL BE FIELD AS A GUIDELINE ONLY. THE ACTUAL LOCATION OF THE BREAKERS SHALL BE DETERMINED IN THE FIELD BASED ON FIELD CONDITIONS BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT SLOPE BREAKERS (ARROW INDICATES FLOW VIEW FLOW DIRECTION)

PERMANENT TRENCH BREAKER

*AT A MINIMUM, TRENCH BREAKERS AND SLOPE BREAKERS SHALL BE LOCATED AT THE BASE OF SLOPES, UPSLOPE SIDES OF WETLANDS AND WATERBODIES. ACTUAL LOCATION SHALL BE DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT TRENCH BREAKER SPACING	
SLOPE (%)	SPACING (FT)
<5	125
5–10	100
>10–20	75
>20–35	50
>35	25

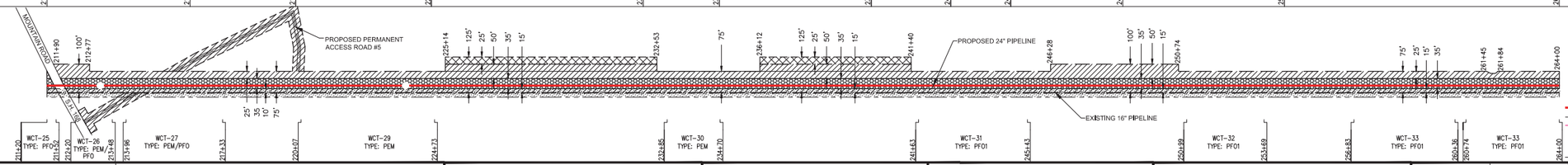
PERMANENT SLOPE BREAKER SPACING	
SLOPE (%)	SPACING (FT)
1	400
2	245
3–5	125
6–10	78
11–15+	58

ENVIRONMENTAL

SOIL TYPE

GENERAL E&S FIGURES: 19, 20, 29, 30, 31, 34, 41; 65, 81, 82, 83, 84, 118

WORKSPACE SCHEMATIC



LEGEND

- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- LIMITS OF DISTURBANCE
- ℄ Proposed 24" Pipeline
- ℄ Existing Pipeline
- Silt Fence
- Delineated Wetlands
- Delineated Vernal Pools
- ℄ Stream

L.L. NO.	OWNERSHIP
798	
797	
796.01	
796	
795	
794	
793	
792	
791	
790.02	
790.01	

WORKSPACE INSETS

● Stormwater monitoring location

REFERENCE DRAWINGS

TO-T13-300-2-WCT25	WCT-25
TO-T13-300-2-WCT26	WCT-26&27
TO-T13-300-2-WCT28	WCT-28&29
TO-T13-300-2-WCT30	WCT-30
TO-T13-300-2-WCT31	WCT-31
TO-T13-300-2-WCT32	WCT-32
TO-T13-300-2-WCT33	WCT-33
TO-T13-300-2-RX7	SH 168
TO-T13-300-2-AR5	PERMANENT ACCESS ROAD 5

BMP GROUP LEGEND

SYMBOL	BMP GROUP	ASSOCIATED BMP FIGURE NUMBERS
W	WETLANDS CROSSING	2,11,12,13,19,20,29,34,37,40,46,58A,90,91
S	WATERBODY CROSSING	1,2,5,6,7,19,20,30,31,36,37,38,39,41,44,63,80 111,115,116,119
R	ROAD CROSSING	3,15,49,50

SOIL TYPE LEGEND

10	Raynham silt loam
27A	Belgrade silt loam, 0 to 5 percent slopes
28A	Elmridge fine sandy loam, 0 to 3 percent slopes
9	Scitico, Shaker, and Mayfield soils

ISSUED FOR BID

NOTE: MAOP IS 800 PSIG, OPERATING 719 PSIG

SCALE

200 100 0 200 400

IMAGERY DATE: JULY, 2012

REVISIONS

NO	PROJ ID	DESCRIPTION	DATE	BY	CK	APPR
D	67159 & 67170	ISSUED FOR CTDEEP	11/13/15	AP	BL	
C	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	6/22/15	AP	RE	
B	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	3/20/15	AP	RE	
A	67159 & 67170	ISSUED FOR FERC	7/21/14	MS	BP	RG

AREA: NASSAU	DIV.: NORTHERN		
DRAFTER: MS	DATE: 06/27/14		
DRAFT. COORD: JD	DATE: 06/30/14		

Tennessee Gas Pipeline Company, L.L.C.
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CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
EROSION & SEDIMENTATION CONTROL PLAN
HARTFORD COUNTY, CONNECTICUT

DESIGN COORD:	DATE:	SCALE: 1" = 200'	AFE: 67159
PROJECT COORD:	DATE:	TO-T13-300-2-110A	D
OPER. APPR:	DATE:		

PROTECTION EASEMENT

LINE LIST

RODS

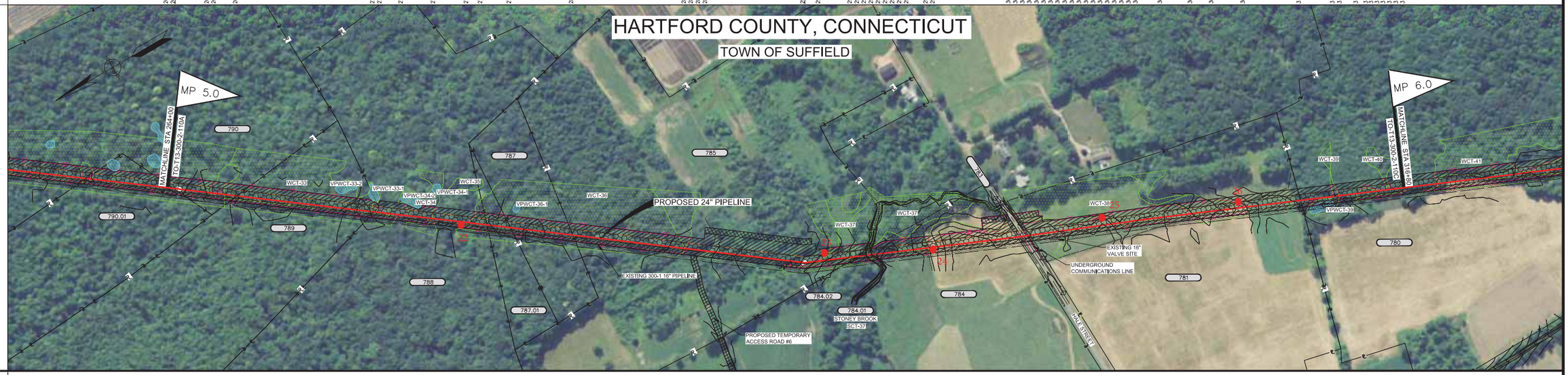
790.01	790	789	788	787.01	787	785	784.02	784.01	784	783	781	780
1.6	16.4	35.5	29.2	6.1	16.1	73.8	3		38	3.4	70.1	26.7

264+00 264+26 264+59 272+82 277+64 278+65 281+31 293+48 294+02 300+28 301+94 312+40 316+80

PIPELINE STATIONING

264+26 PROPERTY LINE
264+59 P.A. ∠ 6°00'00" RT.
265+82 EXIT WETLAND WCT-33
266+10 ENTER WETLAND WCT-33
266+96 PROPERTY LINE
272+82 PROPERTY LINE
273+22 EXIT WETLAND WCT-33
274+25 ENTER WETLAND WCT-34
275+33 EXIT WETLAND WCT-34
276+81 ENTER WETLAND WCT-36
277+64 PROPERTY LINE
278+65 PROPERTY LINE
281+31 PROPERTY LINE
286+09 EXIT WETLAND WCT-36
286+40 TREE LINE CROSSING
286+77 ℄ OF PROPOSED TEMPORARY ACCESS ROAD #6
287+13 TREE LINE CROSSING
291+18 P.A. ∠ 13°38'33" LT.
291+81 ENTER WETLAND WCT-37
293+32 TREE LINE CROSSING
293+42 PROPERTY LINE
293+55 FENCE LINE CROSSING
293+80 EXIT WETLAND WCT-37
294+10 ℄ OF BANK (STONEY BROOK)
294+10 ENTER WETLAND WCT-37
294+14 TOP OF BANK
294+44 HEDGE ROW / BRUSH
296+44 FENCE LINE CROSSING
296+49 EXIT WETLAND WCT-37
300+28 PROPERTY LINE
300+38 FENCE LINE CROSSING
300+46 EDGE OF ROAD
300+56 POWER LINE CROSSING
300+59 ℄ OF HALE STREET
300+68 EDGE OF ROAD
300+68 TOP OF SLOPE
300+70 UNDERGROUND COMMUNICATIONS LINE CROSSING
300+73 FENCE LINE CROSSING
300+76 POWER LINE CROSSING (61' TIE TO POLE #4985)
300+84 PROPERTY LINE
300+95 FENCE CORNER, (CHAINLINK) 19' RT.
301+45 FENCE CORNER, (CHAINLINK) 12' RT.
301+65 FENCE CORNER, (CHAINLINK) 19' RT.
301+98 FENCE CORNER, (CHAINLINK) 31' RT.
302+22 EXIT WETLAND WCT-38
302+45 TOE OF SLOPE
302+59 EXIT WETLAND WCT-38
304+43 ENTER WETLAND WCT-38
306+59 EXIT WETLAND WCT-38
307+70 ENTER WETLAND WCT-38
308+66 FENCE LINE CROSSING
309+95 EXIT WETLAND WCT-38
312+40 PROPERTY LINE
313+83 ENTER WETLAND WCT-39
314+05 EXIT WETLAND WCT-39
314+84 ENTER WETLAND WCT-40
315+94 EXIT WETLAND WCT-40
316+00 TREE LINE CROSSING
316+25 EXIT WETLAND WCT-40
316+40 ENTER WETLAND WCT-40
316+46 ENTER WETLAND WCT-40
316+57 EXIT WETLAND WCT-40

ALIGNMENT STRIP MAP



MATERIAL

COATING

DESIGN FACTOR

CLASS LOCATION

PROFILE

GENERAL NOTES
1. THE BEST MANAGEMENT PRACTICE (BMP) NUMBERS NOTED ABOVE CORRESPOND TO SPECIFIC DETAILS FOUND ON THE BEST MANAGEMENT PRACTICE DETAIL SHEETS. THE BMP DETAILS INCLUDE GENERAL LAYOUT, LOCATION, DIMENSIONS, CONSTRUCTION NOTES, MATERIALS, ETC. THAT SHOULD BE FOLLOWED DURING CONSTRUCTION OF THE PIPELINE.
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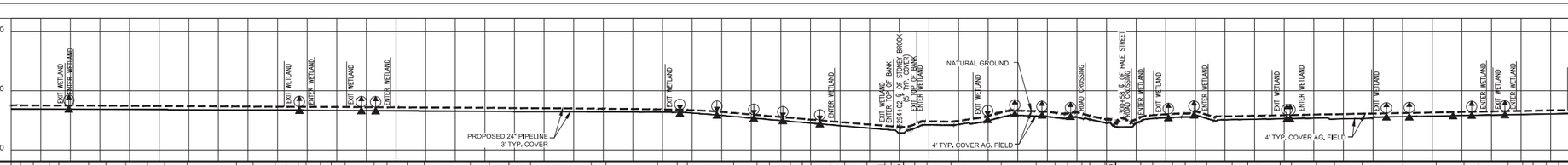

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PERMANENT SLOPE BREAKERS (ARROW INDICATES FLOW VIEW FROM DIRECTION)

PERMANENT TRENCH BREAKER

NOT A MINIMUM. TRENCH BREAKERS AND SLOPE BREAKERS SHALL BE LOCATED WITHIN 50 FT. OF THE EDGE (BOTH SIDES) OF WETLANDS AND WATERBODIES. ACTUAL LOCATION SHALL BE DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT TRENCH BREAKER SPACING	
SLOPE (%)	SPACING (FT)
<5	125
5–10	100
>10–20	75
>20–35	50
>35	25

PERMANENT SLOPE BREAKER SPACING	
SLOPE (%)	SPACING (FT)
1	400
2	245
3–5	125
6–10	78
11–15+	58

ENVIRONMENTAL

1% 2% 0% 5% 2% 1% 1% 0% 1% 0% 1% 3% 3% 3% 0% 2% 0% 1% 3% 1% 2% 0% 0% 1% 1% 1% 1% 1% 1% 0% 1% 3% 1% 2% 1% 3% 4% 3% 2% 3% 0% 50% 50% 2% 1% 3% 1% 4% 1% 3% 3% 3% 4% 3% 3% 3% 4% 6% 3% 0% 4% 2% 1% 4% 1% 2% 8% 2% 2% 3% 1% 1% 1% 3% 2% 0%

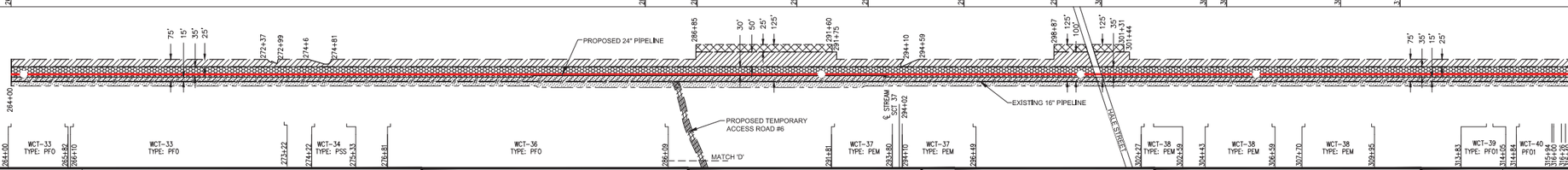
W W W W W W W S W R W W W W W W

GENERAL E&S FIGURES: 19 20 29 30 31 34 41 65 81 82 83 84 118

SOIL TYPE

264+00 9 285+60 28A 287+36 9 292+76 28A 293+00 107 295+22 28B 299+44 108 300+97 28B 304+35 108 306+76 9 308+84 25B 310+86 9 316+80

WORKSPACE SCHEMATIC



LEGEND

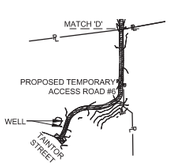
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)

LIMITS OF DISTURBANCE

- ℄ Proposed 24" Pipeline
- ℄ Existing Pipeline
- Silt Fence
- Delineated Wetlands
- Delineated Vernal Pools
- ℄ Stream

L.L. NO.	OWNERSHIP
790.01	
790	
789	
788	
787.01	
787	
785	
784.02	
784.01	
784	
783	
781	
780	

WORKSPACE INSETS



● Stormwater monitoring location

REFERENCE DRAWINGS

TO-T13-300-2-WCT32	WCT-33
TO-T13-300-2-WCT34	WCT-34
TO-T13-300-2-WCT36	WCT-36
TO-T13-300-2-WCT37	WCT-37
TO-T13-300-2-WCT38	WCT-38
TO-T13-300-2-WCT39	WCT-39&40
TO-T13-300-2-RX8	HALE STREET
TO-T13-300-2-AR6	TEMPORARY ACCESS ROAD 6

BMP GROUP LEGEND

SYMBOL	BMP GROUP	ASSOCIATED BMP FIGURE NUMBERS
W	WETLANDS CROSSING	2,11,12,13,19,20,29,34,37,40,46,58A,90,91
S	WATERBODY CROSSING	1,2,5,6,7,19,20,30,31,36,37,38,39,41,44,63,80 111,115,116,119
R	ROAD CROSSING	3,15,49,50

SOIL TYPE LEGEND

9	Scitico, Shaker, and Maybid soils
28A	Elmridge fine sandy loam, 0 to 3 percent slopes
107	Limerick and Lim soils
28B	Elmridge fine sandy loam, 3 to 8 percent slopes
108	Saco silt loam
25B	Brancroft silt loam, 3 to 8 percent slopes

ISSUED FOR BID

NOTE: MAOP IS 800 PSIG, OPERATING 719 PSIG

SCALE

200 100 0 200 400

IMAGERY DATE: JULY, 2012

REVISIONS

NO	PROJ ID	DESCRIPTION	DATE	BY	CK	APPR
D	67159 & 67170	ISSUED FOR CTDEEP	11/13/15	AP	BL	
C	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	6/22/15	AP	RE	
B	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	3/20/15	AP	RE	
A	67159 & 67170	ISSUED FOR FERC	7/21/14	MS	BP	RG

AREA: NASSAU	DIV.: NORTHERN		
DRAFTER: MS	DATE: 06/27/14		
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Tennessee Gas Pipeline Company, L.L.C.
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CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
EROSION & SEDIMENTATION CONTROL PLAN
HARTFORD COUNTY, CONNECTICUT

DESIGN COORD:	DATE:	SCALE: 1" = 200'	AFE: 67159
PROJECT COORD:	DATE:	TO-T13-300-2-110B	D
OPER. APPR:	DATE:		

PROTECTION EASEMENT

LINE LIST

RODS

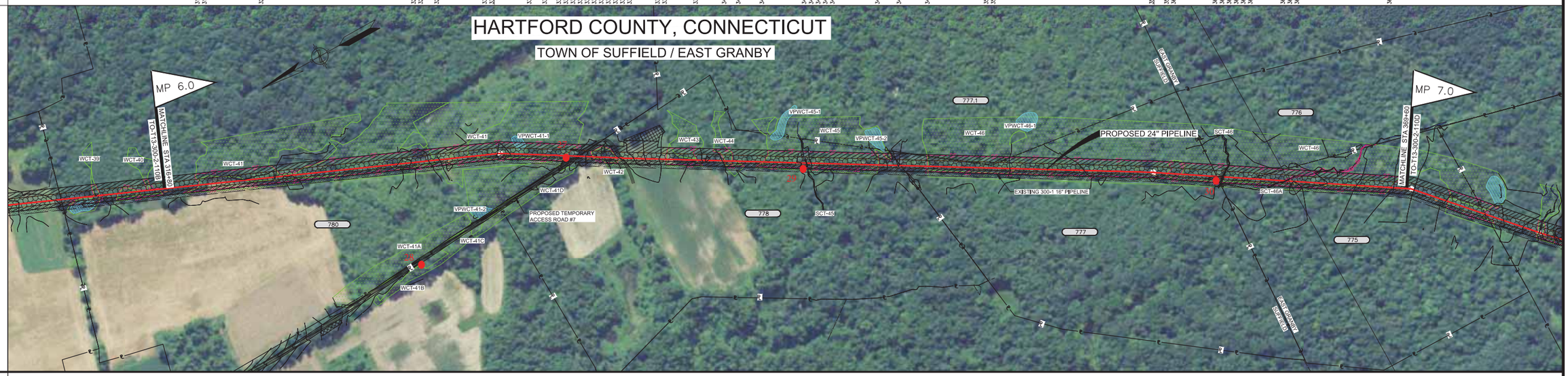
780	778	777.01	777	776	775
106.8	82.9		81.3	8.6	40.3

316+80 | 333+55 | 348+12 | 358+83 | 362+95 | 369+60

PIPELINE STATIONING

318+27 ENTER WETLAND WCT-41
318+54 TREE LINE CROSSING
321+01 TREE LINE CROSSING
327+51 TREE LINE CROSSING
327+94 TREE LINE CROSSING
328+49 TREE LINE CROSSING
330+54 TREE LINE CROSSING
331+12 P.I. ∠ 7°50'41" RT.
332+43 TREE LINE CROSSING
333+09 TREE LINE CROSSING
333+85 EXIT WETLAND WCT-41
334+26 TREE LINE CROSSING
334+29 TOP OF ACCESS ROAD
334+42 ℄ OF PROPOSED TEMPORARY ACCESS ROAD #7
334+42 PROPERTY LINE
334+56 EDGE OF ACCESS ROAD
334+62 TREE LINE CROSSING
334+88 TREE LINE CROSSING
335+08 ENTER WETLAND WCT-42
336+02 EXIT WETLAND WCT 42
336+13 HEDGE ROW / BRUSH
338+19 ENTER WETLAND WCT-43
338+60 TREE LINE CROSSING
339+46 EXIT WETLAND WCT-43
340+66 ENTER WETLAND WCT-44
341+05 EXIT WETLAND WCT-44
342+31 ENTER WETLAND WCT-45
344+09 TOP OF BANK
344+11 ℄ OF STREAM SCT-45
344+13 ℄ OF STREAM SCT-45
344+14 TOP OF BANK
347+16 EXIT WETLAND WCT-45
348+12 PROPERTY LINE
349+27 ENTER WETLAND WCT-46
351+82 FENCE CORNER, (BARB WIRE) 15' LT.
351+94 MONUMENT, FND. 5" RON PIPE 11' LT.
358+83 P.I. ∠ 2°07'51" RT.
359+41 EXIT WETLAND WCT-46
360+02 ENTER WETLAND WCT-46
361+53 PROPERTY LINE
361+70 TOP OF WATER 24" RT.
361+77 ℄ OF STREAM SCT-46
361+83 TOP OF BANK
362+95 PROPERTY LINE
364+41 TOP OF BANK
364+46 ℄ OF STREAM SCT-46A
364+53 TOP OF BANK
368+89 EXIT WETLAND WCT-46

ALIGNMENT STRIP MAP



MATERIAL

COATING

DESIGN FACTOR

CLASS LOCATION

PROFILE

GENERAL NOTES
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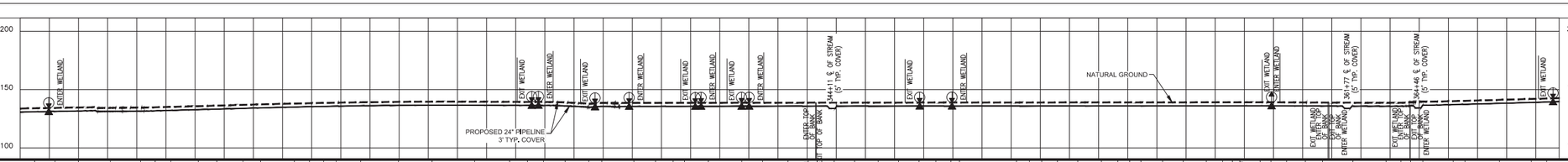

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PERMANENT SLOPE BREAKERS (ARROW INDICATES FLOW VIEW FLOW DIRECTION)

PERMANENT TRENCH BREAKER

NOT A MINIMUM. TRENCH BREAKERS AND SLOPE BREAKERS SHALL BE LOCATED WITHIN 50 FT. OF THE EDGE (BOTH SIDES) OF WETLANDS AND WATERBODIES. FINAL LOCATION SHALL BE DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT TRENCH BREAKER SPACING

SLOPE (%)	SPACING (FT)
<5	125
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>35	25

PERMANENT SLOPE BREAKER SPACING

SLOPE (%)	SPACING (FT)
1	450
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3–5	125
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ENVIRONMENTAL

0% 1% 3% 2% 0% 1% 1% 1% 1% 1% 1% 0% 5% 4% 1% 4% 1% 2% 1% 0% 3% 4% 3% 4% 3% 1% 1% 2% 3% 2% 1% 1% 0% 28% 28% 0% 1% 1% 1% 2% 2% 1% 1% 1% 1% 3% 1% 2% 1% 1% 2% 0% 1% 0% 1% 0% 1% 2% 2% 2% 2% 1% 30% 38% 1% 8% 20% 0% 2% 1% 18% 1% 3% 2%

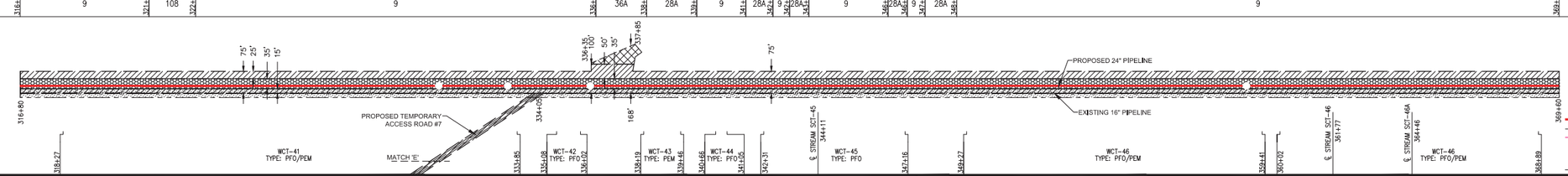
W W W W W W S W S W

GENERAL E&S FIGURES: 19 20 29 30 31 34 41 / 65 81 82 83 84 118

SOIL TYPE

316+80 | 9 | 321+29 | 108 | 322+91 | 9 | 336+52 | 36A | 338+60 | 28A | 339+75 | 9 | 341+46 | 28A | 342+40 | 9 | 342+98 | 28A | 344+45 | 9 | 346+38 | 28A | 346+71 | 9 | 347+50 | 28A | 348+60 | 9 | 369+60

WORKSPACE SCHEMATIC



LEGEND

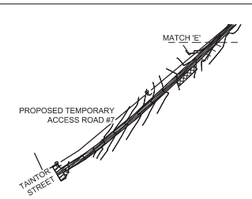
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)

LIMITS OF DISTURBANCE

- ℄ Proposed 24" Pipeline
- ℄ Existing Pipeline
- Silt Fence
- Delineated Wetlands
- Delineated Vernal Pools
- ℄ Stream

L.L. NO.	OWNERSHIP
780	
778	
777.01	
777	
776	
775	

WORKSPACE INSETS



● Stormwater monitoring location

REFERENCE DRAWINGS

TO-T13-300-2-WCT41	WCT-41
TO-T13-300-2-WCT42	WCT-42&43&44
TO-T13-300-2-WCT/SCT45	WCT/SCT-45
TO-T13-300-2-WCT/SCT46	WCT/SCT-46
TO-T13-300-2-AR7	TEMPORARY ACCESS ROAD 7

BMP GROUP LEGEND

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R	ROAD CROSSING	3,15,49,50

SOIL TYPE LEGEND

9	Scitico, Shaker, and Maybid soils
108	Saco silt loam
36A	Windsor loamy sand, 0 to 3 percent slopes
28A	Elmridge fine sandy loam, 0 to 3 percent slopes

ISSUED FOR BID

NOTE: MAOP IS 800 PSIG, OPERATING 719 PSIG

SCALE

200 100 0 200 400

IMAGERY DATE: JULY, 2012

REVISIONS

NO	PROJ ID	DESCRIPTION	DATE	BY	CK	APPR
E	67159 & 67170	ATWS CHANGE FOR FERC SUBMITTAL	03/14/16	AP	SL	
D	67159 & 67170	ISSUED FOR CTDEEP	11/13/15	AP	BL	
C	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	6/22/15	AP	RE	
B	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	3/20/15	AP	RE	
A	67159 & 67170	ISSUED FOR FERC	7/21/14	MS	BP	RG

AREA: NASSAU | DIV.: NORTHERN

DRAFTER: MS | DATE: 06/27/14

DRAFT. COORD: JD | DATE: 06/30/14

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
EROSION & SEDIMENTATION CONTROL PLAN
HARTFORD COUNTY, CONNECTICUT

DESIGN COORD: | DATE: | SCALE: 1" = 200' | AFE: 67159

PROJECT COORD: | DATE:

OPER. APPR: | DATE:

TO-T13-300-2-110C | E

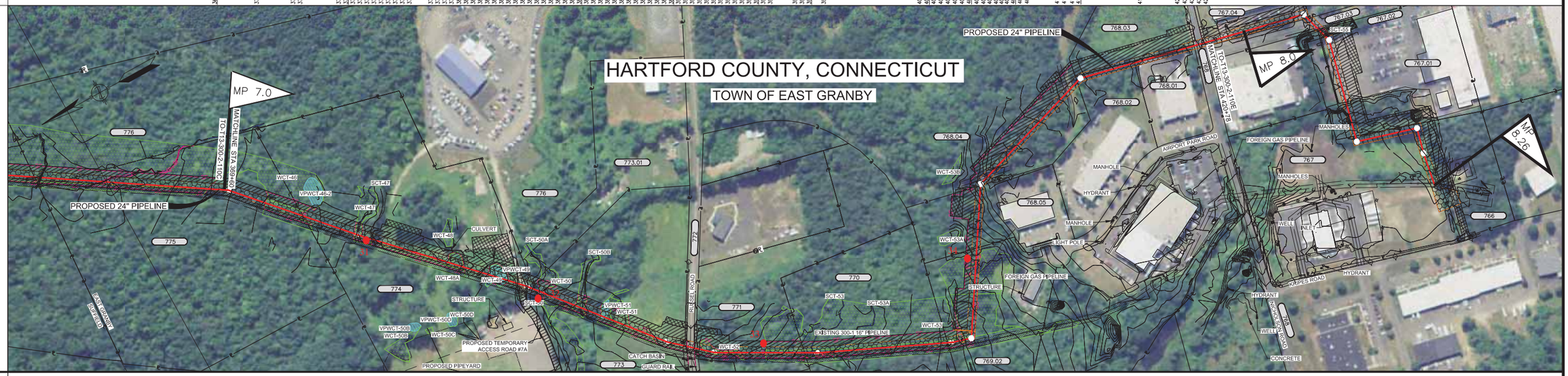
PROTECTION EASEMENT

LINE LIST

RODS

PIPELINE STATIONING

ALIGNMENT STRIP MAP



MATERIAL

COATING

DESIGN FACTOR

CLASS LOCATION

PROFILE

GENERAL NOTES

1. THE BEST MANAGEMENT PRACTICE (BMP) NUMBERS NOTED ABOVE CORRESPOND TO SPECIFIC DETAILS FOUND ON THE BEST MANAGEMENT PRACTICE DETAIL SHEETS. THE BMP DETAILS INCLUDE GENERAL LAYOUT, LOCATION, DIMENSIONS, CONSTRUCTION NOTES, MATERIALS, ETC. THAT SHOULD BE FOLLOWED DURING CONSTRUCTION OF THE PIPELINE.
2. THE APPROXIMATE LOCATION AND TYPE OF SEDIMENT BARRIERS TO BE INSTALLED ALONG THE CONSTRUCTION WORKSPACE ARE LOCATED IN TABLES IN THE SILT FENCE DESIGN CRITERIA FOR CONNECTICUT. THE ACTUAL LOCATION SHALL BE DETERMINED IN THE FIELD BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.
3. TEMPORARY AND PERMANENT SLOPE BREAKER SPACING IS THE SAME. SLOPE BREAKERS SHALL BE MAINTAINED IN PLACE AT ALL TIMES.

THE LOCATIONS OF TRENCH BREAKERS AND SLOPE BREAKERS SHOWN ON THE PROFILE SHALL BE USED AS A GUIDELINE ONLY. THE ACTUAL LOCATION OF THE BREAKERS SHALL BE DETERMINED IN THE FIELD BASED ON FIELD CONDITIONS BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT SLOPE BREAKERS (ARROW INDICATES PLAN VIEW FLOW DIRECTION)

PERMANENT TRENCH BREAKER

NOT A MANUAL TRENCH BREAKERS AND SLOPE BREAKERS SHALL BE LOCATED WITHIN 50 FT. OF THE EDGE (BOTH SIDES) OF WETLANDS AND WATERBODIES. ACTUAL LOCATION SHALL BE DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND CONTRACTOR.

PERMANENT TRENCH BREAKER SPACING	
SLOPE (%)	SPACING (FT)
<5	125
5–10	100
10–20	75
20–30	50
>35	25

PERMANENT SLOPE BREAKER SPACING	
SLOPE (%)	SPACING (FT)
1	400
2	245
3–5	125
6–10	75
11–15+	50

ENVIRONMENTAL

GENERAL E&S FIGURES: 19, 20, 29, 30, 31, 34, 41; 65, 81, 82, 83, 84, 118

SOIL TYPE

WORKSPACE SCHEMATIC

LEGEND

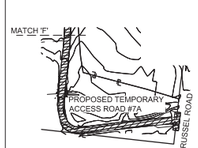
- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)

LIMITS OF DISTURBANCE

- ℄ Proposed 24" Pipeline
- ℄ Existing Pipeline
- Silt Fence
- Delineated Wetlands
- Delineated Vernal Pools
- ℄ Stream

L.L. NO.	OWNERSHIP
775	
774	
773.01	
773	
772	
771	
770	
769.02	
768.05	
768.04	
768.03	
768.02	
768.01	
768	

WORKSPACE INSETS



● Stormwater monitoring location

REFERENCE DRAWINGS

TO-T13-300-2-WCT46	WCT-46
TO-T13-300-2-WCT47	WCT-47&48A SCT-47
TO-T13-300-2-WCT49	WCT-49&50&50A SCT-50B
TO-T13-300-2-WCT51	WCT-51&52
TO-T13-300-2-WCT53	WCT-53 SCT-53A
TO-T13-300-2-AR7A	TEMPORARY ACCESS ROAD 7A
TO-T13-300-2-RX09	RUSSEL ROAD
TO-T13-300-2-RX10	NICHOLSON ROAD

BMP GROUP LEGEND

SYMBOL	BMP GROUP	ASSOCIATED BMP FIGURE NUMBERS
W	WETLANDS CROSSING	2,11,12,13,19,20,29,34,37,40,46,58A,90,91
S	WATERBODY CROSSING	1,2,5,6,7,19,20,30,31,36,37,38,39,41,44,63,80 111,115,116,119
R	ROAD CROSSING	3,15,49,50

SOIL TYPE LEGEND

9	Scitico, Shaker, and Maybid soils
28A	Elmridge fine sandy loam, 0 to 3 percent slopes
25B	Brancroft silt loam, 3 to 8 percent slopes
108	Saco silt loam
28B	Elmridge fine sandy loam, 3 to 8 percent slopes
30B	Udorthents, smoothed
34A	Merrimac sandy loam, 0 to 3 percent slopes
103	Rippowam fine sandy loam
36B	Windsor loamy sand, 3 to 8 percent slopes

ISSUED FOR BID

NOTE: MAOP IS 800 PSIG, OPERATING 719 PSIG

SCALE

200 100 0 200 400

IMAGERY DATE: JULY, 2012

REVISIONS

NO	PROJ ID	DESCRIPTION	DATE	BY	CK	APPR
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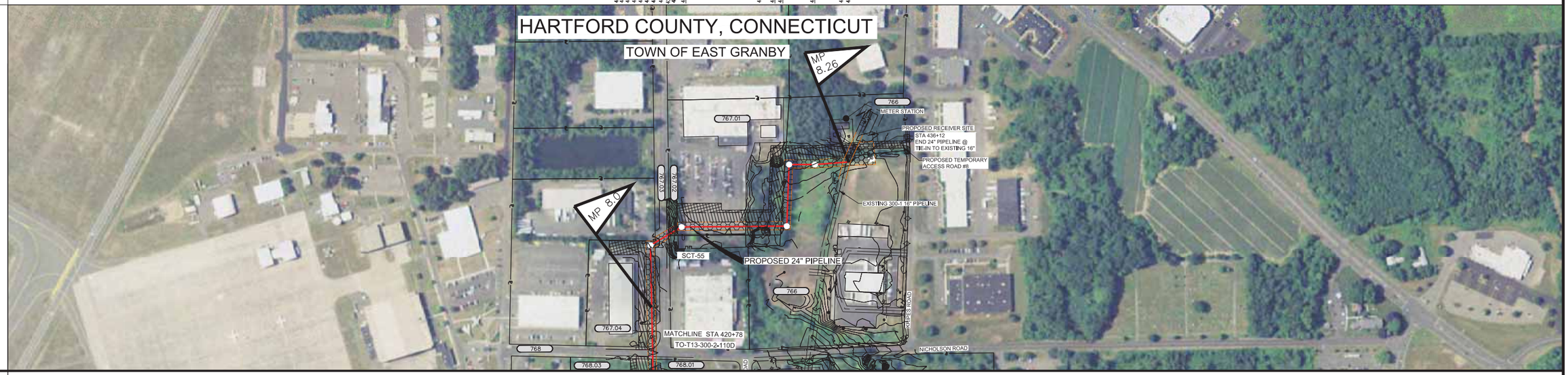
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION
CONNECTIUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
EROSION & SEDIMENTATION CONTROL PLAN
HARTFORD COUNTY, CONNECTICUT

DESIGN COORD:	DATE:	SCALE: 1" = 200'	AFE: 67159
PROJECT COORD:	DATE:	TO-T13-300-2-110D	E
OPER. APPR:	DATE:		

PROTECTION EASEMENT	768
LINE LIST RODS	767.04 (27.2) · 767.03 (4.2) · 767.02 (1.6) · 767.01 (46.4) · 767 (16.5) 420+75 · 425+23 · 425+92 · 426+19 · 433+39
PIPELINE STATIONING	420+75 PROPERTY LINE 424+48 EXISTING GAS PIPELINE CROSSING 425+18 EXISTING SANITARY SEWER LINE 425+23 PROPERTY LINE 425+33 EXISTING SANITARY SEWER LINE 425+80 EDGE OF ROADWAY 425+83 EXISTING GAS PIPELINE CROSSING 425+92 PROPERTY LINE 426+19 ℄ SCT-55 426+43 PI = 30°03'34" RT 430+74 PROPERTY LINE 430+99 PI = 87°22'42" LT 433+60 PI = 87°48'31" RT 434+68 PI = 04°16'07" LT 436+01 EXISTING GAS PIPELINE CROSSING 436+12 END STA.

ALIGNMENT STRIP MAP



MATERIAL	
COATING	
DESIGN FACTOR	
CLASS LOCATION	

PROFILE

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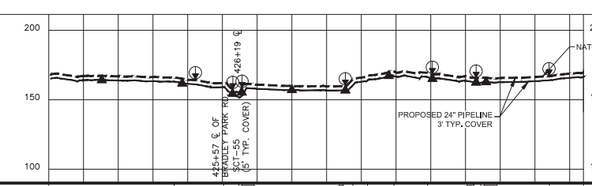

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>35	25

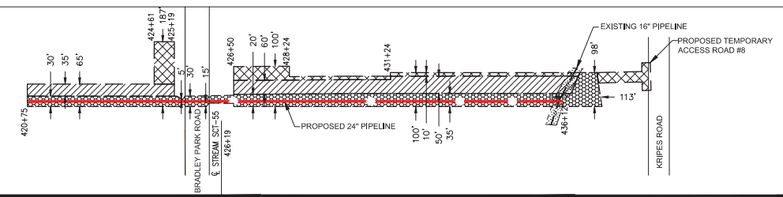
PERMANENT SLOPE BREAKER SPACING	
SLOPE (%)	SPACING (FT)
1	400
2	245
3–5	125
6–10	78
11–15+	58

ENVIRONMENTAL	
	1% · 3% · 19% · 45% · 1% · 26% · 6% · 4% · 1% · 3% · 61% · 45% · 1% · 3%
	R · S

GENERAL E&S FIGURES: 19, 20, 29, 30, 31, 34, 41; 65, 81, 82, 83, 84, 118

SOIL TYPE	

WORKSPACE SCHEMATIC



LEGEND

- EXISTING PERMANENT EASEMENT
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- LIMITS OF DISTURBANCE
- ℄ Proposed 24" Pipeline
- ℄ Existing Pipeline
- Silt Fence
- Delineated Wetlands
- Delineated Vernal Pools
- ℄ Stream

L.L. NO.	OWNERSHIP	WORKSPACE INSETS
767.04		
767.03		
767.02		
767.01		
767		
766		

REFERENCE DRAWINGS

TO-T13-300-2-WCT56	SCT-55
TO-T13-300-2-RX10	NICHOLSON ROAD
TO-T13-300-2-RX11	BRADLEY PARK ROAD
TO-T13-300-2-AR8	TEMPORARY ACCESS ROAD 8

BMP GROUP LEGEND

SYMBOL	BMP GROUP	ASSOCIATED BMP FIGURE NUMBERS
W	WETLANDS CROSSING	2,11,12,13,19,20,29,34,37,40,46,58A,90,91
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R	ROAD CROSSING	3,15,49,50

SOIL TYPE LEGEND

34A	Merrimac sandy loam, 0 to 3 percent slopes
36A	Windsor loamy sand, 0 to 3 percent slopes

ISSUED FOR BID

NOTE: MAOP IS 800 PSIG, OPERATING 719 PSIG

SCALE

200 100 0 200 400

IMAGERY DATE: JULY, 2012

REVISIONS

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B	67159 & 67170	ISSUED FOR FERC RESUBMITTAL	3/20/15	AP	RE	
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AREA: NASSAU	DIV.: NORTHERN		
DRAFTER: MS	DATE: 06/27/14		
DRAFT. COORD: JD	DATE: 06/30/14		
DESIGN COORD:	DATE:	SCALE: 1" = 200'	AFE: 67159
PROJECT COORD:	DATE:	TO-T13-300-2-110E	D
OPER. APPR:	DATE:		

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
EROSION & SEDIMENTATION CONTROL PLAN
HARTFORD COUNTY, CONNECTICUT

APPROXIMATE LOCATION OF MATTED ROADWAY SURFACE

PROPOSED SUPER SILT FENCE SEDIMENT BARRIER AND LIMIT OF DISTURBANCE

END PROPOSED SUPER SILT FENCE SEDIMENT BARRIER, BEGIN STANDARD SILT FENCE SEDIMENTATION BARRIER AND LIMIT OF DISTURBANCE

PROPOSED STANDARD SILT FENCE SEDIMENT BARRIER AND LIMIT OF DISTURBANCE

PIPE STORAGE AREA

PIPE STORAGE AREA

PIPE STORAGE AREA

PIPE STORAGE AREA

PIPE STORAGE AREA

PIPE STORAGE AREA

APPROXIMATE LOCATION OF SNOW STORAGE

APPROXIMATE LOCATION OF SNOW STORAGE

PROPOSED SUPER SILT FENCE SEDIMENT BARRIER AND LIMIT OF DISTURBANCE

END PROPOSED STANDARD SILT FENCE SEDIMENT BARRIER AND LIMIT OF DISTURBANCE

STABILIZED CONSTRUCTION ENTRANCE

BEGIN PROPOSED SUPER SILT FENCE SEDIMENT BARRIER AND LIMIT OF DISTURBANCE

LEGEND

- EXISTING PERMANENT EASEMENT NOT FOR CONSTRUCTION
- EXISTING PERMANENT EASEMENT FOR CONSTRUCTION
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
- ADDITIONAL TEMPORARY WORKSPACE (ATWS)
- PROPOSED PIPELINE
- EXISTING PIPELINE
- PROPERTY LINE
- STRUCTURE
- SNOW STORAGE
- ELEC CABLE — EC — EC — EC —
- FENCE — X — X — X — X — X —
- TREE LINE
- FIBER OPTIC LINE — C — C — C —
- POWER LINES — P — P — P —
- TELEPHONE CABLE — TC — TC — TC —
- TELEPHONE LINE — T — T — T —
- CABLE LINE — C — C — C —
- SILT FENCE — SF — SF —

GRAPHIC SCALE

60 30 0 60

SCALE IN FEET

DRAWING NUMBER	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
REVISIONS					

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
PIPEYARD PLAN @ M.P. 0.38
TENNESEE GAS PIPELINE COMPANY
HAMPDEN COUNTY, MA & HARTFORD COUNTY, CT

Division:		Op. Area:	
State: CT		Co./Par.: HARTFORD	
Section:	Township:	Range:	
Drafter: JS	Date: 7/15/2014	Project ID:	Type:
Chk'd: JB	Date: 7/21/2014	Scale: 1"=60'	
Appr: DK	Date: 7/21/2014	Filename: SK14C4781CT07_Pipeyards.dwg	
		Sheet: 1 of 1	Rev. A

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LEGEND

- EXISTING PERMANENT EASEMENT NOT FOR CONSTRUCTION
- EXISTING PERMANENT EASEMENT FOR CONSTRUCTION
- PROPOSED PERMANENT EASEMENT
- TEMPORARY WORKSPACE
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- PROPOSED PIPELINE
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- STRUCTURE
- SNOW STORAGE
- ELEC CABLE — EC — EC — EC —
- FENCE — X — X — X — X — X —
- TREE LINE
- FIBER OPTIC LINE — C — C — C —
- POWER LINES — P — P — P —
- TELEPHONE CABLE — TC — TC — TC —
- TELEPHONE LINE — T — T — T —
- CABLE LINE — C — C — C —
- SILT FENCE — SF — SF —

GRAPHIC SCALE

50 25 0 50

SCALE IN FEET

DRAWING NUMBER	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
PIPEYARD PLAN @ M.P. 7.26
8686 SALES AND LEASING, LLC.
HARTFORD COUNTY, CT

Division:		Op. Area:	
State: CT		Co./Par.: HARTFORD	
Section:	Township:	Range:	
Drafter: JS	Date: 5/16/2014	Project ID:	Type:
Chk'd: JB	Date: 5/20/2014	Scale: 1"=50'	
Appr: DK	Date: 5/20/2014	Filename: SK14C4781CT07_Pipeyards.dwg	
		Sheet: 1 of 1	Rev. A

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SEQUENCE OF BMP INSTALLATION AND REMOVAL NOTES

CONSTRUCTION MUST BE IN ACCORDANCE WITH THE FOLLOWING SCHEDULE. THIS SCHEDULE IS DESIGNED TO MINIMIZE SOIL EROSION AND SEDIMENTATION. THE CONTRACTOR MAY DEVIATE SLIGHTLY FROM THE STAGING OF PERMANENT SITE IMPROVEMENTS, BUT NO DEVIATION FROM THE RELATIVE ORDER OF EROSION AND SEDIMENTATION CONTROL MEASURES WILL BE ALLOWED WITHOUT WRITTEN APPROVAL FROM THE CONNECTICUT CONSERVATION DISTRICT OR THE .

FACILITIES TO CONTROL THE TRANSPORT OF SOIL MATERIAL FROM THE CONSTRUCTION AREA SHALL BE INSTALLED PRIOR TO ANY EARTH DISTURBANCE.

NOTE: THE STAGING OF EARTHMOVING ACTIVITIES FOR THIS PROJECT IS A GENERAL DESCRIPTION OF THE WORK REQUIRED. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH PROJECT OWNER STANDARDS, THE NYSDEC REGULATIONS, AND ALL OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS.

ALL EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE FOLLOWING SEQUENCE. EACH STAGE SHALL BE COMPLETED BEFORE ANY FOLLOWING STAGE IS INITIATED (EXCEPT AS INDICATED BELOW). DEVIATION FROM THAT SEQUENCE MUST BE APPROVED IN WRITING FROM THE COUNTY CONSERVATION DISTRICT (CCD)/CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION (CTDEEP). CLEARING & GRUBBING SHALL BE LIMITED TO THOSE AREAS DESCRIBED IN EACH STAGE.

1. SCHEDULE WORK TO MINIMIZE THE LENGTH OF TIME THAT BARE SOIL WILL BE EXPOSED TO THE ELEMENTS.
2. FOLLOW THE CONSTRUCTION/EROSION CONTROL IMPLEMENTATION PLAN AS OUTLINED ON THE DRAWINGS.
3. IMPLEMENT CONTROL MEASURES AS SPECIFIED; HOWEVER, THE CONTRACTOR MAY INSERT ADDITIONAL CONSTRUCTION PHASES IN ORDER TO EXPEDITE HIS WORK.
4. IMMEDIATELY UPON DISCOVERING UNFORESEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE OPERATOR SHALL IMPLEMENT APPROPRIATE BMPS TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT POLLUTION AND NOTIFY THE CCD/NYSDEC.
5. ALL OFF-SITE WASTE AND BORROW AREAS MUST HAVE AN E&S PLAN APPROVED BY THE LOCAL CONSERVATION DISTRICT OR CTDEEP FULLY IMPLEMENTED PRIOR TO BEING ACTIVATED. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REMOVAL OF ANY EXCESS MATERIAL AND TO DEVELOP A PLAN THAT MEETS THE CONDITIONS OF GENERAL PERMIT FOR THE DISCHARGE OF STORM WATER AND DEWATERING WASTE WATERS FROM CONSTRUCTION ACTIVITIES.
6. ALL DISTURBED AREAS WITHIN 50' OF A STREAM CROSSING (WHERE THE STREAM WIDTH IS LESS THAN OR EQUAL 10') SHALL BE STABILIZED WITHIN 24 HOURS OF COMPLETING CONSTRUCTION AT THE CROSSING.
7. ALL DISTURBED AREAS WITHIN 50' OF A STREAM CROSSING (WHERE THE STREAM WIDTH > 10') SHALL BE STABILIZED WITHIN 48 HOURS OF COMPLETING CONSTRUCTION AT THE CROSSING.
8. CONSTRUCTION SEQUENCE IS AS FOLLOWS:
9. PRE-CONSTRUCTION MEETING TO BE HELD BY PROJECT MANAGER, A REPRESENTATIVE FROM CONSERVATION DISTRICT, CTDEEP, ALL CONTRACTORS INVOLVED IN EARTH DISTURBANCE ACTIVITIES, AND THE OPERATOR'S ENGINEER PRIOR TO LAND DISTURBING ACTIVITIES. PROVIDE THE REQUIRED 7 DAY NOTICE FOR SCHEDULING OF THE PRE-CONSTRUCTION MEETING. ALL PARTIES LISTED ARE REQUIRED TO ATTEND.
10. INSTALL TEMPORARY CONSTRUCTION FENCE, CONSTRUCTION ENTRANCE, PERIMETER COMPOST FILTER SOCKS, SILT FENCE, WATER BARS*, TRENCH PLUGS, TEMPORARY DIVERSION SWALES, BROAD BASED DIPS, AND CROSS TRENCHES.
11. WHERE CONSTRUCTION MATTING IS CALLED FOR IN THE PLANS IT SHALL BE INSTALLED SIMULTANEOUSLY WITH OTHER REQUIRED SEDIMENTATION CONTROL SUCH THAT CREATION OF ERODIBLE SURFACES ARE MINIMIZED.
12. INSTALL ROADSIDE SWALE AND CHECK DAMS PER PLAN.
13. SCHEDULE AN INSPECTION WITH CTDEEP OR CD AT LEAST 3 DAYS PRIOR TO START OF OTHER CONSTRUCTION ACTIVITIES. CTDEEP SHALL CONDUCT AN ASSESSMENT OF THE SITE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND CERTIFY IN AN INSPECTION REPORT THAT THE APPROPRIATE EROSION AND SEDIMENT CONTROLS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLAN SHEETS HAVE BEEN ADEQUATELY INSTALLED OR IMPLEMENTED TO ENSURE OVERALL PREPAREDNESS OF THE SITE FOR THE COMMENCEMENT OF CONSTRUCTION.
14. TRENCH ONLY AREAS THAT CAN BE INSTALLED IN THE SAME WORKDAY. AT END OF WORKDAY, CONTRACTOR SHALL ENSURE ALL TEMPORARY STABILIZATION BMPS AND MEASURES ARE INSTALLED PROPERLY.
15. INSTALL BEDDING MATERIAL AND PIPELINES.
16. INSTALL STREAM AND WETLAND CROSSINGS AS NEEDED.
17. INSTALL EROSION CONTROL BLANKETS IN CONJUNCTION WITH INSTALLATION OF PIPE ON STEEP SLOPES.
18. IMMEDIATELY AFTER EARTH DISTURBANCE ACTIVITIES CEASE LONGER THAN 4 DAYS IN ANY AREA OR SUBAREA OF THE PROJECT, THE OPERATOR SHALL STABILIZE ALL DISTURBED AREAS.
19. DURING NON-GERMINATING MONTHS, MULCH OR PROTECTIVE BLANKETING SHALL BE APPLIED AS DESCRIBED IN THE PLAN. AREAS NOT AT FINISHED GRADE, WHICH WILL BE REACTIVATED WITHIN 1 YEAR, MAY BE STABILIZED IN ACCORDANCE WITH THE TEMPORARY STABILIZATION SPECIFICATIONS. THOSE AREAS WHICH WILL NOT BE REACTIVATED WITHIN 1 YEAR SHALL BE STABILIZED IN ACCORDANCE WITH THE PERMANENT STABILIZATION SPECIFICATIONS.
20. FINISH GRADING; PLACE 4" MINIMUM TOPSOIL ON SLOPES AFTER FINAL GRADING IS COMPLETED. FERTILIZE SEED AND MULCH. SEED MIXTURE TO BE INSTALLED APRIL 1- JUNE 1 OR SEPTEMBER 1 - NOVEMBER 30. FOR TEMPORARY STABILIZATION BEYOND SEEDING DATES USE ANNUAL RYE AT 10.0 LBS./1,000 S.Y. FERTILIZE WITH 5-5-5 AT 1000 LBS. OF NITROGEN PER ACRE AND LIME AT ONE TON PER ACRE (MAX.).
21. ALL AREAS THAT HAVE BEEN DISTURBED WHICH HAVE REACHED FINAL GRADE SHALL BE PERMANENTLY STABILIZED.
22. REMOVE SILT SACKS AND/OR FENCE ONLY AFTER ALL PIPELINE HAS BEEN INSTALLED AND EXPOSED SURFACES ARE STABILIZED. REMOVE TEMPORARY CONSTRUCTION FENCING, WATER BARS, TEMPORARY DIVERSION SWALES, CROSS TRENCHES, TIMBER MATS AND ANY PIPES AND STONE ASSOCIATED WITH STREAM CROSSINGS.
23. AN AREA SHALL BE CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM UNIFORM 80% PERENNIAL VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING AND OTHER MOVEMENTS.

STANDARD EROSION & SEDIMENTATION CONTROL PLAN NOTES

1. ALL EARTH DISTURBANCES, INCLUDING CLEARING AND GRUBBING AS WELL AS CUTS AND FILLS SHALL BE DONE IN ACCORDANCE WITH THE APPROVED E&S PLAN. A COPY OF THE APPROVED DRAWINGS (STAMPED, SIGNED AND DATED BY THE REVIEWING AGENCY) MUST BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES. THE REVIEWING AGENCY SHALL BE NOTIFIED OF ANY CHANGES TO THE APPROVED PLAN PRIOR TO IMPLEMENTATION OF THOSE CHANGES. THE REVIEWING AGENCY MAY REQUIRE A WRITTEN SUBMITTAL OF THOSE CHANGES FOR REVIEW AND APPROVAL AT ITS DISCRETION.

2. AT LEAST 7 DAYS PRIOR TO THE PRE-CONSTRUCTION MEETING, THE OWNER AND/OR OPERATOR SHALL INVITE ALL CONTRACTORS, THE LANDOWNER, APPROPRIATE MUNICIPAL OFFICIALS, THE E&S PLAN PREPARER, THE LICENSED OR QUALIFIED PROFESSIONAL RESPONSIBLE FOR OVERSIGHT OF CRITICAL STAGES OF IMPLEMENTATION OF THE PLAN, AND A REPRESENTATIVE FROM CTDEEP TO AN ON-SITE PRE-CONSTRUCTION MEETING.

3. AT LEAST 48 HOURS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, OR EXPANDING INTO AN AREA PREVIOUSLY UNMARKED, THE CONTRACTOR SHALL CONTACT 811 CALL BEFORE YOU DIG FOR THE LOCATION OF EXISTING UNDERGROUND UTILITIES.

4. ALL EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE SEQUENCE PROVIDED ON THE PLAN DRAWINGS. DEVIATION FROM THAT SEQUENCE MUST BE APPROVED IN WRITING FROM THE CTDEEP PRIOR TO IMPLEMENTATION.

5. AREAS TO BE FILLED ARE TO BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS AND OTHER OBJECTIONABLE MATERIAL.

6. CLEARING, GRUBBING, AND TOPSOIL STRIPPING SHALL BE LIMITED TO THOSE AREAS DESCRIBED IN EACH STAGE OF THE CONSTRUCTION SEQUENCE. GENERAL SITE CLEARING, GRUBBING AND TOPSOIL STRIPPING MAY NOT COMMENCE IN ANY STAGE OR PHASE OF THE PROJECT UNTIL THE E&S BMPS AND MEASURES SPECIFIED BY THE BMP SEQUENCE FOR THAT STAGE OR PHASE HAVE BEEN INSTALLED AND ARE FUNCTIONING AS DESCRIBED IN THIS E&S PLAN.

7. AT NO TIME SHALL CONSTRUCTION VEHICLES BE ALLOWED TO ENTER AREAS OUTSIDE THE LIMIT OF DISTURBANCE BOUNDARIES SHOWN ON THE PLAN MAPS. THESE AREAS MUST BE CLEARLY MARKED AND FENCED OFF BEFORE CLEARING AND GRUBBING OPERATIONS BEGIN.

8. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED ALONG THE PIPELINE WITHIN THE TEMPORARY WORK LIMITS IN THE AMOUNT NECESSARY TO COMPLETE THE FINISH GRADING OF ALL EXPOSED AREAS THAT ARE TO BE STABILIZED BY VEGETATION. EACH STOCKPILE SHALL BE PROTECTED IN THE MANNER SHOWN ON THE PLAN DRAWINGS. STOCKPILE HEIGHTS SHALL NOT EXCEED 35 FEET. STOCKPILE SLOPES SHALL BE 2H:1V OR FLATTER.

9. IMMEDIATELY UPON DISCOVERING UNFORESEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE OPERATOR SHALL IMPLEMENT APPROPRIATE BEST MANAGEMENT PRACTICES TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT POLLUTION AND NOTIFY THE CTDEEP.

11. ALL OFF-SITE WASTE AND BORROW AREAS MUST HAVE AN E&S PLAN APPROVED BY THE LOCAL AUTHORITY AND FULLY IMPLEMENTED PRIOR TO BEING ACTIVATED.

STANDARD EROSION & SEDIMENTATION CONTROL PLAN NOTES (CONT.)

12. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ANY MATERIAL BROUGHT ON SITE IS CLEAN FILL.

13. ALL PUMPING OF WATER FROM ANY WORK AREA SHALL BE DONE ACCORDING TO THE PROCEDURE DESCRIBED IN THIS PLAN, OVER UNDISTURBED VEGETATED AREAS.

14. UNTIL THE SITE IS STABILIZED, ALL EROSION AND SEDIMENT BMPS AND MEASURES SHALL BE MAINTAINED PROPERLY. MAINTENANCE SHALL INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENT BMPS AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, REMULCHING AND RENETTING MUST BE PERFORMED IMMEDIATELY. IF THE E&S BMPS FAIL TO PERFORM AS EXPECTED, REPLACEMENT BMPS, OR MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.

15. A LOG SHOWING DATES THAT E&S BMPS WERE INSPECTED AS WELL AS ANY DEFICIENCIES FOUND AND THE DATE THEY WERE CORRECTED SHALL BE MAINTAINED ON THE SITE AND BE MADE AVAILABLE TO REGULATORY AGENCY OFFICIALS AT THE TIME OF INSPECTION.

16. SEDIMENT TRACKED ONTO ANY PUBLIC ROADWAY OR SIDEWALK SHALL BE RETURNED TO THE CONSTRUCTION SITE BY THE END OF EACH WORK DAY AND DISPOSED IN THE MANNER DESCRIBED IN THIS PLAN. IN NO CASE SHALL THE SEDIMENT BE WASHED, SHOVELED, OR SWEPT INTO ANY ROADSIDE DITCH, STORM SEWER, OR SURFACE WATER.

17. ALL SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF IN THE MANNER DESCRIBED ON THE PLAN DRAWINGS.

18. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 3 TO 5 INCHES OR 6 TO 12 INCHES ON COMPACTED SOILS OR PRIOR TO PLACEMENT OF TOPSOIL. AREAS TO BE VEGETATED SHALL HAVE A MINIMUM 4 INCHES OF TOPSOIL IN PLACE PRIOR TO SEEDING AND MULCHING. FILL OUTSLOPES SHALL HAVE A MINIMUM OF 2 INCHES OF TOPSOIL.

19. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.

20. ALL EARTHEN FILLS SHALL BE PLACED IN COMPACTED LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.

21. FILL MATERIALS SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.

22. FROZEN MATERIALS OR SOFT, MUCKY, OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED INTO FILLS.

23. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.

24. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.

25. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY UPON REACHING FINISHED GRADE. CUT SLOPES IN COMPETENT BEDROCK AND ROCK FILLS NEED NOT BE VEGETATED. SEEDED AREAS WITHIN 15 FEET OF A SURFACE WATER, OR AS OTHERWISE SHOWN ON THE PLAN DRAWINGS, SHALL BE BLANKETED ACCORDING TO THE STANDARDS OF THIS PLAN.

26. IMMEDIATELY AFTER EARTH DISTURBANCE ACTIVITIES CEASE IN ANY AREA OR SUBAREA OF THE PROJECT, THE OPERATOR SHALL STABILIZE ALL DISTURBED AREAS. DURING NON-GERMINATING MONTHS, MULCH OR PROTECTIVE BLANKETING SHALL BE APPLIED AS DESCRIBED IN THE PLAN. AREAS NOT AT FINISHED GRADE, WHICH WILL BE REACTIVATED WITHIN 1 YEAR, MAY BE STABILIZED IN ACCORDANCE WITH THE TEMPORARY STABILIZATION SPECIFICATIONS. THOSE AREAS WHICH WILL NOT BE REACTIVATED WITHIN 1 YEAR SHALL BE STABILIZED IN ACCORDANCE WITH THE PERMANENT STABILIZATION SPECIFICATIONS.

27. PERMANENT STABILIZATION IS DEFINED AS A MINIMUM UNIFORM, PERENNIAL 80% VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED EROSION. CUT AND FILL SLOPES SHALL BE CAPABLE OF RESISTING FAILURE DUE TO SLUMPING, SLIDING, OR OTHER MOVEMENTS.

28. E&S BMPS SHALL REMAIN FUNCTIONAL AS SUCH UNTIL ALL AREAS TRIBUTARY TO THEM ARE PERMANENTLY STABILIZED OR UNTIL THEY ARE REPLACED BY ANOTHER BMP APPROVED BY THE LOCAL CONSERVATION DISTRICT OR THE CTDEEP.

29. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENT BMPS MUST BE REMOVED OR CONVERTED TO PERMANENT POST CONSTRUCTION STORMWATER MANAGEMENT BMPS. AREAS DISTURBED DURING REMOVAL OR CONVERSION OF THE BMPS SHALL BE STABILIZED IMMEDIATELY. IN ORDER TO ENSURE RAPID REVEGETATION OF DISTURBED AREAS, SUCH REMOVAL/CONVERSIONS ARE TO BE DONE ONLY DURING THE GERMINATING SEASON.

30. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATOR SHALL CONTACT THE LOCAL CONSERVATION DISTRICT TO SCHEDULE A FINAL INSPECTION.

31. FAILURE TO CORRECTLY INSTALL E&S BMPS, FAILURE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE CONSTRUCTION SITE, OR FAILURE TO TAKE IMMEDIATE CORRECTIVE ACTION TO RESOLVE FAILURE OF E&S BMPS MAY RESULT IN ADMINISTRATIVE, CIVIL, AND/OR CRIMINAL PENALTIES BEING INSTITUTED BY THE CTDEEP.

32. CONCRETE WASH WATER SHALL BE HANDLED IN THE MANNER DESCRIBED ON THE PLAN DRAWINGS. IN NO CASE SHALL IT BE ALLOWED TO ENTER ANY SURFACE WATERS OR GROUNDWATER SYSTEMS.

33. UNDERGROUND UTILITIES CUTTING THROUGH ANY ACTIVE CHANNEL SHALL BE IMMEDIATELY BACKFILLED AND THE CHANNEL RESTORED TO ITS ORIGINAL CROSS-SECTION WITH A PROTECTIVE LINING. ANY BASE FLOW WITHIN THE CHANNEL SHALL BE CONVEYED PAST THE WORK AREA IN THE MANNER DESCRIBED IN THIS PLAN UNTIL SUCH RESTORATION IS COMPLETE.

34. EROSION CONTROL BLANKETING SHALL BE INSTALLED ON ALL SLOPES 3H:1V OR STEEPER WITHIN 15 FEET OF A SURFACE WATER AND ON ALL OTHER DISTURBED AREAS SPECIFIED ON THE PLAN MAPS AND/OR DETAIL SHEETS.

NOTICES TO CONTRACTOR

1. THE CONTRACTOR SHALL VERIFY AND ADHERE TO ALL REQUIRED PERMITS PRIOR TO STARTING WORK.

2. THE CONTRACTOR SHALL ASSURE THAT THE APPROVED EROSION AND SEDIMENT CONTROL PLAN IS PROPERLY AND COMPLETELY IMPLEMENTED.

3. CONTRACTOR SHALL VERIFY ACTIVE AGRICULTURAL/FARM FIELDS DURING CONSTRUCTION. IF AN ACTIVE AGRICULTURAL/FARM FIELD IS IDENTIFIED, EROSION CONTROL MATTING CAN BE LIMITED/REDUCED TO AVOID THE AGRICULTURAL/FARM FIELD.

4. WATERBARS IN AGRICULTURAL/FARM FIELDS MAY BE TEMPORARY AT THE REQUEST OF THE SURFACE LANDOWNER AND BE REMOVED AND RESTABILIZED UPON ESTABLISHMENT OF 80 PERCENT PERMANENT VEGETATIVE COVER WITHIN THE UPSLOPE TRIBUTARY DRAINAGE AREA.

5. ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE COORDINATED WITH THE AGENCY HAVING JURISDICTION.

6. FURNISH & INSTALL TEMPORARY DIVERSIONS WHENEVER CONCENTRATED FLOWS HAVE THE POTENTIAL TO RUN ONTO OR THROUGH THE CONSTRUCTION AREA. DIRECT THE TEMPORARY DIVERSION DISCHARGE TO A STABLE OUTLET WITH RIP RAP ENERGY DISSIPATER AND VEGETATED AREA.

THERMAL IMPACT ANALYSIS

THERMAL IMPACTS WERE AVOIDED FOR THE CURRENT PROJECT BY INITIALLY ENGAGING IN ROUTING STUDIES TO SPECIFICALLY AVOID IMPACTS TO FORESTED STREAM CORRIDORS. WHEN AVOIDANCE WAS NOT POSSIBLE, THE APPLICANT CONSIDERED THE FEASIBILITY OF CROSSING THESE FEATURES VIA CONVENTIONAL BORE OR HORIZONTAL DIRECTIONAL DRILLING (HDD). WHEN CROSSING VIA BORE/HDD WERE NOT PRACTICABLE, THE PROJECT LIMIT OF DISTURBANCE WAS MINIMIZED AT EACH CROSSING. DURING CONSTRUCTION, THE DURATION OF EXPOSED SOIL IN THESE AREAS WILL BE MINIMIZED AND THE AREAS WILL BE RESTORED TO A MEADOW-LIKE CONDITION.

THE BMPS AND MEASURES USED TO MITIGATE ANY THERMAL IMPACTS ARE A VEGETATED SWALE AND ASSOCIATED CHECK DAMS WHICH WILL BE USED IN CONJUNCTION WITH THE PERMANENT ROAD WILL SERVE TO POOL STORMWATER FOR A PERIOD OF TIME, ALLOWING THE HEAT FROM THESE AREAS TO DISSIPATE PRIOR TO ENTERING DOWNSTREAM RESOURCES. ADDITIONALLY, PERMANENT WATERBARS WILL SLOW DOWN THE RATE OF RUNOFF TO FORESTED STREAM CORRIDORS.

GENERAL EROSION & SEDIMENT CONTROL NOTES

1. AT MINIMUM, ALL BMPs ARE TO BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. A WRITTEN REPORT MUST ALSO BE COMPLETED, DOCUMENTING EACH INSPECTION AND, IF NECESSARY, ANY REPAIR, REPLACEMENT OR MAINTENANCE ACTIVITY.

2. INSPECT SNOW STORAGE AREAS DURING THE THAW CYCLE. INSTALL EROSION & SEDIMENT CONTROL BMPs AND MEASURES DURING QUICK THAWS AND WHEN SNOW MELT RUNOFF IS CONCENTRATED OR IS CAUSING EROSION.

3. DISCHARGING SEDIMENT LADEN WATER WHICH WILL CAUSE OR CONTRIBUTE TO THE DEGRADATION OF A BENEFICIAL USE OF A WATER OF THE STATE FROM THE CONSTRUCTION SITE, A DEWATERING SITE, OR SEDIMENT BASIN/TRAP INTO ANY WATER BODY OR STORM DRAIN WITHOUT FILTRATION OR EQUIVALENT TREATMENT IS PROHIBITED.

4. DISCHARGES ORIGINATING FROM OFF-SITE SOURCES, WHICH FLOW THROUGH OR ACROSS THE AREAS DISTURBED BY CONSTRUCTION, SHALL BE DIVERTED AROUND THE ACTIVE CONSTRUCTION AREA WHENEVER POSSIBLE.

5. STAGING AREAS, ASSEMBLY AREAS, TEMPORARY EQUIPMENT AND NON-HAZARDOUS MATERIAL STORAGE AREAS SHALL BE LOCATED OUTSIDE THE 100-YR FLOOD ZONE. HAZARDOUS MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM SURFACE WATER BODIES.

6. ALL EXCAVATED MATERIALS THAT WILL NOT BE USED ON THE SITE CANNOT BE STORED IN THE FLOODPLAIN AND MUST BE HAULED TO A DISPOSAL SITE LOCATED OUTSIDE OF THE FLOODPLAIN.

7. CONSTRUCTION STAGING AREAS SHALL BE LOCATED A MINIMUM OF 50 FEET AWAY FROM THE EDGE OF A WETLAND.

8. MEASURES SHALL BE TAKEN TO PREVENT TRENCHES FROM DRAINING A WETLAND OR CHANGING ITS HYDROLOGY.

9. IT IS DESIRED THAT THE AMOUNT AND DURATION OF OPEN TRENCH BE MINIMIZED DURING THE PROJECT.

10. IF TOPSOIL AND SOIL PILES ARE EXPOSED FOR GREATER THAN 4 DAYS, THEY SHALL BE SEEDED WITH AN ANNUAL SEED MIXTURE AND MULCHED WITH STRAW AS SPECIFIED BY THE PROJECT OWNER.

INTERIM AND PERMANENT STABILIZATION

1. INTERIM STABILIZATION

TEMPORARY SEEDING WITH MULCH COVER FOR INTERIM STABILIZATION IS A TYPE OF BMP THAT CAN USUALLY BE PROVIDED WHERE THE EARTH DISTURBANCE ACTIVITY TEMPORARILY CEASES (I.E. 4 DAYS OR MORE) UNLESS DIRECTED BY THE PROJECT OWNER.

THE INSTALLATION OF AN EROSION CONTROL BLANKET OR APPLICATION OF MULCH UPON SEEDED AREAS ARE BOTH CONSIDERED TO BE INTERIM STABILIZATION BMPs TO PROTECT THE SEEDBED UNTIL VEGETATION IS ESTABLISHED.

2. PERMANENT STABILIZATION

UPON COMPLETION OF ANY EARTH DISTURBANCE ACTIVITY, THE SITE SHALL BE IMMEDIATELY SEEDED, MULCHED, OR OTHERWISE PROTECTED FROM ACCELERATED EROSION AND SEDIMENTATION.

THE INSTALLATION OF PAVEMENT, ROCK RIP RAP, OR GABIONS ARE SOME EXAMPLES OF STABILIZATION. THE STANDARD FOR VEGETATIVE COVER AS STABILIZATION IS PERENNIAL VEGETATION THAT IS ESTABLISHED WITH A UNIFORM COVERAGE DENSITY OF 80% ACROSS THE DISTURBED AREA. THE APPLICATION OF LIME, FERTILIZERS, SEED, AND MULCH IS USUALLY DONE TO ACHIEVE PERMANENT STABILIZATION. THE MULCH IS CONSIDERED TO BE AN INTERIM STABILIZATION MEASURE TO ASSIST IN THE ESTABLISHMENT OF THE PERMANENT VEGETATIVE COVER.

3. STABILIZATION DURING NON-GROWING SEASONS

WHEN UTILITY CONSTRUCTION MUST BE DONE AND IS COMPLETED DURING A NON-GROWING SEASON, INTERIM STABILIZATION BMPs AND MEASURES MUST BE IMPLEMENTED AND ADEQUATELY MAINTAINED. THE APPLICATION OF STRAW MULCH AT THE RATE OF 2.0 TONS PER ACRE IS RECOMMENDED. THE BMPs AND MEASURES SHOULD BE INSPECTED WEEKLY (UNLESS SNOW COVERED) TO IDENTIFY AREAS THAT BECOME BARE.

BARE AREAS SHOULD BE COVERED WITH A PROPERLY INSTALLED EROSION CONTROL BLANKET. ALL TEMPORARY EROSION AND SEDIMENT POLLUTION CONTROLS MUST BE MAINTAINED UNTIL PERENNIAL VEGETATION IS ESTABLISHED.

4. WHERE REQUIRED, HAY OR STRAW MULCH MUST BE APPLIED AT A MINIMUM OF 2.0 TONS PER ACRE.

5. STRAW MULCH SHALL BE APPLIED IN LONG STRANDS, NOT FINELY CHOPPED OR BROKEN.

6. PRIOR TO ANY SEEDING, LIME, OR FERTILIZATION APPLICATION, A SOIL TEST SHALL BE PERFORMED TO DETERMINE THE pH FACTOR. ADDITIONAL LIME AND FERTILIZER MAY BE REQUIRED. NO LIME OR FERTILIZERS SHALL BE USED IN WETLAND AREAS.

7. LIME, FERTILIZE, SEED, AND MULCH DISTURBED AREAS PER THE EROSION AND SEDIMENT CONTROL PLANS. IN AREAS OF STEEP SLOPES OR OBVIOUS AREAS WHERE POTENTIAL EROSION MAY OCCUR, AND EROSION CONTROL MAT OR FLEXIBLE GROWTH MEDIUM (FGM) SHALL BE USED. FGM SHALL BE APPLIED PER MANUFACTURER SPECIFICATIONS. NO LIME OR FERTILIZERS SHALL BE USED IN WETLAND OR STREAM AREAS.

GRAPHIC SCALE

50 25 0 50

SCALE IN FEET

DRAWING NUMBER	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
REVISIONS					

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
EROSION & SEDIMENTATION NOTES
8686 SALES AND LEASING, LLC.
HARTFORD COUNTY, CT

Division:		Op. Area:	
State: CT		Co./Par.: HARTFORD	
Section:	Township:	Range:	
Drafter: JS	Date: 5/16/2014	Project ID:	Type:
Chk'd: JB	Date: 5/20/2014	Scale: N.T.S.	
Appr: DK	Date: 5/20/2014	Filename: SK14C47811CT07_Pipeyards.dwg	
		Sheet: 1 of 1	Rev. A

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GENERAL SEEDING NOTES

1. IN NON–AGRICULTURAL AREAS, PREPARE A FIRM SEEDBED IN DISTURBED AREAS TO A DEPTH OF THREE (3) TO FOUR (4) INCHES MINIMUM USING APPROPRIATE EQUIPMENT. THE SEEDBED SHALL BE SCARIFIED IN AREAS TO BE HYDRO SEEDED TO FACILITATE LODGING AND GERMINATION OF SEED.
2. SEED DISTURBED AREAS IN ACCORDANCE WITH WRITTEN RECOMMENDATIONS FOR SEED MIXES, RATES, AND DATES AS DETAILED IN ECP ATTACHMENT 7 – SEEDING, FERTILIZER AND LIME RECOMMENDATIONS OR THE REVEGETATION/SEED MIXTURES PLAN UNLESS A SPECIFIC WRITTEN REQUEST IS MADE BY A LANDOWNER, LAND MANAGEMENT AGENCY OR APPLICABLE PERMITTING AGENCY FOR AGRICULTURAL LANDS ONLY. SEEDING SHALL NOT BE CONDUCTED IN ACTIVELY CULTIVATED CROPLANDS UNLESS REQUESTED IN WRITING BY THE LANDOWNER. PERMANENT SEEDING, CONSISTENT WITH THE IMPACTED FIELD'S SPECIFIC REQUIREMENTS, SHALL BE APPLIED IN LONG–TERM AND ROTATION HAYFIELDS AND PASTURES, AS WELL AS AGRICULTURAL CONSERVATION RESERVE PROGRAM (CRP) LANDS.
3. THE CONNECTICUT PIPELINE EXPANSION PROJECT HAS PREPARED A WINTER CONSTRUCTION PLAN IN ANTICIPATION OF CONSTRUCTION ACTIVITIES PROGRESSING DURING THE LATE AUTUMN AND WINTER SEASONS. THE WINTER CONSTRUCTION PLAN IS INCLUDED AS ATTACHMENT 12 TO THE ECP.
4. PERFORM SEEDING OF PERMANENT VEGETATION WITHIN THE RECOMMENDED SEEDING DATES NOTED BELOW. IF SEEDING CANNOT BE DONE WITHIN THOSE DATES, USE APPROPRIATE TEMPORARY EROSION CONTROL MEASURES AND PERFORM SEEDING OF PERMANENT VEGETATION AT THE APPROPRIATE TIME WITHIN THE NEXT RECOMMENDED SEEDING SEASON BASED ON ROW SOIL.
5. DISTURBED SOILS SHALL BE SEEDED WITHIN SIX (6) WORKING DAYS OF FINAL GRADING, WEATHER AND SOIL CONDITIONS PERMITTING, UNLESS OTHERWISE REQUIRED BY THE APPLICABLE REGULATORY AGENCY, LANDOWNER OR LAND MANAGEMENT AGENCY.
6. SEEDING RATES SHALL BE BASED ON PURE LIVE SEED (PLS) RATE APPLICATIONS.
7. ALL SEED SHALL BE USED WITHIN 12 MONTHS OF THE SEED TESTING DATE AS NOTED BY THE MANUFACTURER.
8. LEGUME SEED SHALL BE TREATED WITH AN INOCULANT SPECIFIC TO THE SPECIES USING THE MANUFACTURER'S RECOMMENDED RATE OF INOCULANT APPROPRIATE FOR THE SEEDING METHOD (BROADCAST, DRILL, OR HYDRO).
9. A SEED DRILL EQUIPPED WITH A CULTIPACKER SHALL BE THE PREFERRED SEED APPLICATION APPARATUS UNLESS WRITTEN RECOMMENDATIONS FROM AN APPLICABLE REGULATORY SPECIFIES OTHERWISE.
10. ALL BROADCAST OR HYDRO SEEDING PERFORMED IN LIEU OF DRILLING SHALL BE PLACED AT DOUBLE THE RECOMMENDED SEEDING RATE. THE SEEDBED SHALL BE FIRMED WITH A CULTIPACKER OR ROLLER IN AREAS WHERE SEEDING IS PACED WITH THE BROADCAST METHOD. IN ROCKY SOILS OR WHERE SITE CONDITIONS MAY LIMIT THE EFFECTIVENESS OF THIS EQUIPMENT, OTHER ALTERNATIVES MAY BE APPROPRIATE (E.G., USE OF A CHAIN DRAG) TO LIGHTLY COVER THE SEED AFTER APPLICATION, AS APPROVED BY THE EI.
11. SEED SLOPES STEEPER THAN 30% IMMEDIATELY AFTER ROUGH GRADING IF FINAL GRADING WILL NOT OCCUR IMMEDIATELY, WEATHER PERMITTING.
12. ANY SEEDING CONDUCTED AFTER OCTOBER 15TH (LATE SEASON ROW STABILIZATION ACTIVITIES) WILL BE CONSIDERED "TEMPORARY", OR AS AN "INTERIM STABILIZATION MEASURE", AS IT MAY RESULT IN POOR SEED GERMINATION AND HIGH MORTALITY. TEMPORARY AND PERMANENT SEEDING OF AGRICULTURAL LANDS SHALL BE CONDUCTED IN ACCORDANCE WITH NYSDAM SEEDING, FERTILIZER AND LIME RECOMMENDATIONS. TEMPORARY AND PERMANENT SEED AND MULCH RATES CAN BE FOUND IN SECTION 10.4 OF THIS ECP.

TEMPORARY REVEGETATION

[illegible]

TEMPORARY VEGETATION NOTES

AFTER GRADING AND EXCAVATION IS COMPLETED WITHIN AN AREA, VEGETATION WILL BE SOWN PROMPTLY AFTER CEASING EARTHWORK IN THOSE AREAS. HAY, STRAW MULCH, OR OTHER SIMILAR MATERIAL SHALL BE APPLIED TO NEWLY SEEDED AREAS TO PROTECT AGAINST EROSION UNTIL THE VEGETATION IS ESTABLISHED. HAY, STRAW MULCH, OR OTHER SIMILAR MATERIAL SHALL BE APPLIED AT A RATE OF AT LEAST TWO (2) TONS PER ACRE. THE SEED MIXES NOTED IN TABLE 10.4–1 ARE QUICK GERMINATING SEEDS THAT CAN BE APPLIED ANY TIME OF THE YEAR. ANY SEEDING COMPLETED AFTER OCTOBER 15TH WILL BE CONSIDERED "TEMPORARY", OR AS AN "INTERIM STABILIZATION MEASURE", AS IT MAY RESULT IN POOR SEED GERMINATION AND HIGH MORTALITY. DISTURBED AREAS THAT ARE FINAL GRADED BETWEEN JUNE 1ST & AUGUST 1ST AND OCTOBER 15TH & MARCH 15TH (OF THE FOLLOWING YEAR) SHALL BE SEEDED WITH THE TEMPORARY SEED MIXES NOTED IN TABLE 10.4–1 TO ENSURE QUICK ESTABLISHMENT. LOCATIONS THAT ARE SEEDED WITH TEMPORARY SEED MIXES SHALL BE SUPPLEMENTED WITH THE APPROPRIATE PERMANENT SEED MIX DURING THE DATE WINDOWS OF MARCH 15TH TO JUNE 1ST AND AUGUST 1ST TO OCTOBER 15TH.

PERMANENT REVEGETATION

PERMANENT REVEGETATION NOTES

TOPSOIL WILL BE REPLACED PRIOR TO PERMANENT STABILIZATION IN APPLICABLE LOCATIONS ALONG THE PROJECT ROW. DISTURBED AREAS SHALL BE SEEDED WITH THE APPROPRIATE SEED MIXTURE AS OUTLINED IN TABLE 10.4–2. LIME AND FERTILIZER SHALL BE APPLIED IN ACCORDANCE WITH SOIL TEST RECOMMENDATIONS. HAY, STRAW MULCH, OR OTHER SIMILAR MATERIAL SHALL BE APPLIED AT A RATE OF AT LEAST TWO (2) TONS PER ACRE, UNLESS OTHERWISE REQUIRED BY APPLICABLE REGULATORY AGENCIES. ALL FERTILIZERS, HERBICIDES, PESTICIDES, OR OTHER CHEMICALS ARE TO BE APPLIES NO CLOSER THAN 200 FEET FROM SINKHOLES, WATERBODIES, SPRINGS, AND CAVE OPENINGS. THE PERMANENT SEED MIXES NOTED IN TABLE 10.4–2 SHALL BE APPLIED BETWEEN MARCH 15TH TO JUNE 1ST AND AUGUST 1ST TO OCTOBER 15TH, INCLUDING AREAS WHERE ONLY TEMPORARY SEED MIXES HAVE BEEN APPLIED. TEMPORARY SEED MIXES NOTED IN TABLE 10.4–1 WILL BE APPLIED TO ALL DISTURBED AREAS OUTSIDE OF THE NOTED PERMANENT SEED MIX WINDOWS.

[illegible]

TABLE 10.4-3 - PERMANENT SEEDING FOR RECREATION AND RESIDENTIAL AREAS

Site	Use Species (% by weight)	lbs/1,000 sq. ft.	lbs./acre
1. Sunny sites (well, moderately well, and somewhat poorly drained soils)			
	b. General recreation areas and lawns (Medium to high maintenance)		
	65% Kentucky bluegrass blend	2.0-2.6	85-114
	20% perennial ryegrass	0.6-0.8	26-35
	15% fine fescue	0.4-0.6	19-2
	OR	3.0-4.0	130-175
	100% Tall fescue, Turf-type, fine leaf	3.4-4.6	150-200
2. Sunny droughty sites - general recreation areas and lawns; low maintenance (somewhat excessively to excessively drained soils). Excluding Long Island			
	65% fine fescue	2.6-3.3	114-143
	15% perennial ryegrass	0.6-0.7	26-33
	20% Kentucky bluegrass blend	0.8-1.0	35-44
	OR	4.0-5.0	175-220
	100% Tall fescue, Turf-type, fine lea	3.4-4.6	150-200
3. Shady dry sites (well to somewhat poorly drained soils).			
	65% fine fescue	2.6-3.3	114-143
	15% perennial ryegrass	0.6-0.7	26-33
	20% Kentucky bluegrass blend	0.8-1.0	35-44
	OR	4.0-5.0	174-220
	80% blend of shade-tolerant Kentucky bluegrass	2.4-3.2	105-138
	20% perennial ryegrass	0.6-0.8	25-37
	OR	3.0-4.0	130-175
	100% Tall fescue, Turf-type, fine leaf	4-4.6	150-200
4. Shady wet sites (somewhat poor to poorly drained soils).			
	70% rough bluegrass	1.4-2.1	60-91
	30% blend of shade-tolerant Kentucky bluegrass	0.6-0.9	25-39
	OR	2.0-3.0	85-130
	100% Tall fescue, Turf-type, fine leaf	3.4-4.6	150-200

NOTES

MULCH – MULCHING FOR ALL SEED MIXTURES SHALL BE AT A RATE OF TWO (2) TONS PER ACRE, AND ANCHORED WITH A NETTING OR TACKIFIER.

SOIL AMENDMENTS – SOIL AMENDMENTS SHOULD BE INCORPORATED INTO THE UPPER 2 INCHES OF SOIL WHEN FEASIBLE. THE SOIL SHOULD BE TESTED TO DETERMINE THE AMOUNTS OF AMENDMENTS NEEDED. APPLY GROUND AGRICULTURAL LIMESTONE TO ATTAIN A PH OF 6.0 IN THE UPPER 2 INCHES OF SOIL. IF SOIL MUST BE FERTILIZED BEFORE RESULTS OF A SOIL TEST CAN BE OBTAINED TO DETERMINE FERTILIZER NEEDS, APPLY COMMERCIAL FERTILIZER AT 600 LBS. PER ACRE OF 5–10–10 OR EQUIVALENT. IF MANURE IS USED, APPLY A QUANTITY TO MEET THE NUTRIENTS OF THE ABOVE FERTILIZER. THIS REQUIRES AN APPROPRIATE MANURE ANALYSIS PRIOR TO APPLYING TO THE SITE. MANURE WILL NOT BE USED ON SITES PLANTED WITH BIRDSFOOT TREFOIL OR IN THE PATH OF CONCENTRATED WATER FLOW. ALL FERTILIZERS, HERBICIDES, PESTICIDES, OR OTHER CHEMICALS ARE TO BE APPLIES NO CLOSER THAN 200 FEET FROM SINKHOLES, WATERBODIES, SPRINGS, AND CAVE OPENINGS.

THE ABOVE NOTED SEED MIXES ARE SUBJECT TO CHANGE.

GRAPHIC SCALE
50 25 0 50
SCALE IN FEET

DRAWING NUMBER	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
GENERAL SEDIMENTATION NOTES
8686 SALES AND LEASING, LLC.
HARTFORD COUNTY, CT

Division:		Op. Area:	
State: CT		Co./Par.: HARTFORD	
Section:	Township:	Range:	
Drafter: JS	Date: 5/16/2014	Project ID:	Type:
Chk'd: JB	Date: 5/20/2014	Scale: N.T.S.	
Appr: DK	Date: 5/20/2014	Filename: SK14C4781CT07_Pipeyards.dwg	
		Sheet: 1 of 1	Rev. A

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RECYCLING AND DISPOSAL METHODS

CONTRACTORS ARE REQUIRED TO INVENTORY AND MANAGE THEIR CONSTRUCTION SITE MATERIALS. THE GOAL IS TO BE AWARE OF THE MATERIALS ON-SITE, ENSURE THEY ARE PROPERLY MAINTAINED, USED, AND DISPOSED OF, AND TO MAKE SURE THE MATERIALS ARE NOT EXPOSED TO STORMWATER.

MATERIALS COVERED

THE FOLLOWING MATERIALS OR SUBSTANCES ARE EXPECTED TO BE PRESENT ON-SITE DURING CONSTRUCTION (NOTE: THIS LIST IS NOT AN ALL-INCLUSIVE LIST AND THE MATERIALS MANAGEMENT PLAN CAN BE MODIFIED TO ADDRESS ADDITIONAL MATERIALS USED ON-SITE):

- ACIDS
- DETERGENTS
- FERTILIZERS (NITROGEN/PHOSPHORUS)
- HYDROSEEDING MIXTURES
- PETROLEUM BASED PRODUCTS
- SANITARY WASTES
- SOIL STABILIZATION ADDITIVES
- SOLDER
- SOLVENTS
- OTHER (LIST HERE): ____

THESE MATERIALS MUST BE STORED AS APPROPRIATE AND SHALL NOT CONTACT STORM OR NON-STORMWATER DISCHARGES. CONTRACTOR SHALL PROVIDE A WEATHER PROOF CONTAINER TO STORE CHEMICALS OR ERODIBLE SUBSTANCES THAT MUST BE KEPT ON THE SITE. CONTRACTOR IS RESPONSIBLE FOR READING, MAINTAINING, AND MAKING EMPLOYEES AND SUBCONTRACTORS AWARE OF MATERIAL SAFETY DATA SHEETS (MSDSs).

MATERIAL MANAGEMENT PRACTICES

THE FOLLOWING ARE MATERIAL MANAGEMENT PRACTICES THAT WILL BE USED TO REDUCE THE RISK OF SPILLS OR OTHER ACCIDENTAL EXPOSURE OF MATERIALS AND SUBSTANCES TO STORMWATER RUNOFF.

1. GOOD HOUSEKEEPING PRACTICES

THE FOLLOWING GOOD HOUSEKEEPING PRACTICES WILL BE FOLLOWED ON SITE DURING CONSTRUCTION:

- STORE ONLY ENOUGH MATERIAL REQUIRED TO DO THE JOB.
- STORE MATERIALS IN A NEAT, ORDERLY MANNER.
- STORE CHEMICALS IN WATERTIGHT CONTAINERS OR IN A STORAGE SHED, UNDER A ROOF, COMPLETELY ENCLOSED, WITH APPROPRIATE SECONDARY CONTAINMENT TO PREVENT SPILL OR LEAKAGE. DRIP PANS SHALL BE PROVIDED UNDER DISPENSERS.
- SUBSTANCES WILL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER.
- MANUFACTURER'S RECOMMENDATIONS FOR PROPER USE AND DISPOSAL WILL BE FOLLOWED.
- INSPECTIONS WILL BE PERFORMED TO ENSURE PROPER USE AND DISPOSAL OF MATERIALS.
- COVER AND BERM LOOSE STOCKPILED CONSTRUCTION MATERIALS THAT ARE NOT ACTIVELY BEING USED (I.E. SOIL, SPOILS, AGGREGATE, ETC.).
- MINIMIZE EXPOSURE OF CONSTRUCTION MATERIALS TO PRECIPITATION.
- MINIMIZE THE POTENTIAL FOR OFF-SITE TRACKING OF LOOSE CONSTRUCTION AND LANDSCAPE MATERIALS.

2. HAZARDOUS PRODUCTS

THESE PRACTICES WILL BE USED TO REDUCE THE RISKS ASSOCIATED WITH HAZARDOUS MATERIALS. MSDSS FOR EACH SUBSTANCE WITH HAZARDOUS PROPERTIES THAT IS USED ON THE JOB SITE(S) WILL BE OBTAINED AND USED FOR THE PROPER MANAGEMENT OF POTENTIAL WASTES THAT MAY RESULT FROM THESE PRODUCTS. A MSDS WILL BE POSTED IN THE IMMEDIATE AREA WHERE SUCH PRODUCT IS STORED AND/OR USED AND ANOTHER COPY OF EACH MSDS WILL BE MAINTAINED IN A FILE AT THE JOB SITE CONSTRUCTION TRAILER OFFICE. EACH EMPLOYEE WHO MUST HANDLE A SUBSTANCE WITH HAZARDOUS PROPERTIES WILL BE INSTRUCTED ON THE USE OF MSDS AND THE SPECIFIC INFORMATION IN THE APPLICABLE MSDS FOR THE PRODUCT HE/SHE IS USING, PARTICULARLY REGARDING SPILL CONTROL TECHNIQUES.

- PRODUCTS WILL BE KEPT IN ORIGINAL CONTAINERS WITH THE ORIGINAL LABELS IN LEGIBLE CONDITION.
- ORIGINAL LABELS AND MSDSS WILL BE PRODUCED AND USED FOR EACH MATERIAL.
- IF SURPLUS PRODUCT MUST BE DISPOSED OF, MANUFACTURER'S OR LOCAL/STATE/FEDERAL RECOMMENDED METHODS FOR PROPER DISPOSAL WILL BE FOLLOWED.

3. HAZARDOUS WASTES

ALL HAZARDOUS WASTE MATERIALS WILL BE DISPOSED OF BY THE CONTRACTOR IN THE MANNER SPECIFIED BY LOCAL, STATE, AND/OR FEDERAL REGULATIONS AND BY THE MANUFACTURER OF SUCH PRODUCTS. SITE PERSONNEL WILL BE INSTRUCTED.

4. CONCRETE AND OTHER WASH WATERS

PREVENT DISPOSAL OF RINSE, WASH WATERS, OR MATERIALS ON IMPERVIOUS OR PERVIOUS SURFACES, INTO STREAMS, WETLANDS OR OTHER WATER BODIES.

CONCRETE TRUCKS WILL BE ALLOWED TO WASH OUT OR DISCHARGE SURPLUS CONCRETE OR DRUM WASH WATER ON THE SITE, BUT ONLY IN EITHER (1) SPECIFICALLY DESIGNATED DIKED AREAS WHICH HAVE BEEN PREPARED TO PREVENT CONTACT BETWEEN THE CONCRETE AND/OR WASHOUT AND SOIL AND STORMWATER HAVING THE POTENTIAL TO BE DISCHARGED FROM THE SITE OR (2) IN LOCATIONS WHERE WASTE CONCRETE CAN BE POURED INTO FORMS TO MAKE RIPRAP OR OTHER USEFUL CONCRETE PRODUCTS.

THE HARDENED RESIDUE FROM THE CONCRETE WASHOUT DIKED AREAS WILL BE DISPOSED OF IN THE SAME MANNER AS OTHER NON-HAZARDOUS CONSTRUCTION WASTE MATERIALS OR MAY BE BROKEN UP AND USED ON THE SITE AS DEEMED APPROPRIATE BY THE CONTRACTOR AND GEOTECHNICAL ENGINEER. THE CONTRACTOR WILL BE RESPONSIBLE FOR SEEING THAT THESE PROCEDURES ARE FOLLOWED.

ALL CONCRETE WASHOUT AREAS WILL BE LOCATED IN AN AREA WHERE THE LIKELIHOOD OF THE AREA CONTRIBUTING TO STORMWATER DISCHARGE IS NEGLIGIBLE. IF REQUIRED, ADDITIONAL BMPS MUST BE IMPLEMENTED TO PREVENT CONCRETE WASTES FROM CONTRIBUTING TO STORMWATER DISCHARGES. THE LOCATION OF THE CONCRETE WASHOUT AREA(S) MUST BE IDENTIFIED, BY THE CONTRACTOR/JOB SITE SUPERINTENDENT, ON THE JOB SITE COPY OF THE EROSION AND SEDIMENT CONTROL PLAN(S) IN THIS ESCP.

5. SANITARY WASTES

ALL SANITARY WASTE UNITS WILL BE LOCATED IN AN AREA WHERE THE LIKELIHOOD OF THE UNIT CONTRIBUTING TO STORMWATER DISCHARGES IS NEGLIGIBLE. ADDITIONAL BMPS MUST BE IMPLEMENTED, SUCH AS CONTAINMENT TRAYS (PROVIDED BY THE RENTAL COMPANY) OR SPECIAL CONTAINMENT CREATED WITH 2"X4" LUMBER, IMPERVIOUS PLASTIC, AND GRAVEL. THE LOCATION OF THE SANITARY WASTE UNITS MUST BE IDENTIFIED ON THE JOB SITE COPY OF THE EROSION AND SEDIMENT CONTROL PLAN(S), IN THIS ESCP, BY THE CONTRACTOR/JOB SITE SUPERINTENDENT.

6. SOLID AND CONSTRUCTION WASTES

ALL WASTE MATERIALS WILL BE COLLECTED AND STORED IN A SECURELY LIDDED METAL DUMPSTER. THE DUMPSTER WILL COMPLY WITH ALL LOCAL AND STATE SOLID WASTE MANAGEMENT REGULATIONS. THE DUMPSTER/CONTAINER LIDS SHALL BE CLOSED AT THE END OF EVERY BUSINESS DAY AND DURING RAIN EVENTS. APPROPRIATE MEASURES SHALL BE TAKEN TO PREVENT DISCHARGES FROM WASTE DISPOSAL CONTAINERS TO THE RECEIVING WATER.

7. CONSTRUCTION ACCESS

A STABILIZED CONSTRUCTION EXIT WILL BE PROVIDED TO HELP REDUCE VEHICLE TRACKING OF SEDIMENTS. THE PAVED ROADS ADJACENT TO THE SITE ENTRANCE WILL BE INSPECTED DAILY AND SWEPT AS NECESSARY TO REMOVE ANY EXCESS MUD, DIRT, OR ROCK TRACKED FROM THE SITE. DUMP TRUCKS HAULING MATERIAL FROM THE CONSTRUCTION SITE WILL BE COVERED WITH A TARPAULIN AS NECESSARY.

8. PETROLEUM PRODUCTS

ON-SITE VEHICLES WILL BE MONITORED FOR LEAKS AND RECEIVE REGULAR PREVENTATIVE MAINTENANCE. PETROLEUM PRODUCTS WILL BE STORED IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED. PETROLEUM STORAGE TANKS ON SITE WILL HAVE A DIKE OR BERM CONTAINMENT STRUCTURE CONSTRUCTED AROUND IT TO CONTAIN SPILLS WHICH MAY OCCUR (CONTAINMENT VOLUME TO BE 110% OF VOLUME STORED). THE DIKE OR BERMED AREA SHALL BE LINED WITH AN IMPERVIOUS MATERIAL SUCH AS A HEAVY DUTY PLASTIC SHEET. DRIP PANS SHALL BE PROVIDED FOR ALL DISPENSERS. ANY ASPHALT SUBSTANCES USED ON THE SITE WILL BE APPLIED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

9. FERTILIZERS AND LANDSCAPE MATERIALS

FERTILIZERS WILL BE APPLIED ONLY IN THE MINIMUM AMOUNTS RECOMMENDED BY THE MANUFACTURER. ONCE APPLIED, FERTILIZER WILL BE WORKED INTO THE SOIL TO MINIMIZE THE POTENTIAL FOR EXPOSURE TO STORMWATER. STORAGE WILL BE UNDER COVER. THE CONTENTS OF ANY PARTIALLY USED BAGS OF FERTILIZER WILL BE TRANSFERRED TO A SEALABLE PLASTIC BIN TO MINIMIZE THE POTENTIAL FOR SPILLS. THE BIN SHALL BE LABELED APPROPRIATELY.

CONTAIN STOCKPILED MATERIALS, SUCH AS BUT NOT LIMITED TO, MULCHES, TOP SOIL, ROCKS AND GRAVEL, AND DECOMPOSED GRANITE, WHEN THEY ARE NOT ACTIVELY BEING USED.

APPLY ERODIBLE LANDSCAPE MATERIAL AT QUANTITIES AND APPLICATION RATES ACCORDING TO MANUFACTURER RECOMMENDATIONS OR BASED ON WRITTEN SPECIFICATIONS BY KNOWLEDGEABLE AND EXPERIENCED FIELD PERSONNEL. DISCONTINUE THE APPLICATION OF ANY ERODIBLE LANDSCAPE MATERIAL WITHIN TWO DAYS PRIOR TO A FORECASTED RAIN EVENT OR DURING PERIODS OF PRECIPITATION.

10. PAINTS, PAINT SOLVENTS AND CLEANING SOLVENTS

CONTAINERS WILL BE TIGHTLY SEALED AND STORED WHEN NOT IN USE. EXCESS PAINT AND SOLVENTS WILL BE PROPERLY DISPOSED OF ACCORDING TO MANUFACTURER'S INSTRUCTIONS OR LOCAL/STATE/FEDERAL REGULATIONS.

11. CONTAMINATED SOILS

ANY CONTAMINATED SOILS (RESULTING FROM SPILLS OF MATERIALS WITH HAZARDOUS PROPERTIES) WHICH MAY RESULT FROM CONSTRUCTION ACTIVITIES WILL BE CONTAINED AND CLEANED UP IMMEDIATELY IN ACCORDANCE WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

MAINTENANCE PROGRAM

THE FOLLOWING INSPECTION AND MAINTENANCE PRACTICES WILL BE USED TO MAINTAIN EROSION AND SEDIMENT CONTROLS AND STABILIZATION MEASURES:

- ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSPECTED ONCE EVERY SEVEN DAYS AND POST-PRECIPITATION.
- ALL MEASURES WILL BE MAINTAINED IN GOOD WORKING ORDER; IF REPAIRS OR ADDITIONAL MEASURES ARE FOUND TO BE NECESSARY, THEY WILL BE INITIATED WITHIN 24 HOURS OF THE INSPECTION REPORT.
- BUILT UP SEDIMENT WILL BE REMOVED FROM PERIMETER BMPS AND MEASURES WHEN IT HAS REACHED ONE-HALF THE HEIGHT OF THE SILT FENCE.
- PERIMETER BMPS WILL BE INSPECTED FOR DEPTH OF SEDIMENT, DAMAGE, ETC., TO ENSURE THE MEASURE IS IN PROPER WORKING ORDER, AND THAT ANY POSTS/WOOD STAKES ARE SECURELY IN THE GROUND.
- TEMPORARY SEDIMENT TRAPS, IF PRESENT, WILL BE INSPECTED FOR DEPTH OF SEDIMENT, AND BUILT UP SEDIMENT WILL BE REMOVED WHEN IT REACHES 33-50% THE DESIGN DEPTH.
- TEMPORARY AND PERMANENT SEEDING, AND OTHER STABILIZATION MEASURES, WILL BE INSPECTED FOR BARE SPOTS, WASHOUTS, AND HEALTHY GROWTH.
- A MAINTENANCE INSPECTION REPORT WILL BE MADE AFTER EACH INSPECTION. COPIES OF THE REPORT FORMS TO BE COMPLETED BY THE INSPECTOR ARE INCLUDED IN THIS ESCP.
- THE INSPECTOR WILL IMPLEMENT INSPECTION AND MAINTENANCE PRACTICES NECESSARY FOR KEEPING THE EROSION AND SEDIMENT CONTROLS THAT ARE USED ON THE SITE IN GOOD WORKING ORDER. THE INSPECTOR WILL ALSO BE TRAINED IN THE COMPLETION OF, INITIATION OF ACTIONS REQUIRED BY, AND THE FILING OF THE INSPECTION FORMS.
- DISTURBED AREAS AND MATERIALS STORAGE AREAS WILL BE INSPECTED FOR EVIDENCE OF OR POTENTIAL FOR POLLUTANTS ENTERING THE STORMWATER.

A COPY OF THE EROSION AND SEDIMENT CONTROL PLAN(S) WILL BE AVAILABLE ON THE SITE AT ALL TIMES.

ONCE ANY EROSION CONTROL MEASURES ARE INSTALLED, THE MAINTENANCE AND INSPECTION PROCEDURES ABOVE SHALL BEGIN. THE CONTRACTOR SHOULD BE AWARE THAT THE INSPECTION FORMS BECOME AN INTEGRAL PART OF THE ESCP AND SHALL BE MADE READILY AVAILABLE TO THE GOVERNMENT INSPECTION OFFICIALS, THE PROJECT OWNER'S ENGINEER, AND THE PROJECT OWNER FOR REVIEW UPON REQUEST DURING VISITS TO THE PROJECT SITE.

INSPECTORS SHOULD BE KNOWLEDGEABLE IN THE PRINCIPLES AND PRACTICE OF EROSION AND SEDIMENT CONTROLS AND POSSESS THE SKILLS TO ASSESS CONDITIONS AT THE CONSTRUCTION SITE THAT COULD IMPACT STORMWATER QUALITY AND TO ASSESS THE EFFECTIVENESS OF ANY SEDIMENT AND EROSION CONTROL MEASURES SELECTED TO CONTROL THE QUALITY OF STORMWATER DISCHARGES FROM THE CONSTRUCTION SITE. THEY SHOULD ALSO HAVE
READ AND UNDERSTOOD ALL PORTIONS OF THIS ESCP, INCLUDING THE CONNECTICUT GENERAL PERMIT FOR THE DISCHARGE OF STORM WATER AND DEWATERING WASTE WATERS FROM CONSTRUCTION ACTIVITES.

THE INDIVIDUAL(S) RESPONSIBLE FOR POST-STORM AND STORM EVENT BMP INSPECTIONS, AND THE QUALIFIED PERSON(S) ASSIGNED RESPONSIBILITY TO ENSURE FULL COMPLIANCE WITH THE PERMIT AND IMPLEMENTATION OF ALL ELEMENTS OF THE ESCP, INCLUDING THE PREPARATION OF THE ANNUAL COMPLIANCE EVALUATION AND THE ELIMINATION OF ALL UNAUTHORIZED DISCHARGES ARE:

NAME: ____

PHONE NUMBER: ____________________ EMERGENCY PHONE #: ____________________

COMPANY: ____

RESPONSIBILITIES: ____

NAME: ____

PHONE NUMBER: ____________________ EMERGENCY PHONE #: ____________________

COMPANY: ____

RESPONSIBILITIES: ____

GRAPHIC SCALE

50 25 0 50

SCALE IN FEET

DRAWING NUMBER	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
REVISIONS					

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
RECYCLING & DISPOSAL PLAN
8686 SALES AND LEASING, LLC.
HARTFORD COUNTY, CT

Division:		Op. Area:	
State: CT		Co./Par.: HARTFORD	
Section:	Township:	Range:	
Drafter: JS	Date: 5/16/2014	Project ID:	Type:
Chk'd: JB	Date: 5/20/2014	Scale: N.T.S.	
Appr: DK	Date: 5/20/2014	Filename: SK14C4781CT07_Pipeyards.dwg	
		Sheet: 1 of 1	Rev. A

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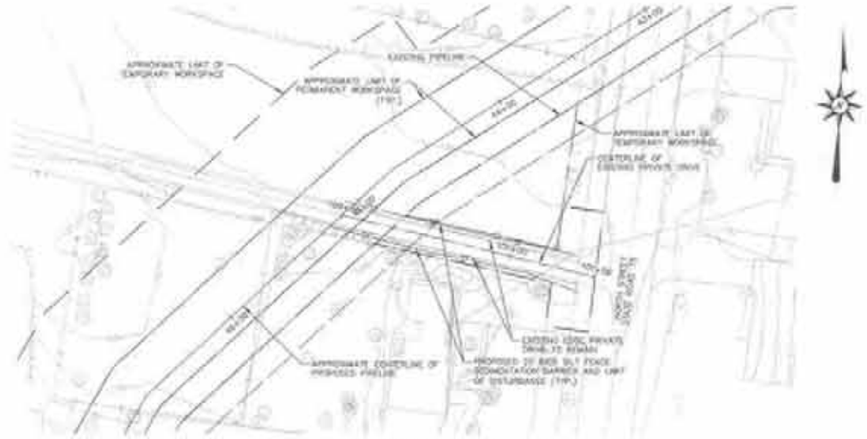
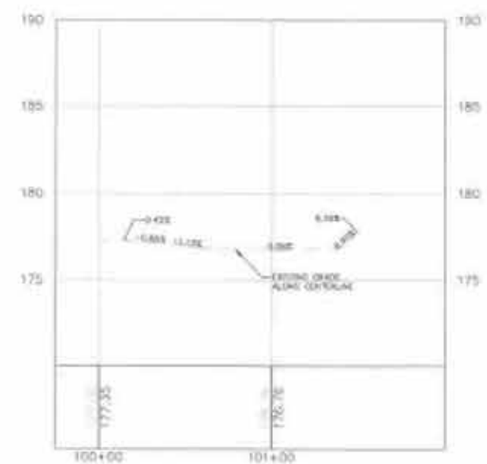


CONNECTICUT TEMPORARY ACCESS ROAD 1 - PLAN



CONNECTICUT TEMPORARY ACCESS ROAD 1 - PROFILE

GENERAL NOTES

1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE KINDER MORGAN (MP) FIGURE NO. 32.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION ADDITIONS," "GENERAL SEEDING NOTES," AND "DEWATERING AND DISPOSAL PLAN," FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF AREA TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE REGRADED TO MATCH THE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED TEMPORARY GRAVEL AND ASSOCIATED CHECK DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 1(V):2(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN (MP) NO. 41. THE MATTING SHALL BE NAG S075BN OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 1(V):3(H) SHALL BE COVERED WITH RIPRAP SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED INTO THE MAIN TRAVEL WAY.

LEGEND

- PROPOSED PIPELINE
- EXISTING PIPELINE
- PROPERTY LINE
- STRUCTURE
- ELEC CABLE
- FENCE
- TREE LINE
- FIBER OPTIC LINE
- POWER LINES
- TELEPHONE CABLE
- TELEPHONE LINE
- CABLE LINE
- EXISTING WETLANDS
- EXISTING EASEMENT
- PROPOSED TEMPORARY WORKSPACE
- PROPOSED EDGE OF ROAD
- PROPOSED SILT FENCE
- PROPOSED GRADING LIMITS

NOT FOR CONSTRUCTION

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

TD-113-300-2-A001	TEMPORARY ACCESS ROAD 1
DRAWING NUMBER	DRAWING NAME

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	DRAWN	CHECKED	APPR.
1	8/29/16	CP	ISSUED FOR BID	ETHANETTE	AP	

REVISIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

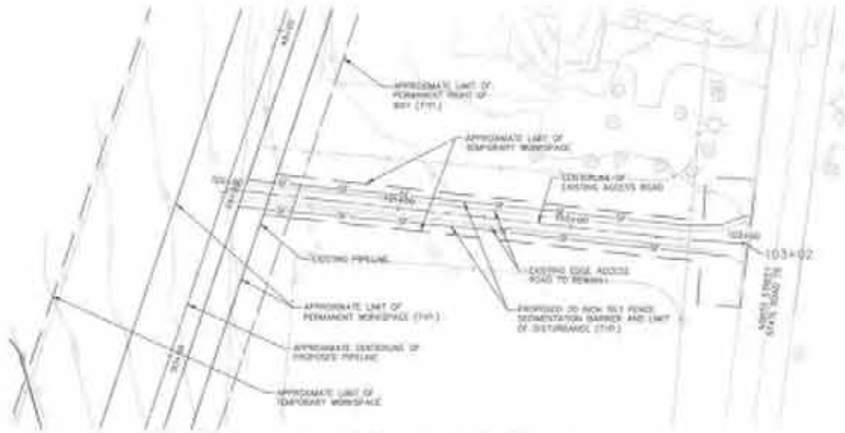
CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Division:		Op. Area:	
State: CT		Co./Par.: HARTFORD	
Section:	Township: SUFFIELD	Range:	
Drafter: JMB	Date: 02/08/16	Project #:	Type:
Chk'd: -	Date: -	Scale: 1" = 40'	
Appr: -	Date: -	Filename:	

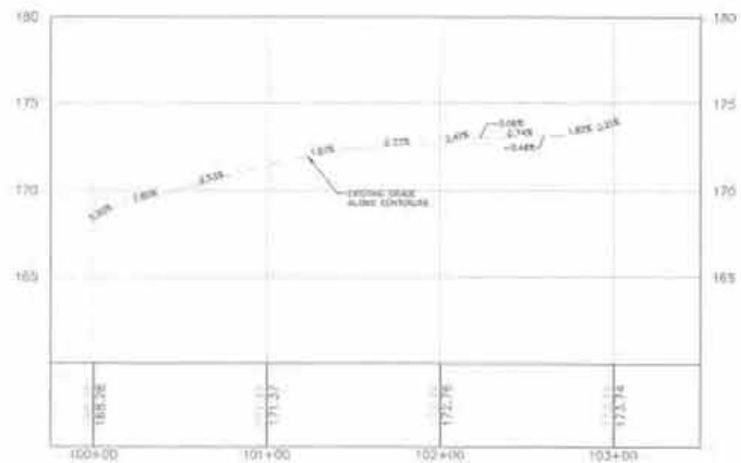
TD-113-300-2-A001

Sheet: 1 of 16

ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL Companies



CONNECTICUT TEMPORARY ACCESS ROAD 2 - PLAN



CONNECTICUT TEMPORARY ACCESS ROAD 2 - PROFILE

GENERAL NOTES

1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE KINDER MORGAN BMP FIGURE NO. 33.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "RECYCLING AND DISPOSAL PLAN" FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED FROM PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE REGRADED TO MATCH PRE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED CHECK DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 1(V):3(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN BMP NO. 41. THE MATTING SHALL BE NAE SC150BN OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 1(V):3(H) SHALL BE COVERED WITH RIPRAP SLOPE PROTECTION. SEE SLOPE PROTECTION SECTION FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED ONTO THE MAIN TRAVEL WAY.

LEGEND

- PROPOSED PIPELINE
- EXISTING PIPELINE
- PROPERTY LINE
- STRUCTURE
- ELEC CABLE
- FENCE
- TREE LINE
- FIBER OPTIC LINE
- POWER LINES
- TELEPHONE CABLE
- TELEPHONE LINE
- CABLE LINE
- EXISTING WETLANDS
- EXISTING EASEMENT
- PROPOSED TEMPORARY WORKSPACE
- PROPOSED EDGE OF ROAD
- PROPOSED SILT FENCE
- PROPOSED GRADING LIMITS

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

NOT FOR CONSTRUCTION

TG-TLS-300-2-AR02		TEMPORARY ACCESS ROAD 2	
DRAWING NUMBER		DRAWING NAME	
REFERENCE DRAWINGS			
1	05/28/04	CP	ISSUED FOR IFC
NO.	DATE	BY	DESCRIPTION

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

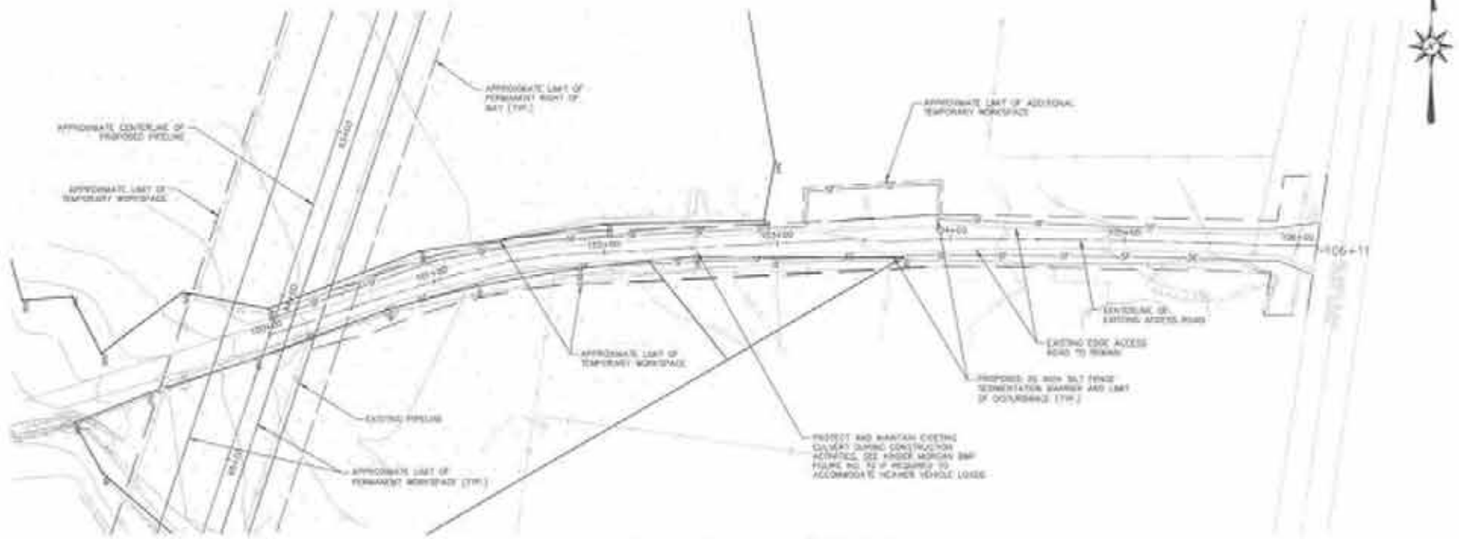
CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Division:		Op. Area:	
State:	CT	Co./Par.:	HARTFORD
Section:		Township: SUFFIELD	Range:
Drafter: AKS	Date: 07/08/04	Project No.	Type:
Chk'd: --	Date: --	Scale: 1" = 40'	
Appr: --	Date: --	Filename:	

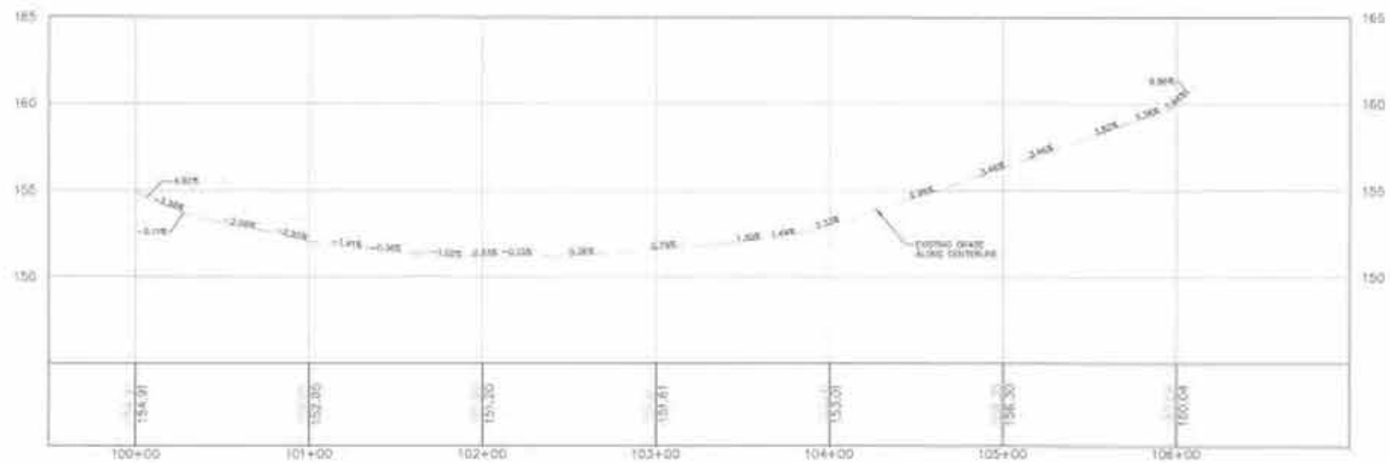
TG-TLS-300-2-AR02

Sheet: 2 of 14 | Rev:

ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL Companies



CONNECTICUT TEMPORARY ACCESS ROAD 3 - PLAN



CONNECTICUT TEMPORARY ACCESS ROAD 3 - PROFILE

GENERAL NOTES

1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE HINDER MORGAN BMP FIGURE NO. 73.
2. REFER TO HINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "RECYCLING AND DISPOSAL PLAN," FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE RESTORED TO MATCH PRE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED CHECK DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY HINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG CONNECTICUT" (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 1(V):3(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER HINDER MORGAN BMP NO. 41. THE MATTING SHALL BE NAG SC150BN OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 1(V):2(H) SHALL BE COVERED WITH RIPRAP. SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED ONTO THE MAIN TRAVEL WAY.

LEGEND

- PROPOSED PIPELINE
- EXISTING PIPELINE
- PROPERTY LINE
- STRUCTURE
- ELEC CABLE
- FENCE
- TREE LINE
- FIBER OPTIC LINE
- POWER LINES
- TELEPHONE CABLE
- TELEPHONE LINE
- CABLE LINE
- EXISTING WETLANDS
- EXISTING EASEMENT
- PROPOSED TEMPORARY WORKSPACE
- PROPOSED EDGE OF ROAD
- PROPOSED SILT FENCE
- PROPOSED GRADING LIMITS

NOT FOR CONSTRUCTION

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

TD-713-300-2-AR03		TEMPORARY ACCESS ROAD 3	
DRAWING NUMBER		DRAWING NAME	
REFERENCE DRAWINGS			
1	11/19/15	CP	ISSUED FOR IND.
NO.	DATE	BY	DESCRIPTION
REVISIONS			

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

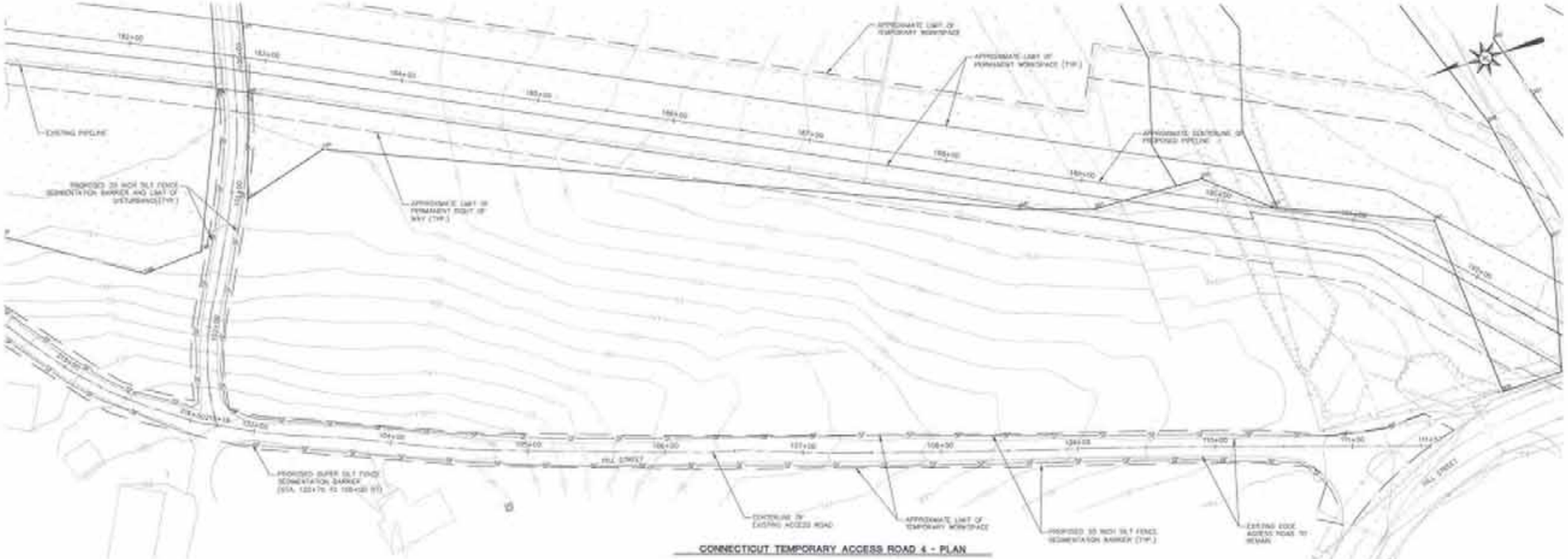
CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Division:		Dir. Area:	
State:	CT	Co./Par.:	HARTFORD
Section:		Township: SUFFIELD	Range:
Drafter: JMS	Date: 07/06/14	Project No.	Type:
Ck'd: --	Date: --	Scale: 1" = 40'	
Appr: --	Date: --	Filename:	

HINDERSTONE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL Companies

TD-713-300-2-AR03

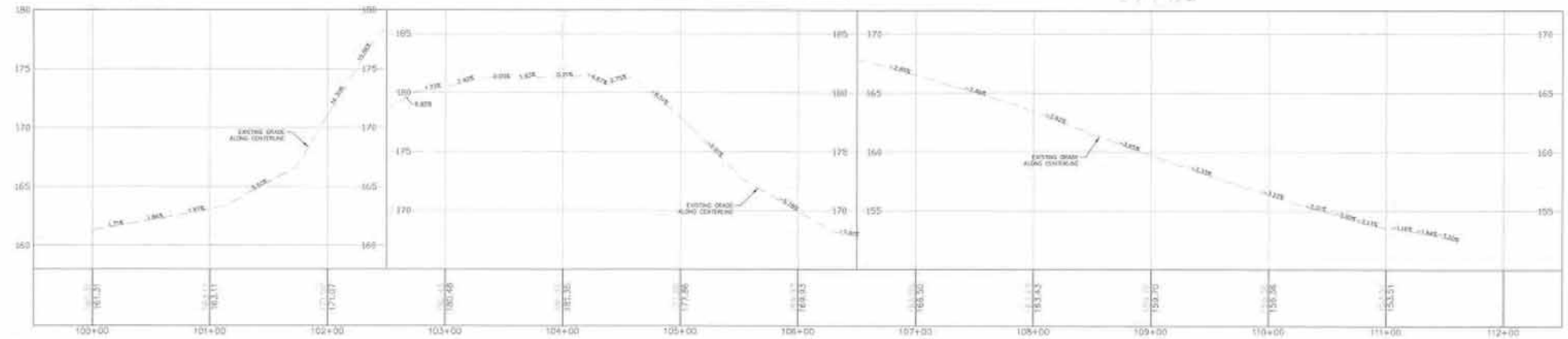
Sheet 3 of 14



CONNECTICUT TEMPORARY ACCESS ROAD 4 - PLAN

GENERAL NOTES

1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE KINDER MORGAN BMP FIGURE NO. 22.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "RECYCLING AND DISPOSAL PLAN," FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE REGRADED TO MATCH PRE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED CHECK DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 1(V):3(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN BMP NO. 41. THE MATTING SHALL BE NAG S075BN OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURING SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 1(V):2(H) SHALL BE COVERED WITH RIPRAP SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED ONTO THE MAIN TRAVEL WAY.



CONNECTICUT TEMPORARY ACCESS ROAD 4 - PROFILE

LEGEND

- PROPOSED PIPELINE
- EXISTING PIPELINE
- PROPERTY LINE
- STRUCTURE
- ELEC CABLE
- FENCE
- TREE LINE
- FIBER OPTIC LINE
- POWER LINES
- TELEPHONE CABLE
- TELEPHONE LINE
- CABLE LINE
- EXISTING WETLANDS
- EXISTING EASEMENT
- PROPOSED TEMPORARY WORKSPACE
- PROPOSED EDGE OF ROAD
- PROPOSED SILT FENCE
- PROPOSED GRADING LIMITS

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

NOT FOR CONSTRUCTION

10-113-300-2-AR04		TEMPORARY ACCESS ROAD 4	
DRAWING NUMBER		DRAWING NAME	
REFERENCE DRAWINGS			
1	10/29/14	CP	ISSUED FOR IFR
NO.	DATE	BY	DESCRIPTION
REVISIONS			

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

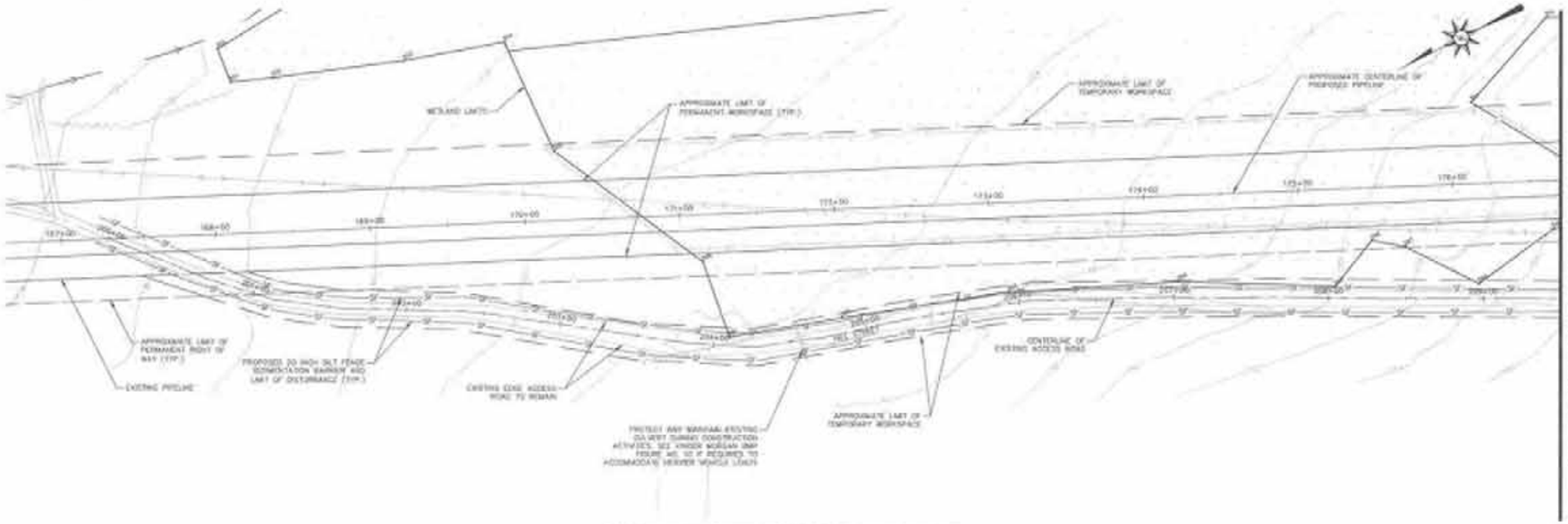
CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Division:		Dr. Area:	
Scale:	1"=	Co./Par.:	HARTFORD
Section:		Township:	SUFFIELD
Drafter: JKS	Date: 07/08/14	Project ID:	
Ch'd: --	Date: --	Scale: 1" = 40'	
App: --	Date: --	Filename:	

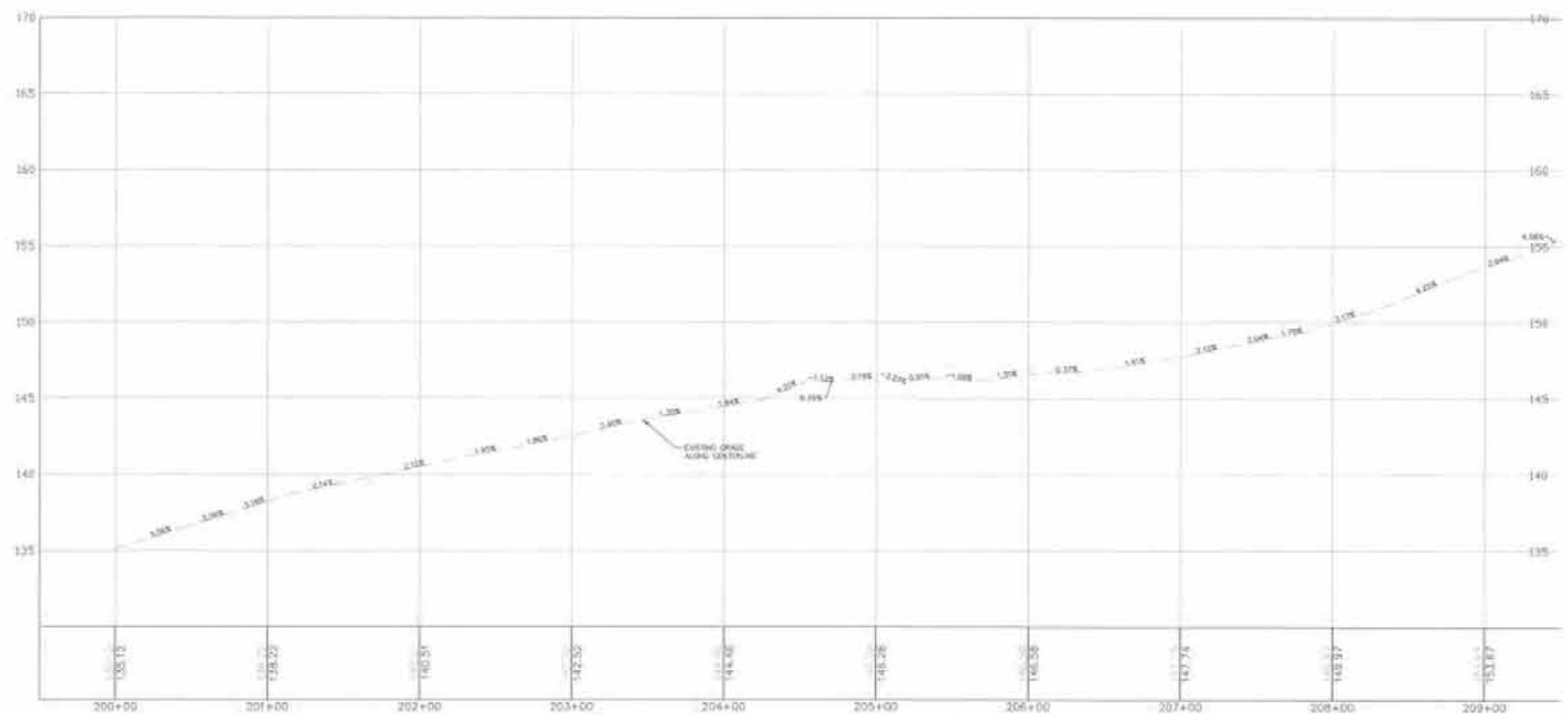
ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL Companies

10-113-300-2-AR04

Sheet 4 of 14



CONNECTICUT TEMPORARY ACCESS ROAD 4a - PLAN (1 OF 2)



CONNECTICUT TEMPORARY ACCESS ROAD 4a - PROFILE (1 OF 2)

NOT FOR CONSTRUCTION

GENERAL NOTES

1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE KINDER MORGAN SMP FIGURE NO. 22.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "REVEGETATION AND REFORESTATION PLAN," FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE RESTORED TO MATCH PRE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED CHECK DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN (1V:3H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN SMP NO. 41. THE MATTING SHALL BE NAIL STRIPPED OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN (1V:2H) SHALL BE COVERED WITH RIPRAP SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED ONTO THE MAIN TRAVEL WAY.

LEGEND

PROPOSED PIPELINE
EXISTING PIPELINE
PROPERTY LINE
STRUCTURE
ELEC CABLE
FENCE
TREE LINE
FIBER OPTIC LINE
POWER LINES
TELEPHONE CABLE
TELEPHONE LINE
CABLE LINE
EXISTING WETLANDS
EXISTING EASEMENT
PROPOSED TEMPORARY WORKSPACE
PROPOSED EDGE OF ROAD
PROPOSED SILT FENCE
PROPOSED GRADING LIMITS

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

10-113-300-C-A604		TEMPORARY ACCESS ROAD 4	
DRAWING NUMBER		DRAWING NAME	
REFERENCE DRAWINGS			
1	2/13/05	UP	ISSUED FOR BID
NO.	DATE	BY	DESCRIPTION
REVISIONS			

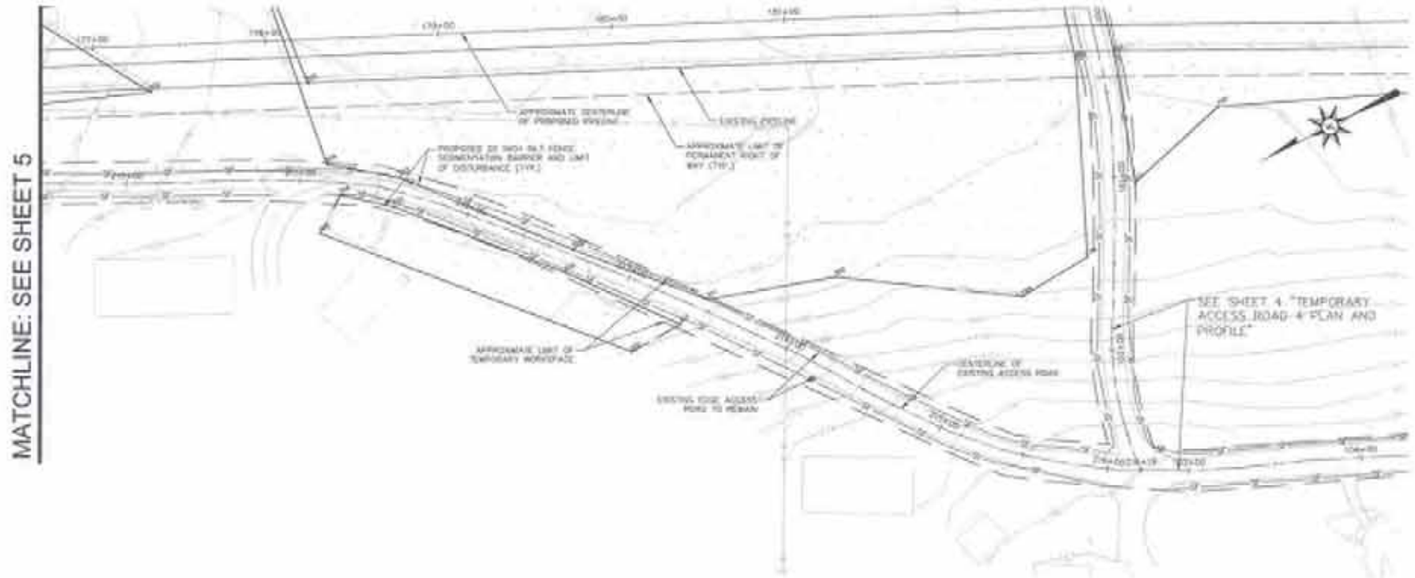
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Division:		Co. Area:	
State:	CT	Co./Par.:	HARTFORD
Section:	Township:	Range:	
Drafter: MS	Date: 07/08/14	Project No.	Type:
Chk'd: --	Date: --	Scale: 1" = 40'	
Appr: --	Date: --	Tolerance:	

10-113-300-3-A604

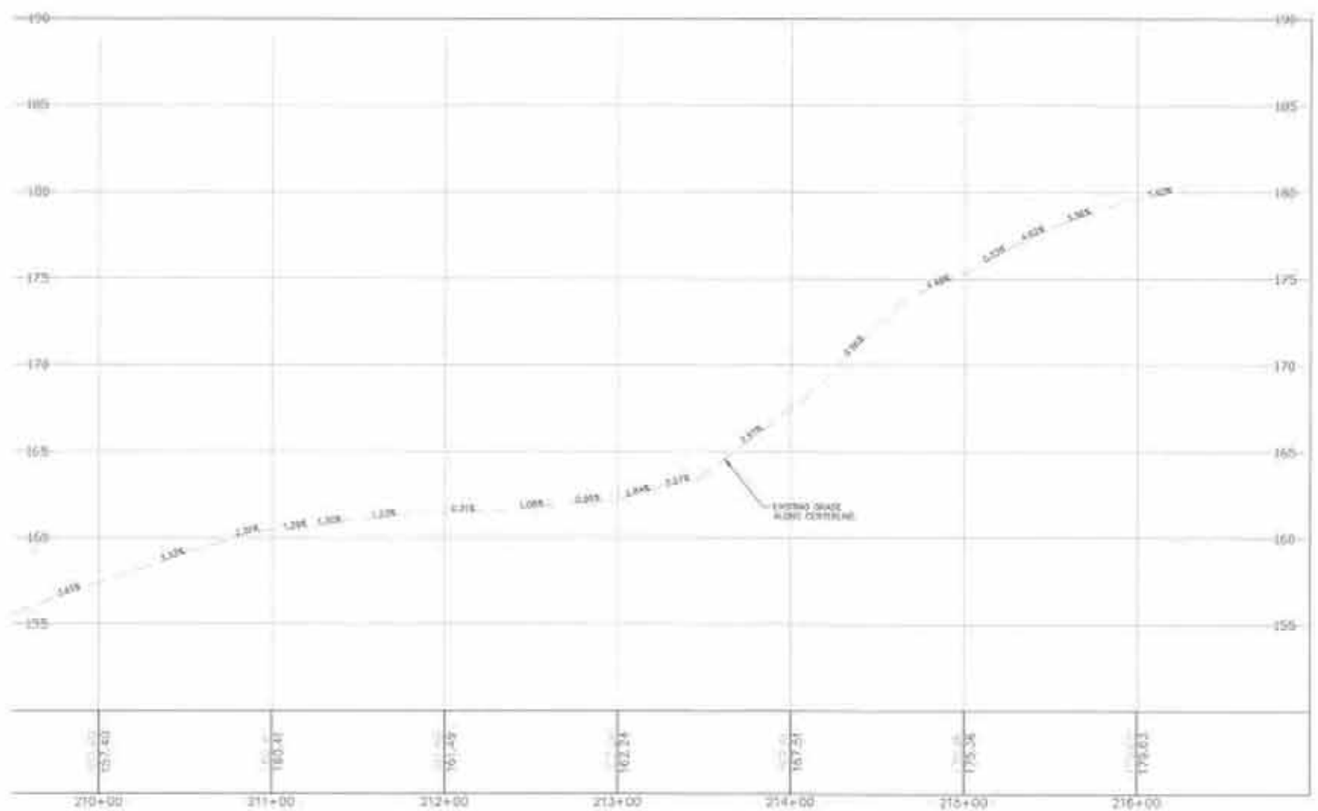
Sheet: 5 of 14



CONNECTICUT TEMPORARY ACCESS ROAD 4a - PLAN (2 OF 2)

GENERAL NOTES

1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE KINDER MORGAN BMP FIGURE NO. 22.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEDIMENT NOTES," AND "RECYCLING AND DISPOSAL PLAN," FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE REGRADED TO MATCH THE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED CHECK DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 3(V):1(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN BMP NO. 40. THE MATTING SHALL BE AN EROSMAT OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 3(V):1(H) SHALL BE COVERED WITH ASPHALT SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION EXTENSIONS ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF FOLLOWING SEGMENT IS SURVEYED INTO THE MAIN TRANSL WAY.



CONNECTICUT TEMPORARY ACCESS ROAD 4a - PROFILE (2 OF 2)

LEGEND

PROPOSED PIPELINE
EXISTING PIPELINE
PROPERTY LINE
STRUCTURE
ELEC CABLE
FENCE
TREE LINE
FIBER OPTIC LINE
POWER LINES
TELEPHONE CABLE
TELEPHONE LINE
CABLE LINE
EXISTING WETLANDS
EXISTING EASEMENT
PROPOSED TEMPORARY WORKSPACE
PROPOSED EDGE OF ROAD
PROPOSED SILT FENCE
PROPOSED GRADING LIMITS

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

NOT FOR CONSTRUCTION

TG-713-300-2-ARD4		TEMPORARY ACCESS ROAD 4	
DRAWING NUMBER		DRAWING NAME	
REFERENCE DRAWINGS			
1	07/17/13	CP	ISSUED FOR 30D
NO.	DATE	BY	DESCRIPTION
REVISIONS			

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

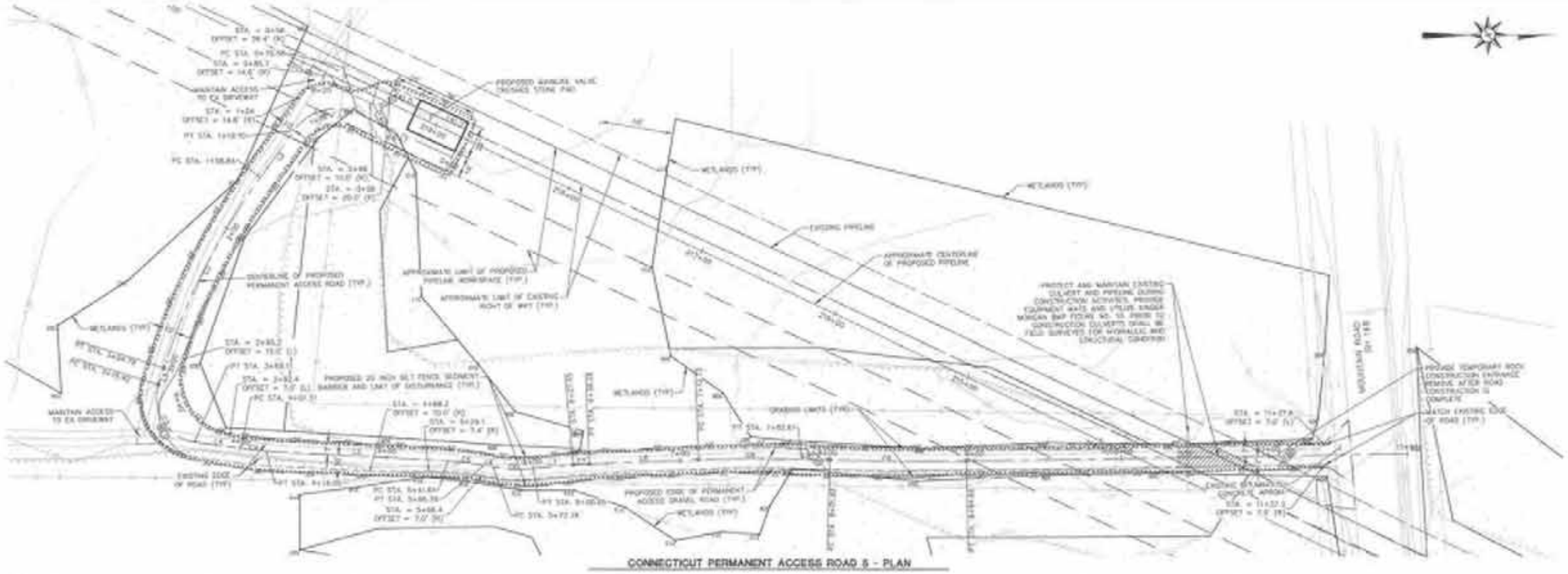
CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Division:		Div. Area:	
State:	CT	Co./Par.:	HARTFORD
Section:		Township:	SUFFIELD
Drafter: JMS	Date: 07/08/14	Project ID:	
Chk'd: --	Date: --	Scale: 1" = 40'	
Appr: --	Date: --		

ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING
BL Companies

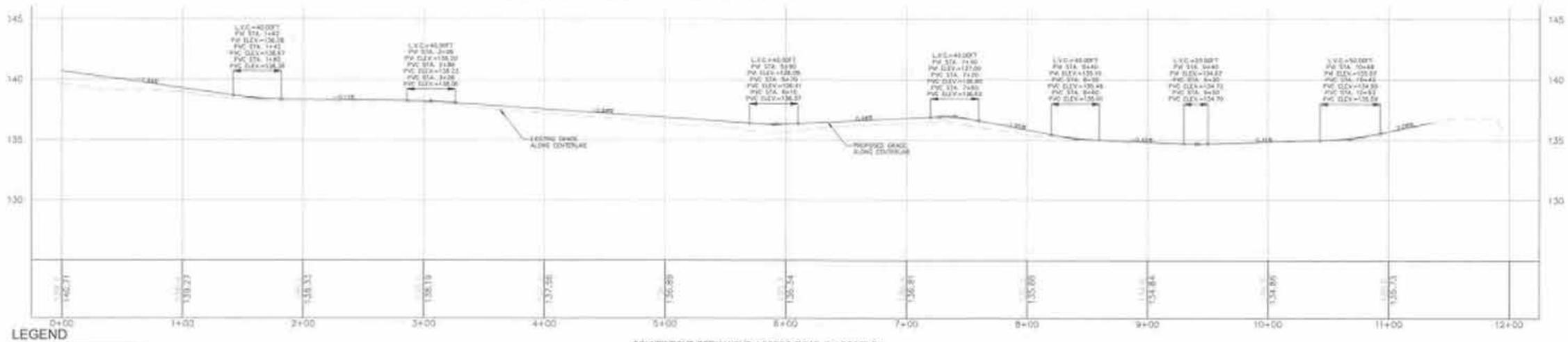
TG-713-300-2-ARD4

Sheet 5 of 14



CONNECTICUT PERMANENT ACCESS ROAD 5 - PLAN

PIAR CT-5							
No.	Northing	Easting	Bearing	Delta(Δ)	Length	Tangent	Radius
L1	[illegible]	[illegible]	[illegible]		70.58		
C1	[illegible]	[illegible]		[illegible]	48.82'	29.07'	35.0'
L2	[illegible]	[illegible]	[illegible]		36.74'		
C2	[illegible]	[illegible]		[illegible]	145.95'	73.58'	600.0'
L3	[illegible]	[illegible]	[illegible]		13.13'		
C3	[illegible]	[illegible]		[illegible]	15.95'	15.95'	30.0'
L4	[illegible]	[illegible]	[illegible]		52.89'		
C4	[illegible]	[illegible]		[illegible]	16.74'	8.38'	100.0'
L5	[illegible]	[illegible]	[illegible]		123.58'		
C5	[illegible]	[illegible]		[illegible]	24.38'	12.40'	100.0'
L6	[illegible]	[illegible]	[illegible]		8.40'		
C6	[illegible]	[illegible]		[illegible]	31.26'	15.73'	100.0'
L7	[illegible]	[illegible]	[illegible]		27.56'		
C7	[illegible]	[illegible]		[illegible]	10.75'	5.37'	200.0'
L8	[illegible]	[illegible]	[illegible]		71.45'		
C8	[illegible]	[illegible]		[illegible]	69.88'	34.95'	1000.0'
L9	[illegible]	[illegible]	[illegible]		19.28'		
C9	[illegible]	[illegible]		[illegible]	99.83'	49.40'	2000.0'
L10	[illegible]	[illegible]	[illegible]		199.62'		



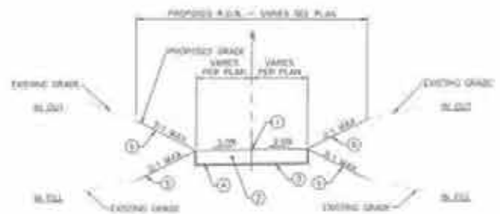
CONNECTICUT PERMANENT ACCESS ROAD 5 - PROFILE

LEGEND

- PROPOSED PIPELINE
- EXISTING PIPELINE
- PROPERTY LINE
- STRUCTURE
- ELEC CABLE
- FENCE
- TREE LINE
- FIBER OPTIC LINE
- POWER LINES
- TELEPHONE CABLE
- TELEPHONE LINE
- CABLE LINE
- EXISTING WETLANDS
- EXISTING EASEMENT
- PROPOSED TEMPORARY WORKSPACE
- PROPOSED EDGE OF ROAD
- PROPOSED SILT FENCE
- PROPOSED GRADING LIMITS

GENERAL NOTES

1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE KINDER MORGAN BMP FIGURE NO. 22.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "RECYCLING AND DISPOSAL PLAN" FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE REGRADED TO MATCH THE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED CHECK DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 1(V):3(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN BMP NO. 41. THE MATTING SHALL BE NAG C125BN OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 1(V):3(H) SHALL BE COVERED WITH WIRMAT SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED OFFSITE THE WORK TRUCKS. ARE



TYPICAL SECTION STA. 0+00 TO 11+38

TYPICAL SECTION LEGEND

1. CENTERLINE OF ACCESS ROAD
2. 12" LAYER CRUSHER RUN (SEE DETAIL DRAWING "A" SHEET 06, COMPOST BIB)
3. SEPARATION FILTER FABRIC (TENCATE GEOSYNTHETICS 170N OR APPROVED EQUAL)
4. UNDISTURBED GROUND IN CUTS/SUBGRADE IN FILLS
5. EROSION CONTROL BLANKET, 4" TOPSOIL DEPTH, AND SEED

NOT FOR CONSTRUCTION

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

TC-TG-BG-J-400	Kinder Morgan
DRAWING NUMBER	DRAWING NAME

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	BY	APPR
1	11/13/19	CP	ISSUED FOR IFC		

REVISIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

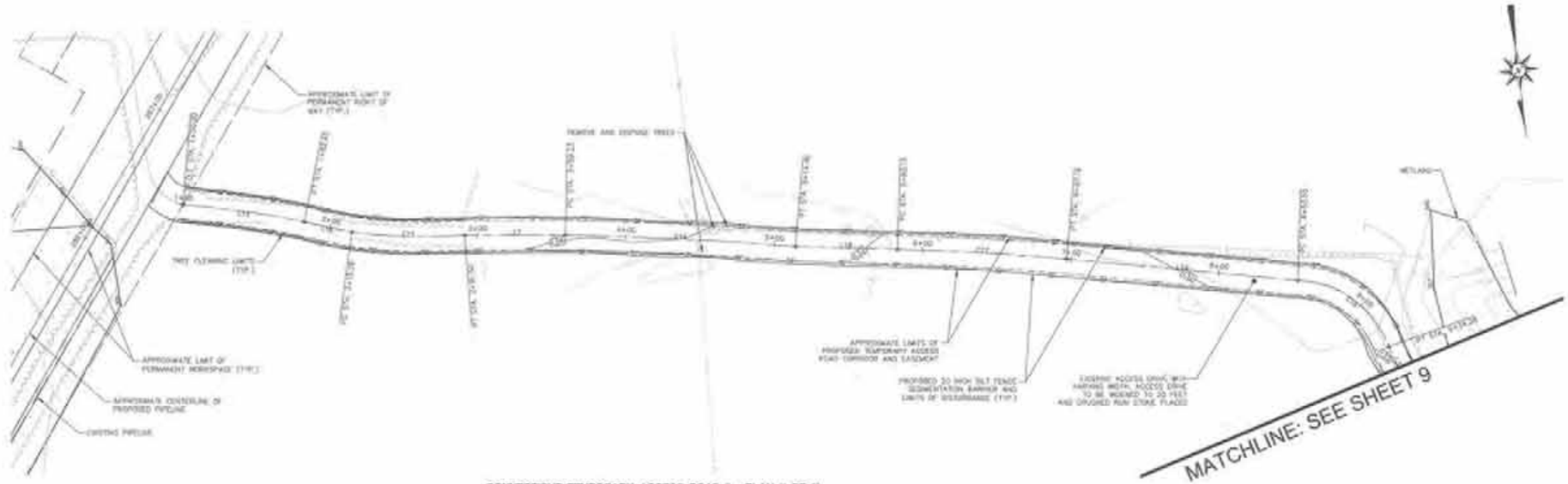
CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Division:		Dir. Area:	
State:	CT	County:	HARTFORD
Section:		Township:	SUFFIELD
Drafter:		Date:	11/13/19
Checker:		Date:	11/13/19
Appr:	AP	Date:	11/13/19

Project ID:
Scale: 1" = 40'
Dimensions

ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL Companies

TG-TLS-300-2-ARDV

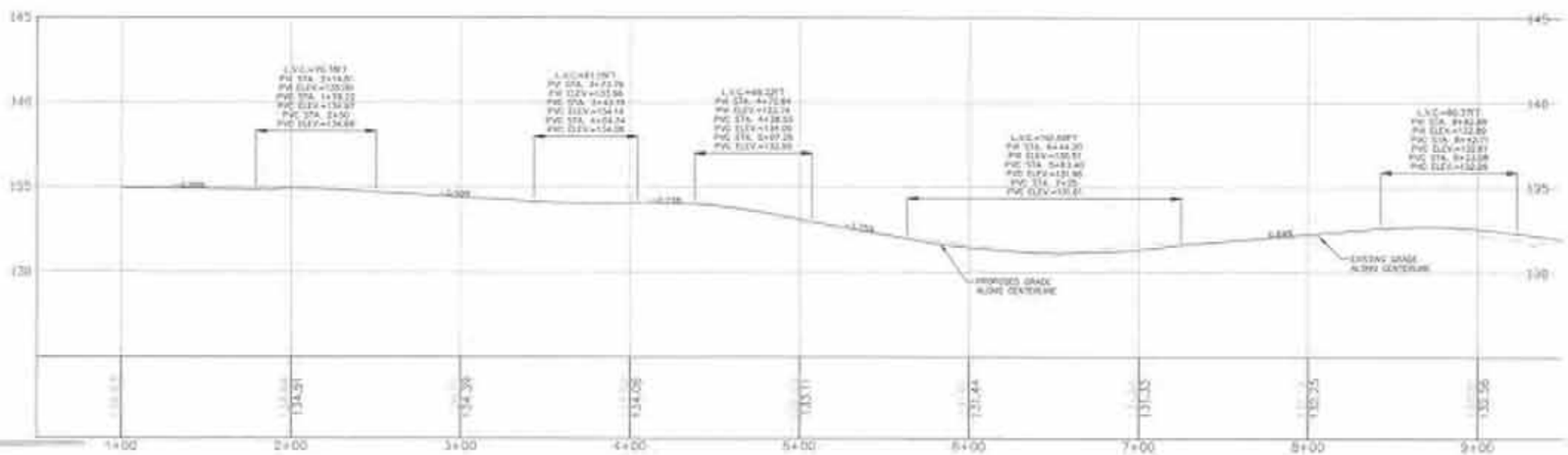


CONNECTICUT TEMPORARY ACCESS ROAD 8 - PLAN (1 OF 2)

TAP (?) -8							
No.	Northing	Easting	Bearing	Delta(,)	Length	Tangent	Radius
C14	PC: 1000587.08 N: 1000587.08 E: 1000000.00 PT: 1000498.52	PC: 2000529.38 N: 2000498.52 E: 2000498.52 PT: 2000498.52		8°53'54"	92.43'	46.28'	998.0'
L16	B: 1000498.72 N: 1000498.72 E: 2000498.72	B: 2000498.72 N: 2000498.72 E: 2000498.72	N70°00'41.17"W		22.88'		
C15	PC: 1000485.00 N: 1000485.00 E: 2000498.72 PT: 1000484.53	PC: 2000495.74 N: 2000495.74 E: 2000495.74 PT: 2000494.53		11°57'51"	76.02'	38.20'	364.0'
L17	B: 1000484.50 N: 1000484.50 E: 2000494.53	B: 2000494.53 N: 2000494.53 E: 2000376.29	N67°36'30.30"W		67.74'		
C16	PC: 1000484.53 N: 1000484.53 E: 2000376.29 PT: 1000484.53	PC: 2000376.29 N: 2000376.29 E: 2000376.29 PT: 2000373.53		3°39'08"	194.23'	77.94'	3430.2'
L18	B: 1000484.53 N: 1000484.53	B: 2000373.53 N: 2000373.53 E: 2000373.53	N63°30'53.50"W		68.73'		
C17	PC: 1000483.07 N: 1000483.07 E: 2000373.53 PT: 1000483.53	PC: 2000305.24 N: 2000305.24 E: 2000305.24 PT: 2000304.53		1°51'11"	114.00'	57.02'	2057.9'
L19	B: 1000483.53 N: 1000483.53 E: 2000304.53	B: 2000304.53 N: 2000304.53 E: 2000192.31	N77°41'16.80"W		156.38'		
C18	PC: 1000478.18 N: 1000478.18 E: 2000192.31 PT: 1000489.53	PC: 2000192.31 N: 2000192.31 E: 2000192.31 PT: 2000194.53		88°38'47"	80.73'	45.97'	51.0'
L20	B: 1000489.53 N: 1000489.53 E: 2000194.53	B: 2000194.53 N: 2000194.53 E: 2000193.54	N15°56'34.23"W		26.24'		

GENERAL NOTES

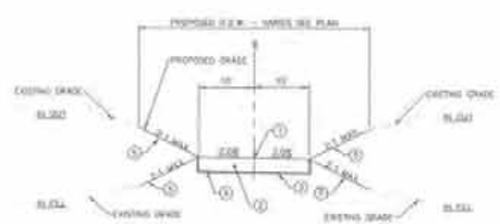
1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL DRAINS IN ACCORDANCE WITH THE KINDER MORGAN BMP FIGURE NO. 22.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL GEOSYNTHETICS NOTES," AND "RECYCLING AND DISPOSAL PLAN," FOR GEOSYNTHETICS INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE RECONTOURED TO MATCH THE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED DRAIN PIPES SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 1(V):3(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN BMP NO. 41. THE MATTING SHALL BE NAG S150BN OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 1(V):3(H) SHALL BE COVERED WITH PERMAT SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED ONTO THE MAIN TRAVEL WAY.



CONNECTICUT TEMPORARY ACCESS ROAD 8 - PROFILE (1 OF 2)

LEGEND

- PROPOSED PIPELINE
- EXISTING PIPELINE
- PROPERTY LINE
- STRUCTURE
- ELEC CABLE
- FENCE
- TREE LINE
- FIBER OPTIC LINE
- POWER LINES
- TELEPHONE CABLE
- TELEPHONE LINE
- CABLE LINE
- EXISTING WETLANDS
- EXISTING EASEMENT
- PROPOSED TEMPORARY WORKSPACE
- PROPOSED EDGE OF ROAD
- PROPOSED SILT FENCE
- PROPOSED GRADING LIMITS



TYPICAL SECTION STA. 1+00 TO 14+13.86

TYPICAL SECTION LEGEND

1. CENTERLINE OF ACCESS ROAD
2. 12" LAYER CRUSHER RUN STONE, GRADING "A" (M02.06, CONNDOT 818)
3. SEPARATION GEOTEXTILE FABRIC (TENCATE GEOSYNTHETICS HS50 OR APPROVED EQUAL)
4. UNDISTURBED GROUND IN CUTS/SUBGRADE IN FILLS
5. EROSION CONTROL BLANKET, TOPSOIL AND SEED

NOT FOR CONSTRUCTION

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
SCALE IN FEET

ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL Companies

TG-TI-300-2 - A106	TEMPORARY ACCESS ROAD 8
DRAWING NUMBER	DRAWING NAME

REFERENCE DRAWINGS

2	06/09/15	CP	ISSUED FOR BID	
NO.	DATE	BY	DESCRIPTION	REVISIONS

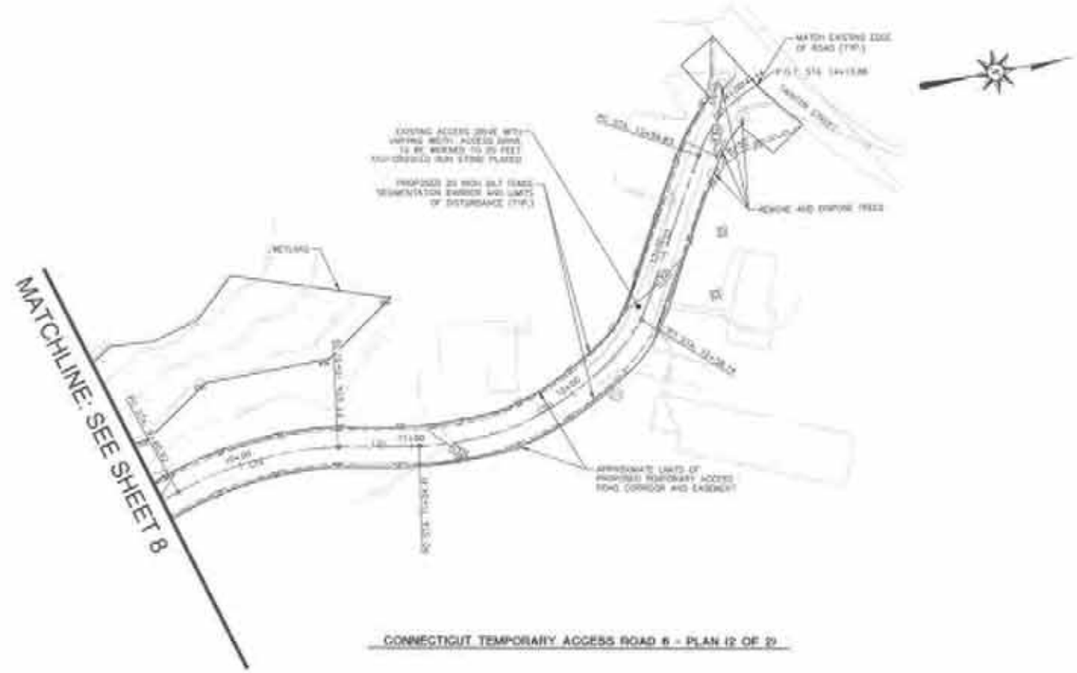
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

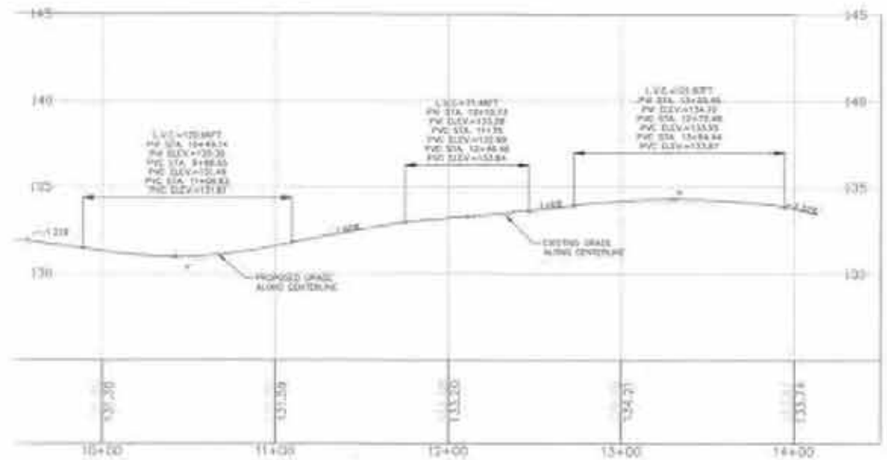
Division:		Op. Area:	
State:	CT	Co./Par.:	HARTFORD
Section:		Township: SUFFIELD	Range:
Drafter: AKR	Date: 07/08/14	Project ID:	Type:
Chk'd: --	Date: --	Scale: 1" = 40' Horizontal	
Appr: --	Date: --		

TG-TI-300-2-A106

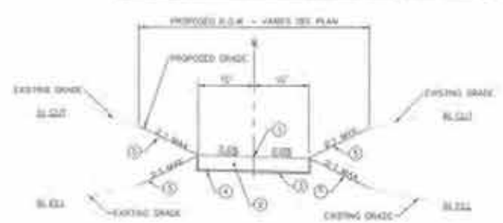
Sheet: 8 of 14



CONNECTICUT TEMPORARY ACCESS ROAD 6 - PLAN (2 OF 2)



CONNECTICUT TEMPORARY ACCESS ROAD 6 - PROFILE (2 OF 2)



TYPICAL SECTION STA. 1+00 TO 14+13.86

TAC C1-6							
No.	Northing	Easting	Bearing	Delta(s)	Length	Tangent	Radius
C10	[illegible]	[illegible]		28°23'40"	96.87'	49.31'	210.3'
L21	[illegible]	[illegible]	N07°31'41.84"E		43.07'		
C00	[illegible]	[illegible]		56°32'34"	104.23'	54.77'	106.4'
L23	[illegible]	[illegible]	N09°20'47.04"W		10.00'		
C01	[illegible]	[illegible]		41°33'13"	34.00'	18.03'	74.8'

GENERAL NOTES

1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL SWALES AS ACCORDANCE WITH THE KINDER MORGAN (MP FIGURE 145 (2)).
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "RECYCLING AND DISPOSAL PLAN," FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED SNOW PILE OFF AREA TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PILE OFF AREA SHALL BE REGRADED TO MATCH PRE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED CHECK DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN (1V:3H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN (MP 10.4). THE MATTING SHALL BE NAE SC150BN OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN (1V:3H) SHALL BE COVERED WITH ERRNAP SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION EXTRANEOUS ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED ONTO THE MAIN TRAVEL WAY.

LEGEND

- PROPOSED PIPELINE
- EXISTING PIPELINE
- PROPERTY LINE
- STRUCTURE
- ELEC CABLE
- FENCE
- TREE LINE
- FIBER OPTIC LINE
- POWER LINES
- TELEPHONE CABLE
- TELEPHONE LINE
- CABLE LINE
- EXISTING WETLANDS
- EXISTING EASEMENT
- PROPOSED TEMPORARY WORKSPACE
- PROPOSED EDGE OF ROAD
- PROPOSED SILT FENCE
- PROPOSED GRADING LIMITS

TYPICAL SECTION LEGEND

1. CENTERLINE OF ACCESS ROAD
2. 12" LAYER CRUSHER RUN STONE, GRADING "A" (M01.06, CONNDOT M01)
3. SEPARATION FILTER FABRIC (TENSATE 1000/NYNEX/CS 1700 OR APPROVED EQUAL)
4. UNDISTURBED GROUND IN CUTS/SUBGRADE IN FILLS
5. EROSION CONTROL BLANKET, TOPSOIL AND SEED

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

NOT FOR CONSTRUCTION

TO-713-300-2-ARRR	TEMPORARY ACCESS ROAD 6
DRAWING NUMBER	DRAWING NAME

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	ESTIMATOR	AP
1	8/14/14	CP	ORDER FOR BID		

REVISIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

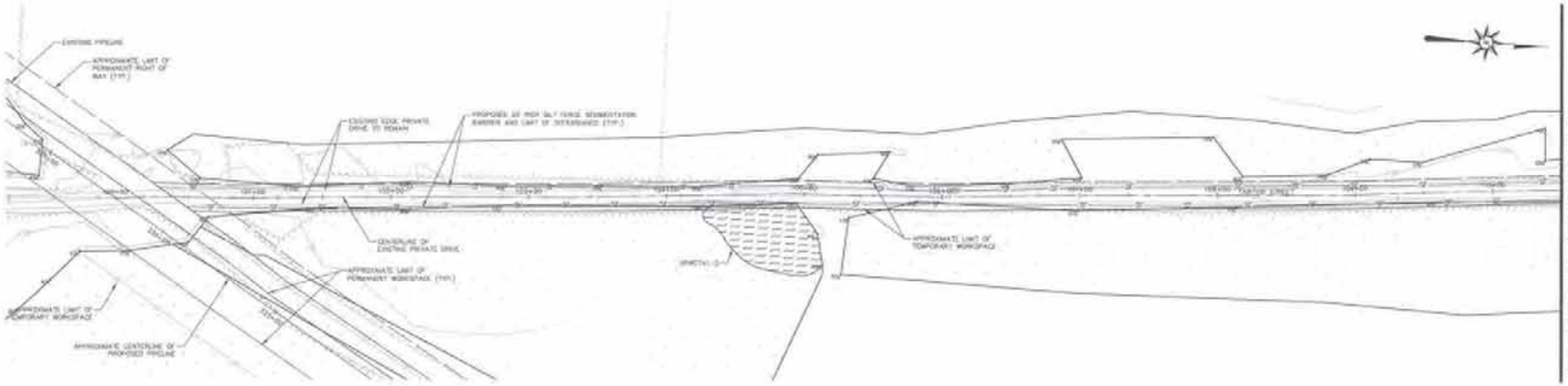
CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Drawn: | Dp. Appr.:
Date: CT | Co./Plat: HARTFORD
Section: | Township: SUFFIELD | Range:
Drafted: JWS | Date: 07/08/14 | Project ID: | TYPE:
Ck'd: -- | Date: -- | Scale: 1" = 40' | Plotted:
Appr: -- | Date: --

TO-713-300-2-ARRR

Sheet | Rev
8 of 14

ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL CONSULTING



CONNECTICUT TEMPORARY ACCESS ROAD 7 - PLAN (1 OF 2)

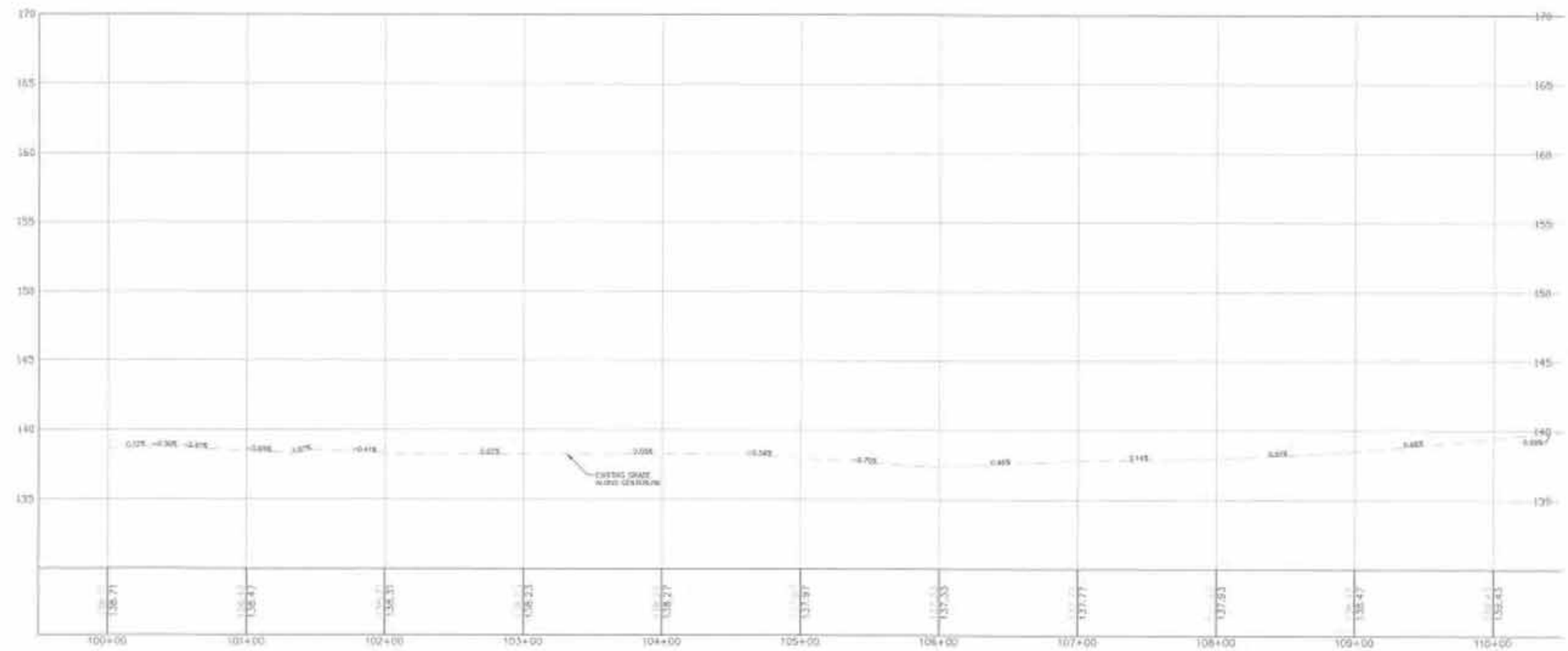
MATCHLINE: SEE SHEET 11

GENERAL NOTES

1. DICOR DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE KINDER MORGAN BMP FIGURE NO. 22.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "RECYCLING AND DISPOSAL PLAN," FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE REGRADED TO REFLECT PRE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED DICOR DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 1(V):3(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN BMP NO. 41. THE MATTING SHALL BE AN ECOSYSTEM OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 1(V):2(H) SHALL BE COVERED WITH ASPHALT SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED ONTO THE MAIN TRAVEL WAY.

LEGEND

PROPOSED PIPELINE
EXISTING PIPELINE
PROPERTY LINE
STRUCTURE
ELEC CABLE
FENCE
TREE LINE
FIBER OPTIC LINE
POWER LINES
TELEPHONE CABLE
TELEPHONE LINE
CABLE LINE
EXISTING WETLANDS
EXISTING EASEMENT
PROPOSED TEMPORARY WORKSPACE
PROPOSED EDGE OF ROAD
PROPOSED SILT FENCE
PROPOSED DRAINAGE LIMITS



CONNECTICUT TEMPORARY ACCESS ROAD 7 - PROFILE (1 OF 2)

GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

TG-113-300-2-A907	TEMPORARY ACCESS ROAD 7
DRAWING NUMBER	DRAWING NAME

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	REVIEWED BY	PROJ. ENG. APPR.
1	10/14/14	DP	ISSUED FOR INC		
NO.	DATE	BY	DESCRIPTION		

REVISIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

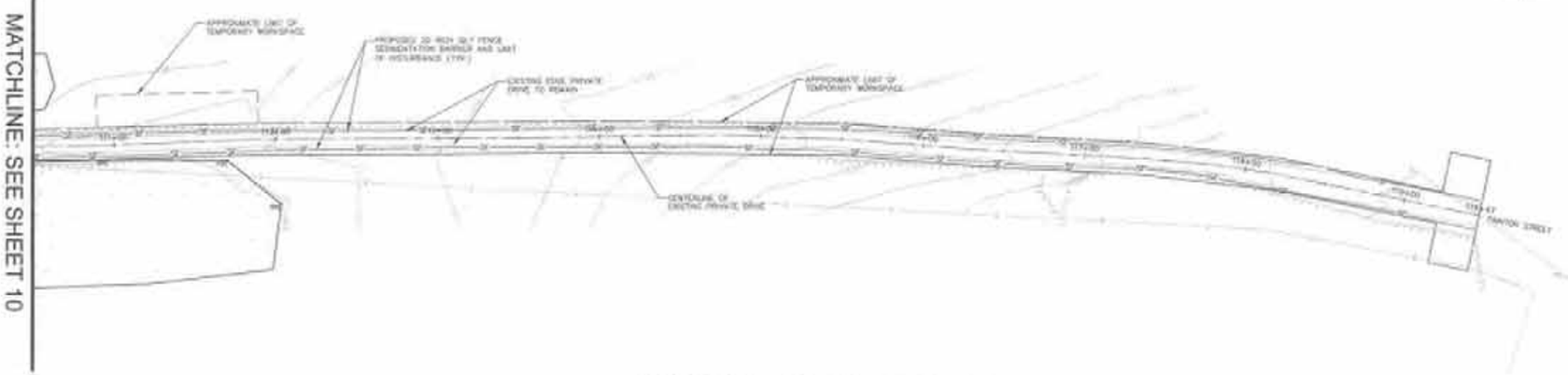
CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF EAST GRANBY
HARTFORD COUNTY, CONNECTICUT

Division: | Op. Area:
State: CT | Co./Par.: HARTFORD
Section: TRANSMISSION/ GRANBY Range:
Drafter: JMS | Date: 10/28/14 | Project #: | Type:
Ck'd: -- | Date: -- | Scale: 1" = 40' | Filename:
Appr: -- | Date: -- | Sheet No. | Rev.
TG-113-300-2-A907

ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL Companies

NOT FOR CONSTRUCTION

MATCHLINE: SEE SHEET 10



CONNECTICUT TEMPORARY ACCESS ROAD 7 - PLAN (2 OF 2)

GENERAL NOTES

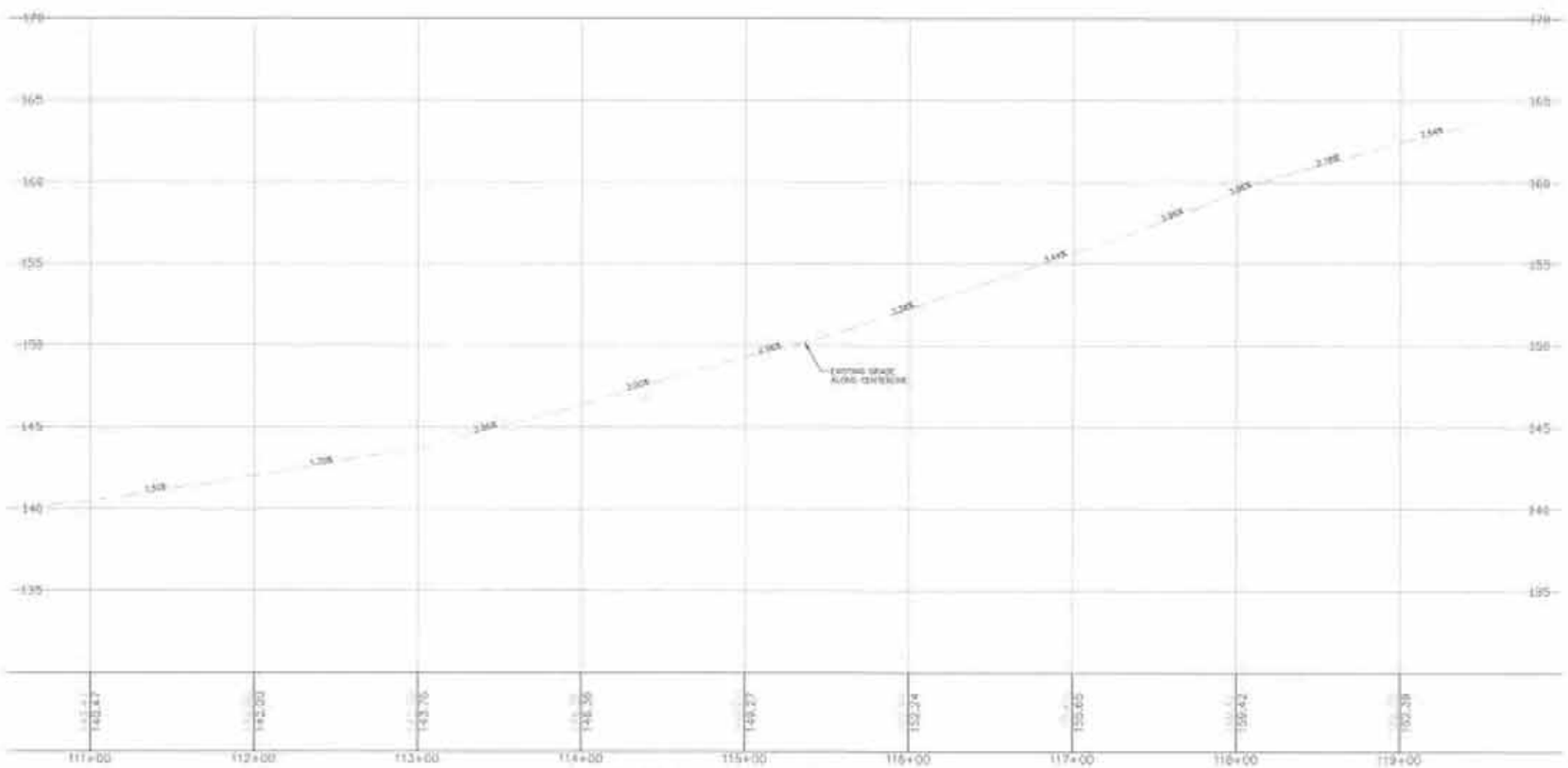
1. DITCH DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE KINDER MORGAN BMP FIGURE NO. 22.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "REFERENCE AND REFERENCE PLAN," FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE REGRADED TO MATCH PRE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED DITCH DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 10:1 (10%) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN BMP NO. 41. THE MATTING SHALL BE NAG SC150BN OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 10:1 (10%) SHALL BE COVERED WITH RIPRAP SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED ONTO THE MAIN TRAVEL WAY.

LEGEND

PROPOSED PIPELINE
EXISTING PIPELINE
PROPERTY LINE
STRUCTURE
ELEC CABLE
FENCE
TREE LINE
FIBER OPTIC LINE
POWER LINES
TELEPHONE CABLE
TELEPHONE LINE
CABLE LINE
EXISTING WETLANDS
EXISTING EASEMENT
PROPOSED TEMPORARY WORKSPACE
PROPOSED EDGE OF ROAD
PROPOSED SILT FENCE
PROPOSED GRADING LIMITS

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET



CONNECTICUT TEMPORARY ACCESS ROAD 7 - PROFILE (2 OF 2)

NOT FOR CONSTRUCTION

10-713-300-2-ARD7			TEMPORARY ACCESS ROAD 7	
DRAWING NUMBER			DRAWING NAME	
REFERENCE DRAWINGS				
1	12/18/08	CP	ISSUED FOR BID	ATHANASIOS AP
NO.	DATE	BY	DESCRIPTION	PROJ. ID LAPPR
REVISIONS				

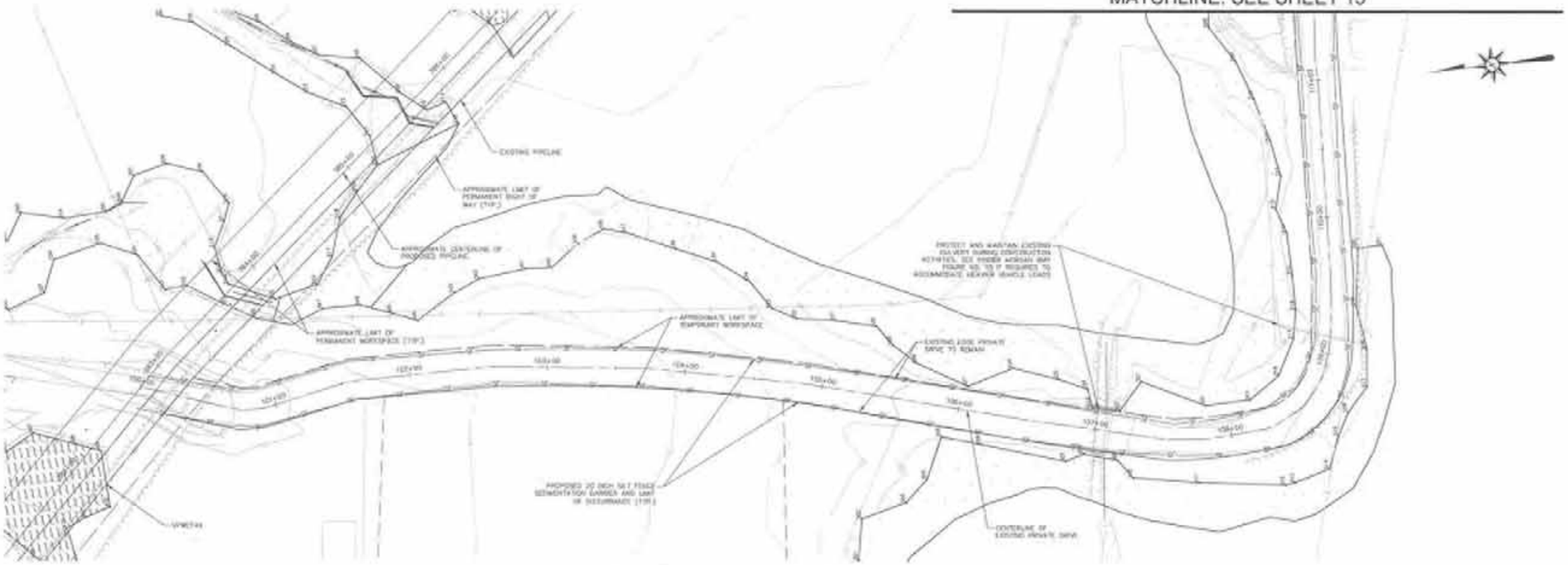
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF EAST GRANBY
HARTFORD COUNTY, CONNECTICUT

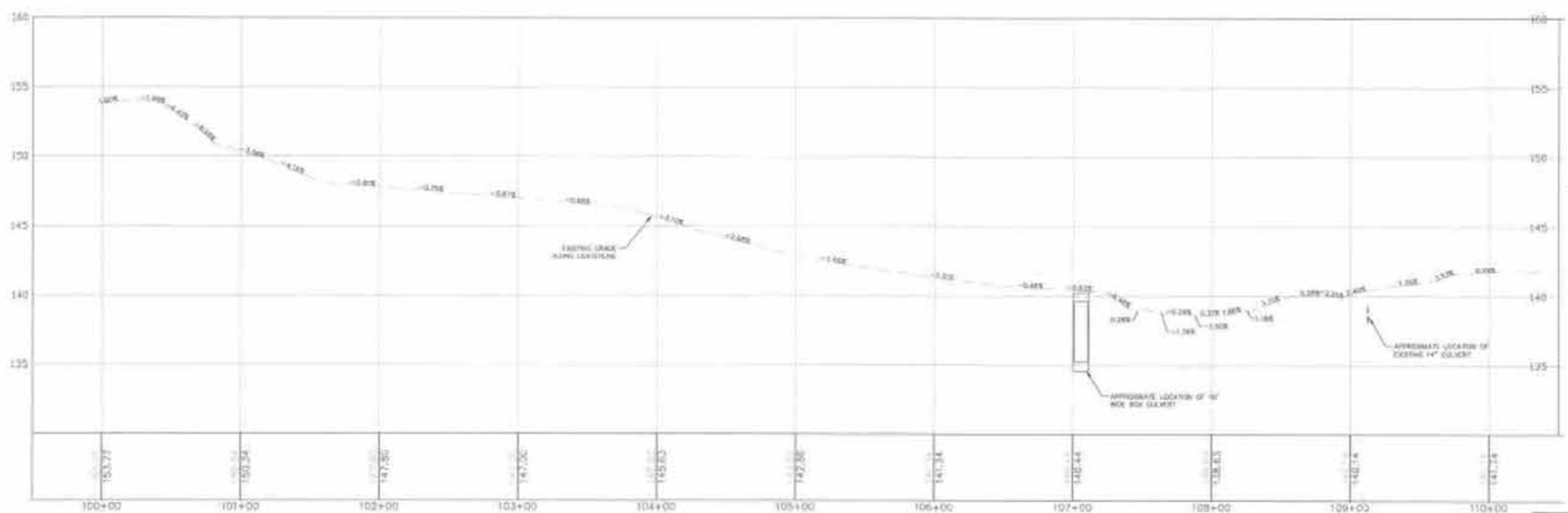
Division:		Div. Area:	
State: CT		Co./Par.: HARTFORD	
Section:	Township/LAT. DRAWING: Range:		
Drafter: JMS	Date: 12/08/14	Project ID:	Type:
Chk'd: -	Date: -	Scale: 1" = 40'	
Appr: -	Date: -	Filename:	
10-713-300-2-ARD7			Sheet: Rev: 17 of 34

ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL Companies

MATCHLINE: SEE SHEET 13



CONNECTICUT TEMPORARY ACCESS ROAD 7A - PLAN (1 OF 2)



CONNECTICUT TEMPORARY ACCESS ROAD 7A - PROFILE (1 OF 2)

NOT FOR CONSTRUCTION

GENERAL NOTES

1. KINDER MORGAN SHALL BE INSTALLED WITHIN ALL TRAILS IN ACCORDANCE WITH THE KINDER MORGAN BMP FIGURE NO. 32.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "RECYCLING AND DISPOSAL PLAN" FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE REGRADED TO MATCH PRE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED CHECK DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 1(V):3(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN BMP NO. 41. THE MATTING SHALL BE HAND SCREDDED OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 1(V):3(H) SHALL BE COVERED WITH BIORAP SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED FROM THE WORK SHARED WAY.

LEGEND

PROPOSED PIPELINE
EXISTING PIPELINE
PROPERTY LINE
STRUCTURE
FIBER OPTIC LINE
POWER LINES
TELEPHONE CABLE
TELEPHONE LINE
CABLE LINE
EXISTING WETLANDS
EXISTING EASEMENT
PROPOSED TEMPORARY WORKSPACE
PROPOSED EDGE OF ROAD
PROPOSED SILT FENCE
PROPOSED GRADING LIMITS

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

TG-713-300-2-A002A	TEMPORARY ACCESS ROAD 7A
DRAWING NUMBER	DRAWING NAME

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	APPROVED	DATE
1	06/24/14	GP	ISSUED FOR REVIEW		

REVISIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF EAST GRANBY
HARTFORD COUNTY, CONNECTICUT

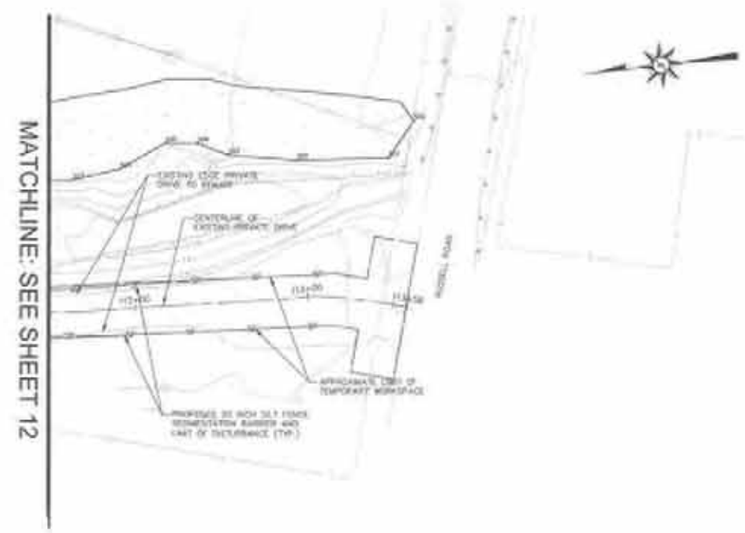
Drawn: GP | Date: 07/08/14 | Project ID: | Type:
Chk'd: | Date: | Scale: 1" = 40' | Horizontal
Appr: | Date: | Vertical

TG-713-300-2-A002A | Sheet: 12 of 14 | Rev:

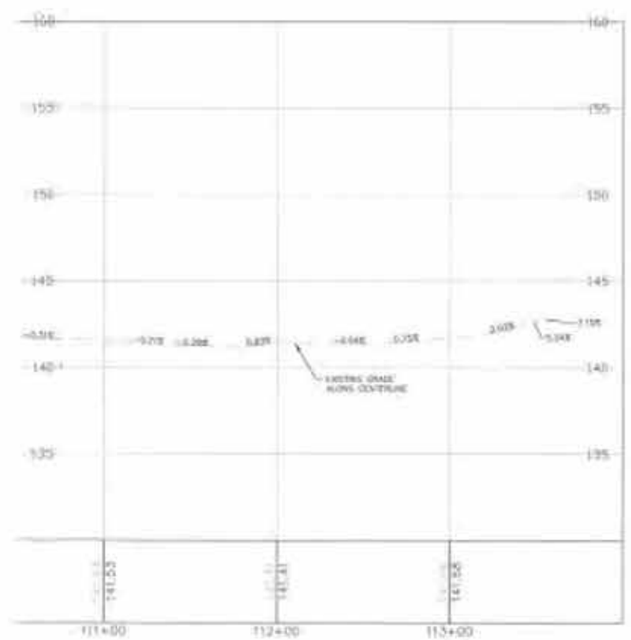
ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL Companies

GENERAL NOTES

1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE KINDER MORGAN BMP FIGURE NO. 22.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "RECYCLING AND DISPOSAL PLAN," FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE REGRADED TO MATCH PRE CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED CHECK DAMS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN, INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 1(V):2(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN BMP NO. 41. THE MATTING SHALL BE NAG TECTERRA OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 1(V):2(H) SHALL BE COVERED WITH ASPHALT SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED ONTO THE AIRP TRAVEL WAY.



CONNECTICUT TEMPORARY ACCESS ROAD 7a - PLAN (2 OF 2)



CONNECTICUT TEMPORARY ACCESS ROAD 7a - PROFILE (2 OF 2)

LEGEND

- PROPOSED PIPELINE
- EXISTING PIPELINE
- PROPERTY LINE
- STRUCTURE
- ELEC. CABLE
- FENCE
- TREE LINE
- FIBER OPTIC LINE
- POWER LINES
- TELEPHONE CABLE
- TELEPHONE LINE
- CABLE LINE
- EXISTING WETLANDS
- EXISTING EASEMENT
- PROPOSED TEMPORARY WORKSPACE
- PROPOSED EDGE OF ROAD
- PROPOSED SILT FENCE
- PROPOSED GRADING LIMITS

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

NOT FOR CONSTRUCTION

TG-713-300-2-00024	TEMPORARY ACCESS ROAD 7
DRAWING NUMBER	DRAWING NAME

REFERENCE DRAWING(S)

#	REVISION	BY	DESCRIPTION	INITIALS	APPR.
NO.	DATE	BY			

REVISIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

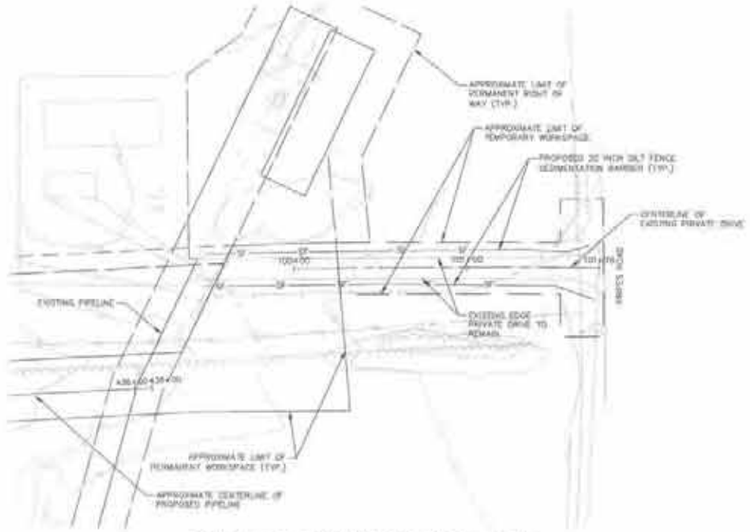
CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF EAST GRANBY
HARTFORD COUNTY, CONNECTICUT

Drawn: | Dr. Area:
State: CT | Co./Par.: HARTFORD
Section: | Township: EAST GRANBY | Range:
Drafter: JMS | Date: 07/08/14 | Project C.: | Type:
Chk'd: | Date: | Scale: 1" = 40' | Filename:
Appr.: | Date:

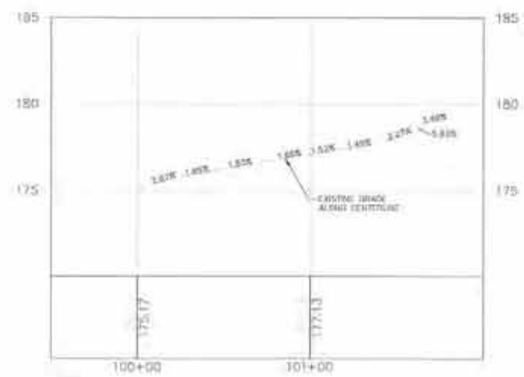
MORETRENCH ENGINEERING ENVIRONMENTAL LAND SURVEYING

TG-713-300-2-00027A

Sheet: | Rev.: | 7 of 14



CONNECTICUT TEMPORARY ACCESS ROAD 8 - PLAN



CONNECTICUT TEMPORARY ACCESS ROAD 8 - PROFILE

GENERAL NOTES

1. CHECK DAMS SHALL BE INSTALLED WITHIN ALL SWALES IN ACCORDANCE WITH THE KINDER MORGAN BMP FIGURE NO. 22.
2. REFER TO KINDER MORGAN CONSTRUCTION BEST MANAGEMENT PRACTICE MANUAL AND SHEETS TITLED "EROSION AND SEDIMENTATION NOTES," "GENERAL SEEDING NOTES," AND "RECYCLING AND DISPOSAL PLAN," FOR SPECIFIC INSTALLATION AND MAINTENANCE SPECIFICATIONS, AND EROSION CONTROLS.
3. PROPOSED TRUCK PULL OFF ARE TEMPORARY AND SHALL BE REMOVED AFTER CONSTRUCTION. THE PULL OFF AREA SHALL BE DEGRADED TO MATCH PRE-CONSTRUCTION CONTOURS WHERE PRACTICAL. ALL PROPOSED PERMANENT SWALES AND ASSOCIATED WATER BARS SHALL BE REMOVED AND REINSTALLED ALONG THE PROPOSED EDGE OF ROAD.
4. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY KINDER MORGAN INC. AND/OR ITS ENGINEER OF ANY CONDITIONS THAT VARY FROM WHAT IS DEPICTED ON THIS PLAN.
5. THE CONTRACTOR SHALL CONTACT CALL BEFORE YOU DIG CONNECTICUT (1-800-922-4455) A MINIMUM OF 72 HOURS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
6. ALL SLOPES THAT ARE EQUAL TO OR STEEPER THAN 1(V):3(H) SHALL BE SEEDED AND THEN COVERED WITH EROSION CONTROL MATTING PER KINDER MORGAN BMP NO. 41. THE MATTING SHALL BE NAG S150BN OR APPROVED EQUAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. SEE DETAIL IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
7. ALL SLOPES THAT ARE STEEPER THAN 1(V):2(H) SHALL BE COVERED WITH RIPRAP SLOPE PROTECTION. SEE SLOPE PROTECTION DETAIL FOR INSTALLATION GUIDELINES IN THE CONSTRUCTION BEST MANAGEMENT PRACTICES.
8. CONSTRUCTION ENTRANCES ARE TO BE CONSTRUCTED ON TEMPORARY ACCESS ROADS IF EXCESSIVE SEDIMENT IS CONVEYED ONTO THE MAIN TRAVEL WAY.

LEGEND

- PROPOSED PIPELINE
- EXISTING PIPELINE
- PROPERTY LINE
- STRUCTURE
- ELEC CABLE
- FENCE
- TREE LINE
- FIBER OPTIC LINE
- POWER LINES
- TELEPHONE CABLE
- TELEPHONE LINE
- CABLE LINE
- EXISTING WETLANDS
- EXISTING EASEMENT
- PROPOSED TEMPORARY WORKSPACE
- PROPOSED EDGE OF ROAD
- PROPOSED SILT FENCE
- PROPOSED GRADING LIMITS

NOT FOR CONSTRUCTION

HORIZONTAL SCALE 1"=40'
GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

VERTICAL SCALE 1"=4'
GRAPHIC SCALE
4 2 0 4
SCALE IN FEET

DRAWING NUMBER	DRAWING NAME
70-112-300-2-ARG8	TEMPORARY ACCESS ROAD 8

REFERENCE DRAWINGS

NO.	DATE	BY	DESCRIPTION	INITIALS/DATE	PROJ. ID	APPR.
1	8/19/15	GP	ISSUED FOR BID			

REVISIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT
CONNECTICUT LOOP 300-500
PROPOSED NATURAL GAS PIPELINE
TOWN OF EAST GRANBY
HARTFORD COUNTY, CONNECTICUT

Division: | Dp. Area:
State: CT | Co./Plc.: HARTFORD
Section: Township EAST GRANBY Range:
Drafter: AFT | Date: 07/08/14 | Project ID: | Type:
Des'n: – | Date: – | Scale: 1" = 40'
Appr: – | Date: – | Filename:

ARCHITECTURE ENGINEERING ENVIRONMENTAL LAND SURVEYING BL Companies

70-112-300-2-ARG8 | Sheet: Rev. 14 of 14

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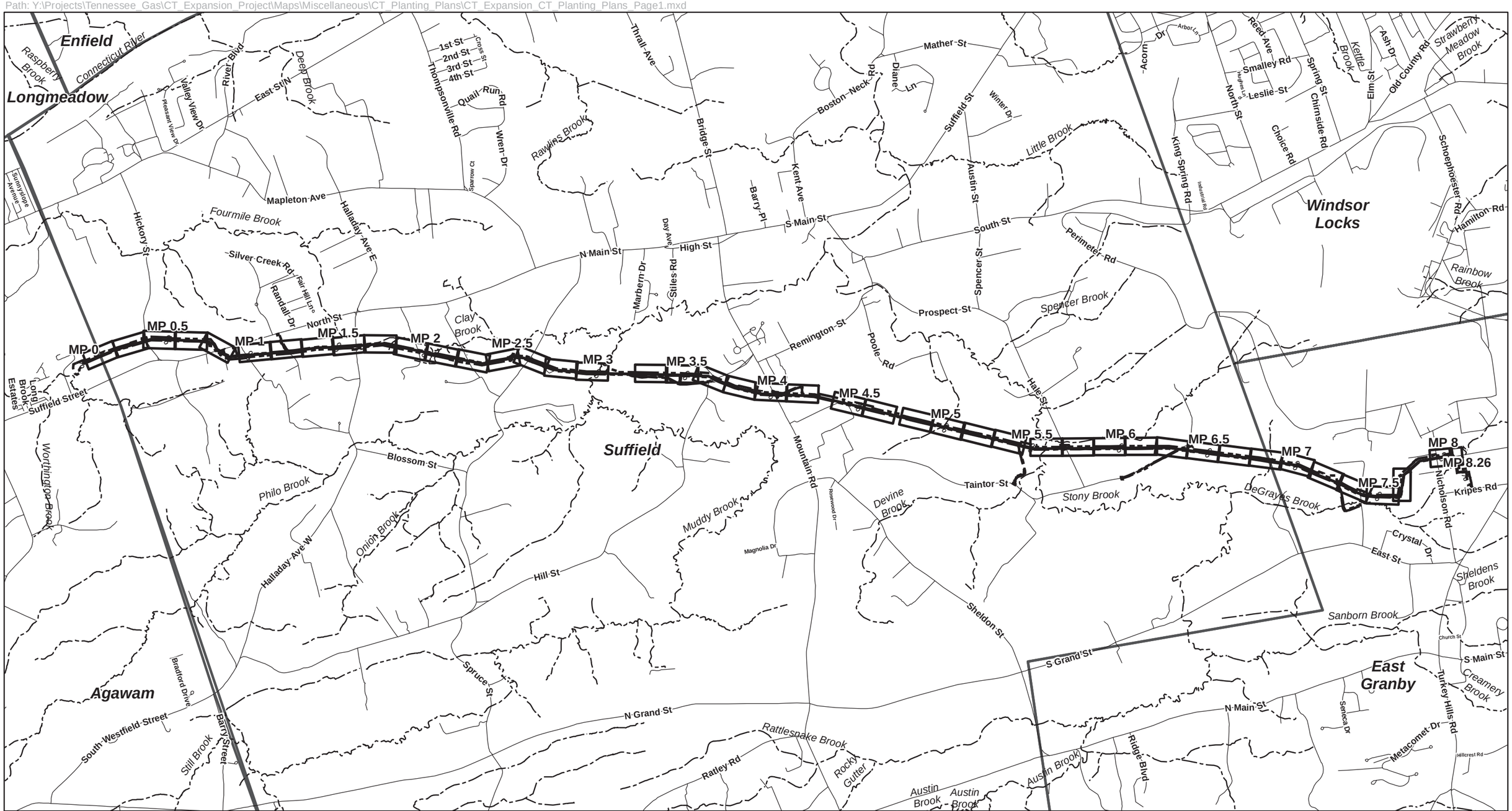
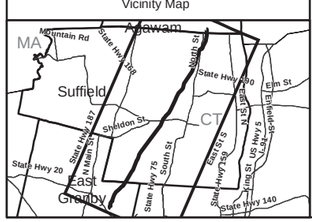


Vicinity Map



Legend

- % Mileposts
- Proposed Pipeline
- Roads
- Streams
- Limits of Disturbance
- Mapsheets

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration"
Connecticut

0 1,400 2,800 5,600 Feet

1 inch = 2,800 feet

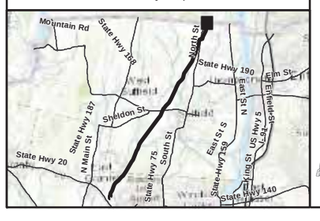
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

Path: Y:\Projects\Tennessee_Gas\CT_Expansion_Project\Maps\Miscellaneous\CT_Planting_Plans\CT_Expansion_CT_Planting_Plans_2016_01.mxd

105
104
103
102
101
100
200
201
202
203
WMA1
WMA-01
Limits of Disturbance
Proposed R/W
Proposed 24" Pipeline
Existing Pipeline
WMA-01/02
WMA2
WMA-02
WCT 1B
106
Proposed R/W
116
118
120
122
124
126
128
130
132

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
- Vernal Pool
- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

N E S W

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

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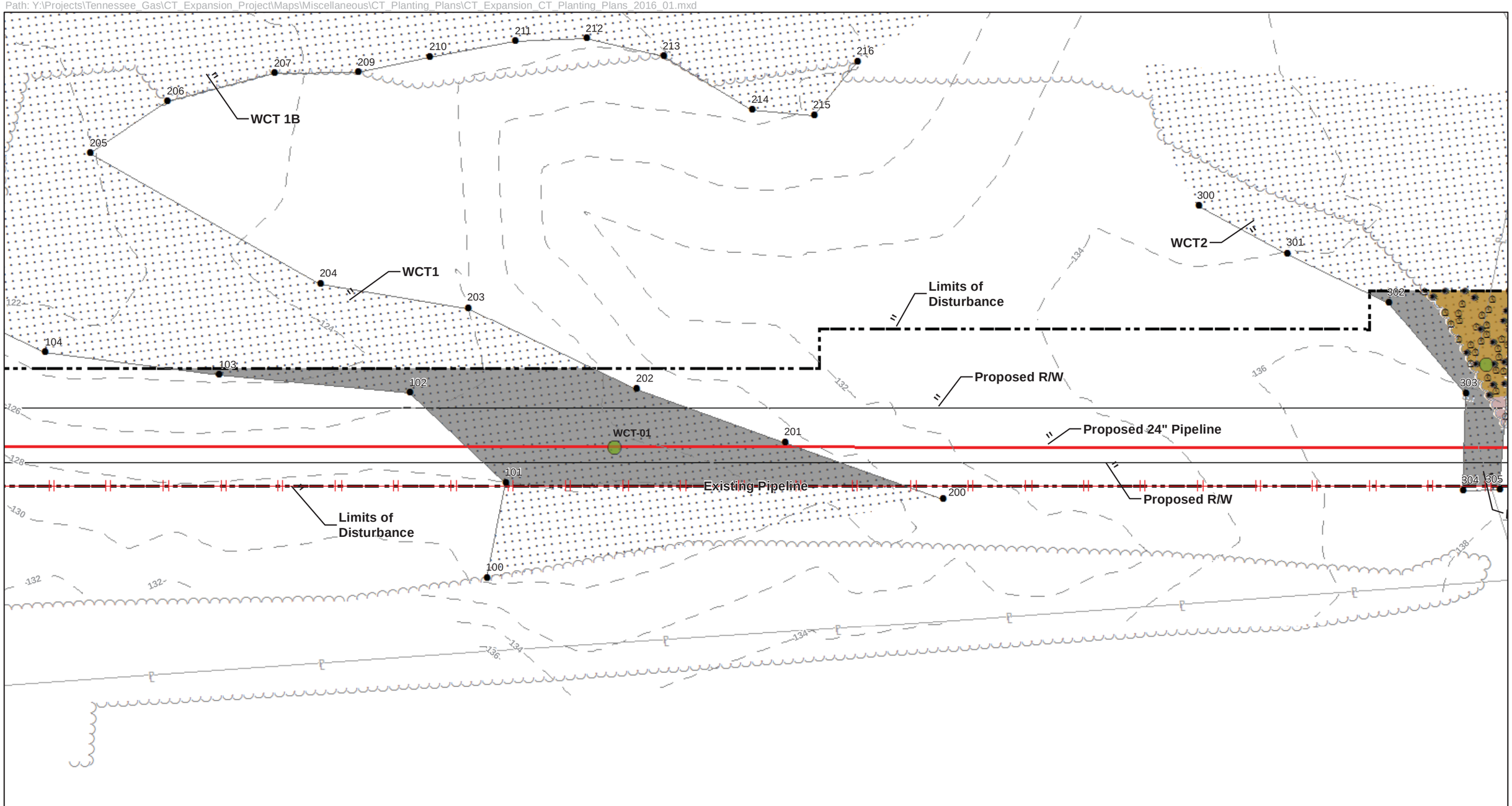
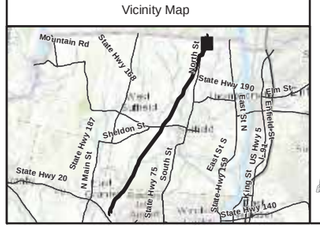


Vicinity Map



Legend

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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

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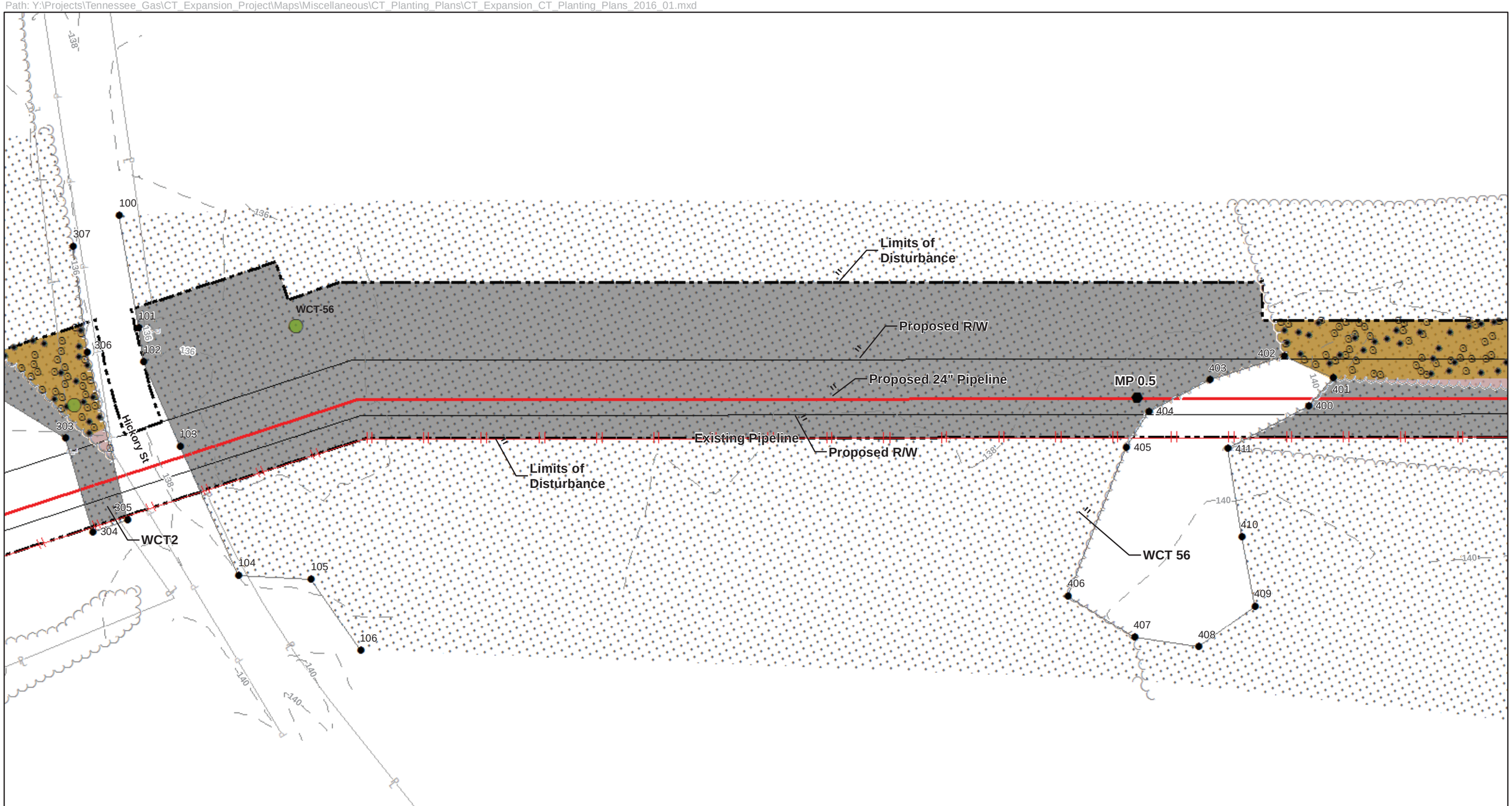

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
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- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

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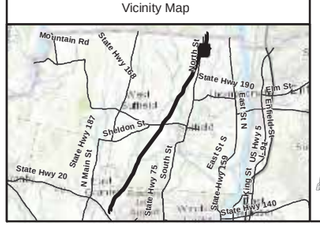
200
212
WCT 56
201
211
Limits of Disturbance
Proposed R/W
210
209
202
203
208
Proposed 24" Pipeline
207
204
205
206
Existing Pipeline
Proposed R/W
Limits of Disturbance
304
305
306
303
WCT 56
302
307
301
308
300

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
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- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

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WCT 56
WCT-56
SCT 56
Limits of Disturbance
Existing Pipeline
Proposed R/W
Proposed 24" Pipeline
North St
200
201
202
203
204
205
206
207
208
209
210
211
600
601
602
603

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
- Vernal Pool
- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

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107
WCT3
Limits of Disturbance
Proposed R/W
Existing Pipeline
106
105
MP 1
104
Proposed 24" Pipeline
103
102
Limits of Disturbance
Proposed R/W
101

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
- Vernal Pool
- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

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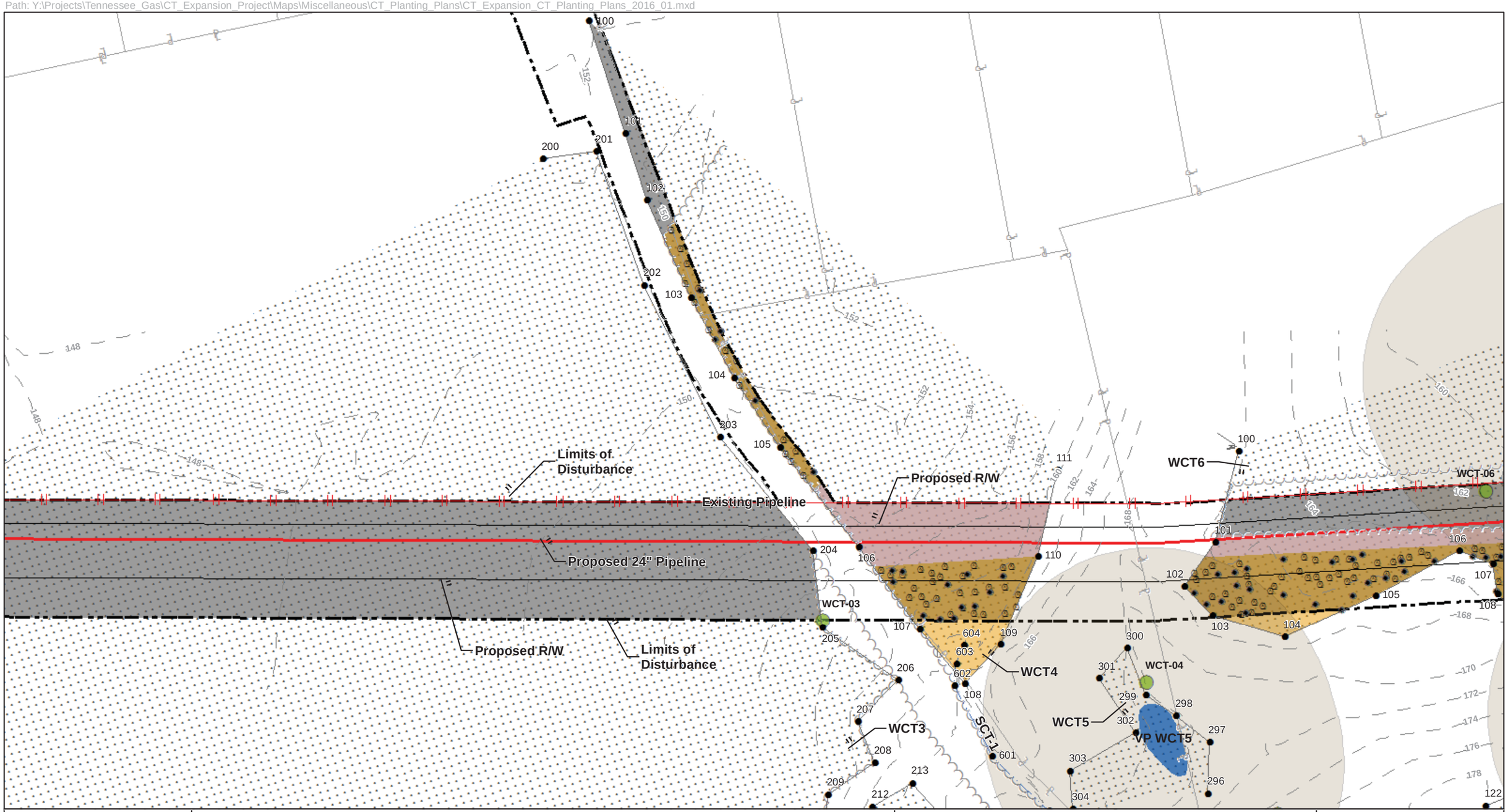
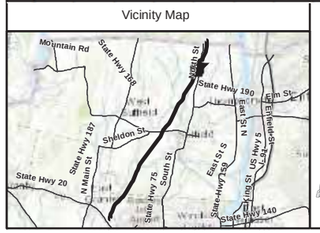


Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
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- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

VP WCT6-1
WCT-06
WCT6
Proposed 24" Pipeline
WCT-07
Limits of Disturbance
VP WCT7
WCT-07/08
Existing Pipeline
WCT-09
WCT7
VPCTVP-2
Proposed R/W
Proposed R/W
WCT8
WCT6
VP WCT6-2
WCT 9
Limits of Disturbance
VP WCT9

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
- Vernal Pool
- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

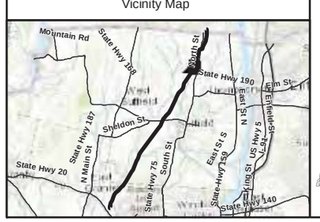
1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

WCT-11
VP WCT11
MP 1.5
WCT-10/11
Limits of Disturbance
Existing Pipeline
Proposed R/W
Proposed 24" Pipeline
Proposed R/W
Limits of Disturbance
Clay Brook
SCT 11
WCT 11
WCT 12
Halladay Ave W
Clay Brook

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
- Vernal Pool
- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

Path: Y:\Projects\Tennessee_Gas\CT_Expansion_Project\Maps\Miscellaneous\CT_Planting_Plans\CT_Expansion_CT_Planting_Plans_2016_01.mxd

Clay Brook

Limits of Disturbance

Existing Pipeline

Proposed R/W

Proposed 24" Pipeline

Proposed R/W

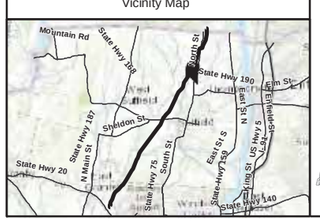
Limits of Disturbance

SCT 12

WCT 12

WCT 12

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
- Vernal Pool
- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

Limits of Disturbance
Proposed R/W
Existing Pipeline
Proposed 24" Pipeline
Proposed R/W
Limits of Disturbance
WCT 12
WCT 14
MP 2
WCT 13
WCT 13 UPL
WCT13-VP1
WCT 13 WET

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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Limits of Disturbance

Proposed R/W

Existing Pipeline

WCT 14

Proposed 24" Pipeline

Proposed R/W

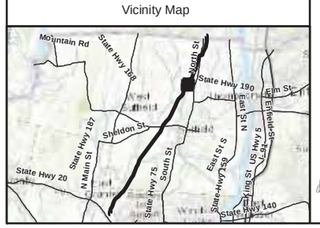
Limits of Disturbance

WCT 15

WCT 16

303 302 307 308 310 311 312 306 309 313 314 305 304 303 302 301 300 320 321 322 200 199 198 201 319 315 318 317 316 202 203 196 195 194 193

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
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Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

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Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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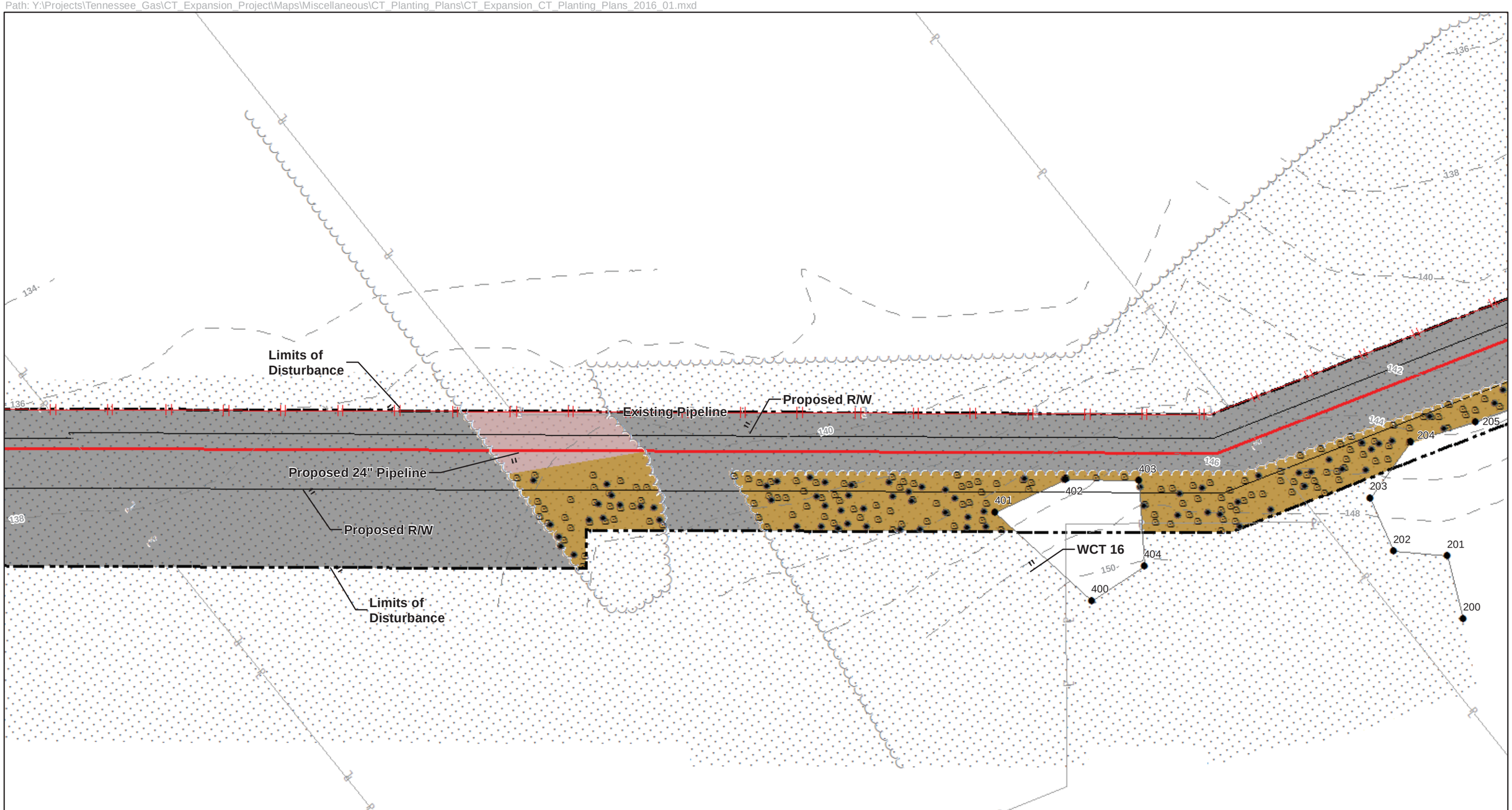

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
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- Delineated Wetlands
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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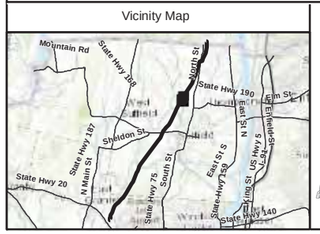
Proposed R/W
Limits of Disturbance
Existing Pipeline
MP 2.5
Proposed 24" Pipeline
Proposed R/W
Limits of Disturbance
WCT 16
205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221
132 134 136 138 140 142 144 146 148

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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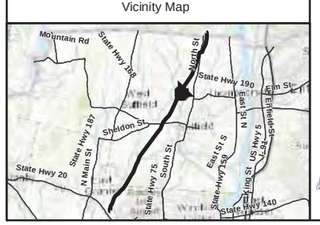
Russell Ave
306
WCT 17
305
300
204
301
203
WCT-16
Limits of Disturbance
304
Proposed R/W
202
302
303
WCT 18
105
104
103
102
100
101
106
Thistledown
Proposed 24" Pipeline
107
201
Existing Pipeline
200
108
109
Proposed R/W
Limits of Disturbance
WCT 16
199
198
Russell Ave
132
130
134
136
138
140

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
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- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

E S N W

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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WCT18-VP1

Limits of Disturbance

Proposed R/W

Proposed 24" Pipeline

Existing Pipeline

Proposed R/W

Limits of Disturbance

WCT 18

Thistledown

Vicinity Map

Legend

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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

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1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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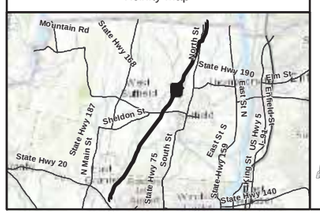
Muddy Brook
WCT 18
SCT 19
Limits of Disturbance
Proposed R/W
Proposed 24" Pipeline
MP 3
Existing Pipeline
WCT 18
WCT 18 WET
WCT 18 UPL

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
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- Delineated Streams
- Delineated Wetlands
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See Page 45 for planting notes and planting schedule

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Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

Tennessee Gas Pipeline Company, L.L.C.
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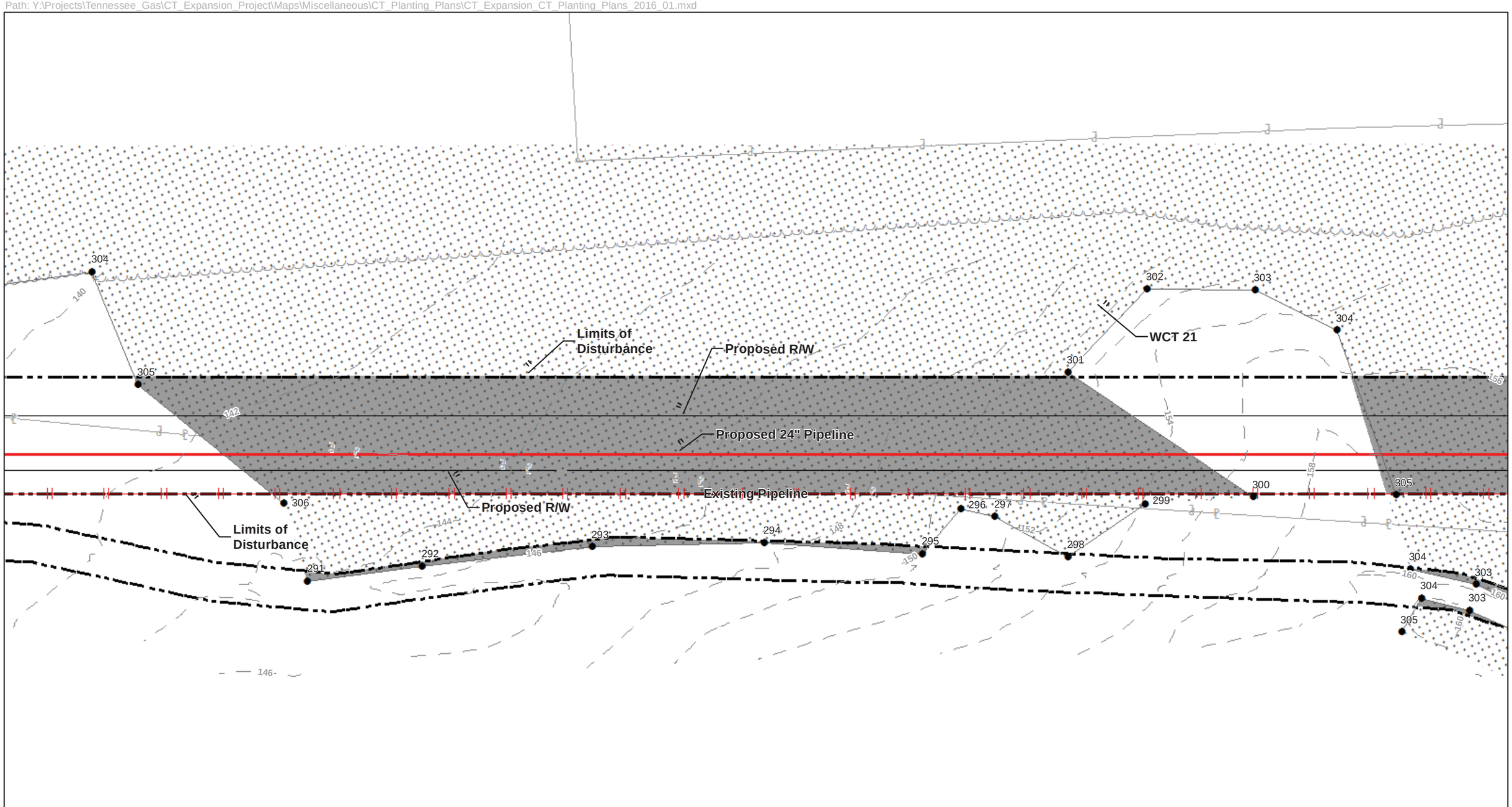
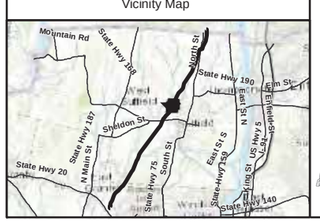


Vicinity Map



Legend

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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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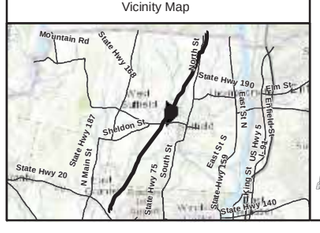
203
202
WCT 21
105
104
201
200
WCT 22
201
202
203
204
205
206
207
Limits of Disturbance
Proposed R/W
103
Proposed 24" Pipeline
MP 3.5
102
Existing Pipeline
200
Proposed R/W
Limits of Disturbance
100
101
303
303
302
302
301
301
300
300
199
198

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
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- Delineated Streams
- Delineated Wetlands
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

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Tennessee Gas Pipeline Company, L.L.C.
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WCT 23

WCT 24

WCT 22

Limits of Disturbance

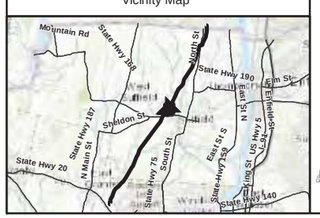
Proposed R/W

Proposed 24" Pipeline

Existing Pipeline

Hill St

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
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- Delineated Streams
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- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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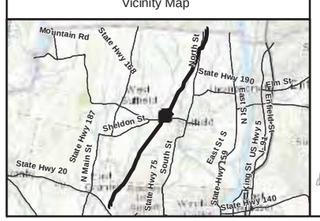
309
308
206
WCT 24
205
204
203
202
201
200
Limits of Disturbance
Proposed R/W
Proposed 24" Pipeline
Existing Pipeline
Proposed R/W
Limits of Disturbance
WCT 25
103
104
105
102
106
101
100
146
144
142
140
138
136

Vicinity Map



Legend

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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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WCT 25
WCT 25
WCT 25
WCT 26
Limits of Disturbance
Proposed R/W
Proposed 24" Pipeline
MP 4
Existing Pipeline
Proposed R/W
Limits of Disturbance
Mountain Rd
103 104 105 106 107 108 109 110 111 112 113 114 200 201 202 203 204 205 300 301 302 303 304 305 306 307

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
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- Delineated Wetlands
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Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

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Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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WCT 27

WCT 28

WCT 29

Limits of Disturbance

Proposed R/W

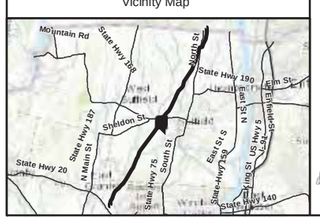
Proposed 24" Pipeline

Existing Pipeline

Proposed R/W

Limits of Disturbance

Vicinity Map



Legend

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- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
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- Delineated Streams
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Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

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Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

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112
209
111
208
110
207
109
206
108
106
107
105
Limits of Disturbance
203
204
205
WCT 30
104
202
102
103
144
146
Proposed R/W
201
Proposed 24" Pipeline
140
MP 4.5
101
100
Existing Pipeline
142
200
Proposed R/W
198
197
Limits of Disturbance
196
199
142
146
148

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
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Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

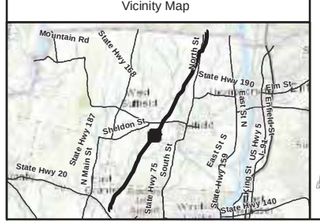
1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

108
107
106
WCT 31
105
104
WCT 31
WCT 31
103
102
101
100
Limits of Disturbance
Proposed R/W
Proposed 24" Pipeline
Existing Pipeline
207
206
205
204
203
202
201
200
Proposed R/W
Limits of Disturbance
144
142
140
146

Vicinity Map



Legend

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- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
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- Delineated Streams
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Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

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Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

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110
109
108
107
106
WCT 32
WCT 32
Limits of Disturbance
105
104
103
102
101
100
Proposed R/W
303
302
301
300
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
WCT32-VP1
WCT32-VP2
WCT 32
Proposed 24" Pipeline
Existing Pipeline
Proposed R/W
138
WCT-VP1
Limits of Disturbance
140
142
138
136
134
WCT 33
WCT 33
WCT 33
WCT33-VP6

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

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Tennessee Gas Pipeline Company, L.L.C.
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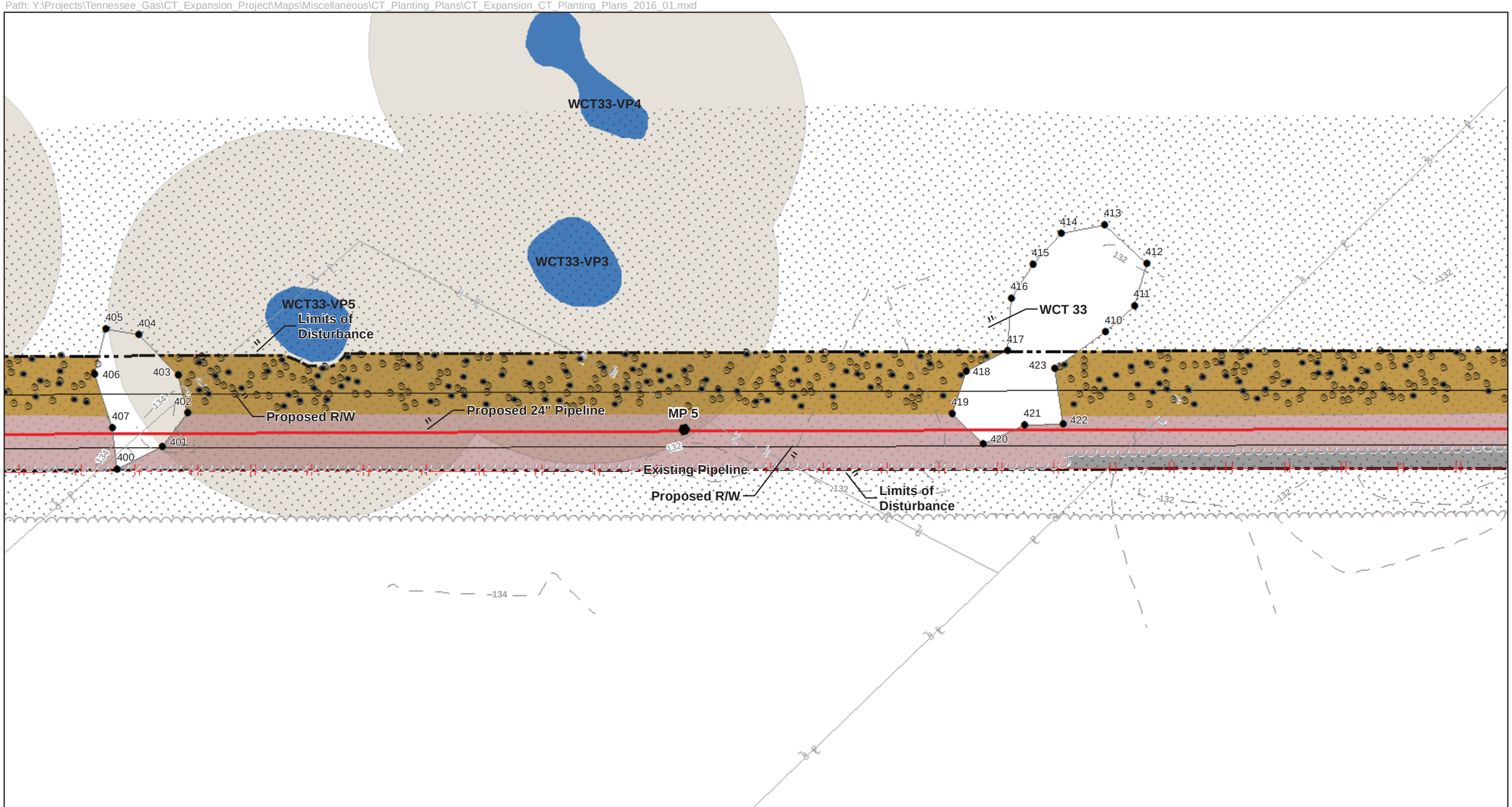

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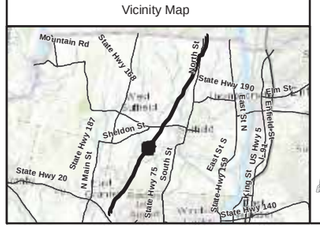

Legend

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- Existing Pipeline
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- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
- Vernal Pool
- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

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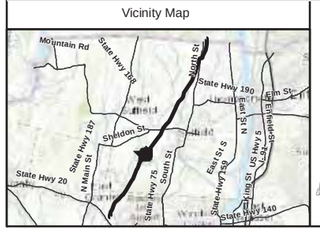
WCT 33
WCT33-VP1
WCT33-VP2
WCT 34
WCT34-VP1
WCT34-VP2
WCT 35
WCT 36
Limits of Disturbance
Proposed R/W
Proposed 24" Pipeline
Existing Pipeline

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
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- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

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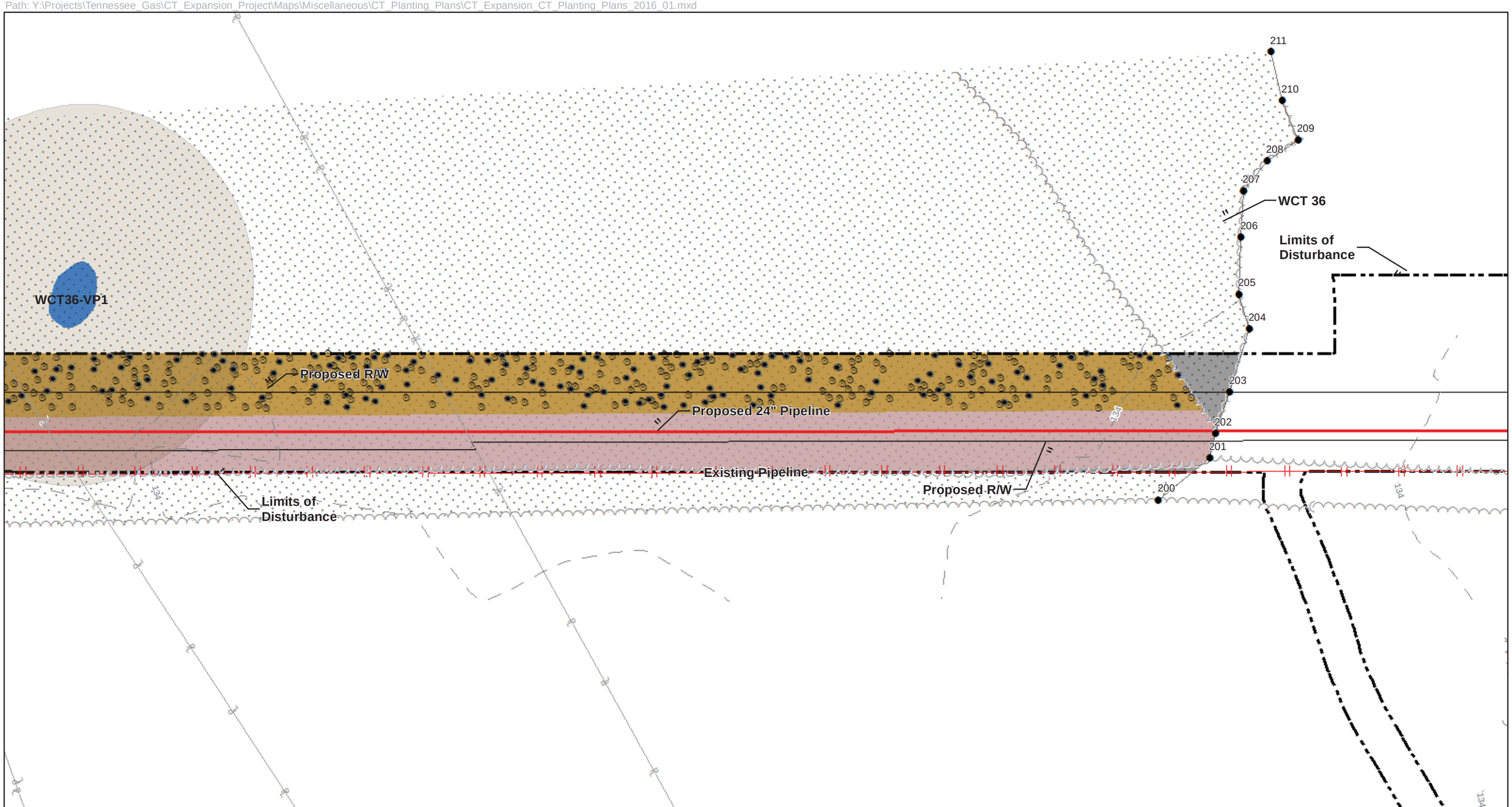
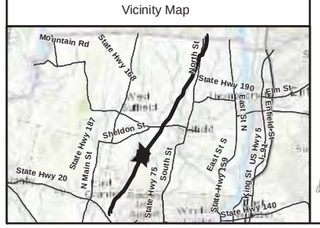


Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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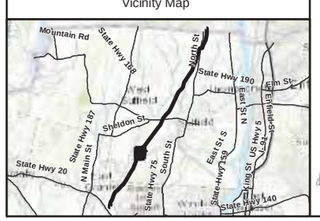
SCT 37
SCT 37
WCT 37
WCT 37
WCT 37
WCT 37
Stony Brook
Limits of Disturbance
Proposed R/W
MP 5.5
Proposed 24" Pipeline
Existing Pipeline
Proposed R/W
Limits of Disturbance
Hale St

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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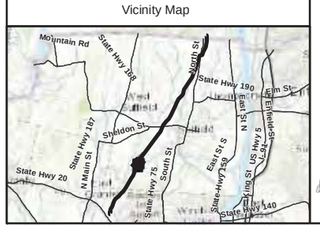
Limits of Disturbance
WCT 38
Proposed R/W
Proposed 24" Pipeline
Existing Pipeline
Hale St

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
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- Delineated Streams
- Delineated Wetlands
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- Temporary Fill/In-Situ Restoration/Temporal Loss
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- Proposed Shrub
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

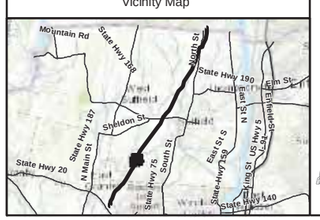
1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

Limits of Disturbance
Proposed R/W
Proposed 24" Pipeline
WCT 38
WCT 39
WCT 39-VP1
Existing Pipeline
WCT 40
MP 6
Proposed R/W

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
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- Contour Line
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- Delineated Streams
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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WCT 41

Limits of Disturbance

Proposed R/W

Proposed 24" Pipeline

Existing Pipeline

Limits of Disturbance

Proposed R/W

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
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- Delineated Streams
- Delineated Wetlands
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- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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WCT 41

Limits of Disturbance

WCT 42

WCT 41D

WCT41-VP1

WCT41-VP2

Proposed R/W

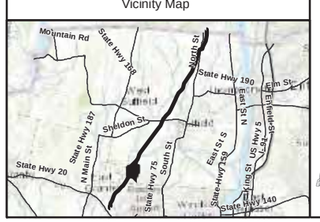
Proposed 24" Pipeline

Existing Pipeline

Proposed R/W

Limits of Disturbance

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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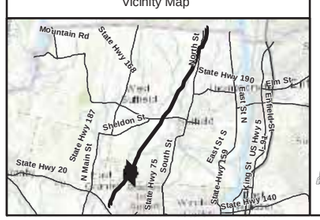
WCT 43
WCT 44
WCT 45
WCT45-VP1
SCT 45
Proposed R/W
Limits of Disturbance
Proposed 24" Pipeline
Existing Pipeline
MP 6.5

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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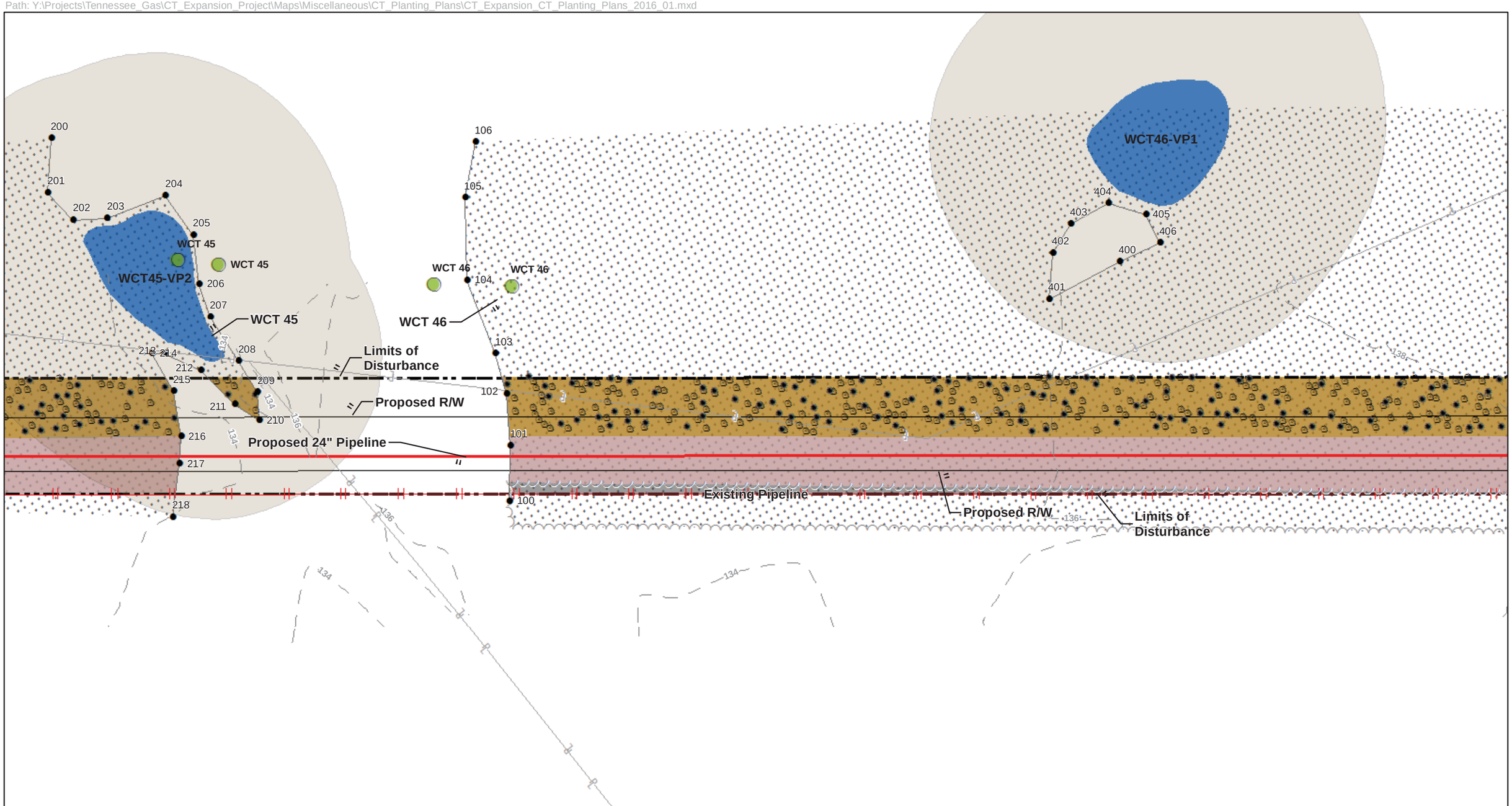
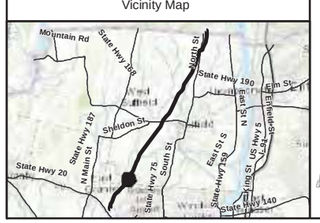


Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
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- Proposed Shrub
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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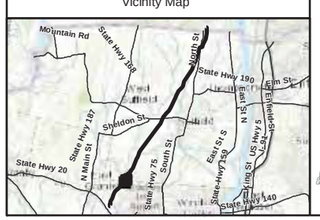
612
611
610
608
609
607
606
605
604
603
602
601
600
SCT 46
Limits of Disturbance
Proposed R/W
418
419
417
416
420
415
414
410
413
412
411
Proposed 24" Pipeline
Existing Pipeline
Limits of Disturbance
Proposed R/W
WCT 46
138
140
142
136

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
- Vernal Pool
- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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SCT 46A

WCT 46

WCT46-VP2

Proposed R/W

Proposed 24" Pipeline

MP 7

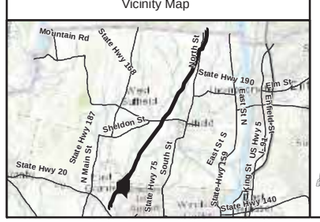
Existing Pipeline

Limits of Disturbance

Limits of Disturbance

Proposed R/W

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
- Vernal Pool
- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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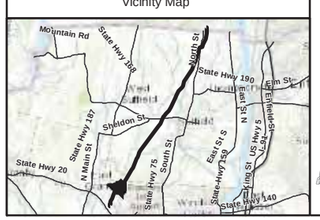
WCT 47
WCT 48
WCT 48A
WCT 49
WCT49-VP1
WCT 50
Limits of Disturbance
Proposed R/W
Proposed 24" Pipeline
Existing Pipeline

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
- Temporary Fill/In-Situ Restoration/Temporal Loss
- Temporary Fill/Permanent Conversion/Off-Site Compensation
- Vernal Pool
- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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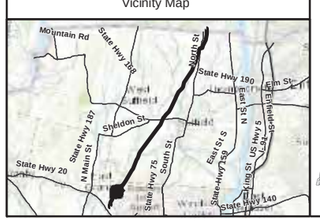
SCT 50
SCT 50 B
WCT 50
WCT 50A
WCT 51
WCT51-VP1
WCT 52
Limits of Disturbance
Proposed R/W
Proposed 24" Pipeline
Existing Pipeline
Russell Rd

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
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- Delineated Streams
- Delineated Wetlands
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- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
- USACE Wetland Data Plot

See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

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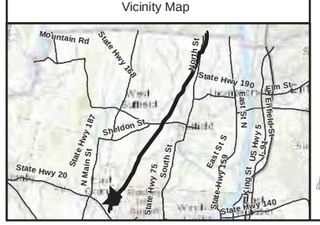
WCT 53
SCT 53
SCT 53A
WCT 52
MP 7.5
Limits of Disturbance
Proposed R/W
Proposed 24" Pipeline
Existing Pipeline
SCT 53

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
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- 100-ft Vernal Pool Envelope
- Proposed 6' Tree
- Proposed Shrub
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
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WCT 53
WCT 53A
WCT 53B
Limits of Disturbance
Proposed 24" Pipeline
Existing Pipeline
Proposed R/W
Airport Park Rd

Vicinity Map

Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
- Delineated Wetland/Waterbody Flag
- Delineated Streams
- Delineated Wetlands
- Temporary Fill/In-Situ Restoration/No Temporal Loss
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Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

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a Kinder Morgan company

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Nicholson Rd

Signature Way

Limits of Disturbance

Nicholson Rd

Proposed 24" Pipeline

Proposed R/W

MP 8

Bradley Park Rd

101
102
103
104
105
106
107
108
201
202
203
204
205
206
207

DeGrayes Brook

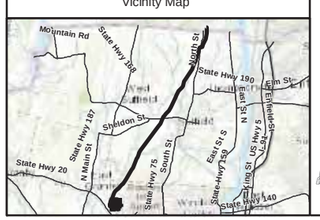
SCT 55

Proposed R/W

Limits of Disturbance

Nicholson Rd

Vicinity Map



Legend

- Proposed Pipeline
- Existing Pipeline
- Power Lines
- Property Line
- Contour Line
- Existing Tree Line
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- Delineated Streams
- Delineated Wetlands
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See Page 45 for planting notes and planting schedule

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration

0 30 60 120 Feet

1 inch = 60 feet

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

Site Preparation

The Planting hole must be dug no deeper than the rootball as measured from the trunk flare to the bottom of the ball. Planting holes dug deeper than the rootball often result in the settling of the plant above the trunk flare and structural roots which can result in the rootball being planted too deep. Research shows that the fibrous or absorbing roots of most woody plants are usually found within the top 6 to 12 inches of soil, and since root development often extends beyond the canopy or dripline, it is now recommended that the planting area be loosened and aerated at least 3 to 5 times the diameter of the rootball.

Planting Hole Preparation

One of the most common errors in tree planting is that the rootball is either planted too deep or too high, both of which can cause serious problems.

To properly plant balled and burlapped (B&B) plant material, start by locating the point at which the trunk flare begins. In some cases, the trunk flare junction may be buried in the top of the rootball and it may be necessary to loosen the burlap at the top of the ball to properly locate the junction. Measuring from the trunk flare to the bottom of the ball will give the correct planting hole depth. {Alternatively, if the trunk flare is not well developed, the root ball can be probed for structural roots using a surveyor's chaining pin or similar tool. Generally the uppermost structural roots in the rootball should be planted within 1 - 3 inches of the soil surface, measured 2 - 5 inches from the trunk.

The integrity of the rootball should be maintained until it is secure in the hole. In the event that some of the soil falls away from the roots, proceed with the planting, taking care to ensure that the roots do not dry out from sun or wind. The planting hole size should be approximately 3 to 5 times the width of the ball and have sloping sides.

Setting the Plant

Carefully set the plant in the hole so that the trunk flare is at, or 1 to 2 inches above, the existing grade. Once the plant is properly placed, cut away and remove all visible rope and burlap. If the rootball appears in danger of completely collapsing, remove the rope and burlap from only the top one-third of the ball. Although still subject to debate, it is recommended that as much of the wire basket as possible, or at least the top 8 to 16 inches of the wire basket, be removed once the root ball is stable in the planting hole. Do not leave any protruding points of wire, which could cause injury.

Backfilling the Planting Hole

According to research, backfilling with soil dug from the planting hole is preferable to mixing the soil with large amounts of organic soil amendments such as peat moss, compost, etc. The addition of an organic soil amendment may be called for if the existing soil is of poor quality, such as excessively sandy or heavy clay soils or those consisting of undesirable fill material. Alternatively, quality topsoil, similar in texture to the existing soil, may be brought in and used for backfill.

While backfilling the hole, it has been customary to tamp the soil to avoid leaving large air pockets. However, this practice often results in the soil being packed so firmly as to drive out all the fine air spaces needed for a well-aerated soil. An alternative to tamping the soil would be to water the soil halfway through the backfill process and allow it to drain. When the water has drained away, resume backfilling and water again thoroughly. If the practice of tamping the soil is chosen, it should be done lightly so as to not compact the soil in the planting hole.

To complete the backfilling, smooth the surface soil and check to ensure that the trunk flare is completely exposed. (The structural roots should be within the top 3 inches of soil as measured 4 inches from the trunk.) Water the rootball and planting area immediately after backfilling.

Watering

Water is a critical factor to the successful establishment of landscape plants. Excessive or insufficient water will impede the formation and/or elongation of new roots. Immediately after planting, water the root ball and the planting area deeply. The root ball of newly planted trees must receive adequate water weekly during the entire first growing season, right up until dormancy in the fall, to become established. More frequent irrigation may be needed during the summer season or in times of extended drought. Rainfall alone may not provide the adequate, consistent moisture necessary for establishment. On larger caliper trees, weekly watering is necessary through the next several growing seasons. According to research, in the Northern part of the US, the establishment period, for recently transplanted trees, is approximately one year for each one inch of trunk caliper.

Fertilizing

Fertilization is not likely to be effective during the first growing season, as long as there is no nutrient deficiency. The addition of fertilizer and limestone should be made according to recommendations based on a soil test. Avoid placing water-soluble (quick-release) nitrogen fertilizer directly in the planting hole as this may cause injury to roots. If needed, a slow release or organic form of nitrogen could be mixed into the planting area or be applied on the soil surface around the tree basin.

Staking

While there are many opinions on the method and value of staking trees at planting time, most experts agree that staking is not necessary for all trees. Trunk strength, size of the canopy, wind direction and site traffic problems should all be considered before staking a tree. Research has shown that staked trees may develop a smaller root system and decreased trunk taper. If the rootball is stable in the soil, then it may not need to be staked. However, if the root ball is unstable and staking is required, try to attach stakes low on the trunk and allow some sway. In most instances, stakes should be removed after one growing season.

Mulching

Mulching is a cultural practice that can be of benefit in the landscape when done correctly. Mulching will reduce weeds, moderate soil temperatures, conserve soil moisture in the root zone, and add an aesthetic quality to the landscape. However, improper mulching can impair plant health and may lead to the decline of the plant material.

Organic mulch should be placed in a wide band around the plant, approximately 3 times the diameter of the rootball, over the root zone and no more than 2 to 4 inches deep, tapering to, but not touching, the trunk. Mulch piled up against the trunk may cause rotting of the bark and can create entry points for insects or disease organisms. Field mice may also inhabit deep mulch and feed on the bark. AVOID "VOLCANO MULCHING".

Pruning

After transplanting, prune only broken or damaged branches. Top pruning to compensate for root loss is no longer recommended. It is important to leave as much foliage on the tree as possible because carbohydrates and other products produced by photosynthesis in the leaves are necessary for root system regeneration and development.

Tree Wrapping

The bark on a tree or shrub is as important as skin to an animal. It acts as a barrier to exclude insects and disease organisms from the vascular system, which lies directly under the bark. Some bark injuries may occur because of damage from the sun (sunscald) or temperature extremes (frost cracks). For many years, it has been a common practice to use tree wrap on newly planted or thin-barked trees in an effort to reduce sun or temperature damage to the bark.

Research has found that some tree wraps may not provide the protection that was originally intended. In experiments using plastic tree guards on dogwoods, large numbers of dogwood borers were found under the guards while few were found in trees without guards. In addition, some tree wraps were found to retain excess moisture beneath the wrap. This may encourage fungal or bacterial growth, especially if there were pre-existing wounds in the trunk.

If tree wrap is to be used, it is recommended that appropriate material be selected, checked frequently, and the wrap be removed during periods of active growth.

It is hoped that these guidelines, together with the selection of appropriate and healthy plant material, will be of help in promoting improved plant health in the landscape.

New England Erosion Control/Restoration Mix For Detention Basins and Moist Sites*

Botanical Name	Common Name	Ind.
Agrostis perennans	Upland Bentgrass	FACU
Agrostis stolonifera	Creeping Bentgrass	FACW
Andropogon gerardii	Big Bluestem, Niagra	FAC
Aster novae-angliae	New England Aster	FACW-
Carex vulpinoidea	Fox Sedge	OBL
Elymus verginicus	Virginia Wild Rye	FACW-
Eupatorium perfoliatum	Boneset	FACW
Euthamia graminifolia (Solidago g.)	Grass Leaved Goldenrod	FAC
Festuca rubra	Creeping Red Fescue	FACU
Jurcus effusus	Soft Rush	FACW+
Onoclea sensibilis	Sensitive Fern	FACW
Panicum virgatum	Switch Grass	FAC
Schizachyrium scoparium	Little Bluestem	FACU
Scirpus atrovirens	Green Bulrush	OBL
Scirpus cyperinus	Wool Grass	FACW
Verbena hatata	Blue Vervain	FACW

New England Erosion Control/Restoration Mix For Detention Basins and Moist Sites contains a selection of native grasses and wildflowers designed to colonize recently disturbed sites where quick growth of vegetation is desired to stabilize the soil surface. It is an excellent seed mix for ecologically appropriate restorations on moist sites that require quick stabilization as well as long-term establishment of native vegetation. This mix is particularly appropriate for detention basins that do not normally hold standing water. Some plants in this mix can tolerate infrequent inundation, but not constant flooding. Always apply on clean bare soil. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper soil-seed contact. Best results are obtained with a Spring or early Fall seeding. Late Spring and Summer seeding will benefit with a light mulching of clean weed-free straw to conserve moisture. If conditions are drier than usual, watering may be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not recommended. Preparation of a clean weed free soil surface is necessary for optimal results.

*From New England Wetland Plants, Amherst, MA Catalog. Exact seed mix makeup may vary.

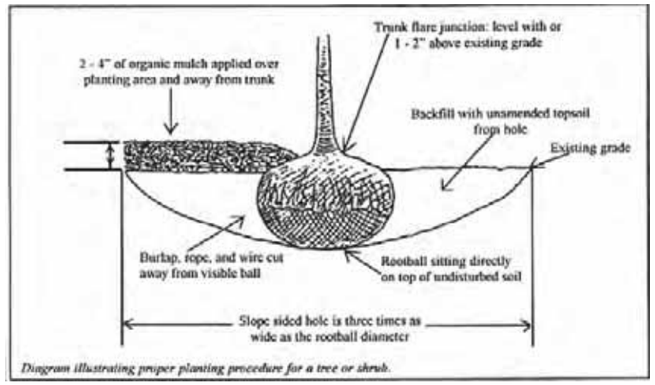


Diagram illustrating proper planting procedure for a tree or shrub.

Planting Schedule

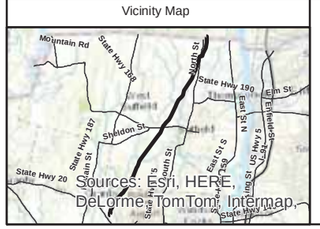
Habitat	Cover type	Quantity	Abbrev.	Scientific Name	Common Name	Size
Wetland	Trees	880	Qb	*Quercus bicolor*	Swamp white oak	6'
		880	Ba	*Betula alleghaniensis*	Yellow Birch	6'
		880	An	*Alnus incana*	Speckled alder	6'
	Shrubs	733	Sa	*Spiraea alba*	Meadowsweet	2-3'
		733	Iv	*Ilex verticillata*	Winterberry holly	2-3'
		733	Ca	*Cornus amomum*	Silky dogwood	2-3'
	Seed Mixes*	1,586	NEM		New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites*	

*Available through New England Wetland Plants, Amherst, MA. New England Erosion Control/Restoration Mix for moist sites to be broadcast throughout suitable portions of the wetland mitigation area at a rate of 35 pounds per acre.

Trees planted at 240 per acre density
Shrubs planted at 200 per acre density

Plant locations in the field will be determined by the supervising wetland scientist.

Vicinity Map



Tree and Shrub Planting Notes

N
W E
S

Tennessee Gas Pipeline Company

CT Expansion Project

Proposed Activities by Type and In-Situ Restoration
Connecticut

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

February 2, 2016

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT G

Agency Correspondence

From:	OSullivan, Tim
To:	laura.saucier@ct.gov
Cc:	Banach, Eileen
Subject:	FW: TGP, CT Expansion Project, ESA Section 7 Freshwater Mussel Consultation Submittal
Date:	Thursday, December 04, 2014 12:18:00 PM
Attachments:	CT_Exp_Sec_7_Consultations_8_26_14.pdf NE_USFWS_RESPONSE.PDF 201304121_Tennessee Gas Pipeline Expansion Suffield East Granby Final.pdf

---

Laura,

This was sent to CT DEEP and N.E. USFWS.

We have not received a response from either agency.

Let me know what additional information you may need and I will get it for you.

Thank you.

Tim

From: OSullivan, Tim
Sent: Wednesday, August 27, 2014 12:29 PM
To: maria_tur@fws.gov; dawn.mckay@ct.gov
Cc: Gardella, Mark
Subject: TGP, CT Expansion Project, ESA Section 7 Freshwater Mussel Consultation Submittal

Maria and Dawn,

Attached, please find the freshwater mussel Section 7 consultation submittal for the Tennessee Gas Pipeline Company's Connecticut Expansion Project (CT NDDB Determination Number: 201304121).

Each of your offices response letters to our initial rare species inquiries are attached here for your reference.

Please let us know if you have any questions regarding any of the information included in the submittal.

We look forward to hearing back from you and thank you for your continued attention to this project.

Tim

Timothy P. O'Sullivan MS, PWS
Project Manager
Wetland and Wildlife Biologist
tim.osullivan@aecom.com

Cell Phone 978-621-6756

AECOM
500 Enterprise Drive
Suite 1A
Rocky Hill, CT 06067
www.aecom.com

Miller, Shannon

From: DEEP Nddbrequest <DEEP.Nddbrequest@ct.gov>
Sent: Friday, February 19, 2016 2:42 PM
To: Benito, Brian
Subject: Re: CT Expansion Project , Complete CT NDDB Submittal for final determination
Attachments: image001.gif

Brian,

Thank you for sending us an updated NDDB review application for the CT Expansion Project. We will start our review process.

Take care,

Dawn
Dawn M. McKay
Wildlife Division
Bureau of Natural Resources
Connecticut Department of Energy and Environmental Protection
79 Elm Street, Hartford, CT 06106-5127
P: 860.424.3592 | E: dawn.mckay@ct.gov<mailto:dawn.mckay@ct.gov>

From: Benito, Brian <Brian_Benito@kindermorgan.com>
Sent: Friday, February 19, 2016 3:22 PM
To: DEEP Nddbrequest
Subject: FW: NOTIFICATION: Brian Benito has sent you files, CT EXP, Complete CT NDDB Submittal

Hello,
I'm forwarding the email below to the correct address.

Please let me know if you have any questions!

Warm Regards,
Brian M. Benito Jr.
EHS - Project Permitting
KINDER~MORGAN
8 Anngina Drive
Enfield, CT 06082
(cell) 860-335-9852, (office) 860-763-6052
Brian_Benito@KinderMorgan.com<mailto:Brian_Benito@KinderMorgan.com>
[Please consider the environment before printing]

From: Benito, Brian
Sent: Thursday, February 18, 2016 10:07 AM
To: 'dawn.mckay@ct.gov'
Subject: NOTIFICATION: Brian Benito has sent you files, CT EXP, Complete CT NDDB Submittal

Dawn,

It has taken us a bit longer than I would have liked but please see the CT Expansion Project CT NDDB re-submittal links below. The main document is the cover letter (after the sendfile program downloaded all of the links it was put last) however; all of the attachments (as listed at the end of the cover letter) are in the correct order.

You can download all of the files at once as a Zip file or each individually. Additionally, AECOM will also be sending a hard copy tomorrow and will include a flash drive or disc with the shapefiles and alignment sheets on it.

Please let me know how (if) I can assist you, Nelson, and/or Laura in your reviews. If you have any questions, please do not hesitate to call!

These files will be available for download until 2/24/2016 File

Description

Size

Att_A_USGS Topographic Overview Mapping.pdf<https://sendfiles.aecom.com/download.aspx?ID=b25ec54f-ba44-4710-94a5-879d4781dad8>

1,384KB

Att_A1_Request for State Listed Species Review NDDB Form.pdf<https://sendfiles.aecom.com/download.aspx?ID=a1dd7c27-60fd-4804-b1a0-a98316ead35e>

150KB

Att_B_CT_NDDB_footprint_20160209.zip<https://sendfiles.aecom.com/download.aspx?ID=aeec5117-d315-43f3-a63a-688578382d0b>

82KB

Att_C_Stamped_CT_ProjectAlignments.pdf<https://sendfiles.aecom.com/download.aspx?ID=69578eaa-001c-4c24-ad5e-12f6abc2ccdc>

85,787KB

Att_D_State Listed Species Report.pdf<https://sendfiles.aecom.com/download.aspx?ID=d46036d6-35fa-49bc-aa82-156b9d8ece3a>

17,176KB

Att_E_Biologist's Resumes.pdf<https://sendfiles.aecom.com/download.aspx?ID=35a1edf6-cd19-44fd-929e-111ad136c1a3>

132KB

Att_F_Exec_Sum_401WaterQualCertApp.pdf<https://sendfiles.aecom.com/download.aspx?ID=c696e725-449f-41d8-a541-ac756578e266>

166KB

Att_G_Env_Assess_401WaterQualCertApp.pdf<https://sendfiles.aecom.com/download.aspx?ID=3f01c152-9b4c-414b-9952-ebdb20f389f8>

243KB

CT_EXP_NDDB_CVRLTR_2_17_16.pdf<https://sendfiles.aecom.com/download.aspx?ID=89958fe7-fc82-43da-b53b-79d234e6b886>

61KB

Download all files (.zip)<https://sendfiles.aecom.com/download.aspx?ID=4890d1a8-d862-4d9d-bbb1-53879e827e23&zip=y>

Warm Regards,

Brian M. Benito Jr.
EHS - Project Permitting
KINDER~MORGAN
8 Anngina Drive
Enfield, CT 06082
(cell) 860-335-9852, (office) 860-763-6052
Brian_Benito@KinderMorgan.com<mailto:Brian_Benito@KinderMorgan.com>
[Please consider the environment before printing]

AECOM
500 Enterprise Drive
Suite 1A
Rocky Hill, CT 06067-3913

860 263 5800 tel
860 263 5777 fax

February 17, 2016

Central Permitting Processing Unit
Department of Energy and Environmental Protection
79 Elm Street
Hartford, Connecticut 06106

Subject: Renewal/Extension of CT Natural Diversity Database Request
Tennessee Gas Pipeline Company, L.L.C.
Connecticut Expansion Project, Connecticut Loop
Natural Diversity Database Request # 201304121

Dear Ms. McKay,

Introduction

Tennessee Gas Pipeline Company, L.L.C. ("Tennessee") is proposing the construction and operation of the Connecticut Expansion Project (the "Project") in Hartford County, Connecticut, Albany County, New York, and Berkshire and Hampden Counties, Massachusetts. The proposed Project involves the construction of two sections of new 36-inch outside diameter ("OD") pipeline looping, totaling 1.35 miles in New York ("New York Loop"), 3.81 miles in Massachusetts ("Massachusetts Loop"), and one section of new 24-inch OD pipeline looping totaling 8.26 miles in Massachusetts and Connecticut ("Connecticut Loop"), as well as appurtenant facilities, including one new main line valve ("MLV"), cathodic protection, and pig launchers and receivers.[1] To the extent that it is practicable, feasible, and in compliance with existing law, Tennessee proposes to locate the pipeline loops within or adjacent to its rights-of-way ("ROW") associated with its existing pipelines designated as the 200 and 300 Lines.

The Connecticut Loop commences in the yard of Compressor Station 261 (in Agawam, MA) and extends approximately 8.26 miles southward to the East Granby meter station.

[1] "Pig" is an industry-specific term for an internal pipeline tool that is used to inspect and/or clean a pipeline.

In addition, two new pig launchers/receivers will be installed, one at the starting point of the Connecticut Loop within Tennessee's existing Compressor Station 261 and one at the terminus point of the Connecticut Loop within Tennessee's existing East Granby meter station. The Connecticut Loop will tie into Tennessee's existing 300-1 Line. A new MLV will also be installed at approximately mile post ("MP") 4.15, south of Mountain Road in Suffield, Connecticut as well as regulation at MLV 354.1.

Construction Methodology and Potential Impact Evaluation

Tennessee has taken measures to minimize or avoid adverse effects from the Project to water resources, as well as state and federal listed species and associated habitats. The proposed Connecticut Loop has been sited parallel and adjacent to existing permanent ROW, to the extent practicable, to minimize impacts. However, by nature of being a linear Project, some impacts are unavoidable. The majority of these impacts will be temporary, except for one permanent access road in Suffield, Connecticut, where a small amount of permanent wetland fill is required to improve an existing access road to allow for access following construction. The centerline for the Project, along with work space, access roads and contractor yards has been provide with this submittal by way of Project shapefiles.

Access roads (for construction and access to appurtenant facilities) already exist along certain portions of the existing pipeline ROW that will be utilized for the Project. However, in the majority of cases, improvements to these temporary access roads will need to be made (i.e., widened, graded, or filled/surfaced) to allow safe passage to construct the Project. Access roads will typically consist of a 10-20 foot wide travel surface. Tennessee identified existing access roads to be used for construction, some of which may require improvements including laying down new gravel or tree trimming to allow passage of vehicles and equipment. Roads may be graveled or consist of construction mats, using a variety of materials to maintain drainage patterns across the ROW. These temporary access roads will accommodate rubber tired light duty trucks only. All access roads in Connecticut will be temporary except for one. One new permanent access road is proposed in Connecticut, as discussed above, which will involve improvement and widening of an existing access road to access the new MLV at approximately MP 4.51. Roads must have sufficient width and capacity for heavy construction and maintenance equipment and both over-the-road and off-road vehicles, including oversize tractor-trailers. The need for access by flat-bed trailers typically determines the scope of access road improvements.

Along the proposed Project, vegetation removal and tree clearing will be required for temporary workspace to install the pipeline facilities. As a result, trees within forested wetlands along new ROW areas will be removed. In temporary workspace areas, trees will be allowed to regrow and return to forested wetlands following construction. In forested wetlands, Tennessee will minimize tree clearing to the maximum extent practicable while maintaining safe construction conditions. Following construction, tree clearing within wetlands during operation of the Connecticut Loop will be limited to selectively clearing trees with roots that could compromise the integrity of the pipeline coating within 15 feet centered on the pipe. Tennessee will also maintain a 10-foot corridor, centered on the pipe, in herbaceous cover to allow for annual pedestrian

walkover surveys that would convert scrub-shrub areas to an herbaceous cover type. These maintenance procedures will result in forested wetlands being converted to scrub-shrub and scrub-shrub to emergent marsh wetland types. This will not create a loss of overall wetland habitat, but rather a long-term change in habitat type, from forested to scrub-shrub and emergent marsh. In-situ restoration plans for the forested wetland areas have been provided in the previously submitted Section 401 Water Quality Certification application.

Access within the ROW across wetlands will only be permitted where soils are non-saturated and able to support construction equipment at the time of crossing, during frozen soil conditions (for winter tree clearing) or with the use of timber mats to avoid rutting of the wetland soil. Within wetlands, no rubber tire equipment will be permitted unless it will not damage the root systems and its use is approved by the on-site Environmental Inspector ("EI"). Where wetlands are saturated and root damage is likely, clearing will be done manually or will be completed with equipment operating on timber mats. If the wetland must be crossed by rubber-tired equipment to access the remainder of the ROW, a travel lane of timber mats will be installed to facilitate access along the ROW. Bulldozers will not be used for clearing in wetlands. Trees and brush will be cut at ground level by hydroaxes, tree shears, grinders or chain saws. Within wetlands, stumps will be left in place, except on the trenchline or unless the removal is necessary to ensure worker safety. Stumps may be ground to a suitable height for safety reasons.

The Project will be constructed in several stages, some overlapping in time. Certain work activities and sequences may vary, based on factors such as site-specific conditions, the final Project designs, and the requirements of regulatory approvals. Tennessee will complete pre-construction planning activities and continue consulting with the municipalities and state and federal agencies to minimize or avoid adverse effects to the environment and to the public. Tennessee will use conventional buried pipeline construction techniques and will follow all permit conditions and requirements set forth in the Federal Energy Regulatory Commission's (the "Commission") Plan and Procedures.

Tennessee will generally follow the pipeline construction procedures for the Project as indicated below:

- Survey and stake the centerline of the new pipeline and ROW boundaries;
- Clearing and grading;
- Trenching;
- Stringing;
- Pipe preparation (welding, bending, weld coating, X-ray, and coating repair) and lowering in;
- Backfilling and grade restoration;
- Hydrostatic testing and tie-ins; and
- Cleanup and restoration.

The above procedures typically follow the sequence listed. However, certain areas requiring specific construction procedures may deviate from the sequencing noted above and include, but are not limited to: road crossings, residential areas, waterbodies and wetlands, rugged topography or unstable soils, agricultural areas, and areas requiring blasting.

In the town of Suffield, the proposed pipeline will cross below Muddy Brook and Stony Brook. The crossing at these two brooks will require temporary equipment bridges. A temporary bridge will allow the construction contractor to access both sides of the brooks with equipment for the construction of the pipeline crossing. The bridge will span 1.25 times the active channel width and allow for the passage of a two year storm event. Construction mats will be placed at the boundary of the channel with a minimum width of 10 feet on either side. The crossing of Muddy Brook and Stony Brook will occur during the dry season so that flow within the streams will be minimal. The bridges will be secured to prevent movement during construction. The equipment bridges will be removed after construction is complete and the areas are restored and stabilized. Construction of the pipeline crossing will be completed with a dam and pump method, flume crossing method, or a combination of both. While the typical depth of cover of the proposed pipeline will be three (3) feet, Tennessee will provide five (5) feet depth of cover at the crossing below each brook. The additional depth of cover will provide a greater margin of safety under flowing water conditions to ensure adequate cover remains over the pipe beneath the streambed. The material removed during the pipeline trenching will be stockpiled onsite. Two stockpiles will be provided, one for channel bottom material and one for embankment material. The stockpiled material will be reused onsite and supplemented with additional suitable material, if required. If any unsuitable or excess material is generated, it will disposed offsite in accordance with all applicable requirements. Any material transported offsite will be dewatered prior to being transported. After the pipeline installation below each streambed for these two brooks, the disturbed construction areas will be completely restored.

Protecting the natural features of each waterbody and the associated wildlife habitat is the highest priority for each stream crossing. Application of Tennessee's Best Management Practices ("BMPs") at each crossing will ensure that the selected construction contractor will protect the waterbodies during construction and provide a stable post-construction environment. Re-vegetation of trees and shrubs in areas adjacent to these waterbodies which currently support forested wetland, outside of the 30-foot corridor directly along the pipe, will further contribute to restoring riparian habitat values along the waterbodies. Project wide, Tennessee will implement its BMPs for construction and restoration, as outlined in the Commission's Plan and Procedures and Tennessee's Construction BMPs, which are intended to be used to avoid, minimize, and/or mitigate impacts from the Project. Said BMPs were included as an attachment to the previously submitted application for the Section 401 Water Quality Certification.

State and Federal Listed Species and Proposed Construction Phase Mitigation Measures

Tennessee's representatives submitted written consultations to the United States Fish and Wildlife Service, New England Field Office ("USFWS") and National Marine Fisheries Service ("NMFS") in order to document federal listed species in the Project area. At the

state level in Connecticut, the Connecticut Natural Diversity Database ("NDDB") was consulted on state-listed endangered, threatened, or species of special concern. Based upon the information subsequently received from these agencies, Tennessee has identified areas of the Project alignment where the potential exists for occurrence of federal and/or state listed threatened and endangered species. Additional information on state and federal listed species correspondence, locations of species identified, survey results, and proposed mitigation measures have been provided within the previously filed Section 401 Water Quality Certification application for the Project. Tennessee has worked cooperatively with the state and federal agencies in developing approved field survey protocols to identify and document occurrences of rare plant and animal species in the Project area. Qualified biologists have performed field surveys in 2013 and 2014, with results being sent directly to CT DEEP Biologists and the USFWS, as appropriate, in addition to being included in the above referenced permit application. Table One presents the species list generated as a result of the state and federal consultations for the Project and indicates the proposed construction phase mitigation measures, which will be implemented to mitigate any potential negative impacts. For many species, these proposed measures are consistent with what AECOM has implemented on behalf of other project proponents on recent, large scale utility projects in Connecticut, including the Greater Springfield Reliability Project and the Interstate Reliability Project.

TABLE ONE
CONNECTICUT STATE AND FEDERAL LISTED RARE PLANT AND WILDLIFE SPECIES POTENTIALLY OCCURRING ON AND/OR IN THE VICINITY OF THE CONNECTICUT EXPANSION PROJECT

Common Name	Scientific Name	Status [a]		Survey Results / Mitigation
		Federal	State	
Reptiles				
Eastern box turtle	*Terrapene carolina carolina*		CT SSC	Proposed construction monitor in habitat during active period.
Eastern hognose snake	*Heterodon platirhinos*		CT SSC	Proposed construction monitor in habitat during active period.
Wood turtle	*Glyptemys insculpta*		CT SSC	Proposed construction monitor in habitat during active period.
Birds				
Horned lark	*Eremophila alpestris*		CT E	Proposed construction monitor in habitat during nesting season.
Grasshopper sparrow	*Ammodramus savannarum*		CT E	Proposed construction monitor in habitat during nesting season.
Vesper sparrow	*Pooecetes gramineus*		CT E	Proposed construction monitor in habitat during nesting season.
Savannah sparrow	*Passerculus sandwichensis*		CT SSC	Proposed construction monitor in habitat during nesting season.

TABLE ONE CONNECTICUT STATE AND FEDERAL LISTED RARE PLANT AND WILDLIFE SPECIES POTENTIALLY OCCURRING ON AND/OR IN THE VICINITY OF THE CONNECTICUT EXPANSION PROJECT				
Common Name	**Scientific Name**	**Status [a]**		**Survey Results / Mitigation**
		Federal	**State**	
Bobolink	*Dolichonyx oryzivorous*		CT SSC	Proposed construction monitor in habitat during nesting season.
Upland sandpiper	*Bartramia longicauda*		CT E	Proposed construction monitor in habitat during nesting season.
Northern harrier	*Circus cyaneus*		CT E	Proposed construction monitor in habitat during nesting season.
American kestrel	*Falco sparverius*		CT T	Proposed construction monitor in habitat during nesting season.
Eastern Meadowlark	*Sturnella magna*		CT SSC	Proposed construction monitor in habitat during nesting season.
Brown thrasher	*Toxostoma rufum*		CT SSC	Proposed construction monitor in habitat during nesting season.
Mussels				
Dwarf wedgemussel	*Alasmidonta heterodon*	E	CT E	Presence/Absence surveys conducted June 2014. Presence confirmed in Muddy and Stony Brooks. This species is proposed to be relocated upstream of the impact areas.
Brook floater	*Alasmidonta varicosa*		CT E	Presence/Absence surveys conducted June 2014. This species was not located during the surveys in either Muddy or Stony Brooks.
Lepidoptera / Coleoptera				
Noctuid moth/Burgess' cutworm	*Apamea burgessi*		CT SSC	Habitat Assessment conducted in September and October 2014. Based upon survey results, no site specific mitigation is proposed.
Brown-bordered geometer	*Eumacaria latiferrugata*		CT SSC	Habitat assessment conducted in September and October 2014. Based upon survey results, no site specific mitigation is proposed.
Jointweed flower moth/Noctuid moth	*Shinia spinosae*		CT SSC	Habitat assessment conducted in September and October 2014. Based upon survey results, no site specific mitigation is proposed.

TABLE ONE CONNECTICUT STATE AND FEDERAL LISTED RARE PLANT AND WILDLIFE SPECIES POTENTIALLY OCCURRING ON AND/OR IN THE VICINITY OF THE CONNECTICUT EXPANSION PROJECT				
Common Name	**Scientific Name**	**Status [a]**		**Survey Results / Mitigation**
		Federal	**State**	
Shrub euchlaena moth	*Euchlaena madusaria*		CT SSC	Habitat assessment conducted in September and October 2014. Based upon survey results, no site specific mitigation is proposed.
Violet dart moth	*Euxoa violaris*		CT T	Habitat assessment conducted in September and October 2014. Based upon survey results, no site specific mitigation is proposed.
Phyllira tiger moth	*Grammia phyllira*		CT E	Habitat assessment conducted in September and October 2014. Based upon survey results, no site specific mitigation is proposed.
Bombardier beetle	*Brachinus cyanipennis*		CT SSC	Habitat assessment conducted in September and October 2014. Based upon survey results, no site specific mitigation is proposed.
Pine barrens tiger beetle	*Cicindela formosa generosa*		CT SSC	Habitat assessment conducted in September and October 2014. Based upon survey results, no site specific mitigation is proposed.
Ground beetle 1	*Harpalus eraticus*		CT SSC	Habitat assessment conducted in September and October 2014. Based upon survey results, no site specific mitigation is proposed.
Ground beetle 2	*Tetragonoderus fasciatus*		CT SSC	Habitat assessment conducted in September and October 2014. Based upon survey results, no site specific mitigation is proposed.
Plants				
Bush's Sedge	*Carex bushii*	-	CT SSC	State-listed plant presence/absence surveys conducted June, July and September 2014. This species was not located.

TABLE ONE CONNECTICUT STATE AND FEDERAL LISTED RARE PLANT AND WILDLIFE SPECIES POTENTIALLY OCCURRING ON AND/OR IN THE VICINITY OF THE CONNECTICUT EXPANSION PROJECT				
Common Name	**Scientific Name**	**Status [a]**		**Survey Results / Mitigation**
		Federal	**State**	
Squarrose Sedge	*Carex squarrosa*	-	CT SSC	State-listed plant presence/absence surveys conducted June, July and September 2014. Nine colonies of this species were observed within or adjacent to the Project area. This species has been delisted in Connecticut. No further action is planned.
Low frost weed	*Helianthemum propinquum*	-	CT T	State-listed plant presence/absence surveys conducted June, July and September 2014. This species was not located.
New England grape	*Vitis x novae-angliae*	-	CT SSC	State-listed plant presence/absence surveys conducted June, July and September 2014. This species was not located.

Source: Species list is based on consultations with the USFWS, CTNDDB.

a: Status Key:
T = Threatened,
E = Endangered,
SSC = Species of Special Concern

During the active period for the Eastern box turtle, Eastern hognose snake and wood turtle (March 15 through October 31), Tennessee will provide Environmental Inspectors (EIs), any time construction activity (including tree and other vegetation removal/management) occurs within the mapped CT NDDB polygons, which intersect the Project area, to ensure these animals are protected from harm to the extent practicable. Should any of these reptile species be observed within active workspace, the EI will remove the individual from harm's way and relocate the animal to the closest suitable habitat, while still ensuring the animal's safety.

With the exception the American kestrel and the brown thrasher, all of the birds listed in Table One are ground nesters. The American kestrel nests in tree cavities and the brown thrasher typically nests in dense shrub/sapling thickets. In an effort to avoid negatively impacting these bird species during construction, during the breeding season (March 15 through August 15), Tennessee will provide EIs any time construction activity (including tree and other vegetation removal/management) occurs within the mapped CT NDDB polygons, which intersect the Project area, to ensure these animals and their nest sites are adequately protected during construction and any observed breeding activity is not disturbed. Should an active nest site for any of the birds species identified in Table One be observed, construction in the vicinity of the nest site will be halted until such time as the

eggs can hatch and/or hatchlings develop to a point where they can fledge and leave the vicinity of the nest site.

Of the two listed freshwater mussels identified by the CT NDDB and USFWS as potentially occurring with Stony and Muddy Brooks, site specific presence/absence surveys of both proposed stream crossing locations identified only one species as present, the federal and state listed dwarf wedgemussel. The state listed brook floater was not located in either watercourse. Tennessee's freshwater mussel consultant (Biodrawversity, L.L.C.) has prepared a mussel relocation and monitoring plan (the "Plan"), which has been submitted as part of the previously filed Section 401 Water Quality Certification application for the Project. In an effort to safeguard the existing dwarf wedge mussel population observed in both Stony and Muddy Brooks, Tennessee is fully committed to implementing the Plan as written.

Regarding terrestrial invertebrates, Dr. David Wagner from the Center for Conservation and Biodiversity, at the University of Connecticut, performed habitat assessments for the ten state listed invertebrate species identified in Table One. The report entitled, "Connecticut Expansion Project Invertebrate Habitat Assessment" was submitted directly to the CT NDDB and was also included in the Section 401 Water Quality Certification application for the Project. Due to the unsuitable nature of the Project area habitats and their inability to support the identified species, no meaningful mitigation measures were identified.

As a result of consultations with the CT NDDB, four state listed plant species were identified as potentially occurring within or proximate to the Project area (see Table One). Accordingly, Tennessee's consultant, AECOM, conducted plant surveys along the ROW in the identified areas. As with the survey reporting for the other state and/or federal listed species, the report was submitted directly to the CT NDDB and was likewise included within the Section 401 Water Quality Certification application for the Project. As a result of the plant surveys, only one of the four identified plant species was located within the Project area. Nine populations of the squarrose sedge were observed in Suffield. However, this species has subsequently been delisted in Connecticut and no further action is planned for the species.

Lastly, in addition to requesting any updated state listed data proximate to the Project, for compliance with the new federal 4(d) rule regarding the Northern long-eared bat (*Myotis septentrionalis*), Tennessee is requesting data relative to the nearest locations of any documented hibernacula and/or confirmed maternity roosting trees for this species.

Please contact either Timothy O'Sullivan at tim.osullivan@aecom.com or 978-621-6756 or Brian Benito Jr. at Brian_Benito@KinderMorgan.com or 860-763-6052 if you have any questions regarding any of the information provided with this submittal.

Thank you for you continued attention to this Project.

Sincerely,

Timothy O'Sullivan, MS, PWS
Wetland and Wildlife Biologist

Attachments:

A1, Request for State Listed Species Review NDDB Form
A, U.S.G.S. Topographic Overview Mapping
B, Project Shapefiles (electronic)
C, Project Alignment Sheets (electronic)
D, State-Listed Species Reports (Terrestrial Invertebrates, Freshwater Mussels, Plants)
E, Resumes
F, Executive Summary from 401 Water Quality Certification Application (Attachment A from 401)
G, Environmental Assessment Report from 401 Water Quality Certification Application (Attachment K from 401)

Connecticut Department of
Energy & Environmental Protection
Bureau of Natural Resources
Wildlife Division

CPPU USE ONLY
App #:_____
Doc #:_____
Check #: No fee required
Program: Natural Diversity Database Endangered Species
Hardcopy _____ Electronic _____

Request for Natural Diversity Data Base (NDDB) State Listed Species Review

Please complete this form in accordance with the instructions (DEEP-INST-007) to ensure proper handling of your request.
There are no fees associated with NDDB Reviews.

Part I: Preliminary Screening & Request Type

Before submitting this request, you must review the most current Natural Diversity Data Base "State and Federal Listed Species and Significant Natural Communities Maps" found on the DEEP website. These maps are updated twice a year, usually in June and December.

Does your site, including all affected areas, fall in an NDDB Area according to the map instructions:

☒ Yes ☐ No **Enter the date** of the map reviewed for pre-screening: **February 1, 2016**

This form is being submitted for a :	
☐ *New* NDDB request ☒ *Renewal/Extension* of a NDDB Request, ***without*** *modifications and within* ***one year*** *of issued NDDB determination* (no attachments required) [*CPPU Use Only - NDDB-Listed Species Determination* # 1736]	☐ *New* **Safe Harbor Determination** (optional) must be associated with an application for a GP for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities ☐ *Renewal/Extension* of an existing Safe Harbor Determination ☐ With modifications ☐ Without modifications (no attachments required) [*CPPU Use Only - NDDB-Safe Harbor Determination* # 1736]
Enter NDDB Determination Number for Renewal/Extension: 201304121	Enter Safe Harbor Determination Number for Renewal/Extension:

Part II: Requester Information

If the requester is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, the name shall be stated **exactly as it is registered with the Secretary of State. Please note, for those entities registered with the Secretary of State, the registered name will be the name used by DEEP. This information can be accessed at the Secretary of the State's database CONCORD.* (www.concord-sots.ct.gov/CONCORD/index.jsp)

If the requester is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).

If there are any changes or corrections to your company/facility or individual mailing or billing address or contact information, please complete and submit the Request to Change company/Individual Information to the address indicated on the form.

1. Requester*

Company Name: **AECOM, Inc.**

Contact Name: **Timothy O'Sullivan**

Address: **500 Enterprise Drive**

City/Town: **Rocky Hill** State: **CT** Zip Code: **06067**

Business Phone: **978-621-6756** ext.

E-mail: **tim.osullivan@aecom.com

**By providing this email address you are agreeing to receive official correspondence from the department, at this electronic address, concerning this request. Please remember to check your security settings to be sure you can receive emails from "ct.gov" addresses. Also, please notify the department if your e-mail address changes

a) Requester can best be described as:

☐ Individual ☐ Federal Agency ☐ State agency ☐ Municipality ☐ Tribal

☒ *business entity (* if a business entity complete i through iii):

i) Check type ☒ corporation ☐ limited liability company ☐ limited partnership ☐ limited liability partnership ☐ statutory trust ☐ Other:

ii) Provide Secretary of the State Business ID #: 0219889 This information can be accessed at the Secretary of the State's database (CONCORD). (www.concord-sots.ct.gov/CONCORD/index.jsp)

iii) ☐ Check here if your business is **NOT** registered with the Secretary of State's office.

b) Acting as (Affiliation), pick one:

☐ Property owner ☒ Consultant ☐ Engineer ☐ Facility owner ☐ Applicant

☐ Biologist ☐ Pesticide Applicator ☐ Other representative:

2. List Primary Contact to receive Natural Diversity Data Base correspondence and inquiries, if different from requester.

Company Name:

Contact Person: Title:

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext.

**E-mail:

Part III: Site Information

This request can only be completed for one site. A separate request must be filed for each additional site.

1. SITE NAME AND LOCATION

Site Name or Project Name: **CT Expansion Project**

Town(s): **Suffield, East Granby**

Street Address or Location Description:
Project will be located along existing pipeline corridor starting in East Granby following the corridor north to the CT/MA border in Suffield, CT (see attached Figures)

Size in acres, or site dimensions: **approx. 8 miles long x 200 feet wide**

Latitude and longitude of the center of the site in decimal degrees (e.g., 41.23456 -71.68574):

Latitude: **Start: 41.932997 End: 42.031317** Longitude: **Start: -72.706232 End: -72.635078**

Method of coordinate determination (check one):

☐ GPS ☒ Photo interpolation using CTECO map viewer ☐ Other (specify):

2a. Describe the current land use and land cover of the site.

The proposed pipeline expansion will occur largely within an existing pipeline ROW that includes the following land uses: open space, forested uplands and wetlands, watercourses, agricultural lands, Farm and Ranchland Protection Program lands, Suffield Town owned land, residential and commercial lands.

b. Check all that apply and enter the size in acres or % of area in the space after each checked category.

☒ Industrial/Commercial <5% ☒ Residential 5% ☒ Forest 15%

☒ Wetland <25% ☒ Field/grassland 10% ☒ Agricultural 50%

☒ Water <5% ☒ Utility Right-of-way 90%

☒ Transportation Right-of-way <5% ☐ Other (specify): _____

Part IV: Project Information

1. PROJECT TYPE:

Choose Project Type: Utility construction/modification , If other describe: _____

2. Is the subject activity limited to the maintenance, repair, or improvement of an existing structure within the existing footprint? ☐ Yes ☒ No If yes, explain.

Part IV: Project Information (continued)

3. Give a detailed description of the activity which is the subject of this request and describe the methods and equipment that will be used. Include a description of steps that will be taken to minimize impacts to any known listed species.

   See cover letter.

4. If this is a renewal or extension of an existing Safe Harbor request *with* modifications, explain what about the project has changed.

5. Provide a contact for questions about the project details if different from Part II primary contact.

   Name: **Mr. Brian Benito Jr., Kinder Morgan, EHS - Permitting**

   Phone: **860-763-6052**

   E-mail: **Brian_Benito@KinderMorgan.com**

Part V: Request Requirements and Associated Application Types

Check *one* box from either Group 1, Group 2 *or* Group 3, indicating the appropriate category for this request.

Group 1. If you check one of these boxes, complete Parts I – VII of this form and submit the required attachments A and B.

- ☐ Preliminary screening was negative but an NDDB review is still requested
- ☐ Request regards a municipally regulated or unregulated activity (no state permit/certificate needed)
- ☐ Request regards a preliminary site assessment or project feasibility study
- ☐ Request relates to land acquisition or protection
- ☐ Request is associated with a *renewal* of an existing permit, with no modifications

Group 2. If you check one of these boxes, complete Parts I – VII of this form and submit required attachments A, B, *and* C.

- ☐ Request is associated with a *new* state or federal permit application
- ☐ Request is associated with modification of an existing permit
- ☐ Request is associated with a permit enforcement action
- ☒ Request regards site management or planning, requiring detailed species recommendations
- ☐ Request regards a state funded project, state agency activity, or CEPA request

☐ **Group 3.** If you are requesting a **Safe Harbor Determination**, complete Parts I-VII and submit required attachments A, B, and D. Safe Harbor determinations can only be requested if you are applying for a GP for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities

If you are filing this request as part of a state or federal permit application(s) enter the application information below.

Permitting Agency and Application Name(s):
CT DEEP, Section 401 Water Quality Certification Application, CT Expansion Project

State DEEP Application Number(s), if known: _____

State DEEP Enforcement Action Number, if known: _____

State DEEP Permit Analyst(s)/Engineer(s), if known: _____

Is this request related to a previously submitted NDDB request? ☒ Yes ☐ No

If yes, provide the previous NDDB Determination Number(s), if known: **201304121**

Part VI: Supporting Documents

Check each attachment submitted as verification that *all* applicable attachments have been supplied with this request form. Label each attachment as indicated in this part (e.g., Attachment A, etc.) and be sure to include the requester's name, site name and the date. **Please note that Attachments A and B are required for all new requests and Safe Harbor renewals/extensions with modifications.** Renewals/Extensions with no modifications do not need to submit any attachments. Attachments C and D are supplied at the end of this form.

☒ Attachment A:	**Overview Map:** an 8 1/2" X 11" print/copy of the relevant portion of a USGS Topographic Quadrangle Map clearly indicating the exact location of the site.
☒ Attachment B:	**Detailed Site Map:** fine scaled map showing site boundary and area of work details on aerial imagery with relevant landmarks labeled. (Site and work boundaries in GIS [ESRI ArcView shapefile, in NAD83, State Plane, feet] format can be substituted for detailed maps, see instruction document)
☒ Attachment C:	**Supplemental Information, Group 2 requirement (attached, DEEP-APP-007C)** ☐ Section i: Supplemental Site Information and supporting documents ☒ Section ii: Supplemental Project Information and supporting documents
☐ Attachment D:	**Safe Harbor Report Requirements, Group 3 (attached, DEEP-APP-007D)**

Part VII: Requester Certification

The requester *and* the individual(s) responsible for actually preparing the request must sign this part. A request will be considered incomplete unless all required signatures are provided.

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief."

Signature of Requester (a typed name will substitute for a handwritten signature)	Date
Timothy O'Sullivan MS, PWS	**2/10/16**
Name of Requester (print or type)	Title (if applicable)
Signature of Preparer (if different than above)	Date
Name of Preparer (print or type)	Title (if applicable)

Note: Please submit the completed Request Form and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

Or email request to: **deep.nddbrequest@ct.gov**

Attachment C: Supplemental Information, Group 2 requirement

Section i: Supplemental Site Information

1. Existing Conditions

Describe all natural and man-made features including wetlands, watercourses, fish and wildlife habitat, floodplains and any existing structures potentially affected by the subject activity. Such features should be depicted and labeled on the site plan that must be submitted. Photographs of current site conditions may be helpful to reviewers.

See cover letter and alignment sheets.

☐ **Site Photographs (optional) attached**

☒ **Site Plan/sketch of existing conditions attached**

2. Biological Surveys

Has a biologist visited the site and conducted a biological survey to determine the presence of any endangered, threatened or special concern species ☒ Yes ☐ No

If yes, complete the following questions and submit any reports of biological surveys, documentation of the biologist's qualifications, and any NDDB survey forms.

Biologist(s) name: See 401 Water Quality Certification Application

Habitat and/or species targeted by survey: See 401 Water Quality Certification Application

Dates when surveys were conducted: See 401 Water Quality Certification Application

☐ **Reports of biological surveys attached**

☐ **Documentation of biologist's qualifications attached**

☐ **NDDB Survey forms for any listed species observations attached**

Section ii: Supplemental Project Information

1. Provide a schedule for all phases of the project including the year, the month and/or season that the proposed activity will be initiated and the duration of the activity.

   See 401 Water Quality Certification Application

2. Describe and quantify the proposed changes to existing conditions and describe any on-site or off-site impacts. In addition, provide an annotated site plan detailing the areas of impact and proposed changes to existing conditions.

   See 401 Water Quality Certification Application

☐ **Annotated Site Plan attached**

Attachment D: Safe Harbor Report Requirements

Submit a report, as Attachment D, that synthesizes and analyzes the information listed below. Those providing synthesis and analysis need appropriate qualifications and experience. A request for a safe harbor determination shall include:

1. **Habitat Description and Map(s), including GIS mapping overlays, of a scale appropriate for the site, identifying:**

   - wetlands, including wetland cover types;
   - plant community types;
   - topography;
   - soils;
   - bedrock geology;
   - floodplains, if any;
   - land use history; and
   - water quality classifications/criteria.

2. **Photographs** - The report should include photographs of the site taken from the ground and also all reasonably available aerial or satellite photographs and an analysis of such photographs.

3. **Inspection** - A visual inspection(s) of the site should be conducted, preferably when the ground is visible, and described in the report. This inspection can be helpful in confirming or further evaluating the items noted above.

4. **Biological Surveys** - The report should include all biological surveys of the site where construction activity will take place that are reasonably available to a registrant. A registrant shall notify the Department's Wildlife Division of biological studies of the site where construction activity will take place that a registrant is aware of but are not reasonably available to the registrant.

5. **Based on items #1 through 4 above, the report shall include a Natural Resources Inventory of the site of the construction activity.** This inventory should also include a review of reasonably available scientific literature and any recommendations for minimizing adverse impacts from the proposed construction activity on listed species or their associated habitat.

6. **In addition, to the extent the following is available at the time a safe harbor determination is requested, a request for a safe harbor determination shall include and assess:**

   - Information on Site Disturbance Estimates/Site Alteration information
   - Vehicular Use
   - Construction Activity Phasing Schedules, if any; and
   - Alteration of Drainage Patterns

Connecticut Department of

ENERGY &
ENVIRONMENTAL
PROTECTION

November 23, 2013

Ms. Julia Stearns
AECOM Environment
10 Orms Street, Suite 405
Providence, RI 02901

Project: Preliminary Assessment of Tennessee Gas Pipeline Company Connecticut Expansion Project, Suffield to East Granby, Connecticut
NDDB Determination No.: 201304121

Dear Ms. Stearns,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map provided for the Preliminary Assessment of Tennessee Gas Pipeline Company Connecticut Expansion Project, Suffield to East Granby, Connecticut. I have attached a list of Federal and State Listed species that are known to occur within your project boundaries. Please be advised that this is a preliminary review and not a final determination. A more detailed review will be necessary to move forward with any subsequent environmental permit applications submitted to DEEP for the proposed project. This determination is good for one year.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. The result of this review does not preclude the possibility that listed species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits.

Please contact me if you have further questions at (860) 424-3592, or dawn.mckay@ct.gov . Thank you for consulting the Natural Diversity Data Base.

Sincerely,

Dawn M. McKay

Dawn M. McKay
Environmental Analyst 3

Species List for Request Number R201304121

11/23/2013

Scientific Name	Common Name	State Protection Status
Animals		
Alasmidonta heterodon	Dwarf wedge mussel	E
Alasmidonta varicosa	Brook floater	E
Ammodramus savannarum	Grasshopper sparrow	E
Apamea burgessi	Apamea moth	SC
Bartramia longicauda	Upland sandpiper	E
Brachinus cyanipennis	Bombardier beetle	SC
Cicindela formosa generosa	Pine barrens tiger beetle	SC
Circus cyaneus	Northern harrier	E
Dolichonyx oryzivorus	Bobolink	SC
Eremophila alpestris	Horned lark	E
Euchlaena madusaria	Scrub euchlaena	SC
Eumacaria latiferrugata	Brown-bordered geometer	SC
Euxoa violaris	Violet dart moth	T
Falco sparverius	American kestrel	T
Glyptemys insculpta	Wood turtle	SC
Grammia phyllira	Phyllira tiger moth	E
Harpalus eraticus	Ground beetle	SC
Heterodon platirhinos	Eastern hognose snake	SC
Passerculus sandwichensis	Savannah sparrow	SC
Pooecetes gramineus	Vesper sparrow	E
Schinia spinosae	Noctuid moth	SC
Sturnella magna	Eastern meadowlark	SC
Terrapene carolina carolina	Eastern box turtle	SC
Tetragonoderus fasciatus	Ground beetle	SC
Toxostoma rufum	Brown thrasher	SC
Natural Communities		
Sand barren		
Plants		
Carex bushii	Sedge	SC
Carex squarrosa	Sedge	SC
Helianthemum propinquum	Low frostweed	T
Vitis x novae-angliae	New England grape	SC

E = Endangered, T = Threatened, SC = Special Concern, SC* = Special Concern, Presumed Extirpated

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Tennessee Gas Pipeline Company, L.L.C.

Implementation Plan

Attachment B

Federal Permits and Approvals

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
http://www.fws.gov/newengland

March 21, 2014

Ms. Julia Stearns
AECOM
10 Orms Street, Suite 405
Providence, Rhode Island 02904

Dear Ms. Stearns:

This responds to your correspondence, dated September 29, 2013, requesting information on the presence of federally listed and/or proposed endangered or threatened species in relation to the Tennessee Gas Pipeline Company's proposal to construct and operate the Connecticut Expansion Project. Additional information was received on November 11, 2013. The project involves the installation of approximately 13.3 miles of pipeline looping (installation of new pipeline along existing pipeline within active rights-of-way) in New York, Massachusetts and Connecticut. Pursuant to section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1533), federal agencies, including the Federal Energy Regulatory Commission, have a responsibility to consult with the U. S. Fish and Wildlife Service (Service) when projects they fund, authorize, or carry out result in effects to federally listed or proposed species. Our comments are provided in accordance with section 7 of the ESA.

This letter addresses only those portions of the project located in Massachusetts and Connecticut. For review of the New York portions of the project, please send a duplicate request for review package to the Service's New York Field Office at 3817 Luker Road, Cortland, New York 13045.

Endangered Species

Dwarf wedgemussel

The 8.1-mile-long Line 300 loop extending from East Granby, Connecticut north to the Massachusetts border crosses Muddy Brook at a point located approximately 4.75 miles north of the proposed project's southernmost point. The federally endangered dwarf wedgemussel (*Alasmidonta heterodon*) is known to occur at several upstream and downstream locations within close proximity to the project area in Muddy Brook. Accordingly, this species may occur in the project area. Since the proposed project crosses habitat known to support dwarf wedgemussel, further consultation with

this office regarding the project is recommended. Specifically, we request project-specific details regarding construction techniques including erosion and sedimentation control measures, along with your determination as to whether or not the proposed crossing of Muddy Brook may affect the dwarf wedgemussel or its habitat.

Species Undergoing Review

In an effort to improve ESA implementation, the Service developed a multiyear-listing work plan that will enable the agency to systematically review and address the needs of more than 250 species listed on the 2010 Candidate Notice of Review, to determine if they should be added to the Federal Lists of Endangered and Threatened Wildlife and Plants. This work plan was subsequently filed as part of a Multi-District Litigation (MDL) court-approved settlement agreement with the Center for Biological Diversity and WildEarth Guardians, whereby the Service has committed to publish certain ESA listing actions (i.e., petition findings, listing determinations, and critical habitat designations) in fiscal years (FY) 2013 to 2016 (the federal fiscal year ends September 30). The Service recently extended the MDL work plan to include FYs 2017 and 2018 (see the work plan available at: http://www.fws.gov/endangered/improving_ESA/listing_workplan_FY13-18.html [accessed March 2014]).

Although not currently listed, the New England cottontail rabbit (*Sylvilagus transitionalis*) and the northern long-eared bat (*Myotis septentrionalis*) are species that appear on the MDL work plan and may occur in the vicinity of the project. While there is currently no legal obligation to avoid affecting the habitat of these species at the present time, the Service strongly encourages their consideration during project planning. Early consideration of these species in project planning may allow the project to be designed in a manner that avoids adverse effects to these species. This early consideration may help to avert future project delays, since a determination that listing of these species under authority of the ESA is warranted will trigger the need for consultation pursuant to section 7 of the ESA.

New England cottontail

The Service's MDL work plan schedule specifies that we will develop a Proposed Rule to list the New England cottontail or conclude that listing of the New England cottontail is not warranted during FY 2015. We are not aware that any comprehensive surveys or other studies have been conducted for this species within the project area. However, the 3.8-mile-long Line 200 portion of the project located in Berkshire County, Massachusetts is located in an area known to be occupied by the New England cottontail. Vegetation management along utility rights-of-way can have a significant impact on the New England cottontail. Long-term management that converts scrub-shrub corridors into herbaceous vegetative cover eliminates habitat and hinders cottontail dispersal, while short-term management of shrubs results in a temporary impact to habitat. These short-term impacts to shrub communities may be necessary to ensure vegetation succession does not proceed to the point where habitat is no longer suitable for the New England cottontail. Given the conservation status of the New England cottontail and their potential presence in the project area, consideration of the species during project planning is strongly advised.

Northern long-eared bats

The northern long-eared bat is currently proposed for listing under the ESA. The Service's MDL work plan schedule indicates that we will develop a Final Rule to list the northern long-eared bat or conclude that listing of the species is not warranted during FY 2014. During summer months, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat species appears to be opportunistic in selecting roosts, using various tree species based on suitability to retain bark or provide cavities or crevices. It has also been found in rare instances roosting in structures like barns and sheds.

Lines 200 and 300 are both located within the known range of the northern long-eared bat. Since the northern long-eared bat may be listed prior to the completion of the Connecticut Expansion Project, we recommend time-of-year restrictions to avoid cutting of occupied summer roosting habitat during the period of April 1 to September 30. If this time-of-year restriction cannot be implemented, further consultation to determine impacts of the project to this species is recommended to avoid potential project delays in the event the species becomes listed.

Thank you for your coordination on this project. Please contact Maria Tur of this office at 603-223-2541 with any additional information or for further assistance.

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

cc: FERC
Tennessee Gas
FWS, New York Field Office,
MaryEllen VanDonsel
Reading file
ES: MTur:3-21-14:603-223-2541

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, NY 13045

October 16, 2015

Mr. Timothy O'Sullivan
Project Manager
AECOM
10 Orms Street, Suite 405
Providence, RI 02904

Dear Mr. O'Sullivan:

This responds to your September 14, 2015, letter regarding Tennessee Gas Pipeline Company's proposal to construct and operate the Connecticut Expansion Project that will be located in New York, Massachusetts, and Connecticut. The project involves 13.3 miles of pipeline looping, which is the installation of new pipeline along an existing pipeline within an active right-of-way. This letter specifically addresses portions of the project that are proposed in New York. Separate correspondence will be needed for the Massachusetts and Connecticut portions of the project. The New York portion, known as the "New York Loop", involves the construction of new 36-inch pipeline looping totaling 1.35 miles in the Town of Bethlehem, Albany County. The pipeline will be built along the south side of the existing line.

As you are aware, federal agencies, such as the Federal Energy Regulatory Commission (FERC), have responsibilities under Section 7 of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to consult with the U.S. Fish and Wildlife Service (Service) regarding projects that may affect federally-listed species or designated critical habitat, and confer with the Service regarding projects that are likely to jeopardize federally-proposed species or adversely modify proposed critical habitat. We understand that all FERC licensees, applicants, pipeline companies, and their representatives have been designated the FERC's non-federal representative for the purposes of completing informal consultation pursuant to Section 7(a)(2) of the ESA.

On behalf of the FERC, AECOM has determined that the proposed project "may affect, but is not likely to adversely affect," the federally-listed threatened northern long-eared bat (*Myotis septentrionalis*; NLEB). While there is a NLEB hibernaculum within 2.0 miles of the project area, the Service concurs with your determination given that no known roosts are located within or adjacent to the project area, a relatively small number of trees are proposed for removal (approximately 4.5 acres), and trees will be removed between October 1 and March 31, when bats are in hibernation.

We also encourage the incorporation of the following conservation measures into the project to further avoid and minimize impacts to this species:

- Bright orange construction fencing and flagging will be used to demarcate trees to be protected compared with those to be cut prior to the initiation of any construction;

- Artificial dyes, coloring, insecticide, algaecide, and/or herbicides will not be used around waterbodies for long-term maintenance of the pipeline; and

- The number of lights will be limited and will include motion sensors, be shielded, and will be directed downward toward the ground and buildings.

Should project plans change, or if additional information on listed or proposed species or critical habitat becomes available, this determination may be reconsidered. The most recent compilation of federally-listed and proposed endangered and threatened species in New York is available for your information. Until the proposed project is complete, we recommend that you check our website every 90 days from the date of this letter to ensure that listed species presence/absence information for the proposed project is current.*

Any additional information regarding the proposed project and its potential to impact listed species should be coordinated with both this office and with the New York State Department of Environmental Conservation.

Thank you for your time. If you require additional information or assistance please contact Noelle Rayman at 607-753-9334. Future correspondence with us on this project should reference project file 130813.

Sincerely,

Patricia Cole

for David A. Stilwell
Field Supervisor

*Additional information referred to above may be found on our website at:
http://www.fws.gov/northeast/nyfo/es/section7.htm

cc: NYSDEC, Albany, NY (Env. Permits, C. Herzog)
NYSDEC, Schenectady, NY (Env. Permits)

Miller, Shannon

From: Rayman, Noelle <noelle_rayman@fws.gov>
Sent: Tuesday, February 23, 2016 8:03 AM
To: Bevan, Liam
Cc: OSullivan, Tim
Subject: Re: NY loop_USFWS_Cleared_Eagles

Thanks Liam - I see no concerns for bald eagles for this project.

On Tue, Feb 23, 2016 at 7:56 AM, Bevan, Liam <Liam.Bevan@aecom.com> wrote:

Hi Noelle,

I am sorry for the trouble with the GIS shapefile. Please see the attached .zip file that includes the NY facilities GIS data. If you have any trouble with this file as well, please let me know so that I can get in touch with our GIS folks to see what is happening. Thank you very much for your assistance!

Regards,

Liam Bevan

AECOM Environment

Northeast Region

Mobile – 413.887.1222

liam.bevan@aecom.com

From: Rayman, Noelle [mailto:noelle_rayman@fws.gov]
Sent: Tuesday, February 23, 2016 7:41 AM
To: Bevan, Liam
Subject: Fwd: NY loop

Good morning, Liam. Please see the email below regarding the GIS files that were submitted to us. Is there anyway that you can send corrected files via email?

---------- Forwarded message ----------
From: **Andy Lowell** <andy_lowell@fws.gov>
Date: Tue, Feb 23, 2016 at 7:32 AM
Subject: NY loop
To: Noelle Rayman <noelle_rayman@fws.gov>

Hi Noelle, there is one GIS file on the CT Expansion disc that will not open, called NY Loop.shp (the zip file was intact so they may have forgotten a supporting file or something)

I don't know if it's important and there's no metadata…. Can you check on it if you think it's important?
Thanks,

Andy Lowell

GIS Specialist

U.S. Fish & Wildlife Service

3817 Luker Rd.

Cortland, NY 13045

(607) 753-9334

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Noelle L. Rayman

Endangered Species Biologist

U. S. Fish and Wildlife Service

New York Field Office

3817 Luker Road

Cortland, NY 13045

Phone: 607-753-9334

Fax: 607-753-9699

E-mail: noelle_rayman@fws.gov

http://www.fws.gov/northeast/nyfo/

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits & Pollution Prevention
625 Broadway, 4th Floor, Albany, New York 12233-1750
P: (518) 402-9167 | F: (518) 402-9168 | deppermitting@dec.ny.gov
www.dec.ny.gov

February 3, 2016

Mr. Mark Gardella
Vice President
AECOM Environment
10th Orms St., Suite 405
Providence, RI 02904

RE: Connecticut Expansion Project
DEC Permit #4-0122-00296/00001 Water Quality Certificate

Dear Mr. Gardella:

In conformance with the requirements of the State Uniform Procedures Act (Article 70, ECL) and its implementing regulations (6NYCRR, Part 621) we are enclosing your permit for the above Connecticut Expansion Project. The permit will be effective on 15 Feb 2016 and expires on 14 Feb 2021.

Please read all permit conditions carefully. All permit documents must be available upon request by the Department staff as well as distributed to and understood by your personnel responsible for the proper operation of the facility and compliance with the discharge limits.

Please be reminded that Tennessee Gas Pipeline Company, LLC is responsible for informing its contractors, employees, agents and assigns of their responsibility to comply with terms and conditions of the permit and this authorization while acting as its agent with respect to permitted activities. Such persons, as listed above, are subject to the same sanctions for permit violations as prescribed for Tennessee Gas Pipeline Company, LLC.

If you have any questions, contact me by phone at (518) 402-9150, or by email at rudyard.edick@dec.ny.gov.

Sincerely,

Rudyard G. Edick

Rudyard G. Edick
Project Manager
Major Projects Management Section
Division of Environmental Permits

enc: Permit #4-0122-00296/00001

cc: K Bose, FERC
A. Dangler, USACE
B Sherwood, USACE
W. Clarke, DEC Region 4
DEC Review Team

PERMIT
Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
TENNESSEE GAS PIPELINE COMPANY LLC
1001 LOUISIANA ST STE 1460C

HOUSTON, TX 77002
(713) 420-5027

Facility:
CONNECTICUT EXPANSION PROJECT
1.4 MI ALONG EXISTING E/W ROW
CROSSING MEADS LN AND FEURA BUSH RD
BETHELEM, NY

Facility Location: in BETHLEHEM in ALBANY COUNTY **Village:** Bethlehem
Facility Principal Reference Point: NYTM-E: 595.018 NYTM-N: 4716.183
Latitude: 42°35'32.0" Longitude: 73°50'30.8"
Project Location: Runs E to W along an existing ROW for 1.4 mi across Meads Ln & Feura Bush Rd
Authorized Activity: Install a 36-inch natural gas pipeline through three unprotected streams and federal wetlands for the purpose of expanding gas delivery capacity of the existing Tennessee (TN) Gas Pipeline. The new line will be a total of 1.4 miles in length and will parallel the existing natural gas transmission line.

Permit Authorizations

Water Quality Certification - Under Section 401 - Clean Water Act
Permit ID 4-0122-00296/00001
New Permit Effective Date: 2/15/2016 Expiration Date: 2/14/2021

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: CHRISTOPHER M HOGAN, Deputy Chief Permit Administrator
Address: NYSDEC Headquarters
625 Broadway
Albany, NY 12233

Authorized Signature: Christopher M. Hogan Date 2/2/15

Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

WATER QUALITY CERTIFICATION SPECIFIC CONDITION

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: WATER QUALITY CERTIFICATION

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by Tennessee (TN) Gas Pipeline Co LLC and include: USACE Joint Application for CT Expansion Project, July 2014; Response to DEC Incomplete Application Notice, Addressed to DEC, 24 Apr 15; TN Gas Letter w/ Revised Drawings To DEC, 7 Dec 15.

2. **Project Supervision** The permittee is responsible for supervising this project, and shall ensure that all necessary measures are employed to prevent environmental degradation and to ensure successful mitigation.

3. **Human or Archaeological Remains** If any human remains or archaeological remains are encountered during excavation, the permittee must immediately cease, or cause to cease, all work in the area of the remains and notify

Regional Permit Administrator
NYSDEC Region 4 Headquarters
1130 N Westcott Rd
Schenectady, NY12306

Work shall not resume until written permission to do so has been received from the Department.

4. **Precautions Against Contamination of Waters** All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

5. **Control Erosion During Construction** Provisions shall be made to minimize erosion during the construction of the project and to prevent increased sedimentation in any water body on or adjacent to the project.

6. **Trench Across Stream/Wetland** The stream pipeline crossing trench shall be opened, installation accomplished and backfilled in one continuous operation.

7. **Equipment Storage 100' from Wetland, Water Body** All equipment and machinery shall be stored and safely contained greater than 100 feet landward of the regulated wetland or water body at the end of each work day. This will serve to avoid the inadvertent leakage of deleterious substances into the regulated area.

8. **In-Stream Work** All in-stream work shall be conducted during a period of no or low-flow. The in-stream work areas shall be dewatered during construction through the use of a temporary cofferdam, pump system or equivalent measures. Upon completion of the in-stream work, the temporary fills shall be removed from the stream and the bed and banks shall be restored to pre-construction conditions and properly stabilized.

9. **Impact to Deep Pools** When a stream crossing involves an impact to a deep pool, avoidance measures should be specified to focus, particularly, on dewatering activities during construction.

10. **Pipeline Installation.** Plans, in accordance with TN Gas 24 April 2015 letter to the NYS DEC, should ensure the pipeline will be installed a minimum of 5 feet below the streambed and proper dewatering acccomplished while maintaining a passage of aquatic organisms.

11. **Restore Pre-Construction Contours** Restore bed and banks of stream to original contours

12. **Maintain Stream Slopes** Appropriate measures - as specified in TN Gas Pipeline's 24 April 2015 letter addressed to NYS DEC - shall be taken to maintain the stability of steep slopes in the vicinity of stream crossings both during construction and post-construction. Bank stabiliziation measures, as specified in the same document cited above, shall be taken based on the grade and elevation of the bank. Simply grading, seeding and mulching stream banks is not adquate stabilization although woody vegetation is encouraged as a stabilizing technique.

13. **Management of Excess Fill** Excess fill material removed from the stream bed, including native rocks, must be managed in an upland area outside of the stream's floodplain and shall not be bermed along the stream banks.

14. **Water Clarity** There shall be no visible contrast in water clarity between the upstream reaches of the construction areas and downstream of construction areas.

15. **Temporary Stream Crossings** Proper stream crossing techniques, including temporary bridges or temporary culverts, shall be employed to cross streams which have flowing water at the time of construction. Temporary stream crossings shall be removed immediatcly following completion of construction and stream bed and banks shall be restored to pre-project conditions.

16. **Stabilize Disturbed Areas** All areas of soil disturbance resulting from this project shall be stabilized immediately following project completion or prior to permit expiration, whichever comes first. The approved methodologies are as follows:

    a. Stabilization of the entire disturbed area with appropriate vegetation (grasses, etc.).

    b. Stabilized as per specifications identified on approved plans.

    c. Temporarily stabilized with straw mulch or jute matting or other similar natural fiber matting within 1 week of final grading. Temporary stabilization shall be maintained until a mature vegetative cover is established.

17. **State Not Liable for Damage** The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations

undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

18. State May Require Site Restoration If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

19. State May Order Removal or Alteration of Work If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

20. Hydrostatic Pipe Testing Discharges If hydrostatic pipe test water is discharged to ground surfaces including wetlands, streams or other water bodies, such water shall only be discharged to heavily-vegetated and well stabilized areas or adequately sized filter bags that will not result in any soil erosion, sedimentation or turbid waters. Discharge rates shall not exceed 1,200 gpm and discharges shall employ energy dissipation devices, and sediment barriers, as necessary, to prevent erosion, sedimentation, turbidity and stream bed scour.

WATER QUALITY CERTIFICATION SPECIFIC CONDITIONS

1. Water Quality Certification The NYS Department of Environmental Conservation hereby certifies that the subject project will not contravene effluent limitations or other limitations or standards under Sections 301, 302, 303, 306 and 307 of the Clean Water Act of 1977 (PL 95-217) provided that all of the conditions listed herein are met.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. Facility Inspection by The Department The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. **Relationship of this Permit to Other Department Orders and Determinations** Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. **Applications For Permit Renewals, Modifications or Transfers** The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer arc to be submitted to:

Deputy Chief Permit Administrator
NYSDEC Headquarters
625 Broadway
Albany, NY12233

4. **Submission of Renewal Application** The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Water Quality Certification.

5. **Permit Modifications, Suspensions and Revocations by the Department** The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by thc permittee to comply with any terms or conditions of the permit;

c. cxceeding thc scopc of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. **Permit Transfer** Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

OSullivan, Tim

From:	Rayman, Noelle <noelle_rayman@fws.gov>
Sent:	Friday, May 16, 2014 4:02 PM
To:	OSullivan, Tim
Cc:	Banach, Eileen; MaryEllen VanDonsel; Patricia Cole
Subject:	Re: Tracking No: 05E1NY00-2013-LSI-0813, CT Expansion Project_USFWS_concurrance

Thanks Tim for the brief summary of our call. See my responses below.

On Fri, May 16, 2014 at 12:49 PM, OSullivan, Tim <Tim.OSullivan@aecom.com> wrote:

Noelle,

Thank you for your response. As discussed on our telephone call this morning, please see below the major points of our discussion:

1) Kinder Morgan's commitment to remove trees during the period when both Indiana and Northern long-eared bats are within their winter hibernacula (October through March) is sufficient mitigation for these species and no site specific surveys are required. Yes, this is correct. A northern long-eared bat hibernaculum is within 2 miles of the project area so we already assume this species is in the area. Therefore, no surveys will be necessary.

2) Regarding the Karner blue butterfly, based upon the habitat, as described in AECOM's March 14, 2014 letter to your office, as well as the NY USFWS records for this species, your office concurs that the Project will have no effect on this species and no site specific surveys are required. Yes, that is correct.

3) Kinder Morgan's commitment to remove trees during the October through March time period is sufficient mitigation to comply with the Migratory Bird Treaty Act. Yes, that is correct. Tree removal during the late fall/winter months will avoid direct impacts to migratory breeding birds.

4) The NY USFWS is unaware of any Eagle nests and/or significant eagle activity proximate to the Project area and the Project is therefore anticipated to be in compliance with the Bald and Golden Eagle Protection Act. If we become aware of any eagle nest sites proximate to the Project, we will notify your office as soon as possible. Yes, that is correct.

5) Kinder Morgan will perform a Phase I bog turtle habitat assessment, using the Hudson/Housatonic forms. Yes, and we also discussed providing additional photos of the wetlands especially Wetland 008.

If you concur with the summary of our conversation as outlined above, please provide an affirmative response to this e-mail.

Also, the Project will be submitting a FERC filing and will also be submitting an Application with the Army Corp of Engineers. These documents are currently being generated and once submitted, will provide you with the answers to the questions you have outlined below.

Once again, thank you for your time and we appreciate your efforts on this Project.

Tim

From: Rayman, Noelle [mailto:noelle_rayman@fws.gov]
Sent: Friday, May 16, 2014 11:28 AM
To: OSullivan, Tim
Cc: Banach, Eileen; MaryEllen VanDonsel; Patricia Cole
Subject: Re: Tracking No: 05E1NY00-2013-LSI-0813, CT Expansion Project

Hi Tim,

I am now back in the office and have reviewed the information submitted. Please see below for questions that I came up with.

- What is the timeline for project construction?

- I assume that FERC is involved with this project; is the Army Corps involved?

- What is the need for the pipeline? Is it just that the current 1.4 miles section needs replacing?

- Can you please provide a shapefile of the project for our GIS program?

- I assume that with the need for tree removal that the current ROW width will increase in the 1.4 miles section. What is current width vs. proposed width?

- It looks like 3 streams will have to be crossed. All appear to be Class C streams. How will this be done?

- How many wetlands were delineated and what are the size of each?

- What measures are being taken to reduce wetland impacts (i.e., winter work)? How will wetlands be crossed?

- Is there any mitigation associated with the project? If so, please submit plans for our review.

- For bog turtle, please provide any data forms/field notes you have pertaining to the habitat assessment done. I'm particularly interested in Wetland 008. How large is this wetland? Do you have additional photos showing vegetation and hydrology of the site? How large were each of the wetlands assessed for bog turtle? FYI - we have Phase 1 habitat assessment data sheet posted now on our website.

- For northern long-eared bat, it is great that proactive measures are being taken for this species. If this project continues beyond October 2014, the determination will need to change to "may affect, but not likely to adversely affect" because of the time of year restriction that will be implemented for tree removal. The time frame for tree removal is October 1 to March 31.

Please let me know if you have any questions, and I'm in Monday through Wednesday next week if you want to discuss further.

Thank you,

Noelle

On Wed, Apr 30, 2014 at 2:20 PM, OSullivan, Tim <Tim.OSullivan@aecom.com> wrote:

Noelle,

I understand you are in the field today. When you return to the office, can you please let us know when we can expect a response from your office regarding our request for a "No Effect" determination for the subject species?

Thank you.

Tim

From: Rayman, Noelle [mailto:noelle_rayman@fws.gov]
Sent: Monday, April 21, 2014 8:20 AM
To: OSullivan, Tim
Cc: Banach, Eileen; MaryEllen VanDonsel; Patricia Cole
Subject: Re: Tracking No: 05E1NY00-2013-LSI-0813, CT Expansion Project

Hi Tim - thank you for submitting additional information regarding this project. We generally have about 30 days to review a project. I will take a look at what you sent and get back to you if I have any questions.

On Fri, Apr 18, 2014 at 8:28 AM, OSullivan, Tim <Tim.OSullivan@aecom.com> wrote:

Noelle,

Following up on our 3/5/14 conversation regarding the Kinder Morgan Connecticut Expansion Project's NY component and the subsequent e-mail transmittal on 3/13/14, can you please tell me when we can expect a response to our "No effect" determination request for the bog turtle, Karner blue butterfly, Indiana bat and Northern long-eared bat? Also, as noted in the correspondence, we addressed the issue of the Migratory Bird Treaty Act in that submittal and we are requesting concurrence with our approach from your office.

The nature of your response will determine the next steps we take to address the rare species situation on the Project. Therefore, any lead time we can be afforded would be greatly appreciated.

Please contact me at the number below if you have any questions.

We appreciate your time and look forward to working with you on this Project.

Thank you.

Tim

Timothy P. O'Sullivan MS, PWS

Project Manager

Wetland and Wildlife Biologist

tim.osullivan@aecom.com

Cell Phone 978-621-6756

AECOM

500 Enterprise Drive

Suite 1A

Rocky Hill, CT 06067

www.aecom.com

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Noelle L. Rayman

Endangered Species Biologist

U. S. Fish and Wildlife Service

New York Field Office

3817 Luker Road

Cortland, NY 13045

Phone: 607-753-9334 ext. 157

Fax: 607-753-9699

E-mail: noelle_rayman@fws.gov

http://www.fws.gov/northeast/nyfo/

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Noelle L. Rayman

Endangered Species Biologist

U. S. Fish and Wildlife Service

New York Field Office

3817 Luker Road

Cortland, NY 13045

Phone: 607-753-9334 ext. 157

Fax: 607-753-9699

E-mail: noelle_rayman@fws.gov

http://www.fws.gov/northeast/nyfo/

View and/or Address a Response

Project 13PR04583: Tennessee Gas Pipeline - Connecticut Expansion Project (GBBC8H7LXRO7)

View Project

Please accept the following information below as the consolidated response from NYS SHPO for the above referenced submission.

Review Responses

Reviewer	Review Type	Response
Daniel Bagrow	Archaeology	SHPO concurs with the proposed avoidance measures and finds that they are thorough and adequate. Additional submissions for this project can be submitted via CRIS using the email address of a project contact and the project review number. If you have any questions please contact Dan Bagrow at dan.bagrow@parks.ny.gov

Information Requests

Proces	Status	Reviewer	Review Type	Request Type	Request Entity	Request Item	Request Description
No Request Records							

Attachments

Attachme	Reviewer	Review Type	Type	Name	Description
No Attachment Records					

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September 5, 2014

Mr. Ted Uhlemann
Kinder Morgan, Inc.
370 Van Gordon Street
Lakewood, CO 80228

Subject: Tennessee Gas Pipeline Company, LLC Proposed Connecticut Expansion Project
Cultural Resources Documentation and Updated Unanticipated Discovery Plan
FERC Docket #CP14-__-000 (PAL #2875)
East Granby and Suffield, Connecticut

Dear Mr. Uhlemann:

The State Historic Preservation Office (SHPO) has reviewed the following technical reports and project-related documentation in response to your request for our comments regarding potential effects to historic properties, dated July 24, 2014, pursuant to Section 106 of the National Historic Preservation Act, as amended.

Archaeological Overview and Identification Survey, Tennessee Gas Pipeline (Tennessee) Connecticut Expansion Project Connecticut Facilities

Historic Architectural Properties Overview and Identification Survey, Tennessee Gas Pipeline (Tennessee) Connecticut Expansion Project Connecticut Facilities

Procedures Guiding the Discovery of Unanticipated Historic Properties and Human Remains: Post-Review Discoveries (36 CFR 800.13)

SHPO understands that Tennessee Gas Pipeline Company, LLC (Tennessee) plans to increase its capacity and reliability to service natural gas customers in the Northeast. As part of this expansion, the Public Archaeology Laboratory, Inc. (PAL) completed cultural resources assessment of approximately 8.1 miles of pipeline looping, 11 access roads, and two pipe yards in Hartford County. The proposed pipeline corridor originates east of North Street near the Connecticut-Massachusetts border in the town of Suffield, it extends parallel to the existing 16-inch pipeline corridor, and it terminates south of Nicholson Road in East Granby. The proposed 11 access roads will be used during construction to access the pipeline corridor from an extant network of paved public roads. All of the proposed access roads measure less than 2000 feet in length and they were described as having dirt, gravel, and asphalt surfaces. The proposed Hickory Street Pipeyard is located near the beginning of the proposed pipeline corridor and the 8686 Sales and Leasing Pipeyard is located at MP 7.3, near the proposed pipeline's point of termination. The Hickory Street Pipeyard, a fallow field located north of Hickory Street in Suffield, encompasses approximately 6.5 acres straddling the border between Connecticut and Massachusetts. The 8686 Sales and Leasing Pipeyard, also described as a fallow field, measures approximately 2 acres in size on the north side of Russell Road in East Granby.

The archeological assessment survey stratified the proposed project items into low and high/moderate areas of archeological sensitivity based on previously recorded site information, environmental characteristics, and extent of prior ground disturbance. Areas with a low archeological sensitivity were subjected only to pedestrian survey; areas classified as having a moderate or high archeological sensitivity were subjected to subsurface testing consisting of shovel tests excavated at 10 meter intervals. The archeological identification survey of the proposed pipeline and its ancillary facilities resulted in the identification of seven archeological

loci (Find Spots 1 through 7), as well as diffuse scatters of historic period artifacts. SHPO has assigned archeological site numbers to Find Spot 1 (139-26), Find Spot 4 (139-27), and a single number to Find Spots 5, 6, and 7 (139-28). Find Spots 2 and 3 did not merit archeological site designation. SHPO concurs with the findings of the report that Find Spots 1 through 7, all of which contained low densities of non-diagnostic pre-contact cultural material, as well as the diffuse historic artifact scatters, are not eligible for listing on the National Register of Historic Places (NRHP) applying the criteria for evaluation (36 CFR 60.4).

The architectural identification survey identified 25 properties that are at least 50 years of age and situated within 300 feet of the proposed project items. Of these, the East Granby Historic District is listed on the NRHP, the Horation J. Lothrop Farmstead is listed on the State Register of Historic Places, and 11 newly identified structures were recommended as eligible for listing on the NRHP. SHPO concurs with the assessment of these properties. Because of the extant pipeline corridor and temporary use of the ancillary facilities, the Connecticut Expansion Project will have no adverse effect on these historic properties.

The State Historic Preservation Office appreciates the opportunity to review and comment upon this project. The resultant technical reports are comprehensive and meet the standards set forth in the *Environmental Review Primer for Connecticut's Archaeological Resources*. SHPO concurs that no additional archeological or architectural recordation of the proposed Connecticut Expansion Project appears warranted. Clarification edits to the draft technical reports and unanticipated discoveries plan have been submitted to PAL for inclusion in the final reports. The comments provided in this letter are conditional upon receipt of two bound copies of the final reports. For additional information, please contact Catherine Labadia, Environmental Reviewer, at (860) 256-2764 or catherine.labadia@ct.gov.

Sincerely,

Mary B. Dunne

Mary B. Dunne
Deputy State Historic Preservation Officer

cc: Mr. Michael Duffin, PAL
Dr. Brian Jones, OSA
Ms. Kathleen Knowles, THPO, Mashantucket Pequot Tribal Nation
Mr. James Quinn, THPO, Mohegan Tribe

February 27, 2015

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First St NE Room 1A
Washington, DC 20426

RE: Tennessee Gas Pipeline Company, LLC/ Kinder Morgan Connecticut Expansion Project, Sandisfield, Tyringham and Agawam, MA. FERC Docket # CPR14-529-0000. MHC #RC.54805. EEA # 15205. PAL # 2875.

Dear Secretary Bose:

Staff of the Massachusetts Historical Commission (MHC), the Office of the Massachusetts State Historic Preservation Officer, have reviewed the following documents, received February 20, 2015, prepared and submitted by the Public Archaeology Laboratory (PAL) for the proposed project referenced above.

Draft project documents submitted by the PAL and reviewed by the MHC include:

- *Avoidance and Protection Plan; G. Dunham Foundation and Allen Foundation Site, Tennessee Gas Pipeline Company, LLC, Connecticut Expansion Project, Massachusetts Loop, Sandisfield, Massachusetts-February 2015;*

- *Connecticut Expansion Project, Stone Wall Documentation and Restoration Procedures.*

The MHC has also received copies of comments to FERC from Ronald M. Bernard and Jean Atwater-Williams of 182 Cold Spring Road in Sandisfield, regarding potential project effects, including vibration and noise, to historic properties, including the Josiah Hulet House at 182 Cold Spring Road (MHC # SAN.86) and other historical resources in the project vicinity in Sandisfield.

The MHC encourages FERC to take these comments into account in development of their findings and determinations for the project. The development and implementation of historic properties protection plans, including measures to evaluate, and avoid and minimize potential vibration and noise effects due to heavy truck traffic and blasting aspects of the project, would assist to address the concerns presented in these comments.

The archaeological site avoidance and protection plan incorporates the MHC's August 14, 2014 comments and incorporates avoidance and protection measures to adequately protect the G. Dunham and Allen Foundation historic archaeological sites in Sandisfield during project construction.

In the MHC's opinion, the project, as proposed, will have "no adverse effect" (36 CFR 800.5(b)) to the G. Dunham and Allen Foundation historic archaeological sites on the following condition: the archaeological site avoidance and protection plan prepared by the PAL, Inc., titled *Avoidance and Protection Plan; G. Dunham Foundation and Allen Foundation Site, Tennessee Gas Pipeline Company, LLC, Connecticut Expansion Project, Massachusetts Loop, Sandisfield, Massachusetts-February 2015*, shall be implemented by the project proponent.

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The MHC looks forward to continued consultation with FERC and to reviewing findings and determinations to avoid, minimize or mitigate adverse effects to significant historic and archaeological resources.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800). Please contact Jonathan K. Patton at this office if you have any questions at this time.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc: Ted Uhlemann, Kinder Morgan
Mark Gardella, AECOM
Karen Kirk Adams, USACOE-New England District, Attn: Kevin R. Kotelly
Kate Atwood, USACOE-New England District
Bettina Washington, Wampanoag Tribe of Gay Head (Aquinnah)
Ramona Peters, Mashpee Wampanoag Tribe
Sherry White, Stockbridge Munsee Community
Secretary Matthew E. Beaton, EEA, Attn: Alex Strysky, MEPA Unit
Sandisfield Historical Commission
Deborah C. Cox, PAL, Attn: Michael P. Duffin
Ronald M. Bernard

September 3, 2015

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth

Massachusetts Historical Commission

Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First St NE Room 1A
Washington, DC 20426

RE: Tennessee Gas Pipeline Company, LLC/ Kinder Morgan Connecticut Expansion Project, Sandisfield, Tyringham and Agawam, MA. FERC Docket # CPR14-529-0000. MHC #RC.54805. EEA # 15205.

Dear Secretary Bose:

Staff of the Massachusetts Historical Commission (MHC), the Office of the Massachusetts State Historic Preservation Officer, have reviewed the following technical reports, received August 25, 2015, prepared and submitted by the Public Archaeology Laboratory (PAL) for the proposed project referenced above.

Technical reports submitted by the PAL and reviewed by the MHC include: *Intensive Archaeological Survey, Connecticut Expansion Project, Massachusetts Facilities, Beach Plain Road, Cold Spring Road and Town Hill Road Pipe Yards, Sandisfield, Massachusetts,* and, *Intensive Archaeological Survey, Connecticut Expansion Project, Massachusetts Facilities, Slater Pipe Yard Extension, Tyringham, Massachusetts.*

The results of the surveys for these pipe yards identified no significant archaeological resources. MHC recommends no further archaeological survey for the pipe yards in Sandifield and Tyringham as currently proposed. The MHC looks forward to continued consultation with FERC and to reviewing findings and determinations to avoid, minimize or mitigate adverse effects to significant historic and archaeological resources.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800). Please contact Jonathan K. Patton at this office if you have any questions at this time.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc: Ted Uhlemann, Kinder Morgan
✓Mark Gardella, AECOM
Kevin R. Kotelly, USACOE-New England District
Kate Atwood, USACOE-New England District
Bettina Washington, Wampanoag Tribe of Gay Head (Aquinnah)
Ramona Peters, Mashpee Wampanoag Tribe
Sherry White, Stockbridge Munsee Community
Secretary Matthew E. Beaton, EEA, Attn: Alex Strysky, MEPA Unit
Sandisfield Historical Commission
Deborah C. Cox, PAL, Attn: Dianna Doucette

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Andrew M. Cuomo
Governor

Rose Harvey
Commissioner

New York State Office of Parks, Recreation and Historic Preservation

Division for Historic Preservation
P.O. Box 189, Waterford, New York 12188-0189
518-237-8643

August 20, 2014

Michael Duffin
PAL
26 Main St
Pawtucket, Rhode Island 02860

Re: FERC
Tennessee Gas Pipeline - Connecticut Expansion Project
Bethlehem, Albany County
13PR04583

Dear Mr. Duffin:

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. They do not include potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8).

Based upon this review, it is the SHPO's opinion that your project will have **No Adverse Effect** upon cultural resources in or eligible for inclusion in the National Registers of Historic Places **with the condition** that the workspace be clearly delineated and fenced during construction so as to ensure there are no impacts to the Britt-Luke Cemetery.

If further correspondence is required regarding this project, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Daniel A. Bagrow
Scientist (Archaeology)

August 13, 2014

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First St NE Room 1A
Washington, DC 20426

RE: Tennessee Gas Pipeline Company, LLC/ Kinder Morgan Connecticut Expansion Project, Sandisfield, Tyringham and Agawam, MA. FERC Docket # Not Yet Assigned. MHC #RC.54805. EEA # 15205. PAL # 2875.

Dear Secretary Bose:

Staff of the Massachusetts Historical Commission (MHC), the Office of the Massachusetts State Historic Preservation Officer, have reviewed the following documents, received July 25, 2014, prepared and submitted by the Public Archaeology Laboratory (PAL) for the proposed project referenced above.

Draft project documents submitted by the PAL and reviewed by the MHC include:

- *Technical Report, Archaeological Overview and Identification Survey, Tennessee Gas Pipeline Company, LLC, Connecticut Expansion Project, Massachusetts Facilities-July 2014;*

- *Technical Report, Historic Architectural Properties Overview and Identification Survey, Algonquin Gas Transmission, Tennessee Gas Pipeline Company, LLC, Connecticut Expansion Project, Massachusetts Facilities-July 2014*

- *Revised Procedures Guiding the Discovery of Unanticipated Historic Properties and Human Remains: Post-Review Discoveries (36 CFR 800.13), Tennessee Gas Pipeline Company, LLC, Connecticut Expansion Project, Massachusetts Facilities-July 2014*

A copy of the draft Environmental Assessment (EA) should be submitted to the MHC for review and comment. The EA should include a summary of consultation with the MHC and other consulting parties and results of the cultural resource survey(s) in a way that does not disclose sensitive archaeological site locational information. Data containing highly sensitive archaeological site locational information is not a public record (36 CFR 800.6(a)(5); 800.11(c); Massachusetts General Laws Chapter 9, sections 26A(1) & 27(C)). All sensitive archaeological site locational information should be removed from any project documents intended for public review. Any documentation prepared with this information should be prominently labeled "Confidential. Not for Public Release", and the distribution strictly controlled.

Results of the archaeological investigation verified the locations of two historical archaeological sites, the G. Dunham Foundation Site (MHC # SAN.HA.2) and Allen Foundation Site (SAN.HA.3) in Sandisfield included in the MHC's Inventory of Archaeological Assets of the Commonwealth and originally identified during previous archaeological survey for gas pipeline projects in 1999 in the same right-of-way. Archaeological testing indicates that these sites retain integrity, and include dry stone masonry cellar holes and associated structural features, and contain additional artifacts, features and deposits associated with 18th and 19th century occupation and land use in Sandisfield, and therefore, in the MHC's opinion, meet criteria A and D at the local level of significance (36 CFR 60) for listing in the National Register of Historic Places.

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The sites appear to be avoidable during project construction, and the PAL draft technical report includes recommendations for the development and implementation of archaeological site avoidance and protection plans that include protective measures, with a buffer zone and protective fencing, to avoid impacts to the sites during project construction. The PAL also recommends that extant stone walls be avoided where feasible, or restored as part of the project. The MHC requests that a written archaeological site avoidance and protection plan be developed and implemented for the G. Dunham Foundation Site (MHC # SAN.HA.2) and Allen Foundation Site (SAN.HA.3) in Sandisfield. The draft avoidance and protection plan should include a figure that incorporates PAL report Figures 5-2, 5-4, 5-6 and 5-8 to show the fenced archaeological site boundaries in relation to project impact areas and access roads. The draft avoidance and protection plan should contain the following stipulations:

- A qualified professional archaeologist shall stake the boundaries of the archaeological site, and the boundaries would be surveyed by a qualified civil engineer and located on project construction plans as a "sensitive resource area: no impact."
- A temporary, high-visibility protective fence (such as a snow fence or a plastic fence) shall be placed prior to construction around the boundaries of the archaeological site, and the protective fence shall be posted with "No Trespassing" signs.
- Suitable language shall be included in contract and construction documents to prevent inadvertent impacts to the fragile archaeological site.
- Construction personnel and contractors shall be informed verbally and in writing that the fenced area is a "no impact area."
- Construction personnel and contractors should neither perform nor permit any tree cutting or tree stumping, construction, excavation, grading, filling, dumping, or the storage or staging of equipment, vehicles, or supplies within the boundaries of the fenced area.
- No unauthorized artifact collecting or archaeological investigation shall be permitted within the fenced area, other than for which the Massachusetts State Archaeologist has issued an archaeological field investigation permit (950 CMR 70).
- The fenced area shall remain in its existing natural condition, and the MHC shall be consulted and provided the opportunity to review and comment on any otherwise unforeseen activities that may be proposed within the fenced area. The fence should be removed upon completion of the project.

Procedures included in the document, *Revised Procedures Guiding the Discovery of Unanticipated Historic Properties and Human Remains: Post-Review Discoveries (36 CFR 800.13), Tennessee Gas Pipeline Company, LLC, Connecticut Expansion Project, Massachusetts Facilities-July 2014* are consistent with the Massachusetts Unmarked Burial Law (Massachusetts General Laws, Chapter 38, § 6; Chapter 9, §§ 26A and 27C; and, Chapter 7, § 38A; all as amended).

The results of the identification efforts conducted and proposed will assist FERC to make findings and determinations (36 CFR 800.4 to 800.5) and to consultation (36 CFR 800.6) to avoid, minimize or mitigate adverse effects to significant historic and archaeological resources.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800). Please contact Jonathan K. Patton at this office if you have any questions at this time.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc: see attached

xc: Ted Uhlemann, Kinder Morgan
Mark Gardella, AECOM
Karen Kirk Adams, USACOE-New England District, Attn: Kevin R. Kotelly
Kate Atwood, USACOE-New England District
Bettina Washington, Wampanoag Tribe of Gay Head (Aquinnah)
Ramona Peters, Mashpee Wampanoag Tribe
Sherry White, Stockbridge Munsee Community
Secretary Maeve Vallely Bartlett, EEA, Attn: Alex Strysky, MEPA Unit
Sandisfield Historical Commission
Deborah C. Cox, PAL, Attn: Michael P. Duffin

Department of Economic and Community Development

Connecticut
still revolutionary

April 20, 2015

Dianna Doucette, Ph.D., RPA
Public Archaeology Laboratory, Inc.
26 Main Street
Pawtucket, RI 02860

Subject: Tennessee Gas Pipeline Company
Connecticut Expansion Project Proposed Reroute – Additional Information
East Granby, Connecticut (PAL #2875)

Dear Dr. Doucette:

The State Historic Preservation Office (SHPO) has reviewed the additional information submitted to this office. SHPO appreciates the additional consideration given to the concrete footings identified during the archaeological reconnaissance survey of the proposed pipeline reroute. SHPO is satisfied that these structures were not located within the block of buildings associated with the German POW Camp. No significant cultural materials were observed or collected as a result of this investigation. SHPO concurs with PAL that no additional archaeological investigations of the proposed reroute is warranted. The investigation appears to meet the standards set forth in the *Environmental Review Primer for Connecticut's Archaeological Resources* and it is SHPO's opinion that no historic properties will be affected by the proposed undertaking.

This office appreciates the cooperation of all interested parties in the professional management of Connecticut's archeological resources. For additional information, please contact Catherine Labadia, Environmental Reviewer, at (860) 256-2764 or catherine.labadia@ct.gov.

Sincerely,

Mary B. Dunne

Mary B. Dunne
Deputy State Historic Preservation Officer

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT H

Record of Revisions Form

RECORD OF REVISIONS

Name of Permittee: Tennessee Gas Pipeline Company, LLC			
Construction Site Name: Connecticut Expansion Project			
Date	Sections Modified	Description of Modification	Approval Signature

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT I

Spill Form

Date: _____ **Time of Spill Occurrence:**

Name/Title of the first observer: _____

Regulatory Agencies Notified / Time & Date of Notification (use reverse side if needed): _____

_____

Location of Spill: Parcel No. _____ **Town** _____ **County**

Nearest Public Road: _____ Nearest Structure No. (if on-ROW): _____

Nearest Street Address or landmark (if off-ROW): _____

Attachments (circle all that apply): map photographs _____ other_____

Type of material spilled: _____

Quantity spilled (circle one): _____ 10 gals. or less

10 - 1,000 gals._____

Over 1,000 gals. _____

Specify approximate amount spilled: _____

Circumstances causing spill: _____

_____

Size of area affected by spill: _____ Estimate depth of spilled material on water or soil: _____

If spill is into water, is a sheen present? (circle one): _____

YES _____

NO _____

Has spill left Company property or ROW? (circle one): _____

YES _____

NO _____

Is spill under control? (circle one): _____

YES _____

NO* _____

*If not, is there a potential for the spill to leave the ROW or staging area? (circle one): _____

YES _____

NO _____

Has spill cleanup begun? (circle one): _____

YES** _____

NO _____

**If so, what methods are being or will be used?: _____

Have soil and/or water samples been taken? (circle one) _____

YES*** _____

NO _____

***If yes, list sample types:

Signature of Contractor Representative/Date: **Signature of Designated Project Representative/Date:**

_____ _____

Print Name/Title: _____ Print Name/Title: _____

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT J

Notice of Termination Form

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT K

FERC Plans and Procedures

Federal Energy Regulatory Commission

Office of
Energy Projects

May 2013

UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN

Washington, DC 20426

MAY 2013 VERSION

UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN

TABLE OF CONTENTS

I. APPLICABILITY 1

II. SUPERVISION AND INSPECTION 2
- A. ENVIRONMENTAL INSPECTION 2
- B. RESPONSIBILITIES OF ENVIRONMENTAL INSPECTORS 2

III. PRECONSTRUCTION PLANNING 4
- A. CONSTRUCTION WORK AREAS 4
- B. DRAIN TILE AND IRRIGATION SYSTEMS 4
- C. GRAZING DEFERMENT 5
- D. ROAD CROSSINGS AND ACCESS POINTS 5
- E. DISPOSAL PLANNING 5
- F. AGENCY COORDINATION 5
- G. SPILL PREVENTION AND RESPONSE PROCEDURES 6
- H. RESIDENTIAL CONSTRUCTION 6
- I. WINTER CONSTRUCTION PLANS 6

IV. INSTALLATION 7
- A. APPROVED AREAS OF DISTURBANCE 7
- B. TOPSOIL SEGREGATION 8
- C. DRAIN TILES 9
- D. IRRIGATION 9
- E. ROAD CROSSINGS AND ACCESS POINTS 9
- F. TEMPORARY EROSION CONTROL 9
  - 1. Temporary Slope Breakers 9
  - 2. Temporary Trench Plugs 10
  - 3. Sediment Barriers 10
  - 4. Mulch 11

V. RESTORATION 12
- A. CLEANUP 12
- B. PERMANENT EROSION CONTROL DEVICES 13
  - 1. Trench Breakers 13
  - 2. Permanent Slope Breakers 14
- C. SOIL COMPACTION MITIGATION 14
- D. REVEGETATION 15
  - 1. General 15
  - 2. Soil Additives 15
  - 3. Seeding Requirements 15

VI. OFF-ROAD VEHICLE CONTROL 16

VII. POST-CONSTRUCTION ACTIVITIES AND REPORTING 17
- A. MONITORING AND MAINTENANCE 17
- B. REPORTING 18

UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN (PLAN)

I. APPLICABILITY

A. The intent of this Plan is to assist project sponsors by identifying baseline mitigation measures for minimizing erosion and enhancing revegetation. Project sponsors shall specify in their applications for a new FERC authorization and in prior notice and advance notice filings, any individual measures in this Plan they consider unnecessary, technically infeasible, or unsuitable due to local conditions and fully describe any alternative measures they would use. Project sponsors shall also explain how those alternative measures would achieve a comparable level of mitigation.

Once a project is authorized, project sponsors can request further changes as variances to the measures in this Plan (or the applicant's approved plan). The Director of the Office of Energy Projects (Director) will consider approval of variances upon the project sponsor's written request, if the Director agrees that a variance:

1. provides equal or better environmental protection;

2. is necessary because a portion of this Plan is infeasible or unworkable based on project-specific conditions; or

3. is specifically required in writing by another federal, state, or Native American land management agency for the portion of the project on its land or under its jurisdiction.

Sponsors of projects planned for construction under the automatic authorization provisions in the FERC's regulations must receive written approval for any variances in advance of construction.

Project-related impacts on wetland and waterbody systems are addressed in the staff's Wetland and Waterbody Construction and Mitigation Procedures (Procedures).

II. SUPERVISION AND INSPECTION

A. ENVIRONMENTAL INSPECTION

1. At least one Environmental Inspector is required for each construction spread during construction and restoration (as defined by section V). The number and experience of Environmental Inspectors assigned to each construction spread shall be appropriate for the length of the construction spread and the number/significance of resources affected.

2. Environmental Inspectors shall have peer status with all other activity inspectors.

3. Environmental Inspectors shall have the authority to stop activities that violate the environmental conditions of the FERC's Orders, stipulations of other environmental permits or approvals, or landowner easement agreements; and to order appropriate corrective action.

B. RESPONSIBILITIES OF ENVIRONMENTAL INSPECTORS

At a minimum, the Environmental Inspector(s) shall be responsible for:

1. Inspecting construction activities for compliance with the requirements of this Plan, the Procedures, the environmental conditions of the FERC's Orders, the mitigation measures proposed by the project sponsor (as approved and/or modified by the Order), other environmental permits and approvals, and environmental requirements in landowner easement agreements.

2. Identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;

3. Verifying that the limits of authorized construction work areas and locations of access roads are visibly marked before clearing, and maintained throughout construction;

4. Verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;

5. Identifying erosion/sediment control and soil stabilization needs in all areas;

6. Ensuring that the design of slope breakers will not cause erosion or direct water into sensitive environmental resource areas, including cultural resource sites, wetlands, waterbodies, and sensitive species habitats;

7. Verifying that dewatering activities are properly monitored and do not result in the deposition of sand, silt, and/or sediment into sensitive environmental resource areas, including wetlands, waterbodies, cultural resource sites, and sensitive species habitats; stopping dewatering activities if such deposition is occurring and ensuring the design of the discharge is changed to prevent reoccurrence; and verifying that dewatering structures are removed after completion of dewatering activities;

8. Ensuring that subsoil and topsoil are tested in agricultural and residential areas to measure compaction and determine the need for corrective action;

9. Advising the Chief Construction Inspector when environmental conditions (such as wet weather or frozen soils) make it advisable to restrict or delay construction activities to avoid topsoil mixing or excessive compaction;

10. Ensuring restoration of contours and topsoil;

11. Verifying that the soils imported for agricultural or residential use are certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;

12. Ensuring that erosion control devices are properly installed to prevent sediment flow into sensitive environmental resource areas (e.g., wetlands, waterbodies, cultural resource sites, and sensitive species habitats) and onto roads, and determining the need for additional erosion control devices;

13. Inspecting and ensuring the maintenance of temporary erosion control measures at least:

    a. on a daily basis in areas of active construction or equipment operation;

    b. on a weekly basis in areas with no construction or equipment operation; and

    c. within 24 hours of each 0.5 inch of rainfall;

14. Ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification, or as soon as conditions allow if compliance with this time frame would result in greater environmental impacts;

15. Keeping records of compliance with the environmental conditions of the FERC's Orders, and the mitigation measures proposed by the project sponsor in the application submitted to the FERC, and other federal or state environmental permits during active construction and restoration;

16. Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase; and

17. Verifying that locations for any disposal of excess construction materials for beneficial reuse comply with section III.E.

III. PRECONSTRUCTION PLANNING

The project sponsor shall do the following before construction:

A. CONSTRUCTION WORK AREAS

1. Identify all construction work areas (e.g., construction right-of-way, extra work space areas, pipe storage and contractor yards, borrow and disposal areas, access roads) that would be needed for safe construction. The project sponsor must ensure that appropriate cultural resources and biological surveys are conducted, as determined necessary by the appropriate federal and state agencies.

2. Project sponsors are encouraged to consider expanding any required cultural resources and endangered species surveys in anticipation of the need for activities outside of authorized work areas.

3. Plan construction sequencing to limit the amount and duration of open trench sections, as necessary, to prevent excessive erosion or sediment flow into sensitive environmental resource areas.

B. DRAIN TILE AND IRRIGATION SYSTEMS

1. Attempt to locate existing drain tiles and irrigation systems.

2. Contact landowners and local soil conservation authorities to determine the locations of future drain tiles that are likely to be installed within 3 years of the authorized construction.

3. Develop procedures for constructing through drain-tiled areas, maintaining irrigation systems during construction, and repairing drain tiles and irrigation systems after construction.

4. Engage qualified drain tile specialists, as needed to conduct or monitor repairs to drain tile systems affected by construction. Use drain tile specialists from the project area, if available.

C. GRAZING DEFERMENT

Develop grazing deferment plans with willing landowners, grazing permittees, and land management agencies to minimize grazing disturbance of revegetation efforts.

D. ROAD CROSSINGS AND ACCESS POINTS

Plan for safe and accessible conditions at all roadway crossings and access points during construction and restoration.

E. DISPOSAL PLANNING

Determine methods and locations for the regular collection, containment, and disposal of excess construction materials and debris (e.g., timber, slash, mats, garbage, drill cuttings and fluids, excess rock) throughout the construction process. Disposal of materials for beneficial reuse must not result in adverse environmental impact and is subject to compliance with all applicable survey, landowner or land management agency approval, and permit requirements.

F. AGENCY COORDINATION

The project sponsor must coordinate with the appropriate local, state, and federal agencies as outlined in this Plan and/or required by the FERC's Orders.

1. Obtain written recommendations from the local soil conservation authorities or land management agencies regarding permanent erosion control and revegetation specifications.

2. Develop specific procedures in coordination with the appropriate agencies to prevent the introduction or spread of invasive species, noxious weeds, and soil pests resulting from construction and restoration activities.

3. Develop specific procedures in coordination with the appropriate agencies and landowners, as necessary, to allow for livestock and wildlife movement and protection during construction.

4. Develop specific blasting procedures in coordination with the appropriate agencies that address pre- and post-blast inspections; advanced public notification; and mitigation measures for building foundations, groundwater wells, and springs. Use appropriate methods (e.g., blasting mats) to prevent damage to nearby structures and to prevent debris from entering sensitive environmental resource areas.

G. SPILL PREVENTION AND RESPONSE PROCEDURES

The project sponsor shall develop project-specific Spill Prevention and Response Procedures, as specified in section IV of the staff's Procedures. A copy must be filed with the Secretary of the FERC (Secretary) prior to construction and made available in the field on each construction spread. The filing requirement does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

H. RESIDENTIAL CONSTRUCTION

For all properties with residences located within 50 feet of construction work areas, project sponsors shall: avoid removal of mature trees and landscaping within the construction work area unless necessary for safe operation of construction equipment, or as specified in landowner agreements; fence the edge of the construction work area for a distance of 100 feet on either side of the residence; and restore all lawn areas and landscaping immediately following clean up operations, or as specified in landowner agreements. If seasonal or other weather conditions prevent compliance with these time frames, maintain and monitor temporary erosion controls (sediment barriers and mulch) until conditions allow completion of restoration.

I. WINTER CONSTRUCTION PLANS

If construction is planned to occur during winter weather conditions, project sponsors shall develop and file a project-specific winter construction plan with the FERC application. This filing requirement does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

The plan shall address:

1. winter construction procedures (e.g., snow handling and removal, access road construction and maintenance, soil handling under saturated or frozen conditions, topsoil stripping);

2. stabilization and monitoring procedures if ground conditions will delay restoration until the following spring (e.g., mulching and erosion controls, inspection and reporting, stormwater control during spring thaw conditions); and

3. final restoration procedures (e.g., subsidence and compaction repair, topsoil replacement, seeding).

IV. INSTALLATION

A. APPROVED AREAS OF DISTURBANCE

1. Project-related ground disturbance shall be limited to the construction right-of-way, extra work space areas, pipe storage yards, borrow and disposal areas, access roads, and other areas approved in the FERC's Orders. Any project-related ground disturbing activities outside these areas will require prior Director approval. This requirement does not apply to activities needed to comply with the Plan and Procedures (i.e., slope breakers, energy-dissipating devices, dewatering structures, drain tile system repairs) or minor field realignments and workspace shifts per landowner needs and requirements that do not affect other landowners or sensitive environmental resource areas. All construction or restoration activities outside of authorized areas are subject to all applicable survey and permit requirements, and landowner easement agreements.

2. The construction right-of-way width for a project shall not exceed 75 feet or that described in the FERC application unless otherwise modified by a FERC Order. However, in limited, non-wetland areas, this construction right-of-way width may be expanded by up to 25 feet without Director approval to accommodate full construction right-of-way topsoil segregation and to ensure safe construction where topographic conditions (e.g., side-slopes) or soil limitations require it. Twenty-five feet of extra construction right-of-way width may also be used in limited, non-wetland or non-forested areas for truck turn-arounds where no reasonable alternative access exists.

   Project use of these additional limited areas is subject to landowner or land management agency approval and compliance with all applicable survey and permit requirements. When additional areas are used, each one shall be identified and the need explained in the weekly or biweekly construction reports to the FERC, if required. The following material shall be included in the reports:

   a. the location of each additional area by station number and reference to previously filed alignment sheets, or updated alignment sheets showing the additional areas;

   b. identification of the filing at FERC containing evidence that the additional areas were previously surveyed; and

c. a statement that landowner approval has been obtained and is available in project files.

Prior written approval of the Director is required when the authorized construction right-of-way width would be expanded by more than 25 feet.

B. TOPSOIL SEGREGATION

1. Unless the landowner or land management agency specifically approves otherwise, prevent the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench and subsoil storage area (ditch plus spoil side method) in:

   a. cultivated or rotated croplands, and managed pastures;

   b. residential areas;

   c. hayfields; and

   d. other areas at the landowner's or land managing agency's request.

2. In residential areas, importation of topsoil is an acceptable alternative to topsoil segregation.

3. Where topsoil segregation is required, the project sponsor must:

   a. segregate at least 12 inches of topsoil in deep soils (more than 12 inches of topsoil); and

   b. make every effort to segregate the entire topsoil layer in soils with less than 12 inches of topsoil.

4. Maintain separation of salvaged topsoil and subsoil throughout all construction activities.

5. Segregated topsoil may not be used for padding the pipe, constructing temporary slope breakers or trench plugs, improving or maintaining roads, or as a fill material.

6. Stabilize topsoil piles and minimize loss due to wind and water erosion with use of sediment barriers, mulch, temporary seeding, tackifiers, or functional equivalents, where necessary.

C. DRAIN TILES

1. Mark locations of drain tiles damaged during construction.

2. Probe all drainage tile systems within the area of disturbance to check for damage.

3. Repair damaged drain tiles to their original or better condition. Do not use filter-covered drain tiles unless the local soil conservation authorities and the landowner agree. Use qualified specialists for testing and repairs.

4. For new pipelines in areas where drain tiles exist or are planned, ensure that the depth of cover over the pipeline is sufficient to avoid interference with drain tile systems. For adjacent pipeline loops in agricultural areas, install the new pipeline with at least the same depth of cover as the existing pipeline(s).

D. IRRIGATION

Maintain water flow in crop irrigation systems, unless shutoff is coordinated with affected parties.

E. ROAD CROSSINGS AND ACCESS POINTS

1. Maintain safe and accessible conditions at all road crossings and access points during construction.

2. If crushed stone access pads are used in residential or agricultural areas, place the stone on synthetic fabric to facilitate removal.

3. Minimize the use of tracked equipment on public roadways. Remove any soil or gravel spilled or tracked onto roadways daily or more frequent as necessary to maintain safe road conditions. Repair any damages to roadway surfaces, shoulders, and bar ditches.

F. TEMPORARY EROSION CONTROL

Install temporary erosion controls immediately after initial disturbance of the soil. Temporary erosion controls must be properly maintained throughout construction (on a daily basis) and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration is complete.

1. Temporary Slope Breakers

a. Temporary slope breakers are intended to reduce runoff velocity and divert water off the construction right-of-way. Temporary slope

breakers may be constructed of materials such as soil, silt fence, staked hay or straw bales, or sand bags.

b. Install temporary slope breakers on all disturbed areas, as necessary to avoid excessive erosion. Temporary slope breakers must be installed on slopes greater than 5 percent where the base of the slope is less than 50 feet from waterbody, wetland, and road crossings at the following spacing (closer spacing shall be used if necessary):

Slope (%)	Spacing (feet)
5 - 15	300
>15 - 30	200
>30	100

c. Direct the outfall of each temporary slope breaker to a stable, well vegetated area or construct an energy-dissipating device at the end of the slope breaker and off the construction right-of-way.

d. Position the outfall of each temporary slope breaker to prevent sediment discharge into wetlands, waterbodies, or other sensitive environmental resource areas.

2. Temporary Trench Plugs

Temporary trench plugs are intended to segment a continuous open trench prior to backfill.

a. Temporary trench plugs may consist of unexcavated portions of the trench, compacted subsoil, sandbags, or some functional equivalent.

b. Position temporary trench plugs, as necessary, to reduce trenchline erosion and minimize the volume and velocity of trench water flow at the base of slopes.

3. Sediment Barriers

Sediment barriers are intended to stop the flow of sediments and to prevent the deposition of sediments beyond approved workspaces or into sensitive resources.

a. Sediment barriers may be constructed of materials such as silt fence, staked hay or straw bales, compacted earth (e.g., driveable berms across travelways), sand bags, or other appropriate materials.

b. At a minimum, install and maintain temporary sediment barriers across the entire construction right-of-way at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody, wetland, or road crossing until revegetation is successful as defined in this Plan. Leave adequate room between the base of the slope and the sediment barrier to accommodate ponding of water and sediment deposition.

c. Where wetlands or waterbodies are adjacent to and downslope of construction work areas, install sediment barriers along the edge of these areas, as necessary to prevent sediment flow into the wetland or waterbody.

4. Mulch

a. Apply mulch on all slopes (except in cultivated cropland) concurrent with or immediately after seeding, where necessary to stabilize the soil surface and to reduce wind and water erosion. Spread mulch uniformly over the area to cover at least 75 percent of the ground surface at a rate of 2 tons/acre of straw or its equivalent, unless the local soil conservation authority, landowner, or land managing agency approves otherwise in writing.

b. Mulch can consist of weed-free straw or hay, wood fiber hydromulch, erosion control fabric, or some functional equivalent.

c. Mulch all disturbed upland areas (except cultivated cropland) <u>before</u> seeding if:

(1) final grading and installation of permanent erosion control measures will not be completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas), as required in section V.A.1; or

(2) construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.

d. If mulching <u>before</u> seeding, increase mulch application on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre of straw or equivalent.

e. If wood chips are used as mulch, do not use more than 1 ton/acre and add the equivalent of 11 lbs/acre available nitrogen (at least 50 percent of which is slow release).

f. Ensure that mulch is adequately anchored to minimize loss due to wind and water.

g. When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 100 feet of wetlands or waterbodies, except where the product is certified environmentally non-toxic by the appropriate state or federal agency or independent standards-setting organization.

h. Do not use synthetic monofilament mesh/netted erosion control materials in areas designated as sensitive wildlife habitat, unless the product is specifically designed to minimize harm to wildlife. Anchor erosion control fabric with staples or other appropriate devices.

V. RESTORATION

A. CLEANUP

1. Commence cleanup operations immediately following backfill operations. Complete final grading, topsoil replacement, and installation of permanent erosion control structures within 20 days after backfilling the trench (10 days in residential areas). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (i.e., temporary slope breakers, sediment barriers, and mulch) until conditions allow completion of cleanup.

   If construction or restoration unexpectedly continues into the winter season when conditions could delay successful decompaction, topsoil replacement, or seeding until the following spring, file with the Secretary for the review and written approval of the Director, a winter construction plan (as specified in section III.I). This filing requirement does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

2. A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed as specified in section IV.F. and inspected and maintained as specified in sections II.B.12 through 14. When access is no longer required the travel lane must be removed and the right-of-way restored.

3. Rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Rock that is not returned to the trench shall be considered construction debris, unless approved for use as mulch or for some other use on the construction work areas by the landowner or land managing agency.

4. Remove excess rock from at least the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields, and residential areas, as well as other areas at the landowner's request. The size, density, and distribution of rock on the construction work area shall be similar to adjacent areas not disturbed by construction. The landowner or land management agency may approve other provisions in writing.

5. Grade the construction right-of-way to restore pre-construction contours and leave the soil in the proper condition for planting.

6. Remove construction debris from all construction work areas unless the landowner or land managing agency approves leaving materials onsite for beneficial reuse, stabilization, or habitat restoration.

7. Remove temporary sediment barriers when replaced by permanent erosion control measures or when revegetation is successful.

B. PERMANENT EROSION CONTROL DEVICES

1. Trench Breakers

a. Trench breakers are intended to slow the flow of subsurface water along the trench. Trench breakers may be constructed of materials such as sand bags or polyurethane foam. Do not use topsoil in trench breakers.

b. An engineer or similarly qualified professional shall determine the need for and spacing of trench breakers. Otherwise, trench breakers shall be installed at the same spacing as and upslope of permanent slope breakers.

c. In agricultural fields and residential areas where slope breakers are not typically required, install trench breakers at the same spacing as if permanent slope breakers were required.

d. At a minimum, install a trench breaker at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody or wetland and where needed to avoid draining a waterbody or wetland. Install trench breakers at wetland boundaries, as specified in the Procedures. Do not install trench breakers within a wetland.

2. Permanent Slope Breakers

a. Permanent slope breakers are intended to reduce runoff velocity, divert water off the construction right-of-way, and prevent sediment deposition into sensitive resources. Permanent slope breakers may be constructed of materials such as soil, stone, or some functional equivalent.

b. Construct and maintain permanent slope breakers in all areas, except cultivated areas and lawns, unless requested by the landowner, using spacing recommendations obtained from the local soil conservation authority or land managing agency.

In the absence of written recommendations, use the following spacing unless closer spacing is necessary to avoid excessive erosion on the construction right-of-way:

Slope (%)	Spacing (feet)
5 - 15	300
>15 - 30	200
>30	100

c. Construct slope breakers to divert surface flow to a stable area without causing water to pool or erode behind the breaker. In the absence of a stable area, construct appropriate energy-dissipating devices at the end of the breaker.

d. Slope breakers may extend slightly (about 4 feet) beyond the edge of the construction right-of-way to effectively drain water off the disturbed area. Where slope breakers extend beyond the edge of the construction right-of-way, they are subject to compliance with all applicable survey requirements.

C. SOIL COMPACTION MITIGATION

1. Test topsoil and subsoil for compaction at regular intervals in agricultural and residential areas disturbed by construction activities. Conduct tests on the same soil type under similar moisture conditions in undisturbed areas to approximate preconstruction conditions. Use penetrometers or other appropriate devices to conduct tests.

2. Plow severely compacted agricultural areas with a paraplow or other deep tillage implement. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil.

If subsequent construction and cleanup activities result in further compaction, conduct additional tilling.

3. Perform appropriate soil compaction mitigation in severely compacted residential areas.

D. REVEGETATION

1. General

a. The project sponsor is responsible for ensuring successful revegetation of soils disturbed by project-related activities, except as noted in section V.D.1.b.

b. Restore all turf, ornamental shrubs, and specialized landscaping in accordance with the landowner's request, or compensate the landowner. Restoration work must be performed by personnel familiar with local horticultural and turf establishment practices.

2. Soil Additives

Fertilize and add soil pH modifiers in accordance with written recommendations obtained from the local soil conservation authority, land management agencies, or landowner. Incorporate recommended soil pH modifier and fertilizer into the top 2 inches of soil as soon as practicable after application.

3. Seeding Requirements

a. Prepare a seedbed in disturbed areas to a depth of 3 to 4 inches using appropriate equipment to provide a firm seedbed. When hydroseeding, scarify the seedbed to facilitate lodging and germination of seed.

b. Seed disturbed areas in accordance with written recommendations for seed mixes, rates, and dates obtained from the local soil conservation authority or the request of the landowner or land management agency. Seeding is not required in cultivated croplands unless requested by the landowner.

c. Perform seeding of permanent vegetation within the recommended seeding dates. If seeding cannot be done within those dates, use appropriate temporary erosion control measures discussed in section IV.F and perform seeding of permanent vegetation at the beginning of the next recommended seeding season. Dormant seeding or temporary

seeding of annual species may also be used, if necessary, to establish cover, as approved by the Environmental Inspector. Lawns may be seeded on a schedule established with the landowner.

d. In the absence of written recommendations from the local soil conservation authorities, seed all disturbed soils within 6 working days of final grading, weather and soil conditions permitting, subject to the specifications in section V.D.3.a through V.D.3.c.

e. Base seeding rates on Pure Live Seed. Use seed within 12 months of seed testing.

f. Treat legume seed with an inoculant specific to the species using the manufacturer's recommended rate of inoculant appropriate for the seeding method (broadcast, drill, or hydro).

g. In the absence of written recommendations from the local soil conservation authorities, landowner, or land managing agency to the contrary, a seed drill equipped with a cultipacker is preferred for seed application.

Broadcast or hydroseeding can be used in lieu of drilling at double the recommended seeding rates. Where seed is broadcast, firm the seedbed with a cultipacker or roller after seeding. In rocky soils or where site conditions may limit the effectiveness of this equipment, other alternatives may be appropriate (e.g., use of a chain drag) to lightly cover seed after application, as approved by the Environmental Inspector.

VI. OFF-ROAD VEHICLE CONTROL

To each owner or manager of forested lands, offer to install and maintain measures to control unauthorized vehicle access to the right-of-way. These measures may include:

A. signs;

B. fences with locking gates;

C. slash and timber barriers, pipe barriers, or a line of boulders across the right-of-way; and

D. conifers or other appropriate trees or shrubs across the right-of-way.

VII. POST-CONSTRUCTION ACTIVITIES AND REPORTING

A. MONITORING AND MAINTENANCE

1. Conduct follow-up inspections of all disturbed areas, as necessary, to determine the success of revegetation and address landowner concerns. At a minimum, conduct inspections after the first and second growing seasons.

2. Revegetation in non-agricultural areas shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. In agricultural areas, revegetation shall be considered successful when upon visual survey, crop growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise.

   Continue revegetation efforts until revegetation is successful.

3. Monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in agricultural areas until restoration is successful.

4. Restoration shall be considered successful if the right-of-way surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless otherwise approved by the landowner or land managing agency per section V.A.6), revegetation is successful, and proper drainage has been restored.

5. Routine vegetation mowing or clearing over the full width of the permanent right-of-way in uplands shall not be done more frequently than every 3 years. However, to facilitate periodic corrosion/leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In no case shall routine vegetation mowing or clearing occur during the migratory bird nesting season between April 15 and August 1 of any year unless specifically approved in writing by the responsible land management agency or the U.S. Fish and Wildlife Service.

6. Efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, shall continue throughout the life of the project. Maintain signs, gates, and permanent access roads as necessary.

B. REPORTING

1. The project sponsor shall maintain records that identify by milepost:

   a. method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;

   b. acreage treated;

   c. dates of backfilling and seeding;

   d. names of landowners requesting special seeding treatment and a description of the follow-up actions;

   e. the location of any subsurface drainage repairs or improvements made during restoration; and

   f. any problem areas and how they were addressed.

2. The project sponsor shall file with the Secretary quarterly activity reports documenting the results of follow-up inspections required by section VII.A.1; any problem areas, including those identified by the landowner; and corrective actions taken for at least 2 years following construction.

   The requirement to file quarterly activity reports with the Secretary does not apply to projects constructed under the automatic authorization, prior notice, or advanced notice provisions in the FERC's regulations.

Federal Energy Regulatory Commission

Office of Energy Projects

May 2013

WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES

Washington, DC 20426

MAY 2013 VERSION

WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES

TABLE OF CONTENTS

I. APPLICABILITY 1

II. PRECONSTRUCTION FILING 2

III. ENVIRONMENTAL INSPECTORS 3

IV. PRECONSTRUCTION PLANNING 3

V. WATERBODY CROSSINGS 5
- A. NOTIFICATION PROCEDURES AND PERMITS 5
- B. INSTALLATION 5
  - 1. Time Window for Construction 5
  - 2. Extra Work Areas 5
  - 3. General Crossing Procedures 6
  - 4. Spoil Pile Placement and Control 7
  - 5. Equipment Bridges 7
  - 6. Dry-Ditch Crossing Methods 8
  - 7. Crossings of Minor Waterbodies 9
  - 8. Crossings of Intermediate Waterbodies 10
  - 9. Crossings of Major Waterbodies 10
  - 10. Temporary Erosion and Sediment Control 10
  - 11. Trench Dewatering 11
- C. RESTORATION 11
- D. POST-CONSTRUCTION MAINTENANCE 12

VI. WETLAND CROSSINGS 13
- A. GENERAL 13
- B. INSTALLATION 14
  - 1. Extra Work Areas and Access Roads 14
  - 2. Crossing Procedures 15
  - 3. Temporary Sediment Control 16
  - 4. Trench Dewatering 17
- C. RESTORATION 17
- D. POST-CONSTRUCTION MAINTENANCE AND REPORTING 18

VII. HYDROSTATIC TESTING 19
- A. NOTIFICATION PROCEDURES AND PERMITS 19
- B. GENERAL 19
- C. INTAKE SOURCE AND RATE 19
- D. DISCHARGE LOCATION, METHOD, AND RATE 20

WETLAND AND WATERBODY
CONSTRUCTION AND MITIGATION PROCEDURES (PROCEDURES)

I. APPLICABILITY

A. The intent of these Procedures is to assist project sponsors by identifying baseline mitigation measures for minimizing the extent and duration of project-related disturbance on wetlands and waterbodies. Project sponsors shall specify in their applications for a new FERC authorization, and in prior notice and advance notice filings, any individual measures in these Procedures they consider unnecessary, technically infeasible, or unsuitable due to local conditions and fully describe any alternative measures they would use. Project sponsors shall also explain how those alternative measures would achieve a comparable level of mitigation.

Once a project is authorized, project sponsors can request further changes as variances to the measures in these Procedures (or the applicant's approved procedures). The Director of the Office of Energy Projects (Director) will consider approval of variances upon the project sponsor's written request, if the Director agrees that a variance:

1. provides equal or better environmental protection;

2. is necessary because a portion of these Procedures is infeasible or unworkable based on project-specific conditions; or

3. is specifically required in writing by another federal, state, or Native American land management agency for the portion of the project on its land or under its jurisdiction.

Sponsors of projects planned for construction under the automatic authorization provisions in the FERC's regulations must receive written approval for any variances in advance of construction.

Project-related impacts on non-wetland areas are addressed in the staff's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan).

B. DEFINITIONS

1. "Waterbody" includes any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes:

   a. "minor waterbody" includes all waterbodies less than or equal to 10 feet wide at the water's edge at the time of crossing;

   b. "intermediate waterbody" includes all waterbodies greater than 10 feet wide but less than or equal to 100 feet wide at the water's edge at the time of crossing; and

   c. "major waterbody" includes all waterbodies greater than 100 feet wide at the water's edge at the time of crossing.

2. "Wetland" includes any area that is not in actively cultivated or rotated cropland and that satisfies the requirements of the current federal methodology for identifying and delineating wetlands.

II. PRECONSTRUCTION FILING

A. The following information must be filed with the Secretary of the FERC (Secretary) prior to the beginning of construction, for the review and written approval by the Director:

1. site-specific justifications for extra work areas that would be closer than 50 feet from a waterbody or wetland; and

2. site-specific justifications for the use of a construction right-of-way greater than 75-feet-wide in wetlands.

B. The following information must be filed with the Secretary prior to the beginning of construction. These filing requirements do not apply to projects constructed under the automatic authorization provisions in the FERC's regulations:

1. Spill Prevention and Response Procedures specified in section IV.A;

2. a schedule identifying when trenching or blasting will occur within each waterbody greater than 10 feet wide, within any designated coldwater fishery, and within any waterbody identified as habitat for federally-listed threatened or endangered species. The project sponsor will revise the schedule as necessary to provide FERC staff at least 14 days advance notice. Changes within this last 14-day period must provide for at least 48 hours advance notice;

3. plans for horizontal directional drills (HDD) under wetlands or waterbodies, specified in section V.B.6.d;

4. site-specific plans for major waterbody crossings, described in section V.B.9;

5. a wetland delineation report as described in section VI.A.1, if applicable; and

6. the hydrostatic testing information specified in section VII.B.3.

III. ENVIRONMENTAL INSPECTORS

A. At least one Environmental Inspector having knowledge of the wetland and waterbody conditions in the project area is required for each construction spread. The number and experience of Environmental Inspectors assigned to each construction spread shall be appropriate for the length of the construction spread and the number/significance of resources affected.

B. The Environmental Inspector's responsibilities are outlined in the Upland Erosion Control, Revegetation, and Maintenance Plan (Plan).

IV. PRECONSTRUCTION PLANNING

A. The project sponsor shall develop project-specific Spill Prevention and Response Procedures that meet applicable requirements of state and federal agencies. A copy must be filed with the Secretary prior to construction and made available in the field on each construction spread. This filing requirement does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

1. It shall be the responsibility of the project sponsor and its contractors to structure their operations in a manner that reduces the risk of spills or the accidental exposure of fuels or hazardous materials to waterbodies or wetlands. The project sponsor and its contractors must, at a minimum, ensure that:

a. all employees handling fuels and other hazardous materials are properly trained;

b. all equipment is in good operating order and inspected on a regular basis;

c. fuel trucks transporting fuel to on-site equipment travel only on approved access roads;

d. all equipment is parked overnight and/or fueled at least 100 feet from a waterbody or in an upland area at least 100 feet from a wetland boundary. These activities can occur closer only if the Environmental Inspector determines that there is no reasonable alternative, and the

project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;

e. hazardous materials, including chemicals, fuels, and lubricating oils, are not stored within 100 feet of a wetland, waterbody, or designated municipal watershed area, unless the location is designated for such use by an appropriate governmental authority. This applies to storage of these materials and does not apply to normal operation or use of equipment in these areas;

f. concrete coating activities are not performed within 100 feet of a wetland or waterbody boundary, unless the location is an existing industrial site designated for such use. These activities can occur closer only if the Environmental Inspector determines that there is no reasonable alternative, and the project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;

g. pumps operating within 100 feet of a waterbody or wetland boundary utilize appropriate secondary containment systems to prevent spills; and

h. bulk storage of hazardous materials, including chemicals, fuels, and lubricating oils have appropriate secondary containment systems to prevent spills.

2. The project sponsor and its contractors must structure their operations in a manner that provides for the prompt and effective cleanup of spills of fuel and other hazardous materials. At a minimum, the project sponsor and its contractors must:

a. ensure that each construction crew (including cleanup crews) has on hand sufficient supplies of absorbent and barrier materials to allow the rapid containment and recovery of spilled materials and knows the procedure for reporting spills and unanticipated discoveries of contamination;

b. ensure that each construction crew has on hand sufficient tools and material to stop leaks;

c. know the contact names and telephone numbers for all local, state, and federal agencies (including, if necessary, the U. S. Coast Guard and the National Response Center) that must be notified of a spill; and

d. follow the requirements of those agencies in cleaning up the spill, in excavating and disposing of soils or other materials contaminated by a spill, and in collecting and disposing of waste generated during spill cleanup.

B. AGENCY COORDINATION

The project sponsor must coordinate with the appropriate local, state, and federal agencies as outlined in these Procedures and in the FERC's Orders.

V. WATERBODY CROSSINGS

A. NOTIFICATION PROCEDURES AND PERMITS

1. Apply to the U.S. Army Corps of Engineers (COE), or its delegated agency, for the appropriate wetland and waterbody crossing permits.

2. Provide written notification to authorities responsible for potable surface water supply intakes located within 3 miles downstream of the crossing at least 1 week before beginning work in the waterbody, or as otherwise specified by that authority.

3. Apply for state-issued waterbody crossing permits and obtain individual or generic section 401 water quality certification or waiver.

4. Notify appropriate federal and state authorities at least 48 hours before beginning trenching or blasting within the waterbody, or as specified in applicable permits.

B. INSTALLATION

1. Time Window for Construction

Unless expressly permitted or further restricted by the appropriate federal or state agency in writing on a site-specific basis, instream work, except that required to install or remove equipment bridges, must occur during the following time windows:

a. coldwater fisheries - June 1 through September 30; and

b. coolwater and warmwater fisheries - June 1 through November 30.

2. Extra Work Areas

a. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from water's edge, except where

the adjacent upland consists of cultivated or rotated cropland or other disturbed land.

b. The project sponsor shall file with the Secretary for review and written approval by the Director, site-specific justification for each extra work area with a less than 50-foot setback from the water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. The justification must specify the conditions that will not permit a 50-foot setback and measures to ensure the waterbody is adequately protected.

c. Limit the size of extra work areas to the minimum needed to construct the waterbody crossing.

3. General Crossing Procedures

a. Comply with the COE, or its delegated agency, permit terms and conditions.

b. Construct crossings as close to perpendicular to the axis of the waterbody channel as engineering and routing conditions permit.

c. Where pipelines parallel a waterbody, maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the construction right-of-way, except where maintaining this offset will result in greater environmental impact.

d. Where waterbodies meander or have multiple channels, route the pipeline to minimize the number of waterbody crossings.

e. Maintain adequate waterbody flow rates to protect aquatic life, and prevent the interruption of existing downstream uses.

f. Waterbody buffers (e.g., extra work area setbacks, refueling restrictions) must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

g. Crossing of waterbodies when they are dry or frozen and not flowing may proceed using standard upland construction techniques in accordance with the Plan, provided that the Environmental Inspector verifies that water is unlikely to flow between initial disturbance and final stabilization of the feature. In the event of perceptible flow, the project sponsor must comply with all applicable Procedure requirements for "waterbodies" as defined in section I.B.1.

4. Spoil Pile Placement and Control

a. All spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings, must be placed in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas as described in section V.B.2.

b. Use sediment barriers to prevent the flow of spoil or silt-laden water into any waterbody.

5. Equipment Bridges

a. Only clearing equipment and equipment necessary for installation of equipment bridges may cross waterbodies prior to bridge installation. Limit the number of such crossings of each waterbody to one per piece of clearing equipment.

b. Construct and maintain equipment bridges to allow unrestricted flow and to prevent soil from entering the waterbody. Examples of such bridges include:

(1) equipment pads and culvert(s);
(2) equipment pads or railroad car bridges without culverts;
(3) clean rock fill and culvert(s); and
(4) flexi-float or portable bridges.

Additional options for equipment bridges may be utilized that achieve the performance objectives noted above. Do not use soil to construct or stabilize equipment bridges.

c. Design and maintain each equipment bridge to withstand and pass the highest flow expected to occur while the bridge is in place. Align culverts to prevent bank erosion or streambed scour. If necessary, install energy dissipating devices downstream of the culverts.

d. Design and maintain equipment bridges to prevent soil from entering the waterbody.

e. Remove temporary equipment bridges as soon as practicable after permanent seeding.

f. If there will be more than 1 month between final cleanup and the beginning of permanent seeding and reasonable alternative access to the right-of-way is available, remove temporary equipment bridges as soon as practicable after final cleanup.

g. Obtain any necessary approval from the COE, or the appropriate state agency for permanent bridges.

6. Dry-Ditch Crossing Methods

a. Unless approved otherwise by the appropriate federal or state agency, install the pipeline using one of the dry-ditch methods outlined below for crossings of waterbodies up to 30 feet wide (at the water's edge at the time of construction) that are state-designated as either coldwater or significant coolwater or warmwater fisheries, or federally-designated as critical habitat.

b. Dam and Pump

(1) The dam-and-pump method may be used without prior approval for crossings of waterbodies where pumps can adequately transfer streamflow volumes around the work area, and there are no concerns about sensitive species passage.

(2) Implementation of the dam-and-pump crossing method must meet the following performance criteria:

(i) use sufficient pumps, including on-site backup pumps, to maintain downstream flows;
(ii) construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);
(iii) screen pump intakes to minimize entrainment of fish;
(iv) prevent streambed scour at pump discharge; and
(v) continuously monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

c. Flume Crossing

The flume crossing method requires implementation of the following steps:

(1) install flume pipe after blasting (if necessary), but before any trenching;

(2) use sand bag or sand bag and plastic sheeting diversion structure or equivalent to develop an effective seal and to divert stream flow through the flume pipe (some modifications to the stream bottom may be required to achieve an effective seal);

(3) properly align flume pipe(s) to prevent bank erosion and streambed scour;

(4) do not remove flume pipe during trenching, pipelaying, or backfilling activities, or initial streambed restoration efforts; and

(5) remove all flume pipes and dams that are not also part of the equipment bridge as soon as final cleanup of the stream bed and bank is complete.

d. Horizontal Directional Drill

For each waterbody or wetland that would be crossed using the HDD method, file with the Secretary for the review and written approval by the Director, a plan that includes:

(1) site-specific construction diagrams that show the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction;

(2) justification that disturbed areas are limited to the minimum needed to construct the crossing;

(3) identification of any aboveground disturbance or clearing between the HDD entry and exit workspaces during construction;

(4) a description of how an inadvertent release of drilling mud would be contained and cleaned up; and

(5) a contingency plan for crossing the waterbody or wetland in the event the HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary.

The requirement to file HDD plans does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

7. Crossings of Minor Waterbodies

Where a dry-ditch crossing is not required, minor waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

a. except for blasting and other rock breaking measures, complete instream construction activities (including trenching, pipe installation, backfill, and restoration of the streambed contours) within 24 hours.

Streambanks and unconsolidated streambeds may require additional restoration after this period;

b. limit use of equipment operating in the waterbody to that needed to construct the crossing; and

c. equipment bridges are not required at minor waterbodies that do not have a state-designated fishery classification or protected status (e.g., agricultural or intermittent drainage ditches). However, if an equipment bridge is used it must be constructed as described in section V.B.5.

8. Crossings of Intermediate Waterbodies

Where a dry-ditch crossing is not required, intermediate waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

a. complete instream construction activities (not including blasting and other rock breaking measures) within 48 hours, unless site-specific conditions make completion within 48 hours infeasible;

b. limit use of equipment operating in the waterbody to that needed to construct the crossing; and

c. all other construction equipment must cross on an equipment bridge as specified in section V.B.5.

9. Crossings of Major Waterbodies

Before construction, the project sponsor shall file with the Secretary for the review and written approval by the Director a detailed, site-specific construction plan and scaled drawings identifying all areas to be disturbed by construction for each major waterbody crossing (the scaled drawings are not required for any offshore portions of pipeline projects). This plan must be developed in consultation with the appropriate state and federal agencies and shall include extra work areas, spoil storage areas, sediment control structures, etc., as well as mitigation for navigational issues. The requirement to file major waterbody crossing plans does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

The Environmental Inspector may adjust the final placement of the erosion and sediment control structures in the field to maximize effectiveness.

10. Temporary Erosion and Sediment Control

Install sediment barriers (as defined in section IV.F.3.a of the Plan) immediately after initial disturbance of the waterbody or adjacent upland.

Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan; however, the following specific measures must be implemented at stream crossings:

a. install sediment barriers across the entire construction right-of-way at all waterbody crossings, where necessary to prevent the flow of sediments into the waterbody. Removable sediment barriers (or driveable berms) must be installed across the travel lane. These removable sediment barriers can be removed during the construction day, but must be re-installed after construction has stopped for the day and/or when heavy precipitation is imminent;

b. where waterbodies are adjacent to the construction right-of-way and the right-of-way slopes toward the waterbody, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the waterbody; and

c. use temporary trench plugs at all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody.

11. Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any waterbody. Remove the dewatering structures as soon as practicable after the completion of dewatering activities.

C. RESTORATION

1. Use clean gravel or native cobbles for the upper 1 foot of trench backfill in all waterbodies that contain coldwater fisheries.

2. For open-cut crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing instream construction activities. For dry-ditch crossings, complete streambed and bank stabilization before returning flow to the waterbody channel.

3. Return all waterbody banks to preconstruction contours or to a stable angle of repose as approved by the Environmental Inspector.

4. Install erosion control fabric or a functional equivalent on waterbody banks at the time of final bank recontouring. Do not use synthetic monofilament

mesh/netted erosion control materials in areas designated as sensitive wildlife habitat unless the product is specifically designed to minimize harm to wildlife. Anchor erosion control fabric with staples or other appropriate devices.

5. Application of riprap for bank stabilization must comply with COE, or its delegated agency, permit terms and conditions.

6. Unless otherwise specified by state permit, limit the use of riprap to areas where flow conditions preclude effective vegetative stabilization techniques such as seeding and erosion control fabric.

7. Revegetate disturbed riparian areas with native species of conservation grasses, legumes, and woody species, similar in density to adjacent undisturbed lands.

8. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5 percent that are less than 50 feet from the waterbody, or as needed to prevent sediment transport into the waterbody. In addition, install sediment barriers as outlined in the Plan.

   In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the waterbody.

9. Sections V.C.3 through V.C.7 above also apply to those perennial or intermittent streams not flowing at the time of construction.

D. POST-CONSTRUCTION MAINTENANCE

1. Limit routine vegetation mowing or clearing adjacent to waterbodies to allow a riparian strip at least 25 feet wide, as measured from the waterbody's mean high water mark, to permanently revegetate with native plant species across the entire construction right-of-way. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees that are located within 15 feet of the pipeline that have roots that could compromise the integrity of the pipeline coating may be cut and removed from the permanent right-of-way. Do not conduct any routine vegetation mowing or clearing in riparian areas that are between HDD entry and exit points.

2. Do not use herbicides or pesticides in or within 100 feet of a waterbody except as allowed by the appropriate land management or state agency.

3. Time of year restrictions specified in section VII.A.5 of the Plan (April 15 – August 1 of any year) apply to routine mowing and clearing of riparian areas.

VI. WETLAND CROSSINGS

A. GENERAL

1. The project sponsor shall conduct a wetland delineation using the current federal methodology and file a wetland delineation report with the Secretary before construction. The requirement to file a wetland delineation report does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

   This report shall identify:

   a. by milepost all wetlands that would be affected;

   b. the National Wetlands Inventory (NWI) classification for each wetland;

   c. the crossing length of each wetland in feet; and

   d. the area of permanent and temporary disturbance that would occur in each wetland by NWI classification type.

   The requirements outlined in this section do not apply to wetlands in actively cultivated or rotated cropland. Standard upland protective measures, including workspace and topsoiling requirements, apply to these agricultural wetlands.

2. Route the pipeline to avoid wetland areas to the maximum extent possible. If a wetland cannot be avoided or crossed by following an existing right-of-way, route the new pipeline in a manner that minimizes disturbance to wetlands. Where looping an existing pipeline, overlap the existing pipeline right-of-way with the new construction right-of-way. In addition, locate the loop line no more than 25 feet away from the existing pipeline unless site-specific constraints would adversely affect the stability of the existing pipeline.

3. Limit the width of the construction right-of-way to 75 feet or less. Prior written approval of the Director is required where topographic conditions or soil limitations require that the construction right-of-way width within the boundaries of a federally delineated wetland be expanded beyond 75 feet. Early in the planning process the project sponsor is encouraged to identify site-specific areas where excessively wide trenches could occur and/or where spoil piles could be difficult to maintain because existing soils lack adequate unconfined compressive strength.

4. Wetland boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

5. Implement the measures of sections V and VI in the event a waterbody crossing is located within or adjacent to a wetland crossing. If all measures of sections V and VI cannot be met, the project sponsor must file with the Secretary a site-specific crossing plan for review and written approval by the Director before construction. This crossing plan shall address at a minimum:

   a. spoil control;

   b. equipment bridges;

   c. restoration of waterbody banks and wetland hydrology;

   d. timing of the waterbody crossing;

   e. method of crossing; and

   f. size and location of all extra work areas.

6. Do not locate aboveground facilities in any wetland, except where the location of such facilities outside of wetlands would prohibit compliance with U.S. Department of Transportation regulations.

B. INSTALLATION

1. Extra Work Areas and Access Roads

   a. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.

   b. The project sponsor shall file with the Secretary for review and written approval by the Director, site-specific justification for each extra work area with a less than 50-foot setback from wetland boundaries, except where adjacent upland consists of cultivated or rotated cropland or other disturbed land. The justification must specify the site-specific conditions that will not permit a 50-foot setback and measures to ensure the wetland is adequately protected.

   c. The construction right-of-way may be used for access when the wetland soil is firm enough to avoid rutting or the construction right-of-way has been appropriately stabilized to avoid rutting (e.g., with timber riprap, prefabricated equipment mats, or terra mats).

      In wetlands that cannot be appropriately stabilized, all construction equipment other than that needed to install the wetland crossing shall

use access roads located in upland areas. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the construction right-of-way.

d. The only access roads, other than the construction right-of-way, that can be used in wetlands are those existing roads that can be used with no modifications or improvements, other than routine repair, and no impact on the wetland.

2. Crossing Procedures

a. Comply with COE, or its delegated agency, permit terms and conditions.

b. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.

c. Use "push-pull" or "float" techniques to place the pipe in the trench where water and other site conditions allow.

d. Minimize the length of time that topsoil is segregated and the trench is open. Do not trench the wetland until the pipeline is assembled and ready for lowering in.

e. Limit construction equipment operating in wetland areas to that needed to clear the construction right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction right-of-way.

f. Cut vegetation just above ground level, leaving existing root systems in place, and remove it from the wetland for disposal.

The project sponsor can burn woody debris in wetlands, if approved by the COE and in accordance with state and local regulations, ensuring that all remaining woody debris is removed for disposal.

g. Limit pulling of tree stumps and grading activities to directly over the trenchline. Do not grade or remove stumps or root systems from the rest of the construction right-of-way in wetlands unless the Chief Inspector and Environmental Inspector determine that safety-related construction constraints require grading or the removal of tree stumps from under the working side of the construction right-of-way.

h. Segregate the top 1 foot of topsoil from the area disturbed by trenching, except in areas where standing water is present or soils are

saturated. Immediately after backfilling is complete, restore the segregated topsoil to its original location.

i. Do not use rock, soil imported from outside the wetland, tree stumps, or brush riprap to support equipment on the construction right-of-way.

j. If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-ground-weight construction equipment, or operate normal equipment on timber riprap, prefabricated equipment mats, or terra mats.

k. Remove all project-related material used to support equipment on the construction right-of-way upon completion of construction.

3. Temporary Sediment Control

Install sediment barriers (as defined in section IV.F.3.a of the Plan) immediately after initial disturbance of the wetland or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench). Except as noted below in section VI.B.3.c, maintain sediment barriers until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan.

a. Install sediment barriers across the entire construction right-of-way immediately upslope of the wetland boundary at all wetland crossings where necessary to prevent sediment flow into the wetland.

b. Where wetlands are adjacent to the construction right-of-way and the right-of-way slopes toward the wetland, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the wetland.

c. Install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way through wetlands. Remove these sediment barriers during right-of-way cleanup.

4. Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any wetland. Remove the dewatering structures as soon as practicable after the completion of dewatering activities.

C. RESTORATION

1. Where the pipeline trench may drain a wetland, construct trench breakers at the wetland boundaries and/or seal the trench bottom as necessary to maintain the original wetland hydrology.

2. Restore pre-construction wetland contours to maintain the original wetland hydrology.

3. For each wetland crossed, install a trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from the wetland, or as needed to prevent sediment transport into the wetland. In addition, install sediment barriers as outlined in the Plan. In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the wetland.

4. Do not use fertilizer, lime, or mulch unless required in writing by the appropriate federal or state agency.

5. Consult with the appropriate federal or state agencies to develop a project-specific wetland restoration plan. The restoration plan shall include measures for re-establishing herbaceous and/or woody species, controlling the invasion and spread of invasive species and noxious weeds (e.g., purple loosestrife and phragmites), and monitoring the success of the revegetation and weed control efforts. Provide this plan to the FERC staff upon request.

6. Until a project-specific wetland restoration plan is developed and/or implemented, temporarily revegetate the construction right-of-way with annual ryegrass at a rate of 40 pounds/acre (unless standing water is present).

7. Ensure that all disturbed areas successfully revegetate with wetland herbaceous and/or woody plant species.

8. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after revegetation and stabilization of adjacent upland areas are judged to be successful as specified in section VII.A.4 of the Plan.

D. POST-CONSTRUCTION MAINTENANCE AND REPORTING

1. Do not conduct routine vegetation mowing or clearing over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees within 15 feet of the pipeline with roots that could compromise the integrity of pipeline coating may be selectively cut and removed from the permanent right-of-way. Do not conduct any routine vegetation mowing or clearing in wetlands that are between HDD entry and exit points.

2. Do not use herbicides or pesticides in or within 100 feet of a wetland, except as allowed by the appropriate federal or state agency.

3. Time of year restrictions specified in section VII.A.5 of the Plan (April 15 – August 1 of any year) apply to routine mowing and clearing of wetland areas.

4. Monitor and record the success of wetland revegetation annually until wetland revegetation is successful.

5. Wetland revegetation shall be considered successful if all of the following criteria are satisfied:

    a. the affected wetland satisfies the current federal definition for a wetland (i.e., soils, hydrology, and vegetation);

    b. vegetation is at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction;

    c. if natural rather than active revegetation was used, the plant species composition is consistent with early successional wetland plant communities in the affected ecoregion; and

    d. invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction.

6. Within 3 years after construction, file a report with the Secretary identifying the status of the wetland revegetation efforts and documenting success as defined in section VI.D.5, above. The requirement to file wetland restoration reports with the Secretary does not apply to projects constructed under the automatic authorization, prior notice, or advance notice provisions in the FERC's regulations.

    For any wetland where revegetation is not successful at the end of 3 years after construction, develop and implement (in consultation with a

professional wetland ecologist) a remedial revegetation plan to actively revegetate wetlands. Continue revegetation efforts and file a report annually documenting progress in these wetlands until wetland revegetation is successful.

VII. HYDROSTATIC TESTING

A. NOTIFICATION PROCEDURES AND PERMITS

1. Apply for state-issued water withdrawal permits, as required.

2. Apply for National Pollutant Discharge Elimination System (NPDES) or state-issued discharge permits, as required.

3. Notify appropriate state agencies of intent to use specific sources at least 48 hours before testing activities unless they waive this requirement in writing.

B. GENERAL

1. Perform 100 percent radiographic inspection of all pipeline section welds or hydrotest the pipeline sections, before installation under waterbodies or wetlands.

2. If pumps used for hydrostatic testing are within 100 feet of any waterbody or wetland, address secondary containment and refueling of these pumps in the project's Spill Prevention and Response Procedures.

3. The project sponsor shall file with the Secretary before construction a list identifying the location of all waterbodies proposed for use as a hydrostatic test water source or discharge location. This filing requirement does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

C. INTAKE SOURCE AND RATE

1. Screen the intake hose to minimize the potential for entrainment of fish.

2. Do not use state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and/or local permitting agencies grant written permission.

3. Maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.

4. Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.

D. DISCHARGE LOCATION, METHOD, AND RATE

1. Regulate discharge rate, use energy dissipation device(s), and install sediment barriers, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive streamflow.

2. Do not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and local permitting agencies grant written permission.

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT L

Waste Management Plan

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Application of Tennessee Gas Pipeline Company for a Certificate of Public Convenience and Necessity

FERC Docket No. CP14-___-000

CONNECTICUT EXPANSION PROJECT

Connecticut, Massachusetts and New York

VOLUME II

ENVIRONMENTAL REPORT

APPENDIX F

WASTE MANAGEMENT PLAN

JULY 2014

CONNECTICUT EXPANSION PROJECT
WASTE MANAGEMENT PLAN

TABLE OF CONTENTS

1. WASTE IDENTIFICATION AND CHARACTERIZATION 1

1.1 IDENTIFYING WASTES 1

1.2 WASTE CHARACTERIZATION 1

2. WASTE TYPES 2

2.1 HAZARDOUS WASTE 2

2.2 NON-HAZARDOUS WASTE 4

2.3 SPECIAL WASTE (ASBESTOS & PCB) 5

2.3.1 Asbestos/ACM 5

2.3.2 PCB Waste 7

2.4 UNIVERSAL WASTE 8

WASTE MANAGEMENT PLAN

The following information is to be used as a contractor's guidance tool when generating wastes for Tennessee Gas Pipeline Company, L.L.C.'s ("Company") Connecticut Expansion Project ("Project") and to assist the contractor in developing a waste management plan, which must be submitted to the Company before the Project begins.

1. Waste Identification and Characterization

1.1 Identifying Wastes

Wastes may be grouped into four categories, each requiring different forms of disposal: hazardous waste, non-hazardous waste, special waste, and universal waste.

- **Hazardous wastes** - Wastes that meet one of the criteria of ignitable, corrosive, reactive, toxic, or is specifically listed as hazardous waste by regulation. These wastes require special handling and disposal.

- **Non-hazardous wastes** - Wastes that do not fall into the other categories. This includes general trash.

- **Special wastes** - Wastes that do not meet the criteria for hazardous wastes, but may present special hazards or require special handling. Examples of special wastes are asbestos, polychlorinated biphenyls ("PCBs"), radioactive waste, and naturally occurring radioactive material ("NORM"). It's important to note that some states have their own classification of special wastes.

- **Universal wastes** - To reduce the amount of hazardous waste in municipal solid waste streams, the Environmental Protection Agency ("EPA") and many states recognize batteries, thermostats and lamps, e.g., fluorescent light bulbs, as "universal" and thus allow easier handling of these wastes.

1.2 Waste Characterization

The Environmental Inspector ("EI") shall coordinate with the Field Environmental Representative to determine if waste profiles exist for wastes generated during construction. If the classification of a waste is unknown, the waste must be characterized using test results or knowledge of the process generating the waste to determine the proper handling requirements for that waste. The EI shall coordinate with the Field Environmental Representative and Contractor to determine the type of waste and the party responsible for proper disposal. The information below is used to characterize a waste.

- Source of the waste.

- Material Safety Data Sheets ("MSDS") for materials comprising the waste.

- Laboratory results from waste testing, as applicable.

Contact the Field Environmental Representative for waste characterization and sampling instructions if no existing waste profile exists.

Prior to waste characterization, a number of general guidelines shall also be adhered to when handling or storing wastes.

- Ensure that the Contractor's Environmental Guidelines in the contract are followed.

- Ensure that the Contractor provides a list to the EI of all hazardous materials or potential contaminants that are to be used or stored on the Project site.

- DO NOT bury any waste with the exception of stumps, rocks, or boulders as approved within the Federal Energy Regulatory Commission's Upland Erosion Control, Revegetation and Maintenance Plan (the "Plan", May 2013 version) and the Commission's Wetland and Waterbody Construction and Mitigation Procedures (the "Procedures", May 2013 version).

- Never mix any waste awaiting characterization with other wastes.

- Never ship any waste unless it has been characterized.

- Never ship any hazardous waste from the job site to a compressor station without prior approval from the Field Environmental Representative and compressor station.

- Ship wastes along with the required manifests only to company-approved facilities.

- Never ship drums of waste to a compressor station without prior approval from the Field Environmental Representative and the compressor station.

2. Waste Types

2.1 Hazardous Waste

Common wastes include, but are not limited to: pipeline sludge, spent pigs, sandblast abrasive (depending on type and use), paint thinner, and solvents.

The following procedures apply to storage of waste determined to be hazardous for all classes of generators:

- Store hazardous wastes using the Department of Transportation ("DOT") approved containers, a frac tank (bulk liquid wastes), a covered steel roll-off

container with a poly-liner (bulk solid wastes like contaminated soil), or on a thick poly-liner and provide the area with a poly-liner cover and temporary containment berm (bulk solid wastes).

- When using DOT-approved containers, be sure the containers are kept closed or sealed (except when waste is being added), maintained in good condition (not damaged, leaking or corroded) and store compatible substances that will not react with the hazardous waste. For example, store acidic wastes in plastic or plastic-lined containers rather than steel containers.

- Label hazardous waste containers (drums, tanks, roll-off containers) with a hazardous waste label as soon as any hazardous waste is placed into the container. Use a waterproof pen to complete the following information on the label:

  - Generator name, address, and phone number.
  - Generator EPA identification number.
  - Description of waste (contact the Field Environmental Representative to obtain a waste description).
  - The 4-digit EPA waste code (the Field Environmental Representative will provide EPA waste codes).
  - Accumulation date (the date the waste was added to the container, if not from satellite storage, or the date it was brought to the waste storage area from a satellite accumulation area).

- Label waste piles with a weatherproof sign identifying the waste and the date the waste pile was started. Waste piles are to be placed on poly-liner, covered to protect them from weather, and surround with barricade tape.

- Store hazardous waste in a designated hazardous waste storage area (or in a designated satellite accumulation area) that is covered or protected from the weather; has an impermeable floor, surrounded by curbing or use spill pallets; and is more than 50 feet away from the facility property line if ignitable or reactive hazardous waste is stored in the area.

<u>Manage the hazardous waste storage areas as follows:</u>

- Identify as hazardous and non-hazardous waste appropriately.

- Arrange the containers by waste type, keeping similar hazardous wastes together.

- Separate any incompatible waste by a dike, berm, wall, or other containment device.

- Turn containers so labels may be read easily and ensure that enough isle space is left between drums to inspect for leaks and to gain access to respond to spills or fire.

- Handle waste containers carefully to prevent rupture or leaks, and protect containers from extreme temperatures.

- Large Quantity Generators and in some states Small Quantity Generators must have a contingency plan, make weekly inspections of hazardous wastes, and provide specific training to personnel.

- Hazardous waste can only be disposed at approved facilities. Contact the Field Environmental Representative for a list of approved facilities.

2.2 Non-Hazardous Waste

Common wastes include, but are not limited to: oily rock/soil, oily rags, sandblast abrasive (depending on type and use), and general trash/garbage.

- Turn containers so labels may be read easily.

- Non-hazardous waste is waste that has not been found to be hazardous through testing or by generator knowledge but has special transportation and disposal requirements, which may include State permitting and approvals.

- Store non-hazardous wastes using one of the following methods:

  - In DOT-approved containers.
  - In a frac tank (bulk liquid wastes).
  - In a covered steel roll-off container with a poly-liner (e.g., bulk solid wastes like contaminated soil or used sandblasting abrasive).
  - On a thick poly-liner and provide the area with a poly-liner cover and temporary containment berm (bulk solid wastes).

- When using DOT-approved containers, be sure the containers are:

  - Kept closed or sealed (except when waste is being added).
  - In good condition (not damaged, leaking or corroded).

- Label non-hazardous waste containers (drums, tanks, roll-off containers) with a non-hazardous waste label identifying the contents as soon as waste is placed into the container.

- Store non-hazardous waste segregated from hazardous waste storage or satellite accumulation areas.

- Non-hazardous waste can only be disposed at approved facilities. Contact the Field Environmental Representative for a list of approved facilities.

Some States allow sandblast sand to be left in the ditch if sandblasting bare pipe only.

Contact the Project Environmental Coordinator to verify if this type of activity may occur.

2.3 Special Waste (Asbestos and PCB)

Common wastes include, but are not limited to: asbestos or asbestos containing material ("ACM") and PCBs.

2.3.1 Asbestos/ACM

Check with the Project Environmental Coordinator to determine if there are any additional state-specific requirements that may apply.

- Store in double, six-mil thick plastic bags, or single bags in DOT approved drums.
- When placing asbestos into waste containers, do the following:
  - Make sure that the asbestos is thoroughly wet before closing the container for the final time.
  - Gloves and other solids can be added before sealing.
  - Seal all containers by securing the drum lids or by wrapping the neck of plastic bags with duct tape.
  - Store containers in an area where the waste is secure and not easily disturbed.
  - For accumulation containers, each item must be individually wrapped and placed in drum.
- Mark or label the container with the information indicated below:
  - The letters "RQ" for reportable quantity, if the waste contains one pound or more of friable asbestos.
  - The word "Waste".
  - The word "Asbestos" and the identification number for asbestos "NA2212".
  - The facility name and address.
  - A warning label stating "DANGER; CONTAINS ASBESTOS FIBERS; AVOID CREATING DUST; CANCER AND LUNG DISEASE HAZARD".
- Ship asbestos waste to a Company-approved disposal facility. Contact the Field Environmental Representative for a list of approved facilities.
- Pipe coated with non-friable asbestos can be sold and transported to a scrap dealer or individual buyer. Written notification to the dealer or buyer must include a disclosure and release document that indicates that the pipe is coated with an asbestos-containing material. The Company has a specific document for this

purpose that contains the appropriate language. Contact the Field Environmental Representative for details on transferring pipe coated with non-friable asbestos.

- Do the following when preparing sections of pipe coated with friable asbestos-containing material for transportation to a Company-approved disposal facility:

  - Pipe joints must be less than 40 feet long for transportation by trailer (also verify whether or not a specific pipe length is required by the disposal company).
  - Pipe joints must be less than 20 feet long for transportation in a roll-off box.
  - Wrap ends of pipe with polyvinyl and duct tape or place in sealed roll-off container.
  - A manifest is required for transportation to a disposal facility.
  - Provide State environmental or health department registration, if applicable.

- Use either Company vehicles or contract vehicles that meet DOT requirements to transport asbestos waste. If the amount of asbestos-containing material being transported is 1,000 pounds or more, a commercial drivers license with hazardous materials endorsement is required.

- Ensure that the vehicle transporting regulated asbestos-containing material (friable) from the facility is marked with signs warning of asbestos danger while the vehicle is being loaded or unloaded. The sign should read "DANGER; ASBESTOS DUST HAZARD; CANCER AND LUNG DISEASE HAZARD; AUTHORIZED PERSONNEL ONLY".

- Inspect all containers before and after unloading/loading to ensure:

  - All drum tops are secured.
  - Duct tape has been placed around the necks of all bags and there are no punctures. Place additional bags over the outside of any punctured bags and secure the necks of the new bags with duct tape.
  - All containers are properly labeled.

- The type of shipping papers required depends on the applicable state. A waste shipping record must be completed for each shipment. Check with the Project Environmental Coordinator to determine if there are any additional <u>state-specific</u> requirements that may apply.

- Make sure shipping papers are completed as follows:

  - Check the "RQ" column on the shipping paper or mark "RQ" before the shipping name if the shipment contains one pound or more of friable asbestos.

- o DOT shipping name is "Waste Asbestos" or, if the asbestos waste is mixed with a binder, filler, or other material, "Waste Asbestos Mixture".
- o Hazard Class Identification Number is "Class 9".
- o North American Identification Number is "NA2212".
- o Packing group is "PG III".

- Never dispose of asbestos-containing wastes by placing it in a container with other trash, by burying, using as fill material, or leaving in a pipe excavation ditch.

- Dispose of asbestos-containing wastes as soon as practical at a disposal facility that is permitted to accept asbestos. Contact the Field Environmental Representative for a list of approved disposal sites for asbestos-containing wastes.

2.3.2 PCB Waste

In some states, PCB wastes are hazardous wastes and all hazardous waste requirements must be followed in addition to those listed in this procedure. **Check with the Project Environmental Coordinator to determine if there are any additional <u>state-specific</u> requirements that may apply.**

- PCB wastes may be stored for 30 days without any special storage requirements.

- PCB wastes may be stored up to one year within an EPA-defined storage area. Contact the Project Environmental Coordinator for assistance on setting up a PCB waste storage area.

- As a minimum, store liquid PCB wastes in DOT-approved containers or on pallets with containment designed to capture any drips or leaks.

- Protect storage containers or equipment from weather.

- Mark PCB wastes with the proper PCB label before being placed into storage. The basic PCB label is 6"x6", white or yellow, which can be reduced as small as 2"x2".

- Mark all PCB wastes with the date that the item was removed from service or the date that the waste was generated and enter this information on the PCB waste log. Mark the storage area with a sign.

- Company vehicles can only be used to transport PCB wastes from a Company location where the waste was generated to another Company location where the waste will be stored. Placards are required if transporting:

  - o More than 99.4 pounds of PCB waste in containers
  - o One or more PCB transformers with 500 ppm or more PCBs.

- Check containers before and after loading to make sure that they are in good condition, are not leaking, and that all covers are secured.

- A hazardous waste manifest must accompany each shipment of PCB waste.

- Contact the Project Environmental Coordinator for a list of Company approved PCB disposal facilities. Dispose all PCB wastes at an approved facility.

- Once the PCB waste has been shipped to an approved disposal facility, the owner or operator of the disposal facility shall send the manifest and acknowledgement of receipt to the generator identified on the manifest which accompanied the shipment of PCB waste within 30 days of the date the disposal facility received the waste. If an acknowledgement of receipt is not received with the manifest, the generator shall confirm by telephone by the close of business that the disposal facility received the manifested waste and document the acknowledgement in the PCB log. The disposal facility should also send a Certificate of Disposal within 30 days of actual disposal of the waste.

2.4 Universal Waste

Common wastes include, but are not limited to: batteries, thermostats, and fluorescent light bulbs.

- If any universal waste is generated during construction, contact the Field Environmental Representative for storage and disposal instructions.

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT M

Spill Prevention and Response Plan

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Application of Tennessee Gas Pipeline Company for a Certificate of Public Convenience and Necessity

FERC Docket No. CP14-___-000

CONNECTICUT EXPANSION PROJECT

Connecticut, Massachusetts and New York

VOLUME II

ENVIRONMENTAL REPORT

APPENDIX D

SPILL PREVENTION AND RESPONSE PROCEDURES

JULY 2014

CONNECTICUT EXPANSION PROJECT
SPILL PREVENTION AND RESPONSE PROCEDURES

TABLE OF CONTENTS

1. PREVENTATIVE MEASURES 1

1.1 TRAINING 1
1.2 EQUIPMENT INSPECTION/MAINTENANCE 1
1.3 REFUELING 2
1.4 STORAGE 3
1.5 PERSONNEL SUPPORT 4

2. IMPACT MINIMIZATION MEASURES 4

3. SUGGESTED EQUIPMENT LIST 7

3.1 TERRESTRIAL CONSTRUCTION 7
3.1.1 Fuels and Lubricating Oil Storage 7
3.1.2 Routine Refueling and Maintenance 7
3.1.3 Equipment Failure 8
3.2 WATERBODY AND WETLAND CROSSINGS 8

SPILL PREVENTION AND RESPONSE PROCEDURES

1. PREVENTATIVE MEASURES

The Spill Prevention and Response Procedures ("SPRP") provides preventative and mitigative measures to be employed by Tennessee Gas Pipeline Company, L.L.C ("Company") during construction of the Project. Methods listed in this section are based on approved spill controls plans that the Company has used successfully in the past and are established to minimize the environmental impact associated with spills or releases at fuel, lubricant, or hazardous materials storage areas, during normal upland construction and refueling activities, and during special refueling activities within 100 feet of perennial stream banks, wetland boundaries, or within municipal watersheds. The Project's on-site Environmental Inspector ("EI") is responsible for ensuring that the Company's Contractors implement the measures and procedures outlined in this SPRP. The responsibilities of these inspectors are described in the Federal Energy Regulation Commission ("FERC") Upland and Erosion Control, Revegetation, and Maintenance Plan ("Plan") and Wetland and Waterbody Construction and Mitigation Procedures ("Procedures").

1.1 TRAINING

The Contractor will instruct personnel on the operation and maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, and lubricants. Personnel will also be made aware of the pollution control laws, rules, and regulations applicable to their work.

Spill prevention briefings with the construction crew will be scheduled and conducted by the Contractor to insure adequate understanding of spill prevention measures. These briefings will highlight:

- precautionary measures to prevent spills;
- sources of spills, such as equipment failure or malfunction;
- standard operating procedures in case of a spill;
- equipment, materials, and supplies available for clean-up of a spill; and
- a list of known spill events.

A spill is an un-permitted release of product, raw materials, or chemicals outside any secondary containment and into the environment. Spills can occur as a result of leaks, accidents, or third party incidents.

1.2 EQUIPMENT INSPECTION/MAINTENANCE

The Contractor will inspect and maintain equipment that must be fueled and/or lubricated according to a strict schedule. The Contractor will submit to the Company for approval written documentation of the methods used and work performed.

All containers, valves, pipelines, and hoses will be examined regularly to assess their general condition. The examination will identify any signs of deterioration that could cause a spill and signs of leaks, such as accumulated fluids. All leaks will be promptly corrected and/or repaired.

1.3 REFUELING

(1) The Contractor will insure that fuel trucks transporting fuel to on-site equipment travel only on approved access roads; all equipment parked overnight and/or fueled at least 100 feet from a waterbody or in an upland area, equipment refueled and lubricated within the right-of-way ("ROW"), compressor station yard, meter station site, or fee property and at least 100 feet away from all waterbodies and wetlands with the following exceptions:

- The EI finds, in advance, that no reasonable alternative is available and the Contractor and Company have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;
- Areas such as rugged terrain or steep slopes where movement of equipment to refueling stations would cause excessive disturbance to the ROW or workspace;
- Areas where removing equipment from a wetland for servicing would increase adverse impacts to the wetland;
- Sites where moving equipment to refueling stations from pre-fabricated equipment pads is impracticable or where there is a barrier from the waterbody/wetland (i.e., road or railroad);
- Locations where the waterbody or wetland is located adjacent to a road crossing, compressor station yard, or meter station site (from which the equipment can be serviced); and
- Refueling of immobile equipment including, but not limited to, bending and boring machines, air compressors, padding machines, and hydro-test fill pumps. Pumps operating within 100 feet of a waterbody or wetland boundary utilize appropriate secondary containment systems to prevent spills.

In these areas, auxiliary fuel tanks will be used to reduce the frequency of refueling operations and in no case will refueling take place within 100 feet of any known potable water wells.

(2) The Contractor will assure that all refueling is done pursuant to the following conditions:

- Impact minimization measures and equipment will be sufficient to prevent discharged fluids from leaving the ROW, compressor station yard, meter station site, or workspace or reaching wetlands or waterbodies, and be readily available for use. These will include some combination of the following:

  a. dikes, berms or retaining walls sufficiently impervious to contain spilled oil;
  b. sorbent and barrier materials in quantities determined by the Contractor to be sufficient to capture the largest reasonably foreseeable spill;
  c. drums or containers suitable for holding and transporting contaminated materials;
  d. curbing;
  e. culverts, gutters, or other drainage systems;
  f. weirs, booms, or other barriers;
  g. spill diversion or retention ponds; and
  h. sumps and collection systems.

- All spills will be cleaned up immediately. Containment equipment will not be used for storing contaminated material.

(3) Concrete coating activities shall not be performed within 100 feet of a wetland or waterbody boundary, unless the location is an existing industrial site designated for such use. These activities can occur closer only if the EI determines that there is no reasonable alternative, and the project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill.

(4) The Contractor will prepare for approval by the Company a list of the type, quantity, and the storage location of containment and clean up equipment to be used during construction.

1.4 STORAGE

Storage containment areas will not have drains, unless such drains lead to a containment area or vessel where the entire spill can be recovered. The Contractor will ensure bulk storage of hazardous materials, including chemicals, fuels, and lubricating oils will have appropriate secondary containment systems.

1.5 PERSONNEL SUPPORT

Prior to construction, the ROW inspector or agent shall identify and prepare a written inventory of water wells within 150 feet of the construction site. The Construction ROW Agent will notify the authorities of all potable water supply intakes located within three miles downstream of any crossings a minimum of one week prior to construction.

2. IMPACT MINIMIZATION MEASURES

Containment is the immediate priority in the case of a spill. A spill will be contained on the Company's property, ROW, compressor station yard, meter station site, or workspace, if possible. Clean up procedures will begin immediately after a spill is contained. In no case will containment equipment be used to store contaminated material.

Project operations will be structured in a manner that provides for the prompt and effective cleanup of spills of fuel and other hazardous materials. The Contractor will ensure the follow measures:

- construction crew (including cleanup crews) has on hand sufficient supplies of absorbent and barrier materials to allow the rapid containment and recovery of spilled materials and knows the procedure for reporting spills and unanticipated discovers of contaminate;
- construction crew has on hand sufficient tools and material to stop leaks;
- names and telephone numbers for all local, state, and federal agencies (including, if necessary, the U. S. Coast Guard and the National Response Center) that must be notified of a spill; and follow the requirements of those agencies in cleaning up the spill, in excavating and disposing of soils or other materials contaminated by a spill, and in collecting and disposing of waste generated during spill cleanup.

Immediately report any spill or release of the following materials *regardless of location* (on-property or off-property) to the EI for notification to the appropriate Company representative as indicated below:

- Oil or petroleum products;
- Hazardous substances or hazardous wastes;
- Chemicals;
- Unplanned natural gas (flaring or venting); and,
- Asbestos-containing materials.

The following contacts are currently assigned to the Project and are subject to change (call in the

order listed until someone is reached):

Tennessee Area Offices

Albany Area Operations Supervisor (New York):

Sandisfield Area Operations Supervisor (Massachusetts):

Agawam Area Operations Supervisor (Massachusetts):

East Granby Area Operations Supervisor (Connecticut):

New York Area Environmental Coordinator:

Massachusetts Area Environmental Coordinator:

Connecticut Area Environmental Coordinator

Albany Area Manager:

Sandisfield Area Manager:

East Granby Area Manager:

Kinder Morgan Corporation Houston Office (Houston, Texas)

General Dept. Number:

Environmental Project Manager:

Environmental Project Manager:

Department Manager:

Department Director:

If a spill enters a body of water, the Contractor will immediately take samples upstream and downstream from point of entry and refrigerate samples. If advised, additional analysis will be completed and/or additional samples will be gathered.

If the EI agrees and the Contractor determines that a spill is small enough such that the construction crew can safely handle it, the crew will use construction equipment to containerize all spilled material, contaminated soil, and sorbent material in a manner consistent with the spilled materials' characterization.

If the EI agrees and the Contractor determines that a spill can not be adequately excavated and disposed of by the construction crew alone, the Contractor will contact waste containment specialists. The Contractor will ensure that all excavated wastes are transported to a Company approved disposal facility licensed to accept such wastes. Wastes will not be transported to a company facility (i.e., compressor station, meter station, etc.) unless the Field Environmental Coordinator approves it in writing.

The Contractor will prepare a Construction Site Spill Report form to be given to the Company that

includes:

a. the date, time and location of the occurrence or discovery of the occurrence;

b. a description or identity of the material spilled;

c. an estimate of the quantity spilled;

d. the circumstances that caused the spill (e.g., equipment failure);

e. a list of waterbodies affected or potentially affected by the spill;

f. a statement verifying whether a sheen is present;

g. the size of the affected area;

h. an estimate of the depth that the material has reached in water or on soil;

i. a determination of whether the spill will migrate off of the Company's property or the ROW or workspace;

j. a determination of whether the spill is under control;

k. a statement verifying that clean-up has begun and a description of the methods being used to clean up the spill;

l. the names of the people observing the spill (with their affiliations) and the extent of injuries, if any;

m. the Field "Report of Spill" form.

The Company shall ensure that the Contractor's spill report is complete and shall forward it to the Field Environmental Coordinator. The Contractor shall follow the *"Contractor's Environmental Guidelines - Waste Disposal and Spill Notification"* procedures regarding all required regulatory notifications, subject to Company's prior approval, and for obtaining any necessary state and local licenses, permits, or other authorizations associated with the Project, except as otherwise provided in the scope of work. Contractor is responsible for knowing what state and local environmental authorizations are necessary for the specific job at hand. Any above-mentioned permits, clearances or authorizations obtained by Contractor shall be furnished to Company.

The following releases require immediate (within 1 hour of discovery) notification to the National Response Center ("NRC"):

(1) Any petroleum product released into streams, rivers, lakes, or dry washes;

(2) A release that exceeds the reportable quantity ("RQ") of any CERCLA hazardous substances in any 24-hour period which is not fully contained;

(3) A release of a hazardous substance or hazardous waste which occurs during transportation; and,

(4) A release of hazardous waste which contains a RQ of a hazardous substance.

- The National Response Center (1-800-424-8802) will be notified immediately if spills occur above threshold levels (Clean Water Act, 40 CFR 110.10) into surface waters and/or wetlands.

3. SUGGESTED EQUIPMENT LIST

Section 1.3 of these procedures states that the Contractor will prepare a list of the type, quantity, and location of storage or containment and clean up equipment to be used on the construction site. The list will include the procedures and impact minimization measures to be used in response to a spill. The Contractor's choice of impact minimization measures and equipment will be tailored to meet the characteristics of the affected terrain as well as the types and amounts of material that could potentially be spilled. The types of equipment that the Company expects to use to control spills at terrestrial sites and wetlands are described in the FERC's Plan.

3.1 TERRESTRIAL CONSTRUCTION

General equipment that the Contractor will use for spill containment and cleanup on terrestrial areas includes:

- sorbents (pillows, socks, and wipe sheets) for containment and pick up of spilled liquids;
- commercially available spill kits (or the functional equivalent thereof) that are prepackaged, self-contained spill kits containing a variety of sorbents for small to large spills;
- structures such as gutters, culverts, and dikes for immediate spill containment;
- shovels, backhoes, etc., for excavating contaminated materials;
- sumps and collection systems; and
- drums, barrels, and temporary storage bags to clean up and transport contaminated materials.

3.1.1 Fuels and Lubricating Oil Storage

The Contractor will implement special measures to prevent spills in areas where trucks carrying fuel and where oil barrels are loaded. Containment equipment will be kept close to tanks and barrels to minimize spill response time, and will include absorbent pads or mats. The quantity and capabilities of the mats will be sufficient to capture the largest foreseeable spill, given ROW or workspace characteristics and crankcase and other fuel vessel capacities.

3.1.2 Routine Refueling and Maintenance

Absorbent pads and mats will be placed on the ground beneath equipment before refueling and maintenance. Equipment that will be stored on site for routine refueling and maintenance includes small sorbent kits (or their functional equivalent).

3.1.3 Equipment Failure

Kits with the capacity of absorbing up to five gallons of liquid can fit beneath the operator's seat on construction equipment for use in an equipment failure.

3.2 WATERBODY AND WETLAND CROSSINGS

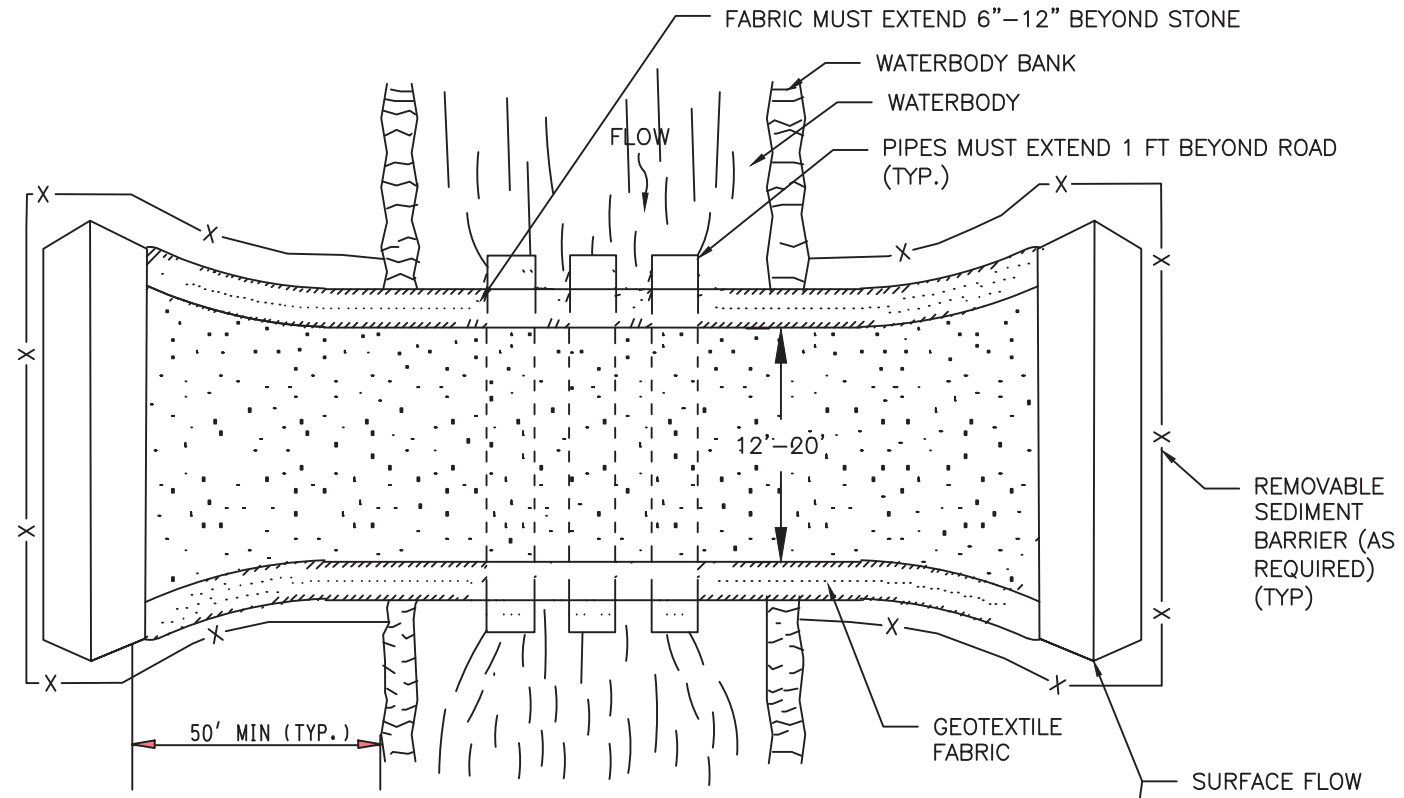
For each wetland and waterbody crossed, the equipment listed below will be available in addition to that needed for terrestrial construction. This equipment will be stored close to the water or wetland to minimize response time, and will include:

- oil containment booms and the related equipment needed for rapid deployment, and
- equipment to remove oils from water, such as oleophilic and hydrophobic absorbent booms and mats, and/or mechanical skimmers.

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

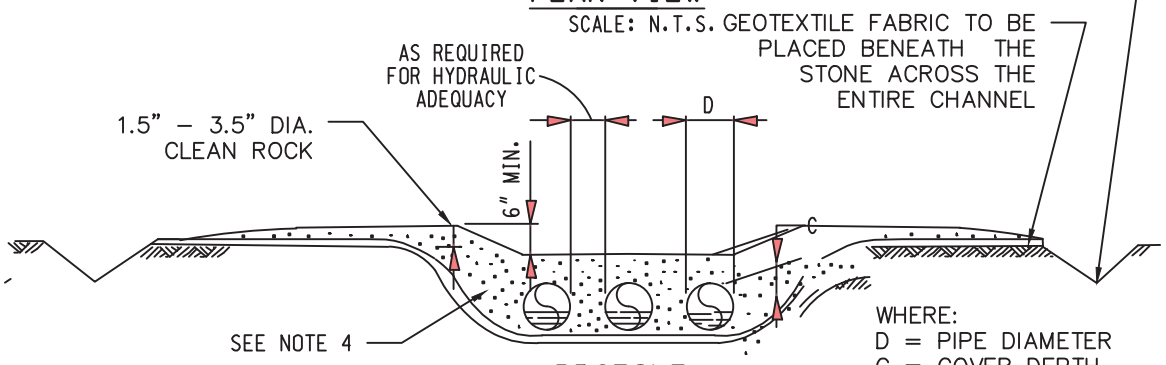
ATTACHMENT N

Tennessee's Best Management Practice Drawings



PLAN VIEW

SCALE: N.T.S.



PROFILE

SCALE: N.T.S.

NOTES:

1. TEMPORARY STREAM CROSSING SHALL BE INSPECTED ON A DAILY BASIS AND BUILD–UP OF SEDIMENT OR DEBRIS ON BRIDGE SHALL BE REMOVED.
2. CULVERTS SHALL BE PLACED AT LEAST ONE– HALF (1/2) THEIR DIAMETER APART.
3. ALL MATERIAL AND EQUIPMENT PLACED IN THE WATERBODY CHANNEL SHALL BE COMPLETELY REMOVED DURING FINAL CLEAN–UP. REMOVAL OF THESE ITEMS ARE NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION.
4. ONLY CLEAN ROCK WILL BE USED. THE ROCK MUST BE SIZED ACCORDING TO THE ANTICIPATED FLOW CONDITIONS. THE ROCK SIZE USED SHALL CONFORM TO CHAPTER 105 GENERAL PERMIT REQUIREMENTS. THE ROCK FILL SHOULD BE EXTENDED A MINIMUM OF 50' FROM THE TOP OF BANK ON EACH SIDE OF THE CROSSING. THE FILL SHOULD BE DEPRESSED A MINIMUM OF 6" OVER THE CHANNEL TO ALLOW FOR OVERFLOW. THE MAXIMUM DEPTH OF FILL OVER THE CULVERT IS THE MINIMUM THE MANUFACTURER REQUIRES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL LOAD CALCULATIONS REQUIRED TO ENSURE THE INSTALLED PIPES CAN STRUCTURALLY SUPPORT THE CONSTRUCTION EQUIPMENT. THIS SHALL INCLUDE, BUT IS NOT LIMITED TO, PIPE MATERIAL SELECTION AND REQUIRED PIPE COVER DEPTH.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
CULVERT EQUIPMENT CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 1

Sheet: 1 of 127

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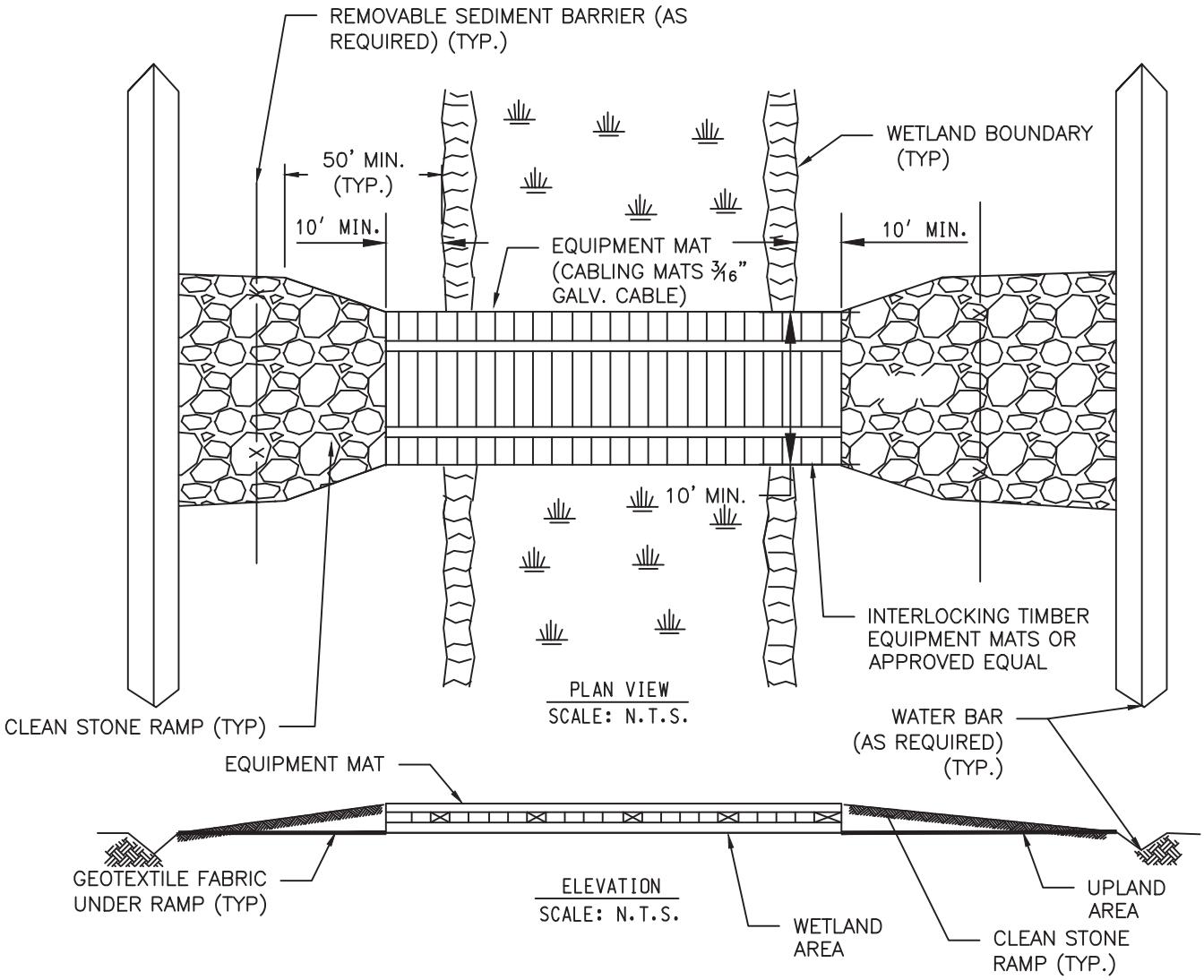

NOTES:

1. INSPECT ON A DAILY BASIS AND REMOVE BUILD-UP OF SEDIMENT AND DEBRIS.
2. MATERIALS PLACED IN WETLANDS SHALL BE COMPLETELY REMOVED DURING FINAL CLEAN-UP. REMOVAL OF THESE MATERIALS IS NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION.
3. IF A WATERBODY IS LOCATED WITHIN A WETLAND, EXTEND EQUIPMENT MATS TO THE BRIDGE EQUIPMENT CROSSING CONSTRUCTED TO CROSS THE WATERBODY IN ORDER TO ALLOW FOR CONTINUOUS EQUIPMENT MAT COVERAGE THROUGH THE WETLAND AND WATERBODY AREA.
4. USE ADDITIONAL EQUIPMENT MATS TO RAISE THE CROSSING ABOVE THE ELEVATION WHERE POOR SOIL CONDITIONS EXIST. A MAXIMUM OF 2 TIMBER MAT LAYERS MAY BE USED WITHIN WETLANDS UNLESS OTHERWISE APPROVED BY THE ENVIRONMENTAL INSPECTOR.
5. EQUIPMENT MATS SHALL EXTEND A MINIMUM OF 10 FEET OUTSIDE OF THE WETLAND AND WATERBODY BOUNDARIES.
6. INSTALL CLEAN STONE RAMP APPROACHES TO EQUIPMENT MATS IN WETLAND AREAS.
7. EQUIPMENT MATS ARE TO BE CONSTRUCTED OF 4'X4' WOOD MEMBERS, LINKED WITH 3/16 GALVANIZED STEEL CABLE TO ENSURE REMOVAL OF ALL MATS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
WETLAND EQUIPMENT CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 2

Sheet: 2 of 127
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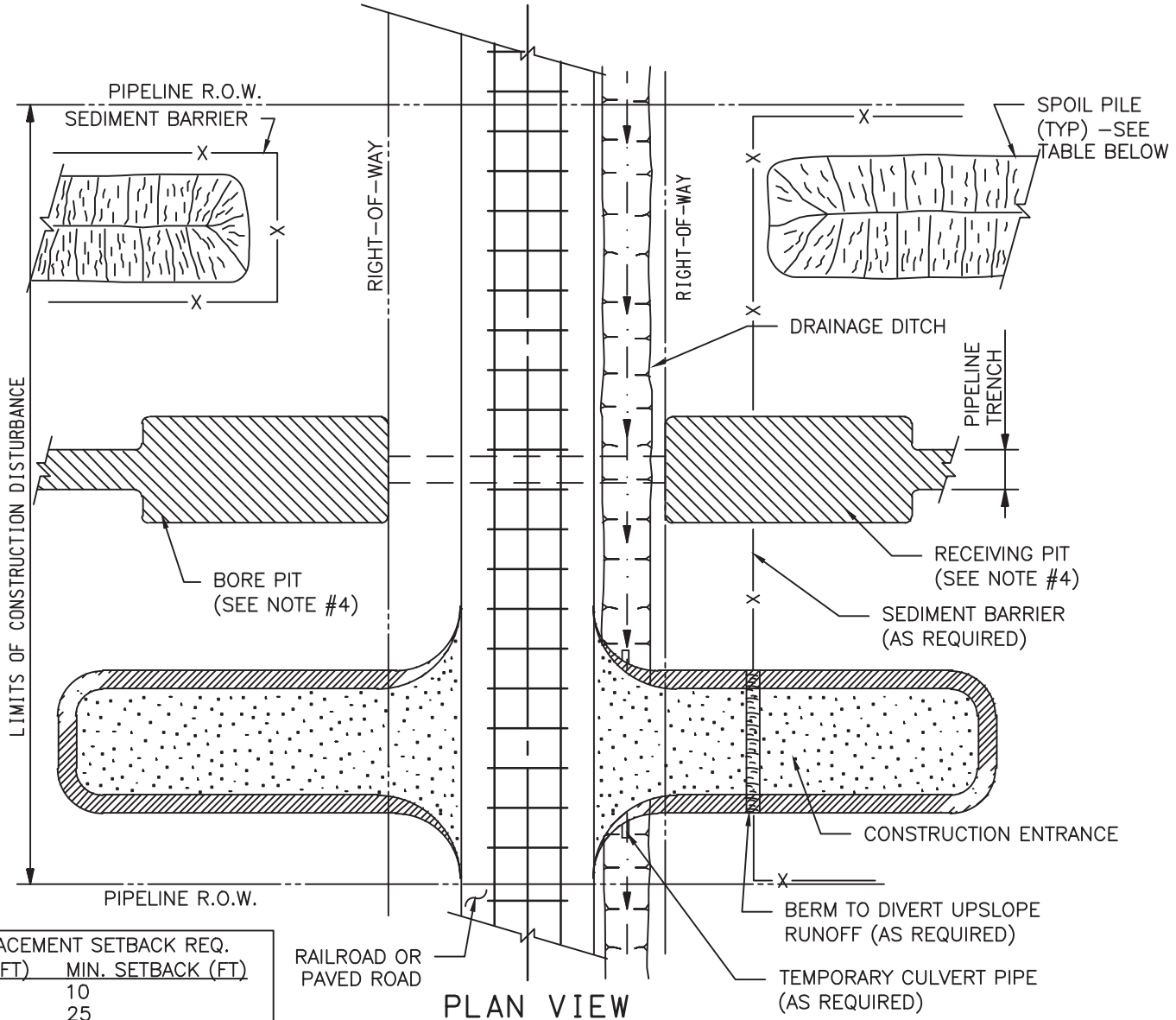

PLAN VIEW

SCALE: N.T.S.

SPOIL PLACEMENT SETBACK REQ.	
HT. FILL (FT)	MIN. SETBACK (FT)
<10	10
10–25	25
25–50	50
>50	1 FT/FT HEIGHT

NOTES:

1. A SEDIMENT BARRIER SHALL BE INSTALLED AT THE BASE OF SLOPES ADJACENT TO THE CROSSING WHERE VEGETATION IS DISTURBED TO INTERCEPT SURFACE RUNOFF.
2. PROTECTION FOR SPOIL PILES SHALL BE INSTALLED ONLY WHERE SEDIMENT BARRIERS ACROSS THE ENTIRE DISTURBED AREA ARE NOT REQUIRED.
3. SEDIMENT BARRIERS SHALL BE MAINTAINED IN PLACE UNTIL PERMANENT REVEGETATION IS ESTABLISHED.
4. ANY WATER REMOVED FROM THE BORE PIT OR RECEIVING PIT SHALL BE FILTERED THROUGH AN APPROVED DEWATERING STRUCTURE OR FILTER BAG.
5. IF WELL POINTING IS REQUIRED, THE CONTRACTOR SHALL CONSULT WITH THE ENVIRONMENTAL INSPECTOR PRIOR TO COMMENCEMENT OF WORK IN ORDER TO DETERMINE PROPER DEWATERING LOCATIONS AND METHODS.
6. THE CONTRACTOR SHALL BE REQUIRED TO KEEP THE CROSSING CLEAR OF DEBRIS AT ALL TIMES.
7. THE CONTRACTOR MAY ELECT TO UTILIZE SHEET PILING IN ORDER TO STABILIZE THE BORE PITS AND RECEIVING PITS.
8. DEPENDING ON TOPOGRAPHY AND STATE AGENCY REQUIREMENTS, A SEDIMENT BARRIER MAY BE REQUIRED ACROSS THE ENTIRE CONSTRUCTION RIGHT OF WAY AT THE EDGE OF CROSSING. IN ADDITION TO THIS DETAIL, REFER TO THE ENVIRONMENTAL ALIGNMENT DRAWINGS FOR PLACEMENT OF SEDIMENT BARRIERS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:	Op. Area:	
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Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
BORED ROAD/RAILROAD CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 3

Sheet: 3 of 127
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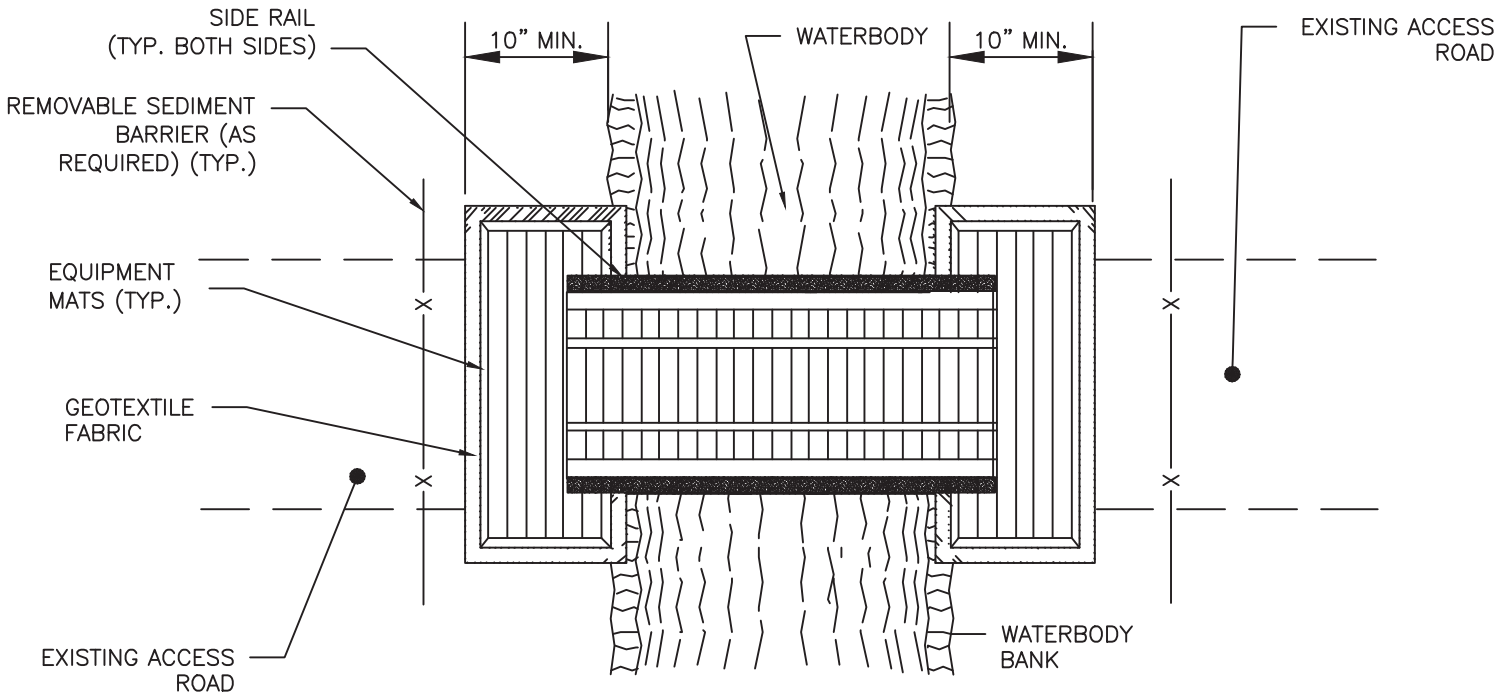

PLAN VIEW
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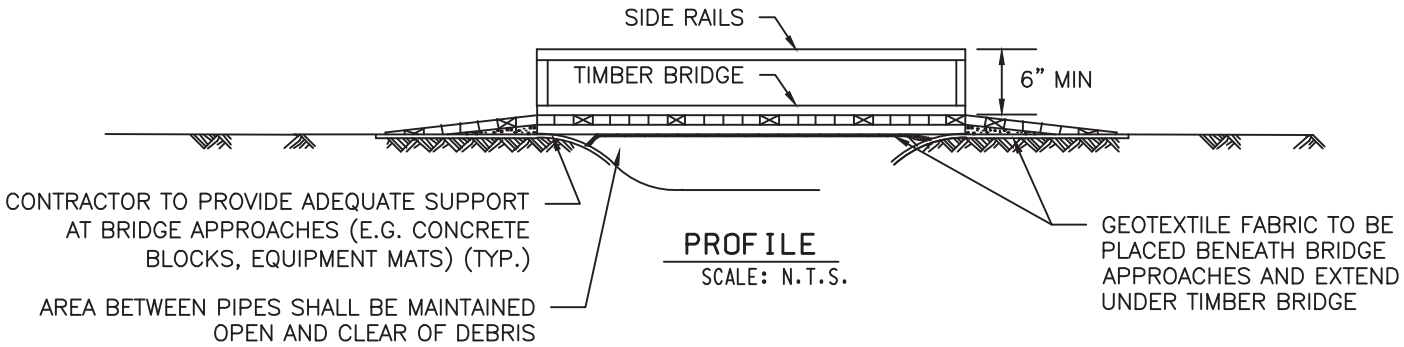

PROFILE
SCALE: N.T.S.

NOTES:

1. TIMBER BRIDGES SHALL BE ADEQUATELY ANCHORED AT BOTH ENDS.
2. TEMPORARY STREAM CROSSINGS SHALL BE INSPECTED ON A DAILY BASIS AND BUILD UP OF SEDIMENT OR DEBRIS SHALL BE REMOVED.
3. BRIDGE APPROACHES SHALL BE SUPPORTED WITH EQUIPMENT MATS OR APPROVED EQUAL.
4. SIDE RAILS SHALL BE INSTALLED ON BOTH SIDES OF THE BRIDGE EQUIPMENT CROSSING IN ORDER TO PREVENT SEDIMENT FROM ENTERING THE WATERBODY. SIDE RAILS ARE TO BE CONSTRUCTED OF PLYWOOD NAILED TO THE OUTER EDGES OF THE EQUIPMENT MATS.
5. EQUIPMENT MATS SHALL EXTEND A MINIMUM OF 10 FEET OUTSIDE OF THE WATERBODY OR WETLAND BOUNDARIES.
6. UNLESS OTHERWISE INDICATED ON PLAN, CROSSING SHALL BE REMOVED IMMEDIATELY AFTER CONSTRUCTION IS COMPLETED.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL LOAD CALCULATIONS REQUIRED TO ENSURE THE INSTALLED MATS/EQUIPMENT BRIDGE CAN STRUCTURALLY SUPPORT THE CONSTRUCTION EQUIPMENT TO BE UTILIZED.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
BRIDGE EQUIPMENT CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 4

Sheet: 4 of 127
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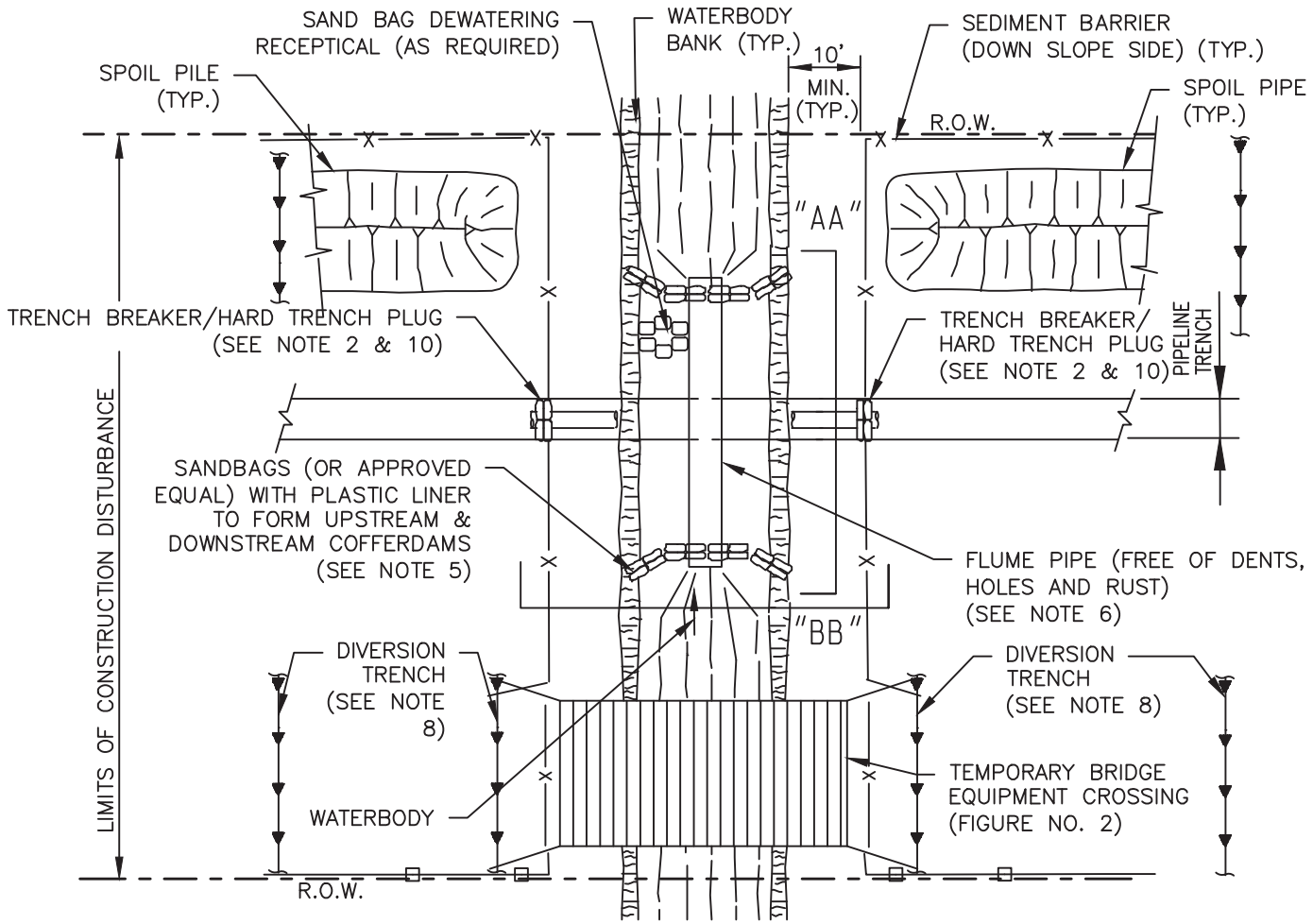

PLAN

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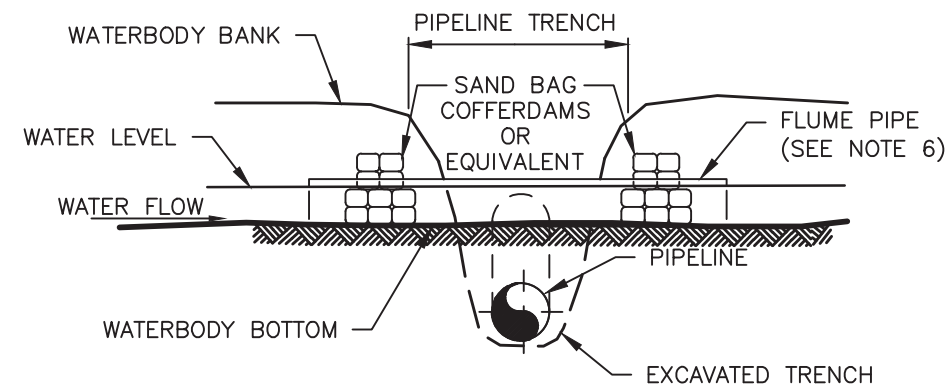

SECTION "A–A"

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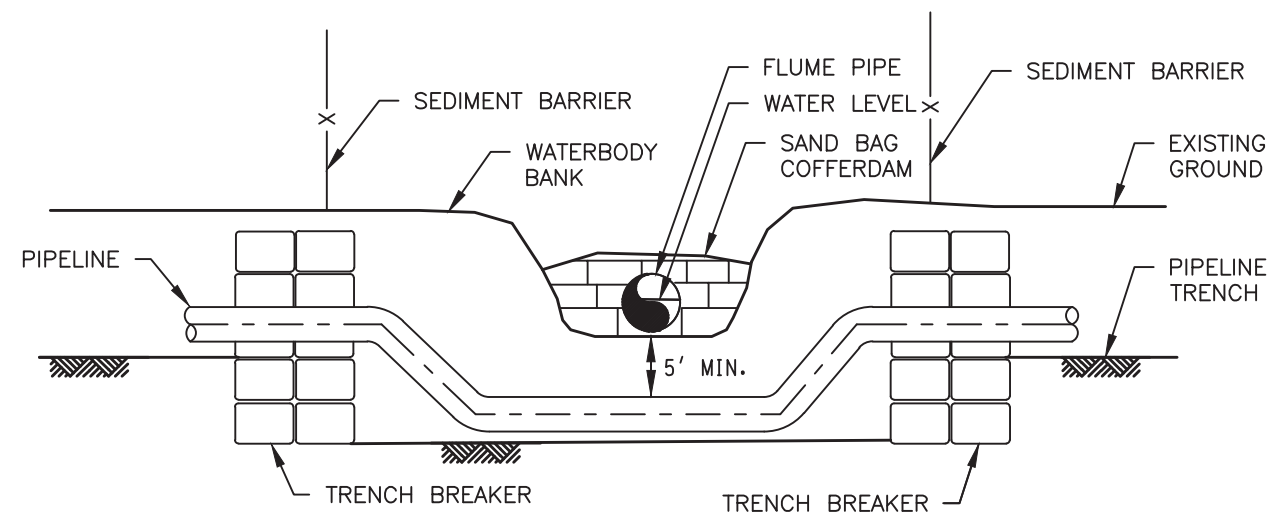

SECTION "B–B"

SCALE: N.T.S.

NOTES:

1. SEDIMENT BARRIERS SHALL BE INSTALLED AS DEPICTED AND ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVY SILT LADEN WATER ENTERS THE WATERBODY OR LEAVES THE CONSTRUCTION RIGHT–OF–WAY.

2. HARD TRENCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE THE MAINLINE DITCH FROM THE WATERBODY CROSSING UNTIL THE WATERBODY CROSSING IS INSTALLED AND BACKFILLED.

3. EQUIPMENT OPERATING IN THE WATERBODY SHALL BE LIMITED TO THAT NEEDED TO PERFORM CONSTRUCTION. IF OTHER TYPES OF EQUIPMENT MUST CROSS THE WATERBODY, THE CONTRACTOR SHALL PROVIDE AND USE A TEMPORARY BRIDGE EQUIPMENT CROSSING.

4. STAGING AREA(S) FOR WATERBODY CROSSING(S), WHEN REQUIRED, SHALL BE LOCATED AT LEAST 50 FEET FROM THE WATER'S EDGE AND SHALL BE OF A MINIMUM SIZE NEEDED FOR CONVENIENT PREPARATION.

5. FLUME CROSSING METHOD REQUIREMENTS INCLUDE:
   (A) INSTALL FLUME PIPE(S) AFTER BLASTING (IF NECESSARY), BUT BEFORE ANY TRENCHING.
   (B) USE SAND BAG OR SAND BAG AND PLASTIC SHEETING DIVERSION STRUCTURES OR EQUIVALENT TO DEVELOP AN EFFECTIVE SEAL AND TO DIVERT WATERBODY FLOW THROUGH THE FLUME PIPE (SOME MINOR MODIFICATIONS TO THE WATERBODY BOTTOM MAY BE REQUIRED TO ACHIEVE AN EFFECTIVE SEAL).
   (C) PROPERLY ALIGN FLUME PIPE(S) TO PREVENT BANK EROSION AND WATERBODY CHANNEL BED SCOUR.
   (D) DO NOT REMOVE FLUME PIPE DURING TRENCHING, PIPE LAYING, OR BACKFILLING ACTIVITIES, OR INITIAL STREAM BED RESTORATION EFFORTS.
   (E) REMOVE ALL FLUME PIPES AND DAMS THAT ARE NOT ALSO PART OF THE EQUIPMENT BRIDGE AS SOON AS FINAL CLEANUP OF THE STREAM BED AND BANK IS COMPLETE.

6. THE FLUME PIPE MUST BE SIZED TO ADEQUATELY CONVEY MAXIMUM ANTICIPATED FLOW RATES AT THE TIME OF THE CROSSING WITHOUT FLOODING THE TRENCH, WHILE TO MAINTAINING ADEQUATE FLOW RATES TO PROTECT AQUATIC LIFE AND PREVENT THE INTERRUPTION OF EXISTING DOWNSTREAM USES.

7. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED DAILY AND REPAIRED IF NECESSARY.

8. INSTALL DIVERSION TRENCHES AT THE BASE OF ALL SLOPES ADJACENT TO THE WATERBODY AND AT 50' FROM WATERBODY BANKS.

9. CHEMICALS, FUELS AND LUBRICATING OILS SHALL NOT BE STORED AND EQUIPMENT SHALL NOT BE REFUELED WITHIN 100 FEET OF THE WATERBODY UNLESS OTHERWISE APPROVED BY THE ENVIRONMENTAL INSPECTOR.

10. ANY WATER ACCUMULATING IN THE WORK SPACE SHALL BE PUMPED TO A FILTER BAG PRIOR TO DISCHARGE TO A WATERBODY.

10. INSTALL TRENCH BREAKERS ON BOTH SIDES OF THE WATERBODY TO PREVENT DIVERSION OF WATER INTO UPLAND PORTIONS OF THE PIPELINE TRENCH AND TO KEEP ANY ACCUMULATED TRENCH WATER OUT OF THE WATERBODY.

11. ALL MATERIAL AND EQUIPMENT PLACED IN THE WATERBODY CHANNEL SHALL BE COMPLETELY REMOVED DURING FINAL CLEAN–UP. REMOVAL OF THESE ITEMS ARE NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION.

12. THE CONTRACTOR SHALL POSTPONE ROUGH GRADING AND GRUBBING OF THE RIGHT OF WAY WITHIN 50' OF TOP OF BANK UNTIL THE STAGING AREA IS PREPARED AND WORK IN THE WATERBODYIS READY TO COMMENCE. ALL DISTURBED AREAS WITHIN 50 FEET OF TOP OF BANK SHALL BE BLANKETED OR MATTED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR STREAMS OR 48 OF INITIAL DISTURBANCE FOR MAJOR STREAMS UNLESS OTHERWISE AUTHORIZED.

13. EXCEPT FOR BLASTING AND OTHER ROCK BREAKING MEASURES, THE CONTRACTOR SHALL COMPLETE IN WATERBODY CONSTRUCTION ACTIVITIES (INCLUDING TRENCHING, PIPE INSTALLATION, BACKFILL, AND RESTORATION OF THE WATERBODY CHANNEL CONTOURS) WITHIN 24 HOURS. WATERBODY BANKS AND UNCONSOLIDATED WATERBODY CHANNELS MAY REQUIRE ADDITIONAL RESTORTION AFTER THIS PERIOD.

14. THE CONTRACTOR SHALL COORDINATE THE ENVIRONMENTAL INSPECTOR TO DETERMINE THE APPROPAITE DRY CROSSING METHOD THAT SHOULD BE UTILIZED DURING CONSTRUCTION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:		Op. Area.:
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Dft:	Date:	Scale:
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Appr:	Date:	

TENNESSE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
FLUME CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 5

Sheet: 5 of 127

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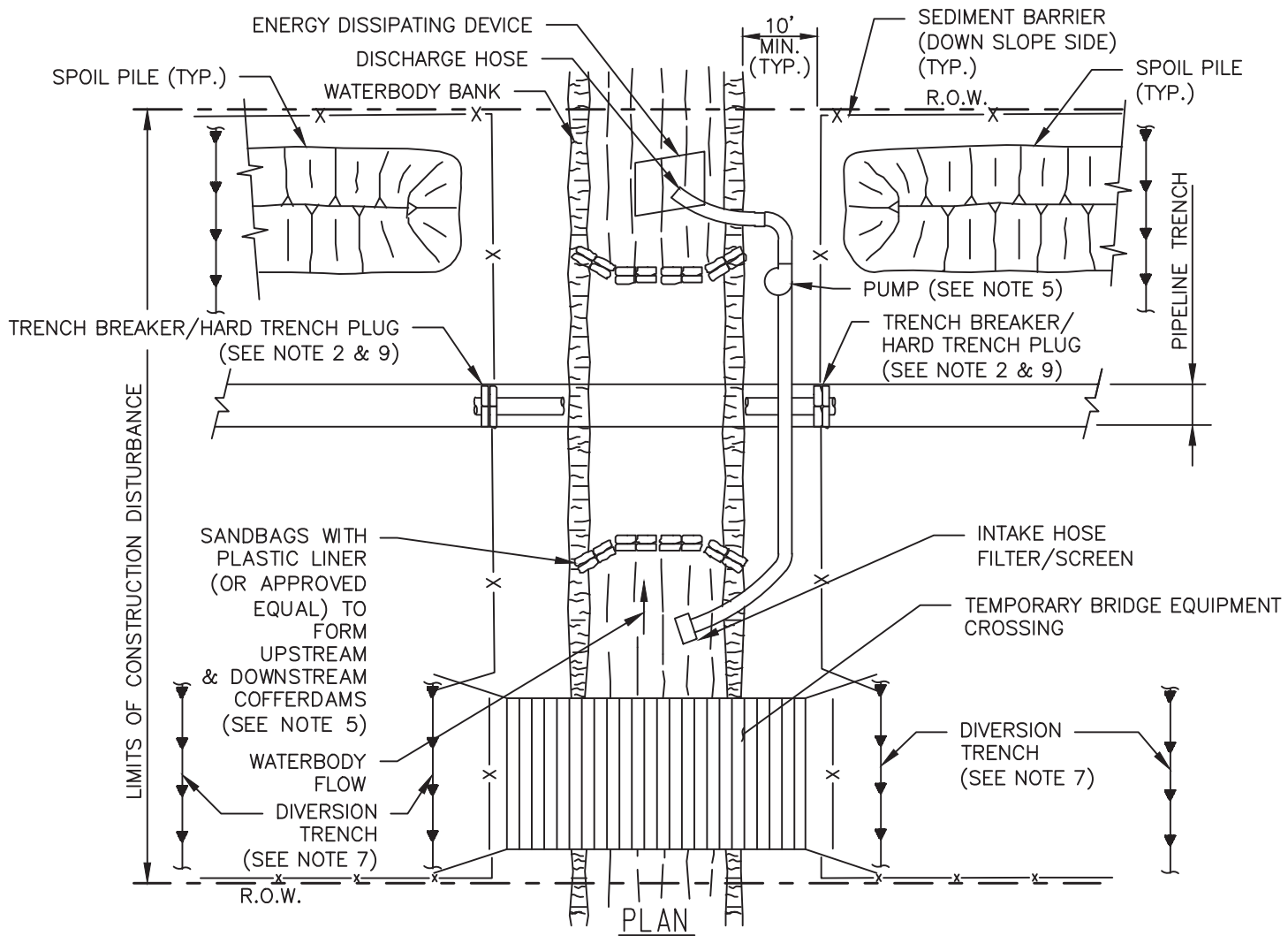

PLAN

SCALE: N.T.S.

NOTES:

1. SEDIMENT BARRIERS SHALL BE INSTALLED AS DEPICTED AND ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVY SILT LADEN WATER ENTERS THE WATERBODY OR LEAVES THE CONSTRUCTION RIGHT-OF-WAY
2. HARD TRENCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE THE MAINLINE DITCH FROM THE WATERBODY CROSSING UNTIL THE WATERBODY CROSSING IS INSTALLED AND BACKFILLED.
3. EQUIPMENT OPERATING IN THE WATERBODY SHALL BE LIMITED TO THAT NEEDED TO PERFORM CONSTRUCTION. IF OTHER TYPES OF EQUIPMENT MUST CROSS THE WATERBODY, THE CONTRACTOR SHALL PROVIDE AND USE A TEMPORARY BRIDGE EQUIPMENT CROSSING.
4. STAGING AREA(S) FOR WATERBODY CROSSING(S), WHEN REQUIRED, SHALL BE LOCATED AT LEAST 50 FEET FROM WATER'S EDGE AND SHALL BE OF A MINIMUM SIZE NEEDED FOR PREPARATION TO SAFELY AND EFFICIENTLY CONSTRUCT THE CROSSING.
5. IMPLEMENTATION OF THE DAM-AND-PUMP CROSSING METHOD MUST MEET THE FOLLOWING PERFORMANCE CRITERIA:
   (A) USE SUFFICIENT PUMPS, INCLUDING ON-SITE BACKUP PUMPS, TO MAINTAIN DOWNSTREAM FLOWS.
   (B) CONSTRUCT DAMS WITH MATERIALS THAT PREVENT SEDIMENT AND OTHER POLLUTANTS FROM ENTERING THE WATERBODY (E.G., SANDBAGS OR CLEAN GRAVEL WITH PLASTIC LINER).
   (C) SCREEN PUMP INTAKES;
   (D) PREVENT STREAM BED SCOUR AT PUMP DISCHARGE WITH AN ENERGY DISSIPATING DEVICE.
   (E) MONITOR THE DAM AND PUMPS TO ENSURE PROPER OPERATION THROUGHOUT THE WATERBODY CROSSING. INTAKE SHALL BE MAINTAINED A SUFFICIENT DISTANCE FROM THE BOTTOM TO PREVENT PUMPING OF SUBSTRATE MATERIALS.
   (F) INTAKE SHALL BE MAINTED AT A SUFFICIENT DISTANCE FROM THE CHANNEL BOTTOM TO PREVENT PUMPING OF SUBSTRATE MATERIALS.
6. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED DAILY AND REPAIRED IF NECESSARY.
7. INSTALL DIVERSION TRENCHES AT THE BASE OF ALL SLOPES ADJACENT TO THE WATERBODY AND AT MINIMUM 50' FROM WATERBODY BANK.
8. CHEMICALS, FUELS AND LUBRICATING OILS SHALL NOT BE STORED AND EQUIPMENT SHALL NOT BE REFUELED WITHIN 100 FEET OF THE WATERBODY, UNLESS OTHERWISE APPROVED BY THE ENVIRONMENTAL INSPECTOR. ANY WATER ACCUMULATING IN THE WORK SPACE SHALL BE PUMPED TO A FILTER BAG PRIOR TO DISCHARGE TO WATERBODY.
9. INSTALL TRENCH BREAKERS ON BOTH SIDES OF THE WATERBODY TO PREVENT DIVERSION OF WATER INTO UPLAND PORTIONS OF THE PIPELINE TRENCH AND TO KEEP ANY ACCUMULATED TRENCH WATER OUT OF THE WATERBODY.
10. THE CONTRACTOR SHALL POSTPONE GRUBBING AND ROUGH GRADING OF THE RIGHT-OF-WAY WITIN 50' OF TOP OF BANK UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE , THE STAGING AREA IS PREPARED, AND WORK IN THE WATERBODY IS READY TO COMMENCE. ALL DISTURBED AREAS WITHIN 50' OF TOP OF BANK SHALL BE STABILIZED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR STREAMS OR 48 HOURS OF INITIAL DISTURBANCE FOR MAJOR STREAMS UNLESS OTHERWISE AUTHORIZED. APPROPRIATE STREAMBANK PROTECTION SHALL BE PROVIDED WITHIN THE CHANNEL.
11. ANY WATER ACCUMULATING IN THE WORKSPACE SHALL BE PUMPED TO A FILTER BAG PRIOR TO DISCHARGE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:	Op. Area:	
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Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
DAM AND PUMP CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 6

Sheet: 6 of 127

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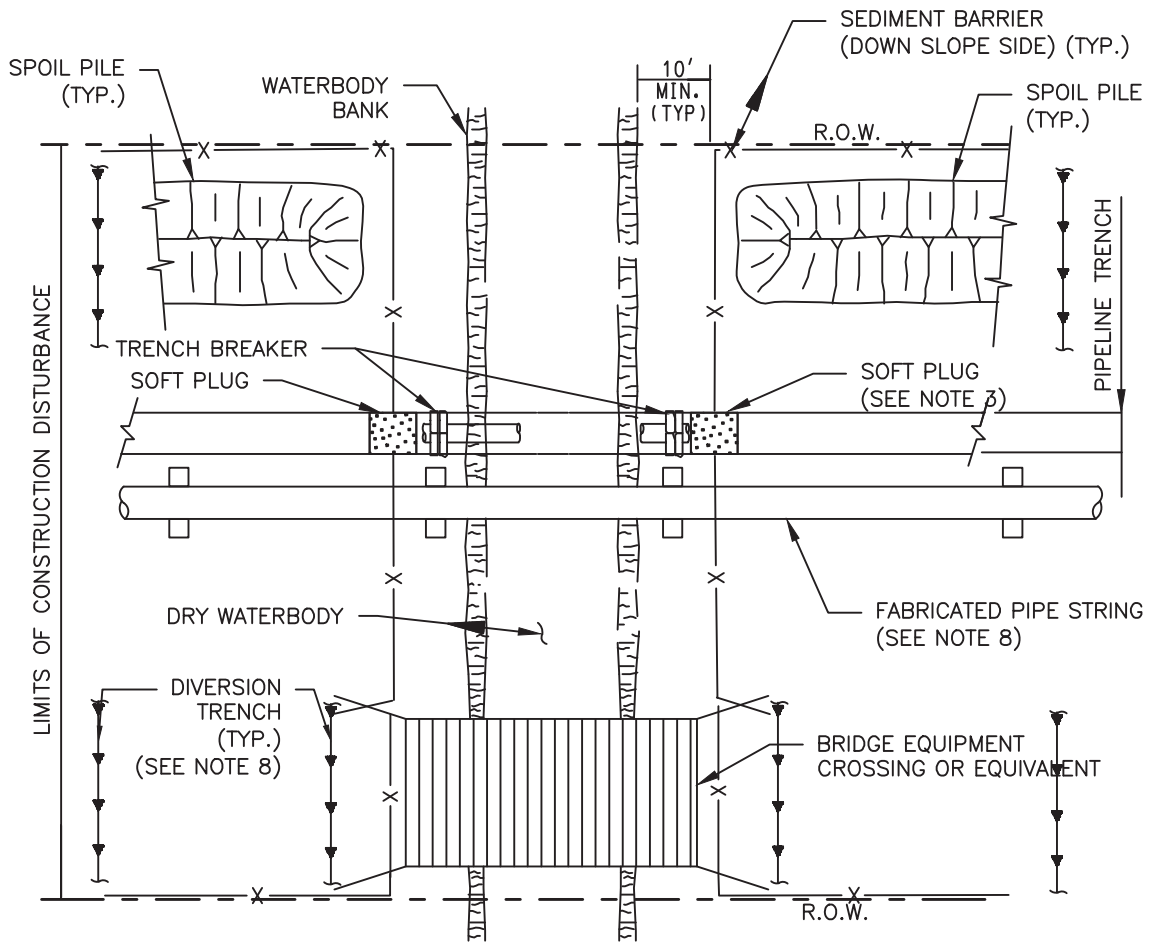

NOTES:

1. THIS METHOD APPLIES TO WATERBODIES THAT ARE DRY AT THE TIME OF CROSSING.
2. SEDIMENT BARRIERS SHALL BE INSTALLED AS DEPICTED AND ALONG DOWN GRADIENT SIDES OF WORK AREAS SUCH THAT NO HEAVILY SILT LADEN WATER ENTERS THE WATERBODY OR LEAVES THE CONSTRUCTION RIGHT OF WAY.
3. SOFT PLUGS SHALL BE INSTALLED FOLLOWING EXCAVATION OF THE MAINLINE TRENCH THROUGH THE WATERBODY.
4. INSTALL TRENCH BREAKERS ON BOTH SIDES OF THE WATERBODY TO PREVENT DIVERSION OF WATER INTO UPLAND PORTIONS OF THE PIPELINE TRENCH AND TO KEEP ANY ACCUMULATED TRENCH WATER OUT OF THE WATERBODY.
5. EQUIPMENT OPERATING IN THE WATERBODY SHALL BE LIMITED TO THAT NEEDED TO PERFORM CONSTRUCTION. IF OTHER TYPES OF EQUIPMENT MUST CROSS THE WATERBODY, THE CONTRACTOR SHALL PROVIDE AND USE A TEMPORARY BRIDGE EQUIPMENT CROSSING OR EQUIVALENT AS APPROVED BY THE ENVIRONMENTAL INSPECTOR.
6. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED DAILY AND REPAIRED IF NECESSARY.
7. CHEMICALS, FUELS AND LUBRICATING OILS SHALL NOT BE STORED AND EQUIPMENT SHALL NOT BE REFUELED WITHIN 100 FEET OF WATERBODY, UNLESS OTHERWISE APPROVED BY THE REGULATORY AUTHORITY. ANY WATER ACCUMULATING IN THE WORKSPACE SHALL BE PUMPED TO A FILTER BAG PRIOR TO DISCHARGE TO A WATERBODY.
8. INSTALL DIVERSION TRENCHES AT THE BASE OF ALL SLOPES ADJACENT TO THE WATERBODY AND AT MINIMUM 50' FROM WATERBODY BANK.
9. THE FABRICATED PIPE STRING MAY SPAN THE DRY WATERBODY CROSSING IN PREPARATION FOR THE LOWERING–IN PHASE OF CONSTRUCTION.
10. THE DRY WATERBODY MAY BE TRENCHED IN SEQUENCE WITH NORMAL TRENCHING OPERATIONS AND THE PIPE INSTALLED THROUGH THE DRY WATERBODY CROSSING IN CONJUCTION WITH UPSTREAM AND DOWN STREAM PIPE.
11. THE CONTRACTOR SHALL POSTPONE GRUBBING AND ROUGH GRADING OF THE RIGHT–OF–WAY WITHIN 50' OF TOP OF BANK UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE, THE STAGING AREA IS PREPARED AND WORK IN THE WATERBODY IS READY TO COMMENCE. ALL DISTURBED AREAS WITHIN 50 FEET OF TOP OF BANK SHALL BE BLANKETED OR MATTED WITHIN 24 HOURS OF INITIAL DISTURBANCE OR MINOR STREAMS OR 48 HOURS OF INITIAL DISTURBANCE FOR MAJOR STREAMS UNLESS OTHERWISE AUTHORIZED. APPROPRIATE STREAMBANK PROTECTION SHALL BE PROVIDED WITHIN THE CHANNEL.
12. ANY WATER ACCUMULATING IN THE WORKSPACE SHALL BE PUMPED TO A FILTER BAG PRIOR TO DISCHARGE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
DRY WATERBODY CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 7

Sheet: 7 of 127
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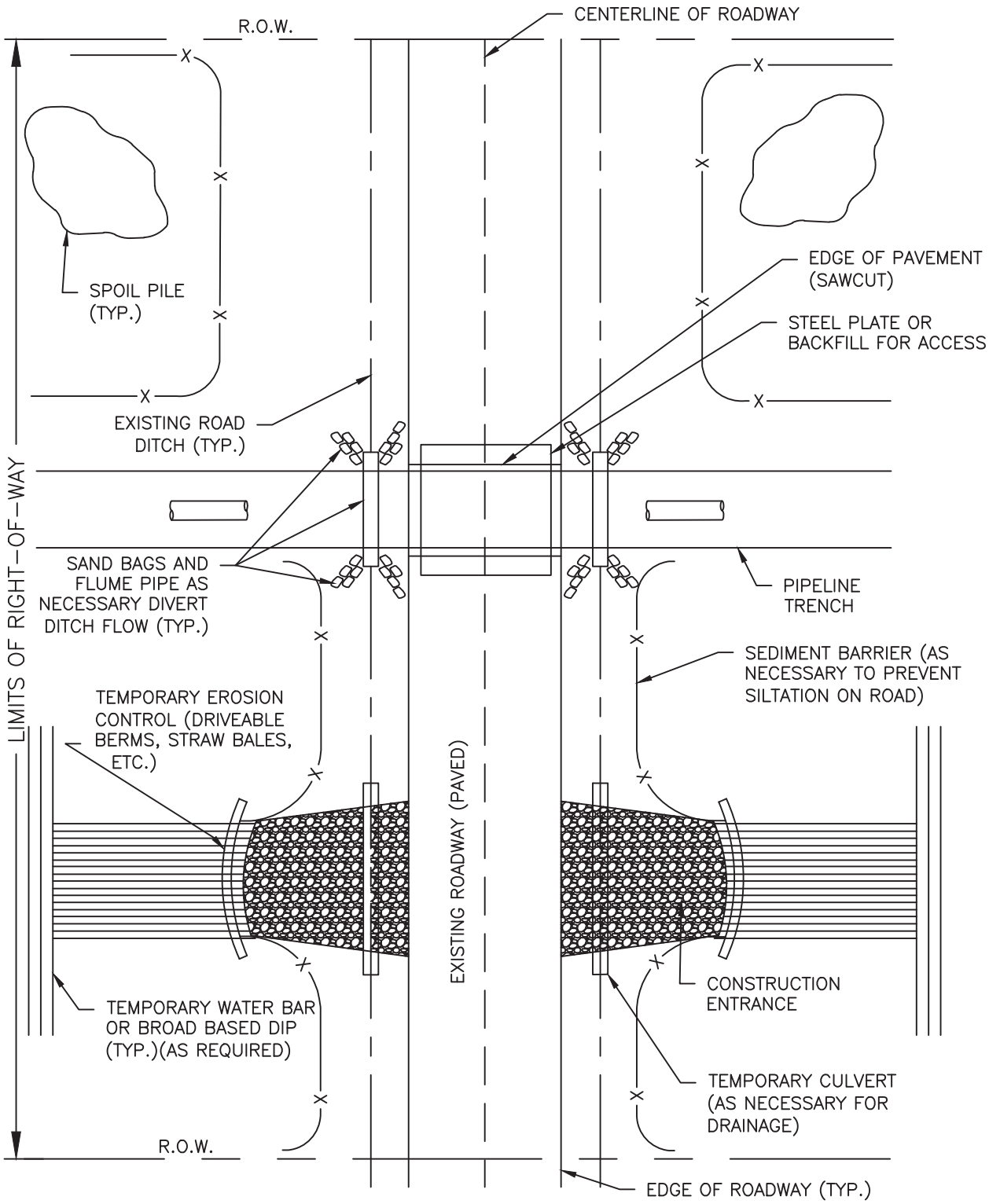

NOTES:
1. THE CONTRACTOR SHALL MAINTAIN ACCESS FOR ALL EMERGENCY VEHICLES.
2. THE CONTRACTOR SHALL COORDINATE ACCESS RESTRICTIONS WITH ALL IMPACTED PARTIES PRIOR TO CROSSING THE ROAD.
3. THE CONTRACTOR SHALL MAINTAIN ONSITE ADEQUATELY SIZED STEEL PLATES TO COVER THE OPEN TRENCH AND ALLOW FOR EMERGENCY OR GENERAL ACCESS IN THE EVENT THAT CONSTRUCTION ACTIVITIES HAVE TO BE HALTED.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL OPEN CUT PAVED
ROAD CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 8

Sheet: 8 of 127
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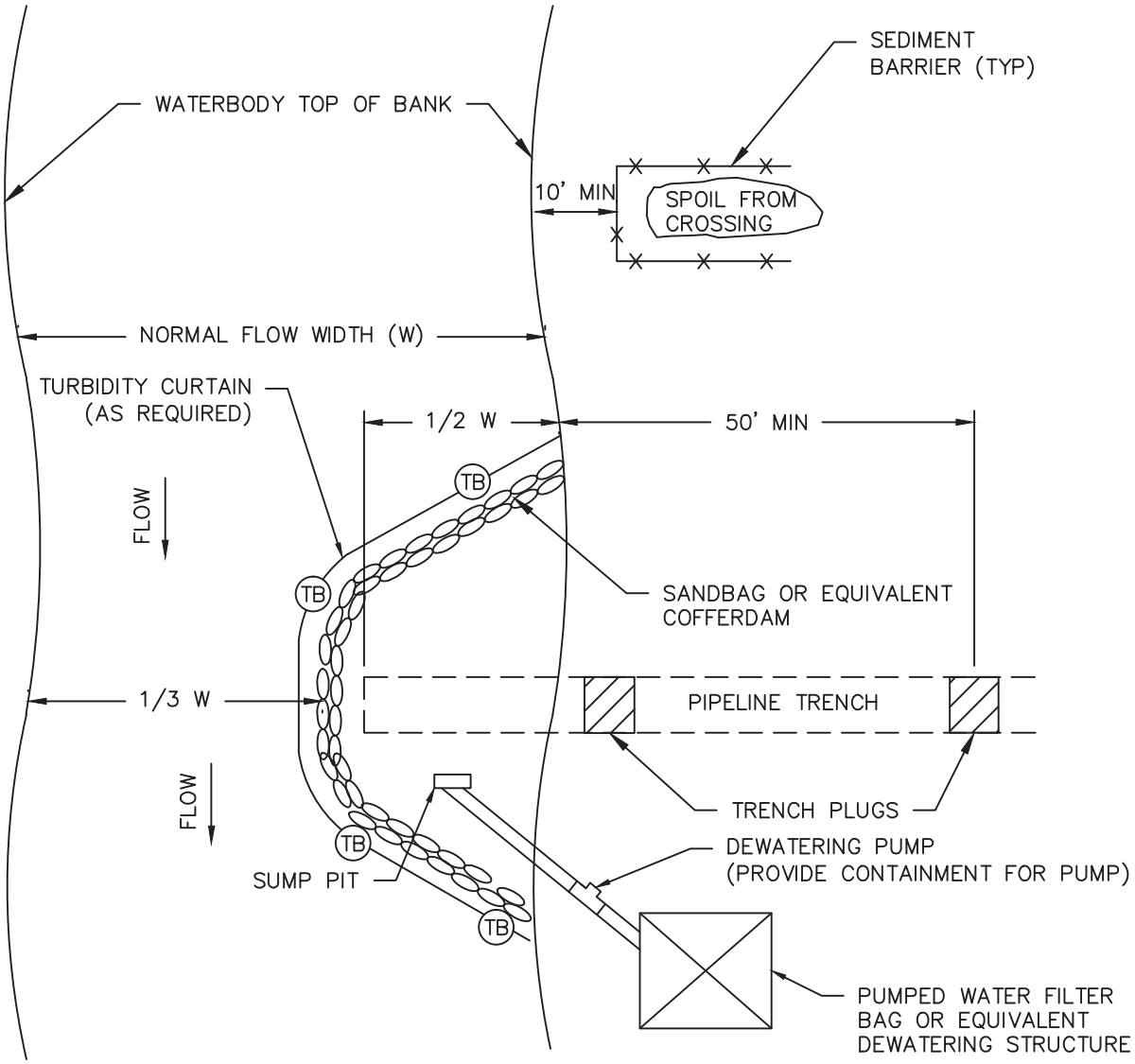

PLAN VIEW

NOTES:

1. GRUBBING SHALL NOT TAKE PLACE WITHIN 50 FEET OF TOP–OF–BANK UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE AND PIPE IS READY FOR INSTALLATION.
2. TRENCH BREAKER SHALL BE INSTALLED WITHIN THE TRENCH ON BOTH SIDES OF THE WATERBODY CHANNEL.
3. WATER ACCUMULATING WITHIN THE WORK AREA SHALL BE PUMPED TO A PUMPED WATER FILTER BAG OR SEDIMENT TRAP PRIOR TO DISCHARGING INTO ANY SURFACE WATER.
4. HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM THE TOP OF WATERBODY BANK.
5. ALL EXCESS EXCAVATED MATERIAL SHALL BE IMMEDIATELY REMOVED FROM THE WATERBODY CROSSING AREA.
6. ALL DISTURBED AREAS WITHIN 50 FEET OF TOP–OF–BANK SHALL BE BLANKETED OR MATTED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR WATERBODIES OR 48 HOURS OF INITIAL DISTURBANCE FOR INTERMEDIATE WATERBODIES UNLESS OTHERWISE AUTHORIZED.
7. APPROPRIATE WATERBODY BANK PROTECTION SHALL BE PROVIDED WITHIN THE CHANNEL.
8. THE WATERBODY CROSSING WILL GENERALLY BE COMPLETED IN 2 STAGES. THE DETAIL DEPICTS STAGE 1. STAGE 2 WILL GENERALLY BE COMPLETED USING THE SAME CONFIGURATION FROM THE OPPOSITE BANK.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL UTILITY LINE CROSSING
WITH COFFERDAM

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 9

Sheet: 9 of 127
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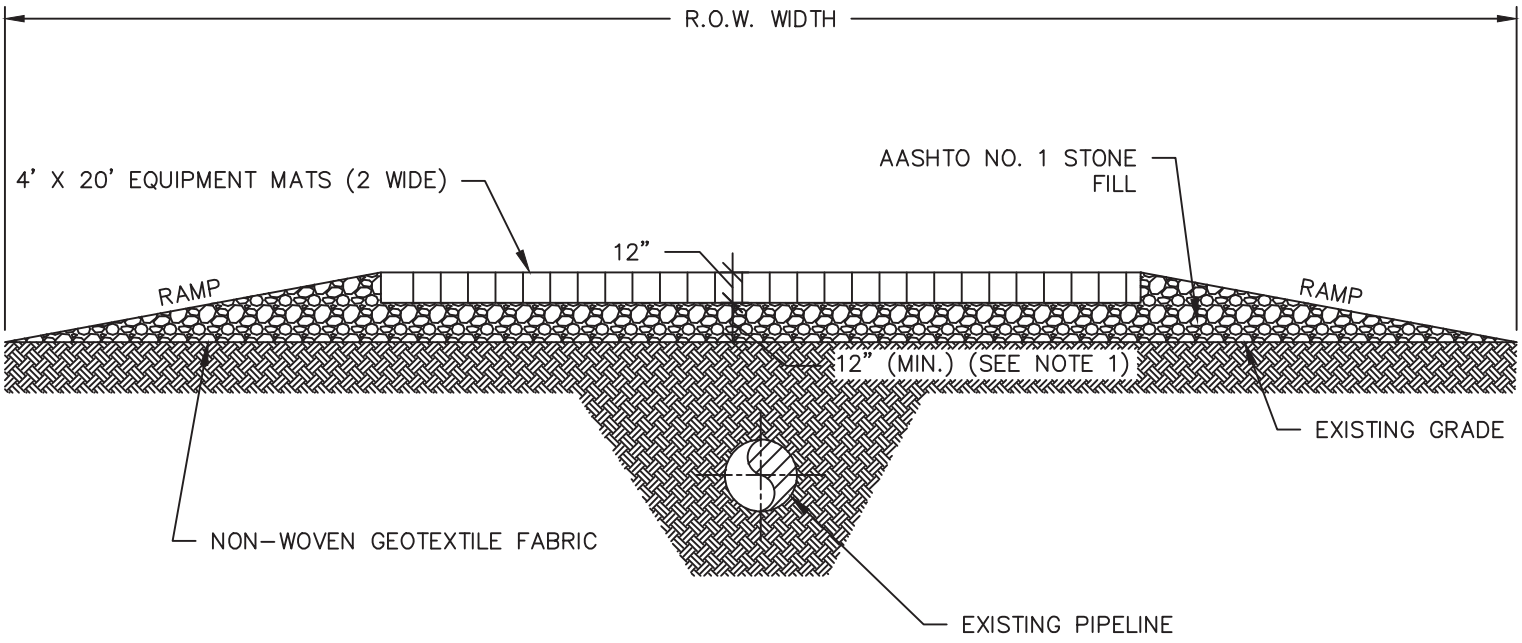

NOTES:

1. ADDITIONAL STONE DEPTH MAY BE REQUIRED DEPENDING ON THE DEPTH OF COVER OVER THE EXISTING PIPE. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER FOR THE REQUIRED DEPTH OF STONE.
2. INSTALL 1 (ONE) LAYER OF NON–WOVEN GEOTEXTILE FABRIC PRIOR TO INSTALLING THE STONE.
3. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO DETERMINE THE NUMBER OF EQUIPMENT MATS REQUIRED.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TEMPORARY WOODEN MAT PIPELINE CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 10

Sheet: 10 of 127
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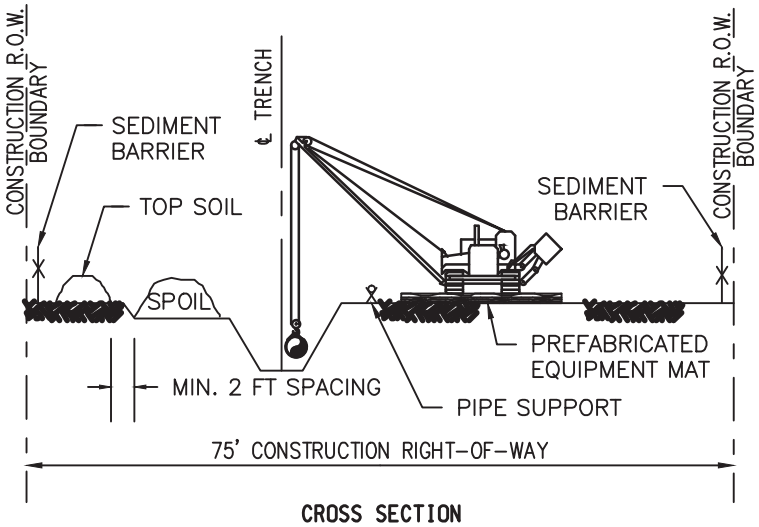

CROSS SECTION

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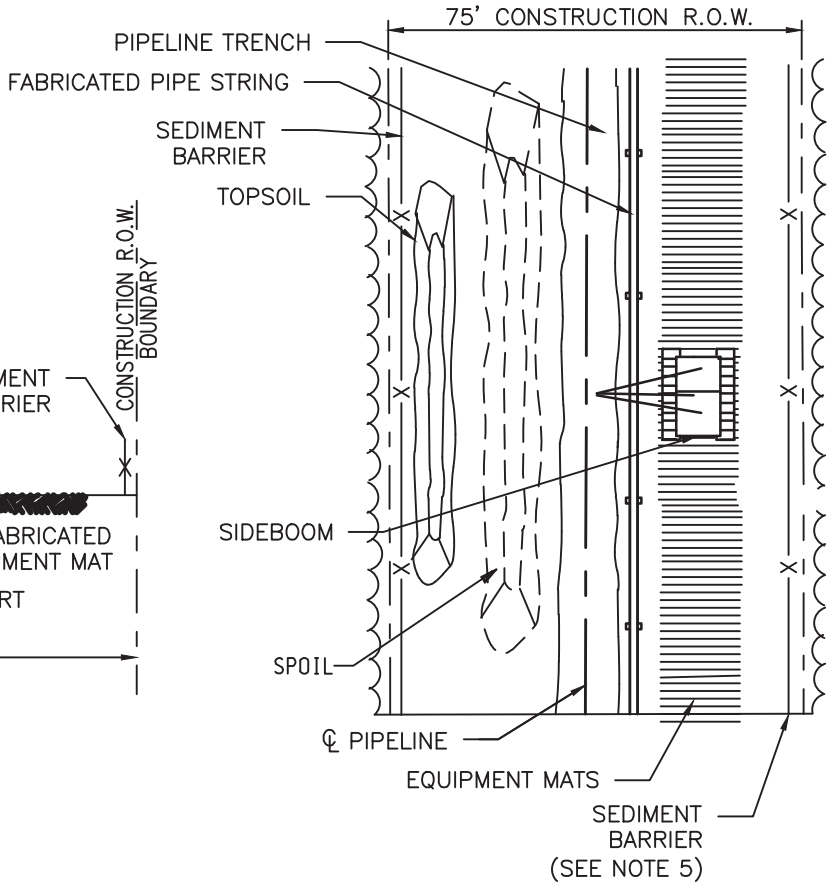

PLAN VIEW

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CONSTRUCTION PROCEDURE NOTES:

1. FLAG WETLAND BOUNDARIES AND INSTALL BOUNDARY SIGNS PRIOR TO CLEARING.
2. NO OVERNIGHT PARKING OR REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER SPCP PLAN.
3. INSTALL TEMPORARY SLOPE BREAKERS UPSLOPE OF WETLAND BOUNDARIES.
4. INSTALL PREFABRICATED EQUIPMENT MATS THROUGH THE ENTIRE WETLAND AREA ON THE WORKING SIDE OF THE CONSTRUCTION CORRIDOR.
5. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS AT THE OUTER BOUNDARIES OF THE WETLAND. INSTALL SEDIMENT BARRIERS ALONG THE EDGE OF THE SPOIL SIDE OF THE CONSTRUCTION CORRIDOR THROUGH THE WETLAND AND ALONG THE DOWN SLOPE EDGE OF THE WETLAND. IF THE DOWN SLOPE EDGE OF THE WETLAND IS THE SPOIL SIDE, THEN SEDIMENT BARRIERS ARE NOT REQUIRED ON THE WORKING SIDE OF THE CORRIDOR UNLESS EQUIPMENT TRAVERSING THROUGH THE WETLAND CAUSES SPOIL AND SEDIMENT TO EXIT THE CONSTRUCTION CORRIDOR.
6. LIMIT PULLING OF TREE STUMPS AND GRADING ACTIVITIES TO DIRECTLY OVER THE TRENCH LINE. DO NOT GRADE OR REMOVE STUMPS OR ROOT SYSTEMS FROM THE REST OF THE RIGHT-OF-WAY IN WETLANDS UNLESS THE CHIEF INSPECTOR AND COMPANY ENVIRONMENTAL INSPECTOR DETERMINE THAT SAFETY RELATED CONSTRUCTION CONSTRAINTS REQUIRE REMOVAL OF TREE STUMPS FROM UNDER THE WORKING SIDE OF THE RIGHT-OF-WAY.
7. CONDUCT TRENCH LINE TOPSOIL STRIPPING (IF TOPSOIL IS NOT SATURATED OR FROZEN). SALVAGE TOPSOIL TO ACTUAL DEPTH OR A MAXIMUM DEPTH OF 12 INCHES, AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR. SEGREGATED TOPSOIL PILE MAY BE LOCATED ON SPOIL SIDE, AS REQUIRED.
8. LEAVE HARD PLUGS AT THE EDGES OF WETLAND UNTIL JUST PRIOR TO TRENCHING.
9. TRENCHING THROUGH WETLANDS MAY PROCEED WHEN THE PIPE SECTION IS FABRICATED AND READY TO LAY. ONCE TRENCHING COMMENCES, CONSTRUCTION THROUGH THE WETLAND IS TO PROCEED CONTINUOUSLY UNTIL THE CROSSING IS COMPLETED, BACK FILLED AND RESTORED IN ORDER TO MINIMIZE THE LENGTH OF TIME THE TRENCH IS OPEN.
10. PIPE SECTION MAY BE FABRICATED WITHIN THE WETLAND ADJACENT TO PIPE TRENCH, OR IN STAGING AREA OUTSIDE THE WETLAND AND WALKED IN. NO CONCRETE COATING ACTIVITY SHALL OCCUR WITHIN 100 FEET OF WETLAND BOUNDARY UNLESS APPROVED BY ENVIRONMENTAL INSPECTOR.
11. LOWER-IN PIPE. PRIOR TO BACK FILLING TRENCH, INSTALL TRENCH BREAKERS IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS.
12. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL MEASURES.
13. REMOVE PREFABRICATED MATS FROM WETLANDS UPON COMPLETION.
14. SEED DISTURBED WETLAND AREAS (UNLESS STANDING WATER IS PRESENT) AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND AS SHOWN ON DRAWINGS AND ECP. 48 LB PLS/ACRE ANNUAL RYE GRASS AND STRAW MULCH AT 3T/ACRE OR AS APPROVED BY THE APPLICABLE PERMITTING AGENCY.
15. NO FERTILIZER OR LIME IS PERMITTED.
16. DO NOT USE LIQUID MULCH BINDERS WITHIN 100 FT OF WETLANDS OR WATERBODIES.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPE I "NON-SATURATED WETLAND"
INSTALLATION PROCEDURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 11

Sheet: 11 of 127

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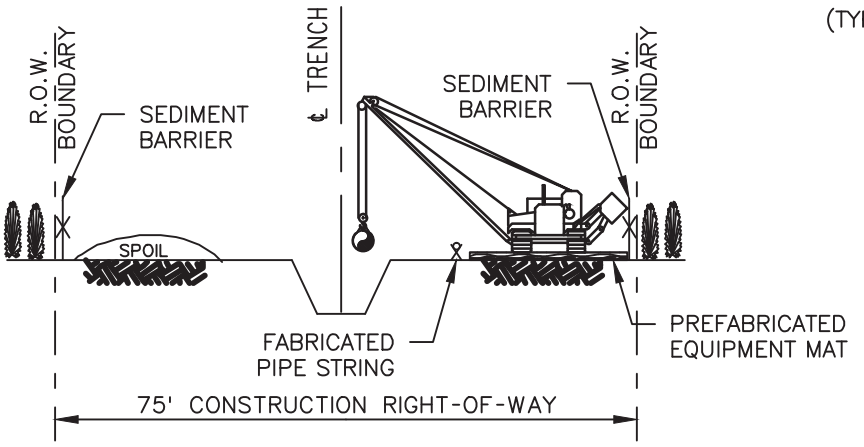

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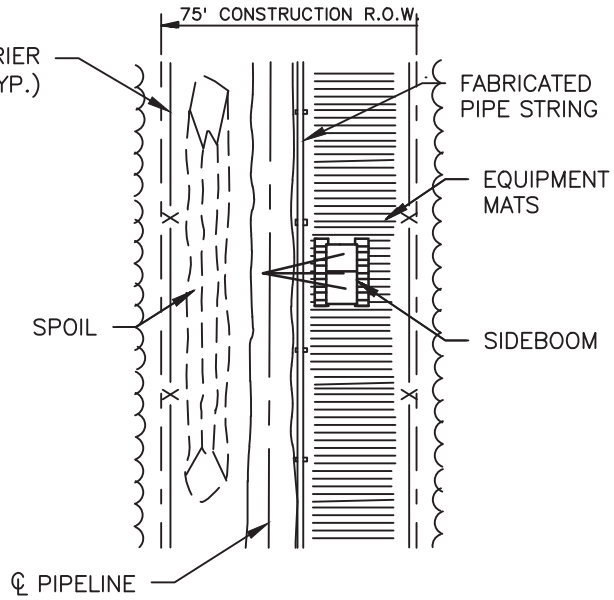

PLAN VIEW
SCALE: N.T.S.

CONSTRUCTION PROCEDURE NOTES:

1. FLAG WETLAND BOUNDARIES AND INSTALL BOUNDARY SIGNS PRIOR TO CLEARING.
2. NO OVERNIGHT PARKING OR REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER SPCC PLAN.
3. INSTALL TEMPORARY SLOPE BREAKERS UPSLOPE OF WETLAND BOUNDARIES.
4. INSTALL PREFABRICATED EQUIPMENT MATS THROUGH ENTIRE WETLAND AREA ON THE WORKING SIDE OF THE CONSTRUCTION CORRIDOR.
5. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS AT OUTER BOUNDARIES OF WETLAND AND ALONG BOTH WETLAND EDGES.
6. LIMIT PULLING OF TREE STUMPS AND GRADING ACTIVITIES TO DIRECTLY OVER THE TRENCHLINE. DO NOT GRADE OR REMOVE STUMPS OR ROOT SYSTEMS FROM THE REST OF THE RIGHT-OF-WAY IN WETLANDS UNLESS THE CHIEF INSPECTOR AND COMPANY ENVIRONMENTAL INSPECTOR DETERMINE THAT SAFETY RELATED CONSTRUCTION CONSTRAINTS REQUIRE REMOVAL OF TREE STUMPS FROM UNDER THE WORKING SIDE OF THE RIGHT-OF-WAY.
7. TOPSOIL STRIPPING SHALL NOT BE REQUIRED IN SATURATED SOIL CONDITIONS.
8. LEAVE HARD PLUGS AT THE EDGES OF WETLAND UNTIL JUST PRIOR TO TRENCHING.
9. TRENCHING THROUGH WETLANDS MAY PROCEED WHEN THE PIPE SECTION IS FABRICATED AND READY TO LAY. ONCE TRENCHING COMMENCES, CONSTRUCTION THROUGH THE WETLAND IS TO PROCEDE CONTINUOUSLY UNTIL THE CROSSING IS COMPLETED, BACKFILLED AND RESTORED IN ORDER TO MINIMIZE THE LENGTH OF TIME THE TRENCH IS OPEN.
10. PIPE SECTION MAY BE FABRICATED WITHIN THE WETLAND ADJACENT TO PIPE TRENCH, OR IN STAGING AREA OUTSIDE THE WETLAND AND WALKED IN. NO CONCRETE COATING ACTIVITY WITHIN 100 FEET OF WETLAND BOUNDARY, UNLESS APPROVED BY COMPANY ENVIRONMENTAL INSPECTOR.
11. LOWER-IN PIPE PRIOR TO BACKFILLING, INSTALL TRENCH PLUGS IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS.
12. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY AND INSTALL PERMANENT EROSION CONTROL MEASURES.
13. REMOVE PREFABRICATED MATS FROM WETLANDS UPON COMPLETION.
14. SEED DISTURBED WETLAND AREA (UNLESS STANDING WATER IS PRESENT) AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR AND AS SHOWN ON DRAWINGS AND ECP. 48 LB PLS/ACRE ANNUAL RYE GRASS AND STRAW MULCH AT 3T/ACRE OR AS APPROVED BY THE APPLICABLE PERMITTING AGENCY.
15. NO FERTILIZER OR LIME IS PERMITTED.
16. DO NOT USE LIQUID MULCH BINDERS WITHIN 100 FT OF WETLANDS OR WATERBODIES.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPE II "SATURATED WETLAND"
INSTALLATION PROCEDURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 12

Sheet: 12 of 127
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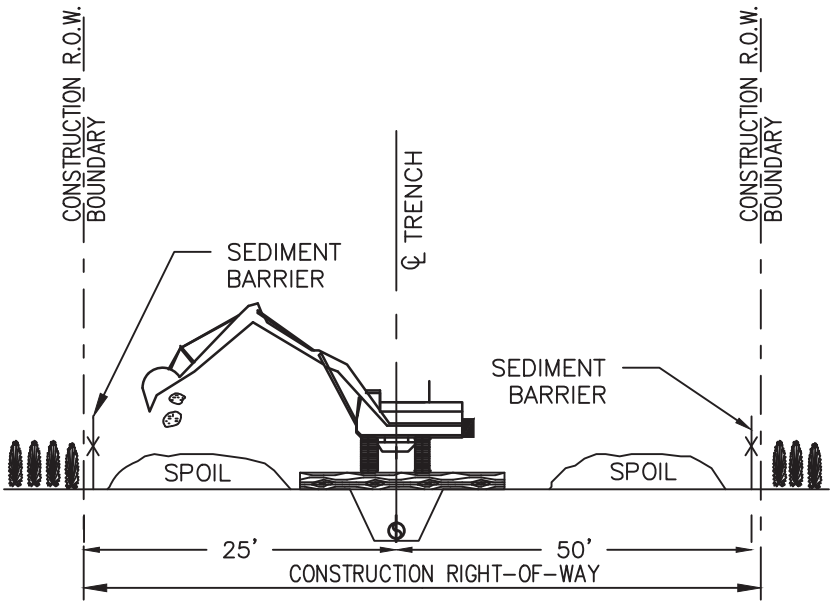

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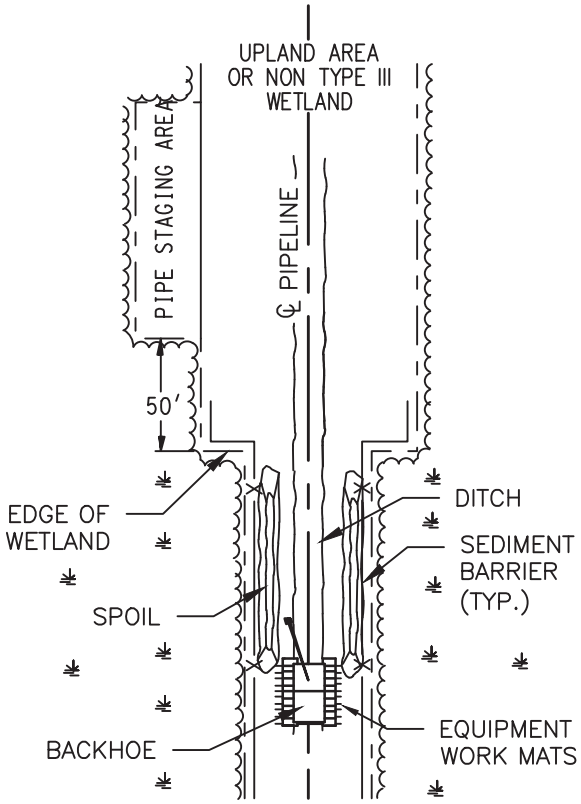

PLAN VIEW
SCALE: N.T.S.

CONSTRUCTION PROCEDURE NOTES:

1. FLAG WETLAND BOUNDARIES AND INSTALL WETLAND BOUNDARY SIGNS PRIOR TO CLEARING.
2. NO OVERNIGHT PARKING OR REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER SPCC PLAN.
3. INSTALL TEMPORARY SLOPE BREAKERS WITHIN 50' UPSLOPE OF WETLAND BOUNDARIES.
4. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS AT OUTER BOUNDARIES OF WETLAND AND ALONG BOTH WETLAND EDGES.
5. LIMIT PULLING OF TREE STUMPS AND GRADING ACTIVITIES TO DIRECTLY OVER TRENCH LINE. DO NOT REMOVE STUMPS OR ROOT SYSTEMS FROM THE REST OF THE RIGHT-OF-WAY IN WETLANDS UNLESS THE CHIEF INSPECTOR AND COMPANY ENVIRONMENTAL INSPECTOR DETERMINE THAT SAFETY RELATED CONSTRUCTION CONSTRAINTS REQUIRE REMOVAL OF TREE STUMPS FROM UNDER THE WORKING SIDE OF THE RIGHT-OF-WAY.
6. TOPSOIL STRIPPING SHALL NOT BE REQUIRED IN SATURATED SOIL CONDITIONS.
7. UTILIZE AMPHIBIOUS EXCAVATORS (PONTOON MOUNTED BACKHOES) OR TRACKED BACKHOES SUPPORTED BY PREFABRICATED EQUIPMENT MATS OR FLOATS, TO EXCAVATE TRENCH. IF PREFABRICATED EQUIPMENT MATS ARE USED FOR STABILIZATION, THE BACKHOE SHALL GRADUALLY MOVE ACROSS THE WETLAND BY MOVING THE MATS FROM IMMEDIATELY BEHIND TO IMMEDIATELY IN FRONT OF THE BACKHOE'S PATH.
8. FABRICATE PIPE IN A STAGING AREA OUTSIDE THE TYPE III WETLAND AS INDICATED ON THE CONSTRUCTION DRAWINGS. NO CONCRETE COATING ACTIVITY SHALL OCCUR WITHIN 100 FEET OF THE WETLAND BOUNDARY, UNLESS APPROVED BY THE ENVIRONMENTAL INSPECTOR.
9. LEAVE HARD PLUGS AT THE EDGE OF TYPE III WETLAND UNTIL JUST PRIOR TO PIPE PLACEMENT.
10. FLOAT PIPE IN PLACE, LOWER-IN, INSTALL TRENCH PLUGS IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS, AND BACKFILL.
11. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY AND INSTALL PERMANENT EROSION CONTROL.
12. REMOVE ANY MATS UTILIZED TO SUPPORT AMPHIBIOUS EQUIPMENT FROM WETLANDS UPON COMPLETION.
13. WETLANDS CROSSED USING PUSH/PULL METHOD TEND TO BE TOO WET FOR EFFECTIVE SEEDING AND WILL NOT BE SEEDED IF STANDING WATER IS PRESENT.
14. NO FERTILIZER OR LIME IS PERMITTED.
15. DO NOT USE LIQUID MULCH BINDERS WITHIN 100 FT OF WETLANDS OR WATERBODIES.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPE III "INUNDATED WETLAND"
INSTALLATION PROCEDURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 13

Sheet: 13 of 127
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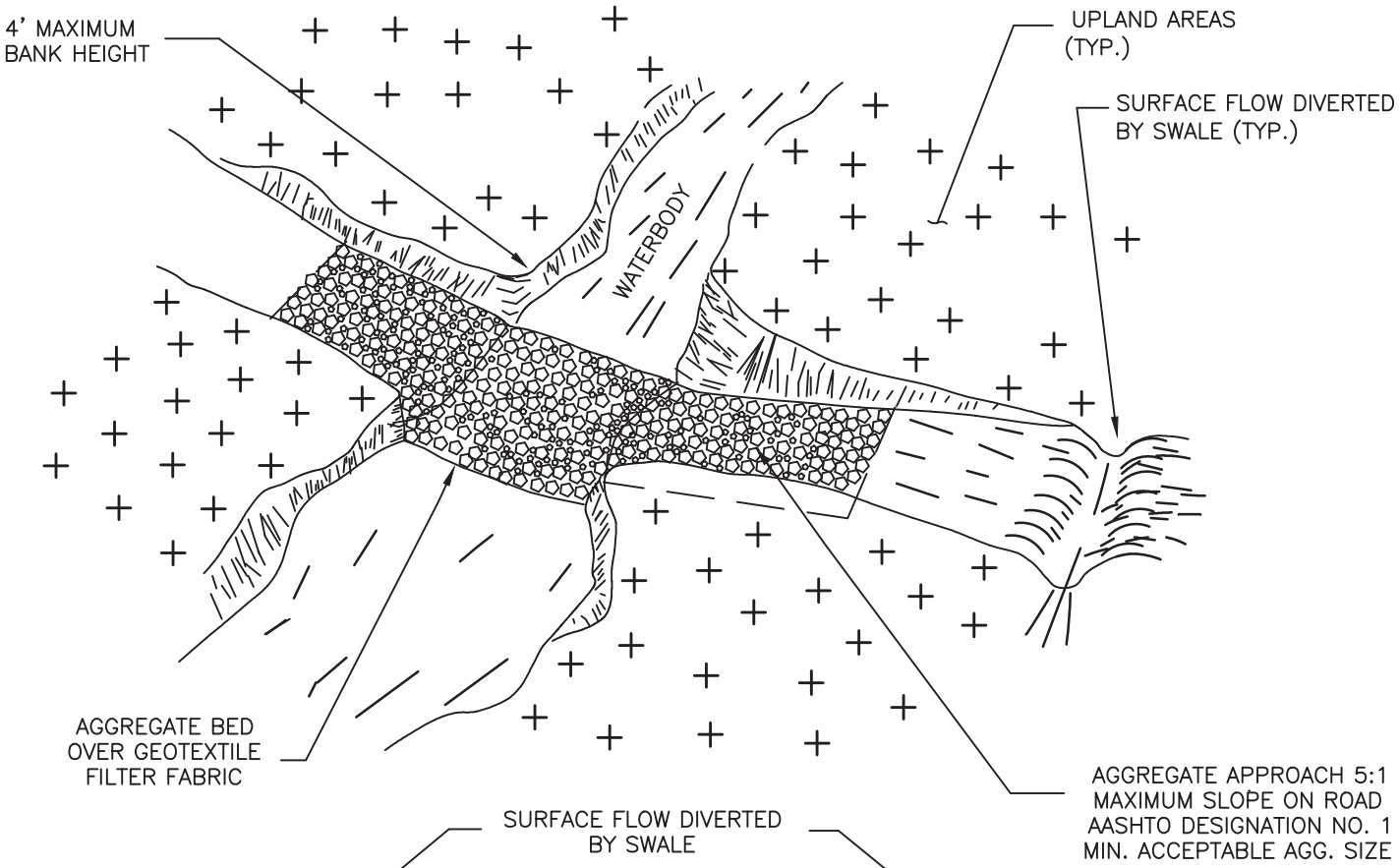

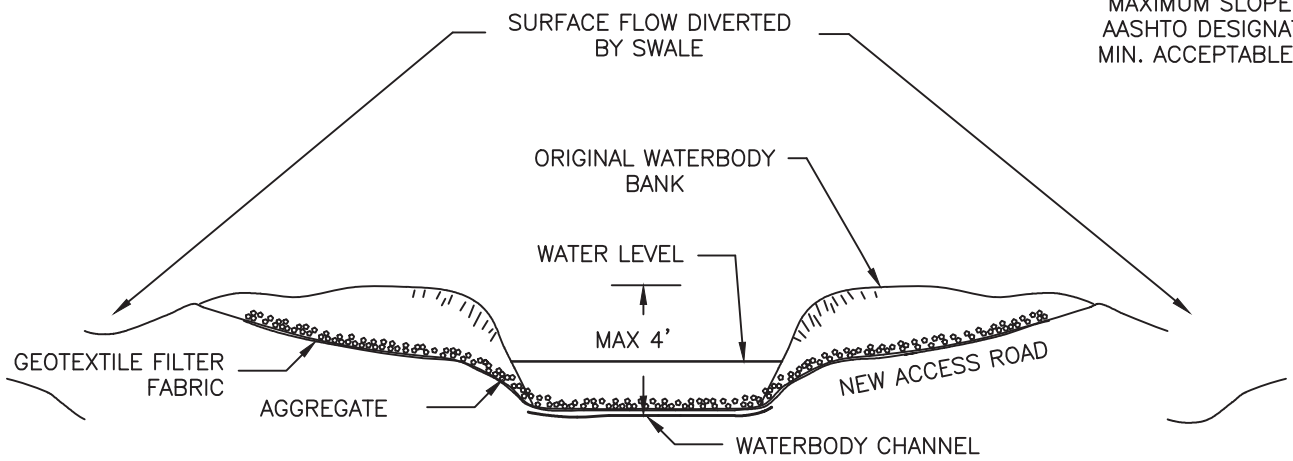

NOTES

1. THIS METHOD IS INTENDED FOR USE BY CLEARING EQUIPMENT AND CONSTRUCTION EQUIPMENT REQUIRED TO CONSTRUCT A TEMPORARY BRIDGE CROSSING PRIOR TO PIPE INSTALLATION (E.G. TRENCHING), UNLESS OTHERWISE APPROVED BY THE APPLICABLE REGULATORY AGENCY. UNLESS OTHERWISE APPROVED, THE CONTRACTOR SHALL LIMIT THE NUMBER OF CROSSINGS TO ONE PER PIECE OF EQUIPMENT.
2. THIS METHOD SHALL ONLY BE USED IF IT WILL NOT AFFECT AQUATIC LIFE SUCH AS FISH MIGRATION OR SPAWNING. COORDINATION WITH THE APPLICABLE PERMITTING AGENCY WILL BE REQUIRED PRIOR TO INSTALLATION.
3. THE ACCESS FORD SHALL BE CONSTRUCTED PERPENDICULAR TO THE WATERBODY BANKS TO MINIMIZE IMPACTS
4. A SWALE SHALL BE CONSTRUCTED AT BOTH APPROACHES A MAXIMUM OF 50' FROM THE EDGE OF THE WATERBODY BANK TO DIVERT RUNOFF AND PREVENT IT FROM DIRECTLY ENTERING THE WATERBODY.
5. THE MAXIMUM HEIGHT BETWEEN THE INVERT OF THE WATERBODY AND THE WATERBODY TOP OF BANK IS 4'. THIS METHOD SHALL NOT BE USED IF THE BANK HEIGHT EXCEEDS 4'.
6. ALL AREAS DISTURBED BY THE ACCESS FORD SHALL BE STABILIZED AS SOON AS PRACTICAL, BUT NO LATER THAN 14 CALENDAR DAYS AFTER REMOVAL.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TEMPORARY ACCESS FORD

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 14

Sheet: 14 of 127
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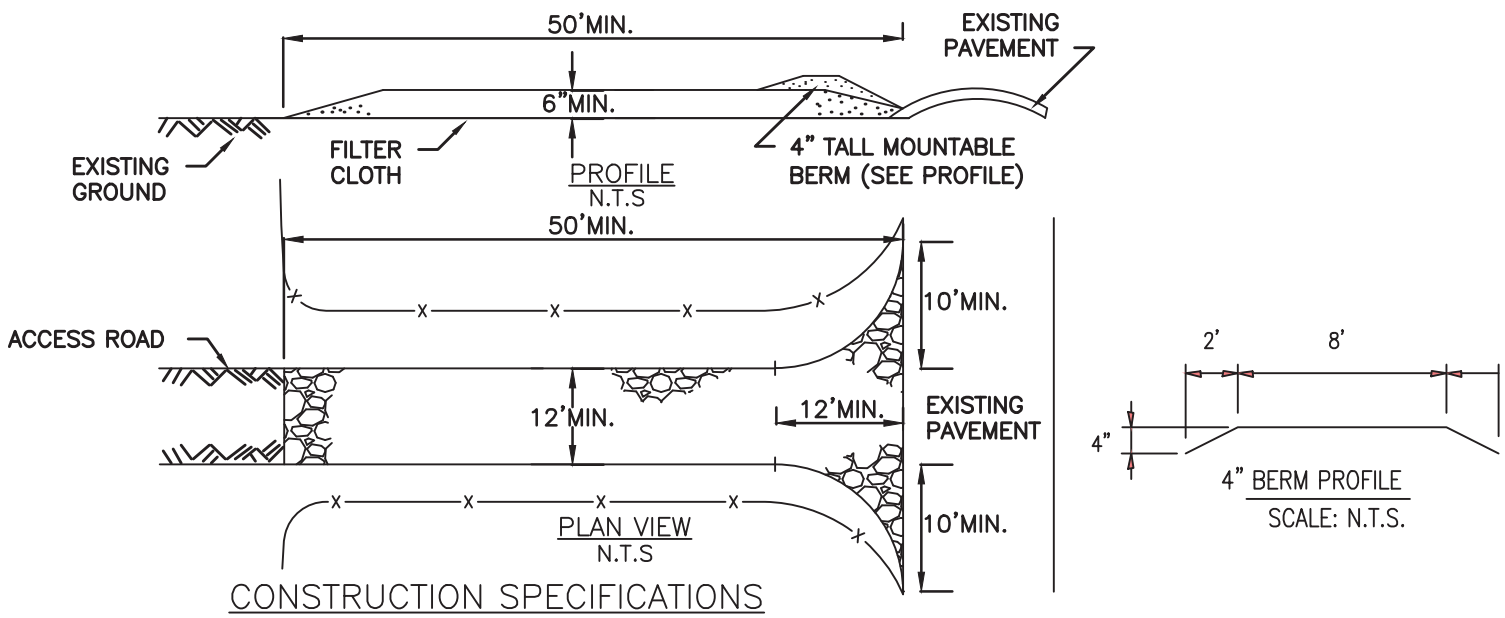

CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – 1–4" STONE PERMITTED FOR USE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH – NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY–FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE. GEOTEXTILE MUST MEET CRITERIA IN TABLE BELOW.
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 OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. 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 EVENT.

TABLE: CRITERIA FOR GEOTEXTILE

FABRIC PROPERTIES	LIGHT DUTY ROADS GRADE SUBGRADE	HEAVY DUTY HAUL ROADS ROUGH GRADED	TEST METHOD
GRAB TENSILE STRENGTH (LBS)	200	220	ASTM D1682
ELONGATION AT FAILURE (%)	50	60	ASTM D1682
MULLEN BRUST STRENGTH (LBS)	190	430	ASTM D3786
PUNCTURE STRENGTH (LBS)	40	125	ASTM D3786 MODIFIED
EQUIVALENT	40–80	40–80	US STD SIEVE
OPENING SIZE			CW–02215
AGGREGATE DEPTH	6	10	

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
STABILIZED CONSTRUCTION ENTRANCE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 15

Sheet: 15 of 127
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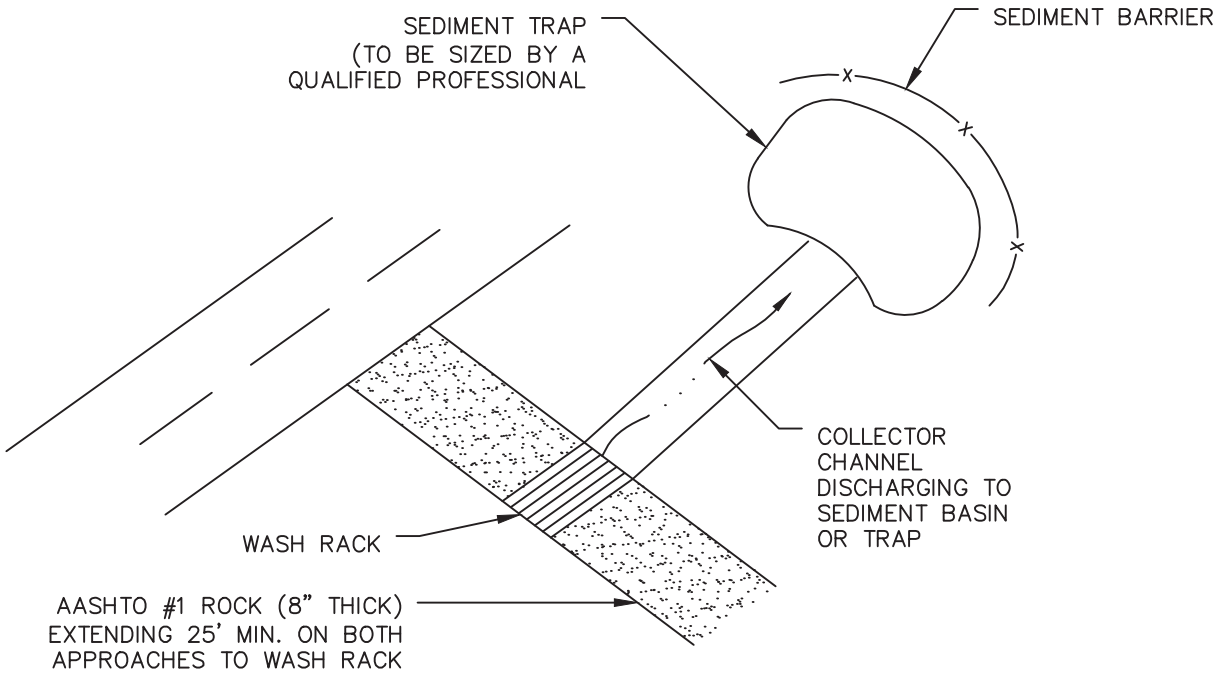

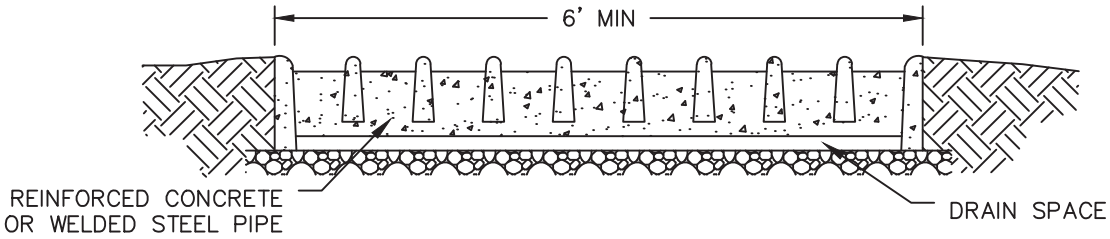

NOTES:

1. WASH RACK SHALL BE 20 FEET (MIN.) WIDE OR TOTAL WIDTH OF ACCESS.
2. WASH RACK SHALL BE DESIGNED AND CONSTRUCTED TO ACCOMMODATE ANTICIPATED CONSTRUCTION VEHICULAR TRAFFIC.
3. A WATER SUPPLY SHALL BE MADE AVAILABLE TO WASH THE WHEELS OF ALL VEHICLES EXITING THE SITE.
4. MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE OF ROCK MATERIAL SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. DRAIN SPACE UNDER WASH RACK SHALL BE KEPT OPEN AT ALL TIMES. DAMAGE TO THE WASH RACK SHALL BE REPAIRED PRIOR TO FURTHER USE OF THE RACK. ALL SEDIMENT DEPOSITED ON ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
STABILIZED CONSTRUCTION ENTRANCE
WITH WASHRACK

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 16

Sheet: 16 of 127
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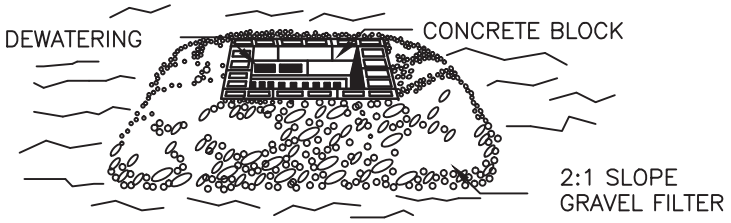
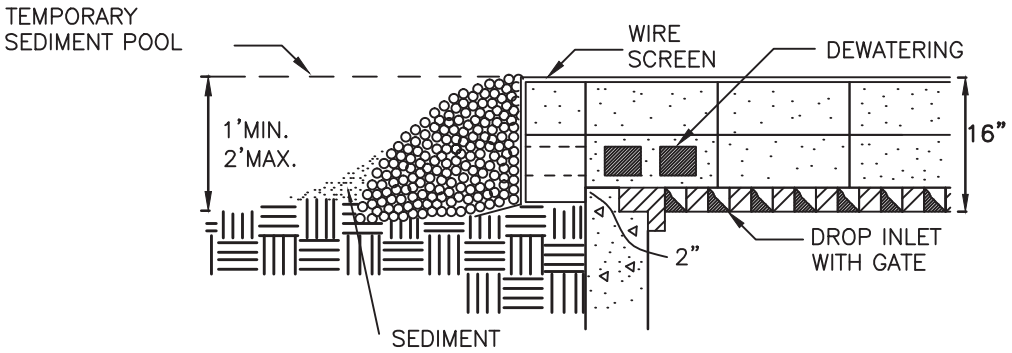
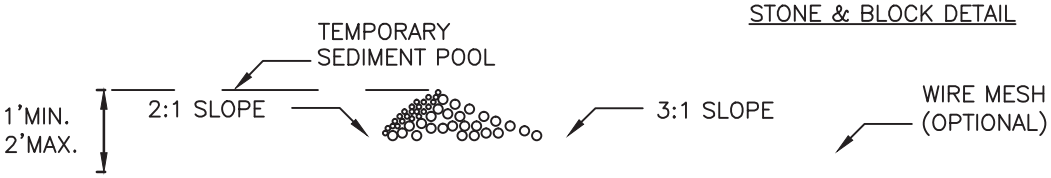


STONE & BLOCK PERSPECTIVE VIEW



STONE & BLOCK DETAIL



"DOUGHNUT" DETAIL

CONSTRUCTION SPECIFICATIONS

1. LAY ONE BLOCK ON EACH SIDE OF THE STRUCTURE ON ITS SIDE FOR DEWATERING. FOUNDATION SHALL BE 2 INCHES MINIMUM BELOW REST OF INLET AND BLOCKS SHALL BE PLACED AGAINST INLET FOR SUPPORT.
2. HARDWARE CLOTH OR 1/2" WIRE MESH SHALL BE PLACED OVER BLOCK OPENINGS TO SUPPORT STONE.
3. USE CLEAN STONE OR GRAVEL 1/2–3/4 INCH IN DIAMETER PLACED 2 INCHES BELOW TOP OF THE BLOCK ON A 2:1 SLOPE OR FLATTER.
4. FOR STONE STRUCTURES ONLY, A 1 FOOT THICK LAYER OF THE FILTER STONE WILL BE PLACED AGAINST THE 3 INCH STONE AS SHOWN ON THE DRAWINGS.
5. MAXIMUM DRAINAGE AREA 1 ACRE.
6. THIS SHALL BE USED IN ADDITION TO A SEDIMENT TRAPPING DEVICE (E.G. SEDIMENT BASIN, FILTER SACK, ETC.)

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
STONE & BLOCK DROP INLET
PROTECTION STRUCTURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 17

Sheet: 17 of 127
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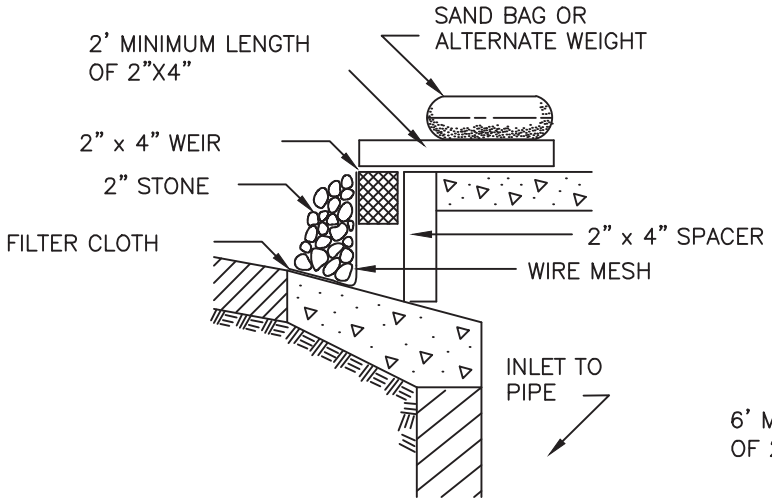

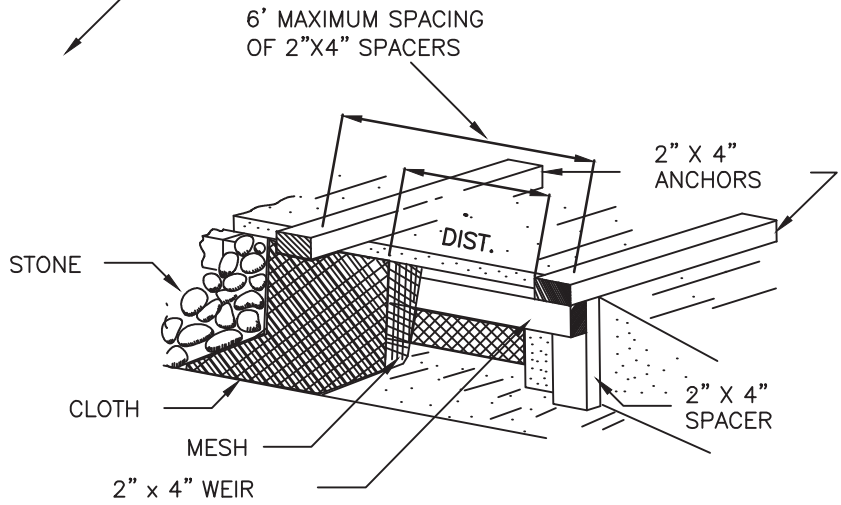

CONSTRUCTION SPECIFICATIONS

1. FILTER FABRIC SHALL HAVE AN EOS OF 40–85.
2. WOODEN FRAME SHALL BE CONSTRUCTED OF 2" x 4" CONSTRUCTION GRADE LUMBER.
3. WIRE MESH ACROSS THROAT SHALL BE A CONTINUOUS PIECE 30 INCH MINIMUM WIDTH WITH A LENGTH 4 FEET LONGER THAN THE THROAT. IT SHALL BE SHAPED AND SECURELY NAILED TO A 2" x 4" WEIR.
4. THE WEIR SHALL BE SECURELY NAILED TO 2" x 4" SPACERS 9 INCHES LONG SPACED NO MORE THAN 6 FEET APART.
5. THE ASSEMBLY SHALL BE PLACED AGAINST THE INLET AND SECURED BY 2" x 4" ANCHORS 2 FEET LONG EXTENDING ACROSS THE TOP OF THE INLET AND HELD IN PLACE BY SANDBAGS OR ALTERNATE WEIGHTS.
6. MAXIMUM DRAINAGE AREA 1 ACRE

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
CURB DROP INLET PROTECTION
STRUCTURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 18

Sheet: 18 of 127
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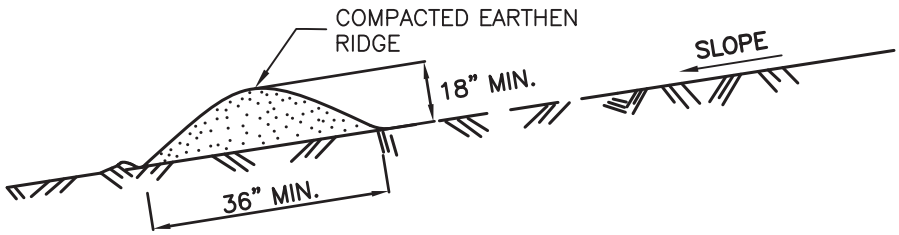

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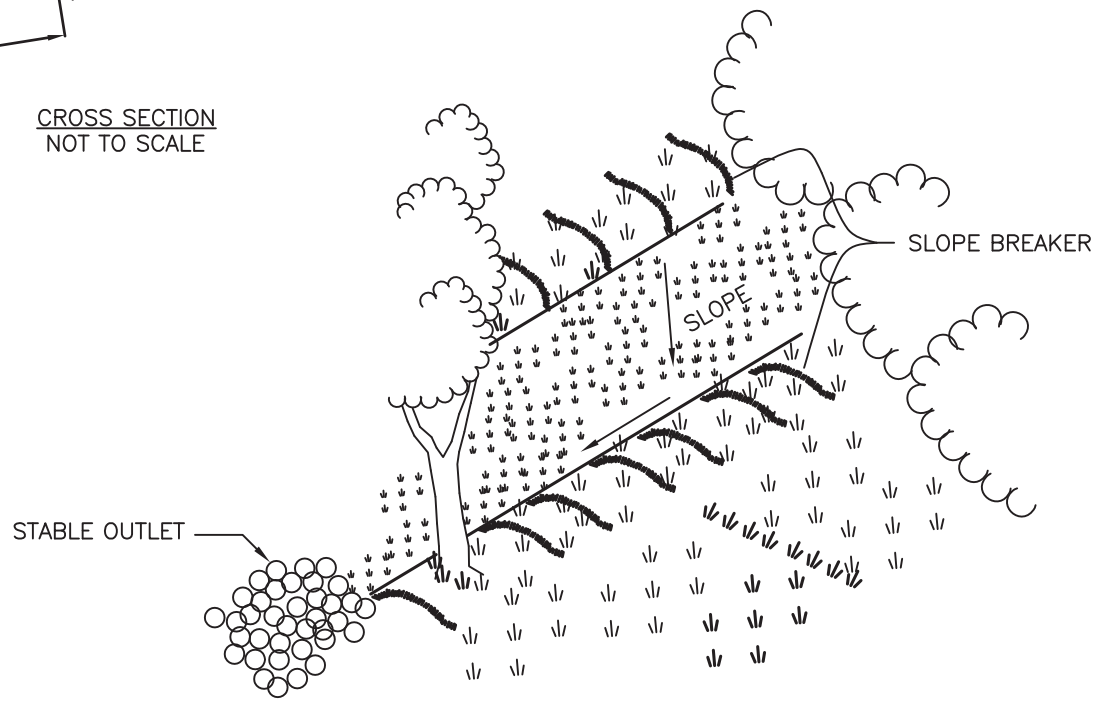

CONSTRUCTION SPECIFICATIONS

1. INSTALL THE SLOPE BREAKER AS SOON AS THE RIGHT OF WAY IS CLEARED AND GRADED.
2. DISK OR STRIP THE SOD FROM THE BASE FOR THE CONSTRUCTED RIDGE BEFORE PLACING FILL.
3. TRACK THE RIDGE TO COMPACT IT TO THE DESIGN CROSS SECTION.
4. SLOPE BREAKERS MAY BE CURVED ALONG THE SLOPE TO CONFORM TO THE CONTOURS. REGARDLESS OF CURVATURE, ALL SLOPE BREAKERS SHALL BE CONSTRUCTED WITH A POSITIVE SLOPE TOWARDS A STABLE OUTLET.
5. THE OUTLET SHALL BE LOCATED ON AN UNDISTURBED AREA. FIELD SPACING WILL BE ADJUSTED TO USE THE MOST STABLE OUTLET AREAS. OUTLET PROTECTION WILL BE PROVIDED WHEN NATURAL AREAS ARE NOT ADEQUATE.
6. VEHICLE CROSSING SHALL BE STABILIZED WITH GRAVEL. EXPOSED AREAS SHALL BE IMMEDIATELY SEEDED AND MULCHED.
7. PERIODICALLY INSPECT SLOPE BREAKERS FOR EROSION DAMAGE AND SEDIMENT. CHECK OUTLET AREAS AND MAKE REPAIRS AS NEEDED TO RESTORE OPERATION.
8. THE POSITIVE GRADE OF THE SLOPE BREAKER SHALL NOT EXCEED 8%. A CROSSING ANGLE OF APPROX. 60 DEGREES IS PREFERRED. SLOPE BREAKERS FLOW MUST BE CONVEYED TO STABLE OUTLETS.

MAXIMUM SPACING OF PERMANENT AND TEMPORARY SLOPE BREAKERS

PERCENT SLOPE	SPACING (FT)
<5	125
5 TO 10	100
10 TO 20	75
20 TO 35	50
>35	25

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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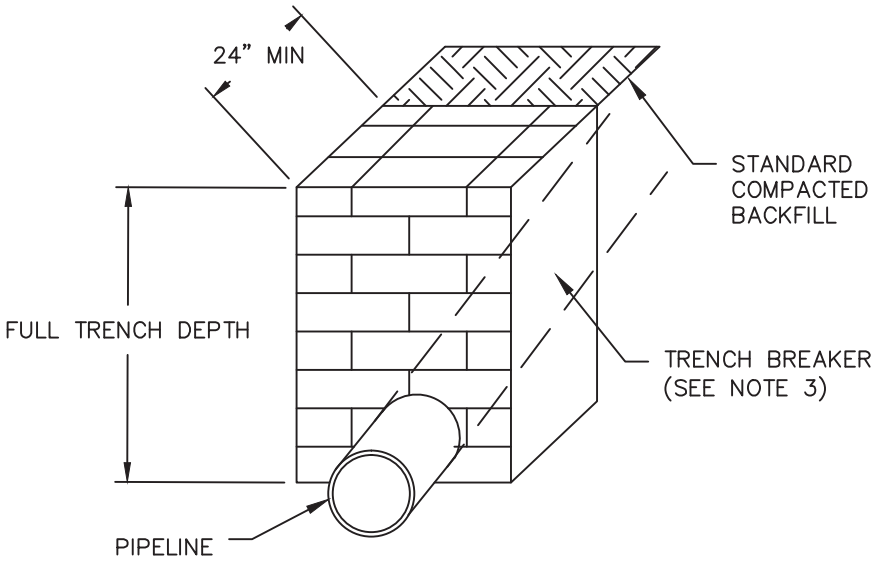
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SLOPE BREAKER (WATERBAR)

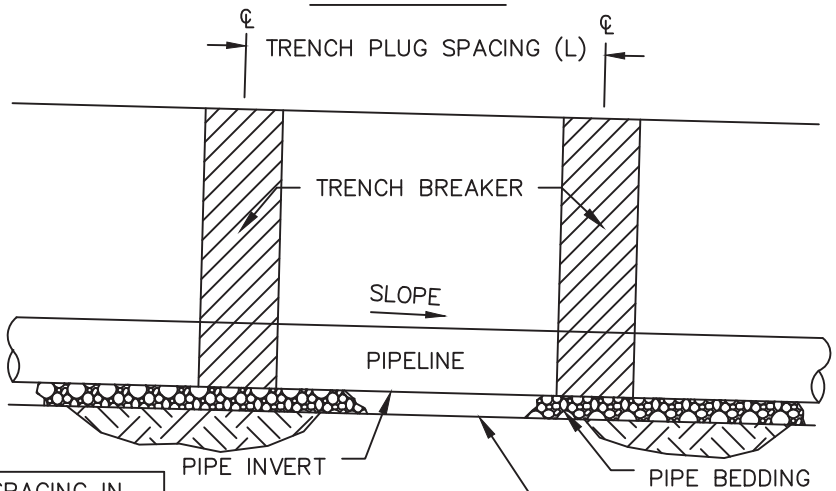
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 19

Sheet: 19 of 127
Type:



SECTION VIEW



ELEVATION

TRENCH BREAKER SPACING IN AGRICULTURAL LAND	
SLOPE (%)	SPACING (L) (FT)
< 5	AS REQUIRED
5 – 10	150
>10 – 15	100
>15 – 20	80
>20 – 30	70
>30 – 40	50
>40 – 100	40
>100	25

TRENCH BREAKER SPACING IN NON–AGRICULTURAL LAND	
SLOPE (%)	SPACING (L) (FT)
< 5	AS REQUIRED
5 – 10	150
>10 – 20	100
>20 – 35	80
<35 –	70

NOTES
1. TOPSOIL SHALL NOT BE USED TO FILL SACKS.
2. IMPERVIOUS TRENCH BREAKERS ARE REQUIRED FOR ALL STREAM, RIVER, WETLAND, OR OTHER WATER BODY CROSSINGS.
3. BREAKER MATERIAL MAY CONSIST OF STACKED CLAY, BENTONITE, SAND BAGS OR FOAM.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

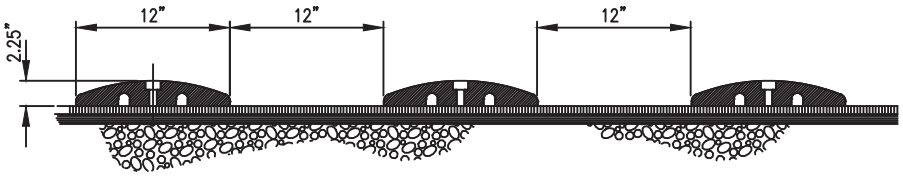
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TRENCH BREAKER (TRENCH PLUG)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 20

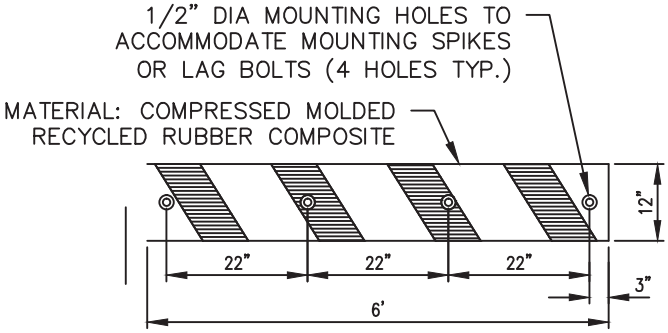
Sheet: 20 of 127
Type:



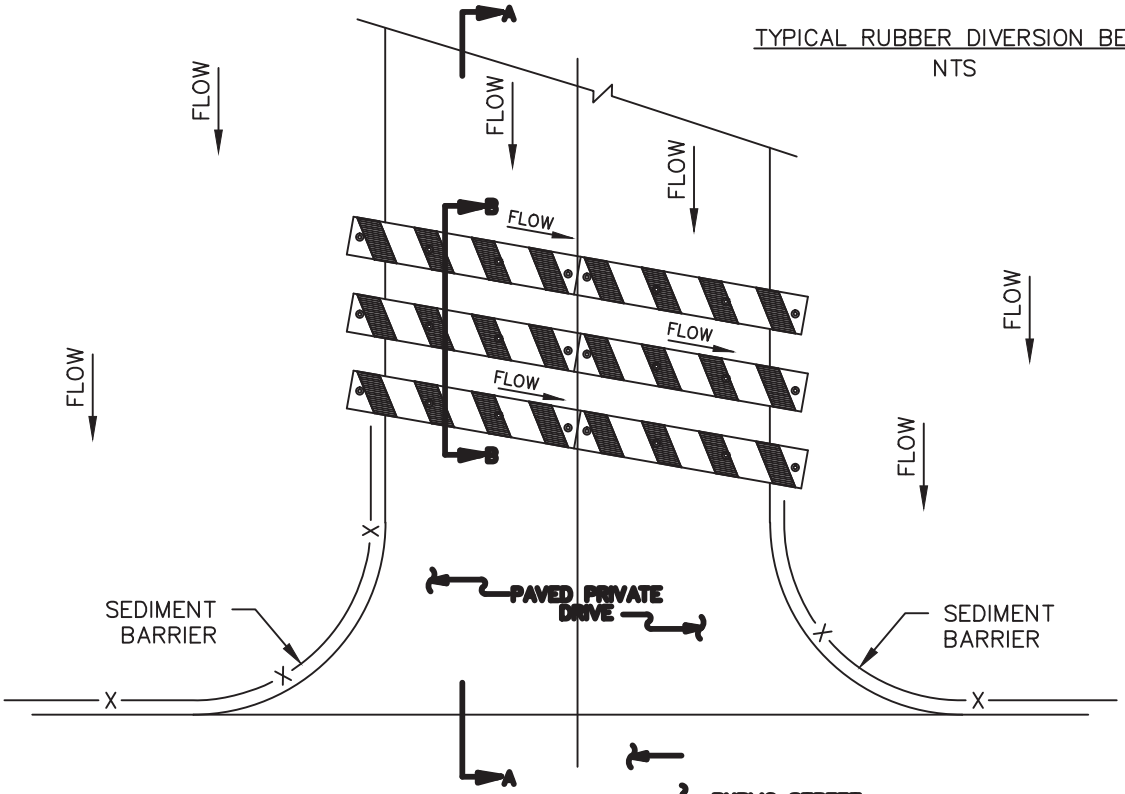
SECTION BB
NTS

NOTES:

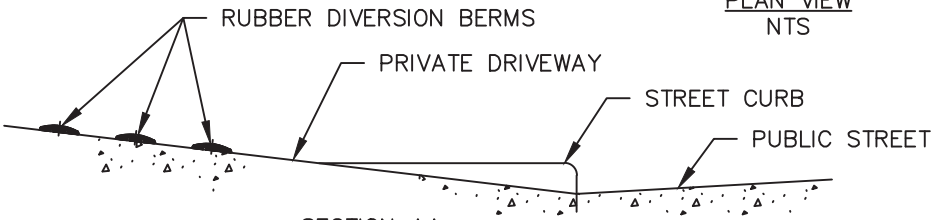
1. DIVERSION BERM TO BE SLOMO SPEED BUMPS BY CHECKER INDUSTRIAL SAFTEY PRODUCTS INC OR APPROVED EQUAL. SPEED BUMPS ARE MANUFACTURED FROM RECYCLED RUBBER COMPOSITE. MODEL NUMBER SB6D–H IS 72" L x 12" W x 2.25" H.
2. EACH 72" SECTION OF BERM TO HAVE MOUNTING HOLES SPACED ON 22" MAXIMUM, CENTERS.
3. BERM TO DIVERT RUNOFF TO EXISTING SEDIMENT BARRIER.
4. WHEN REMOVED, ALL HOLES AND DAMAGE TO EXISTING DRIVEWAY SURFACES SHALL BE REPAIRED.



TYPICAL RUBBER DIVERSION BERM
NTS



PLAN VIEW
NTS



SECTION AA
NTS

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

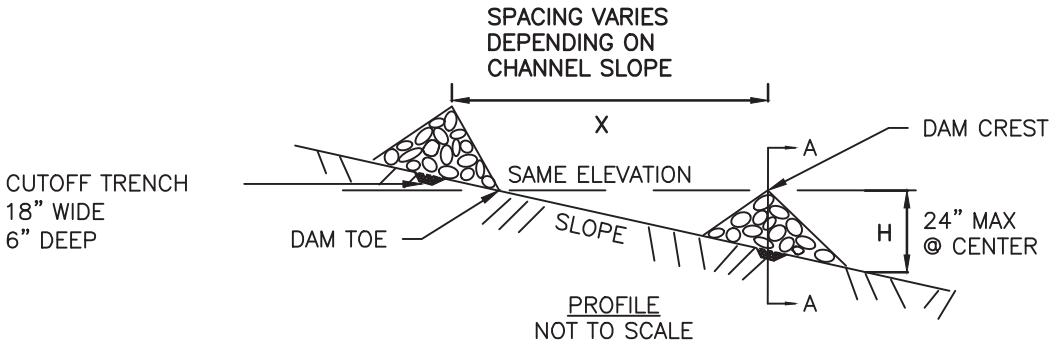
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
DRIVEWAY DIVERSION BERM

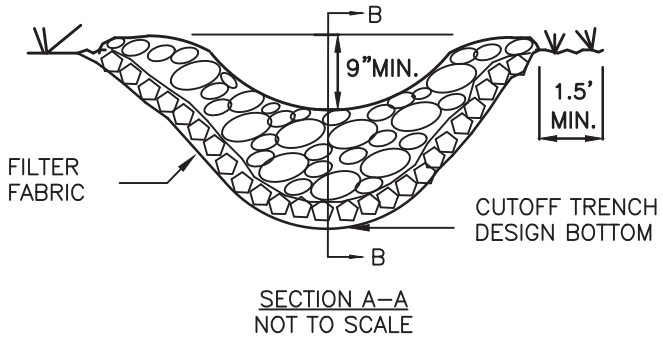
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

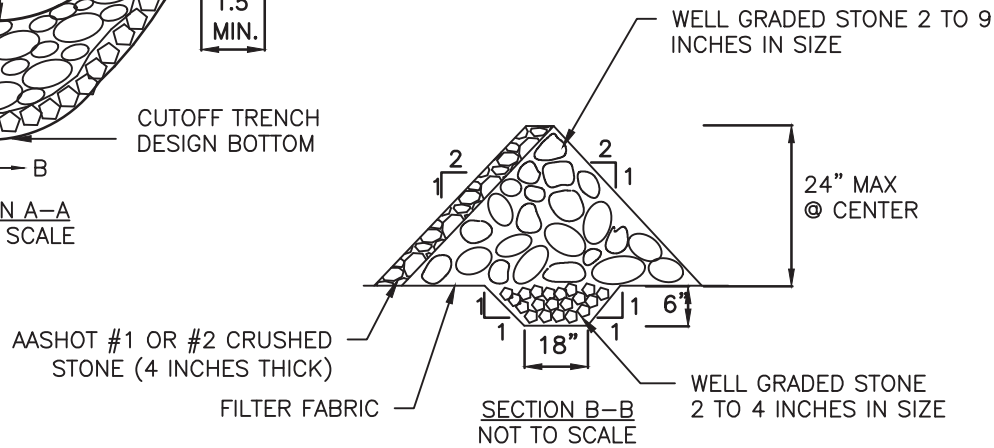
FIG. NO. 21

Sheet: 21 of 127
Type:



$$X = \frac{H\ (Ft)}{SLOPE\ (FT/FT)}$$





CONSTRUCTION SPECIFICATIONS

1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION TO THE LINES, GRADES AND LOCATIONS SHOWN IN THE PLAN.
2. SET SPACING OF CHECK DAMS TO ASSUME THAT THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM.
3. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONE.
6. MAXIMUM DRAINAGE AREA 2 ACRES.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

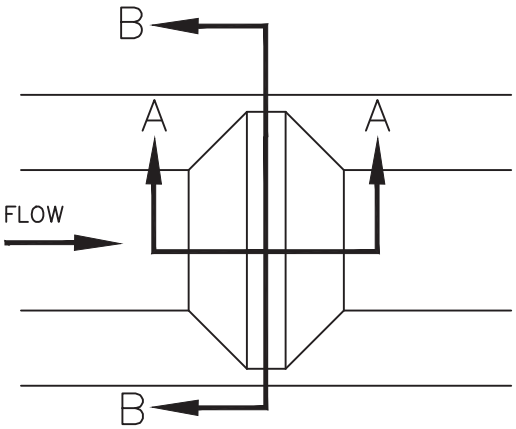
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
CHECK DAM

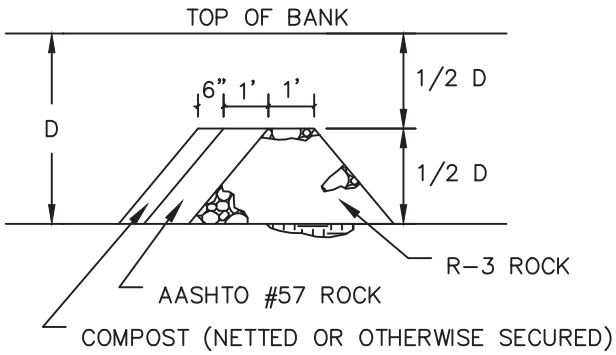
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 22

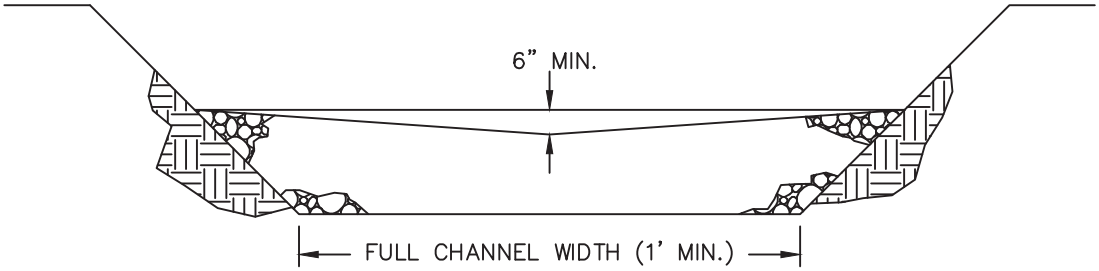
Sheet: 22 of 127
Type:



PLAN VIEW



SECTION A-A



SECTION B-B

FOR 3' ≤ D USE R–4
FOR 2' ≤ D < 3' USE R–3
NOT APPLICABLE FOR D<2'

ROCK FILTER NO.	LOCATION	D (FT.)	RIPRAP SIZE

THIS TABLE IS INTENTIONALLY LEFT BLANK AND SHOULD BE FILLED IN BY THE PLAN PREPARER.

NOTES:

1. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE HEIGHT OF THE FILTER.
2. IMMEDIATELY UPON STABILIZATION OF EACH CHANNEL, INSTALLER SHALL REMOVE ACCUMULATED SEDIMENT, REMOVE ROCK FILTER, AND STABILIZE DISTURBED AREAS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

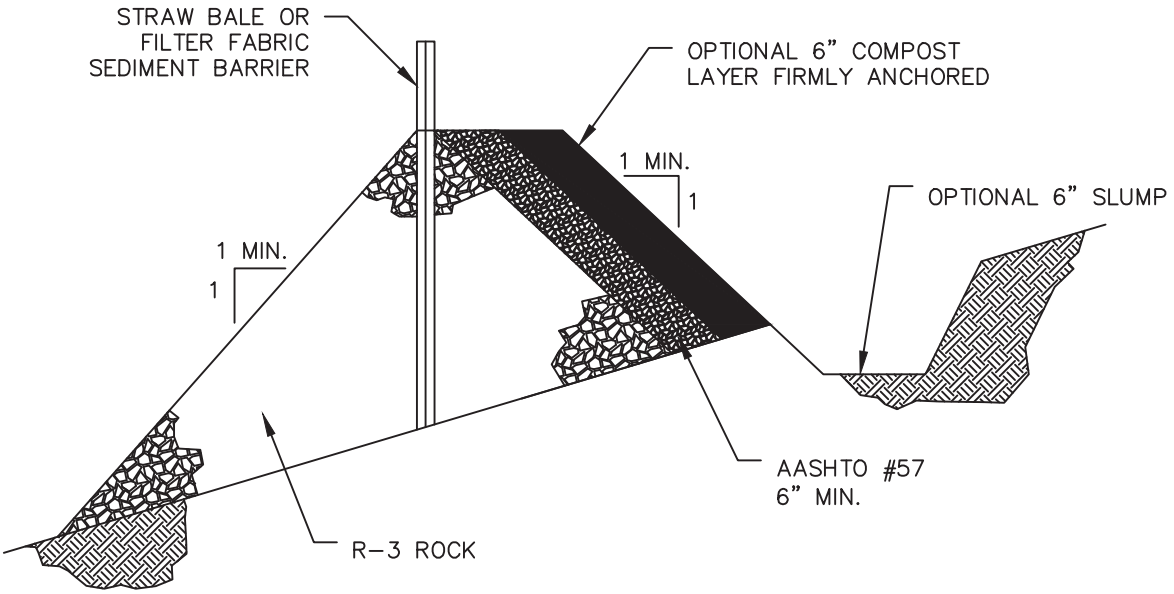
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
ROCK FILTER

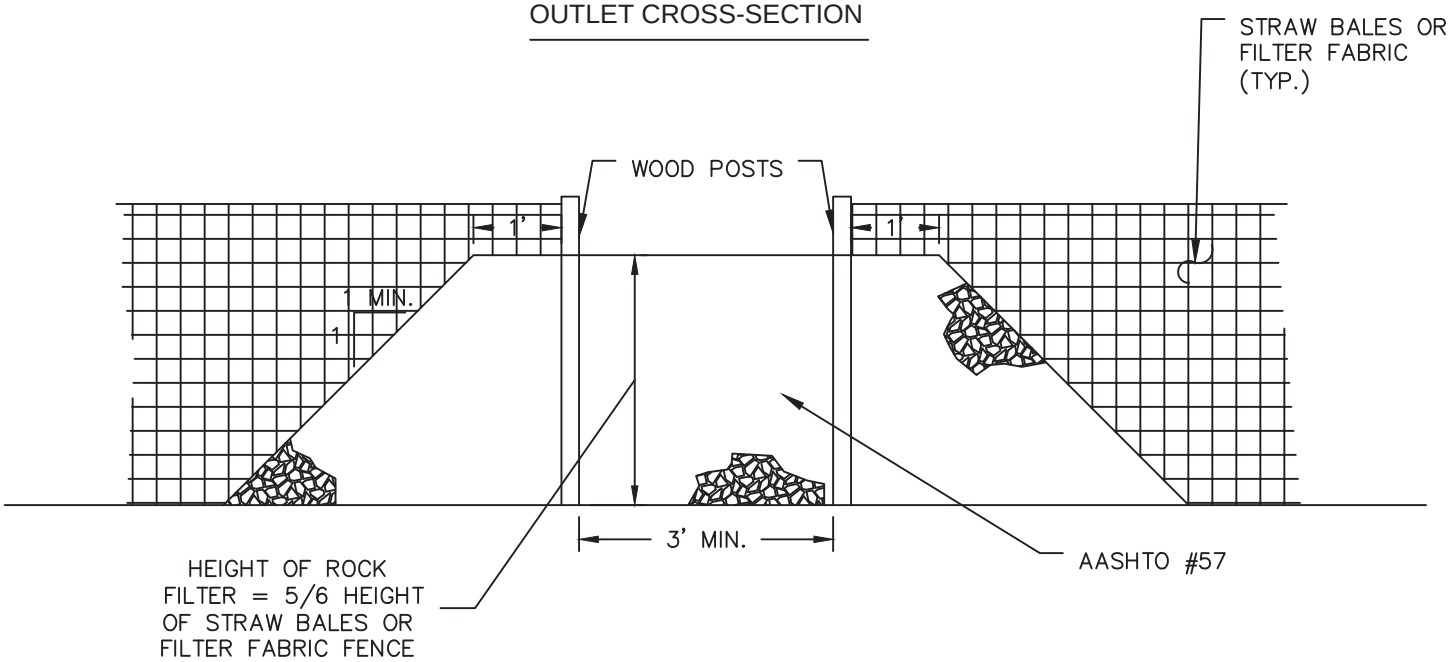
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 23

Sheet: 23 of 127
Type:



OUTLET CROSS-SECTION



UP-SLOPE FACE

NOTES:

1. A ROCK FILTER OUTLET SHALL BE INSTALLED WHERE FAILURE OF A SILT FENCE OR STRAW BALE BARRIER HAS OCCURRED DUE TO CONCENTRATED FLOW. ANCHORED COMPOST LAYER SHALL BE USED ON UPSLOPE FACE IN HIGH QUALITY AND EXCEPTIONAL VALUE WATERSHEDS.

2. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/3 THE HEIGHT OF THE OUTLET.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

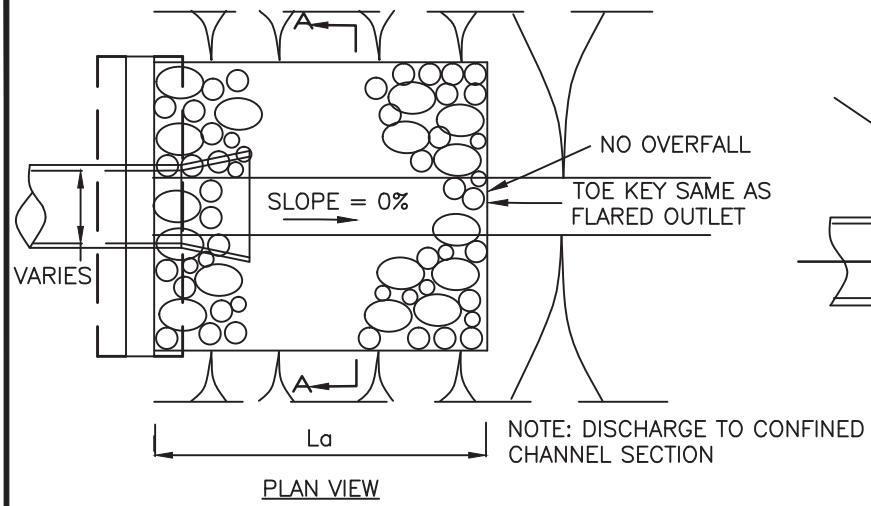
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

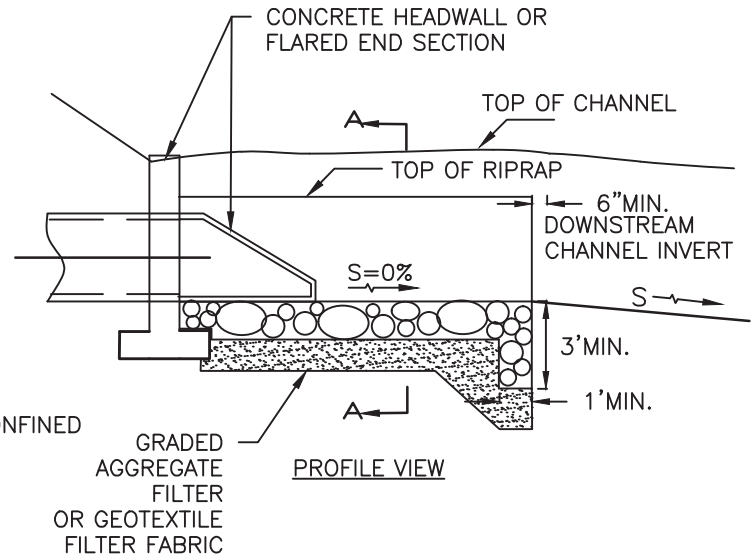
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
ROCK FILTER OUTLET

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

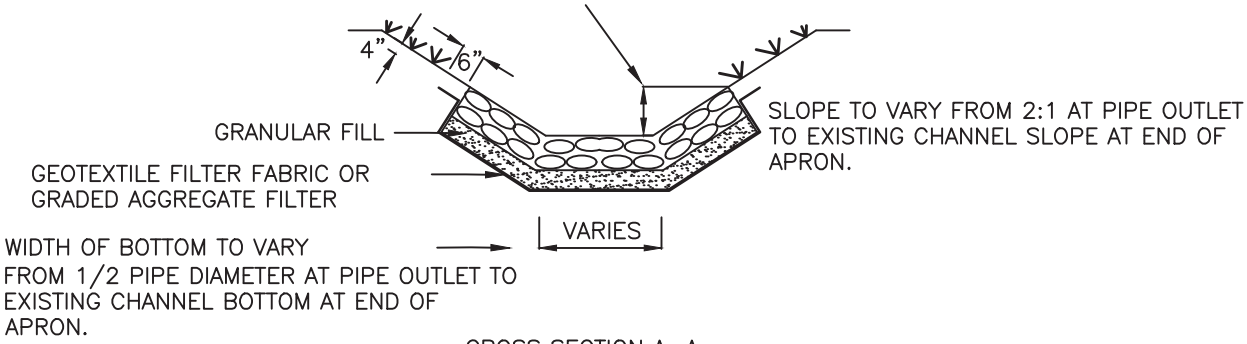
FIG. NO. 24

Sheet: 24 of 127
Type:





MINIMUM DEPTH OF RIPRAP = MAXIMUM DEPTH OF FLOW
(DOWNSTREAM NORMAL DEPTH OR DISCHARGE DEPTH,
WHICHEVER IS GREATER).



CROSS SECTION A–A

NOTES:

1. THE OUTLET PROTECTION MAY BE DONE USING ROCK RIPRAP, GROUTED RIPRAP, OR GABIONS. RIPRAP SHALL BE COMPOSED OF A WELL–GRADED MIXTURE OF STONE SIZE SO THAT 50 PERCENT OF THE PIECES, BY WEIGHT, SHALL BE LARGER THAN THE D50 SIZE DETERMINED BY USING THE CHART. A WELL–GRADED MIXTURE, AS USED HEREIN, IS DEFINED AS A MIXTURE COMPOSED PRIMARILY OF LARGER STONE SIZES, BUT WITH A SUFFICIENT MIXTURE OF OTHER SIZES TO FILL THE SMALLER VOIDS BETWEEN THE STONES. THE DIAMETER OF THE LARGEST STONE SIZE IN SUCH A MIXTURE SHALL BE 1.5 TIMES THE D50 SIZE.

2. THE MINIMUM THICKNESS OF THE RIPRAP LAYER SHALL BE 1.5 TIMES THE MAXIMUM STONE DIAMETER FOR D50 OF 15 INCHES OR LESS; AND 1.2 TIMES THE MAXIMUM STONE SIZE FOR D50 GREATER THAN 15 INCHES.

D 50 (IN)	d max (in)	MIN. BLANKET THICKNESS (IN)
4	6	9
6	9	14
9	14	20
12	18	27
15	22	32
18	27	32
21	32	38
24	36	43

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

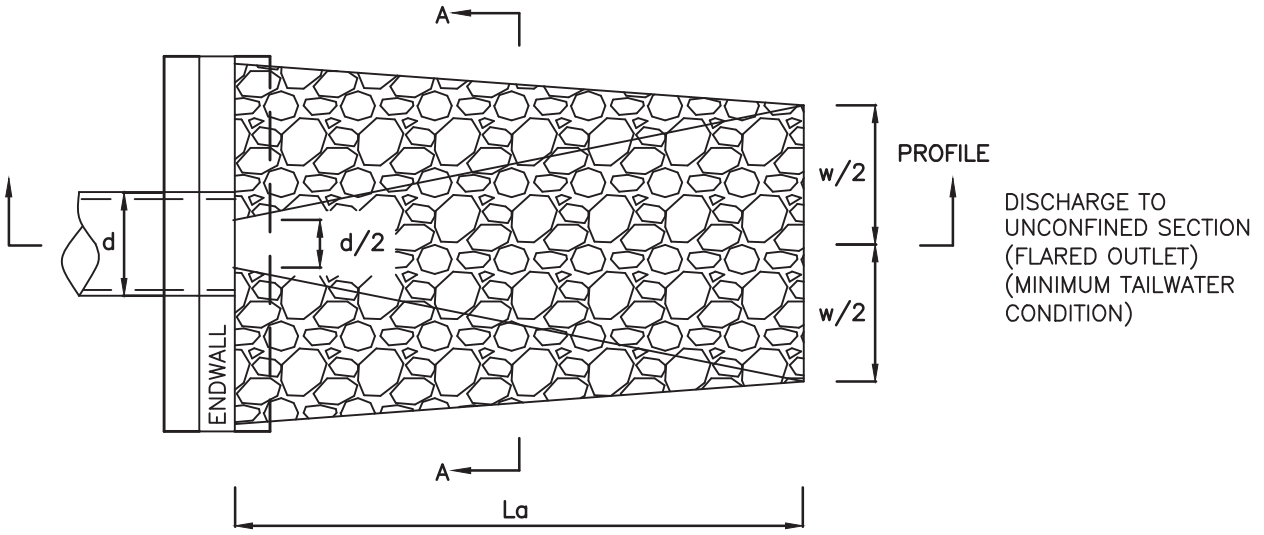
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
RIPRAP OUTLET PROTECTION–GENERAL

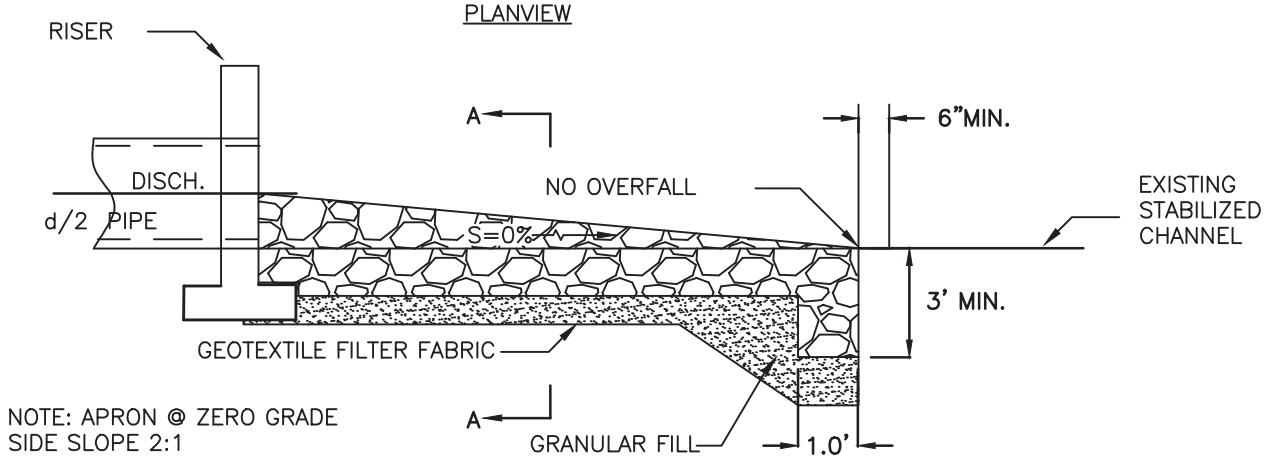
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 25

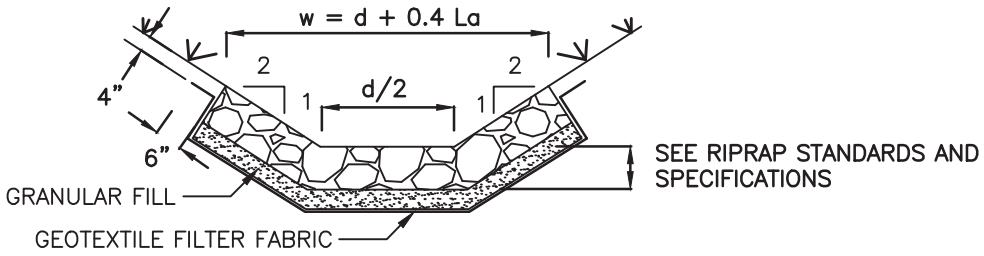
Sheet: 25 of 127
Type:



PLANVIEW



PROFILE VIEW



CROSS SECTION A–A

NOTE:
SEE FIGURE 24 FOR NOTES AND TABLE REGARDING
MINIMUM RIPRAP THICKNESS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

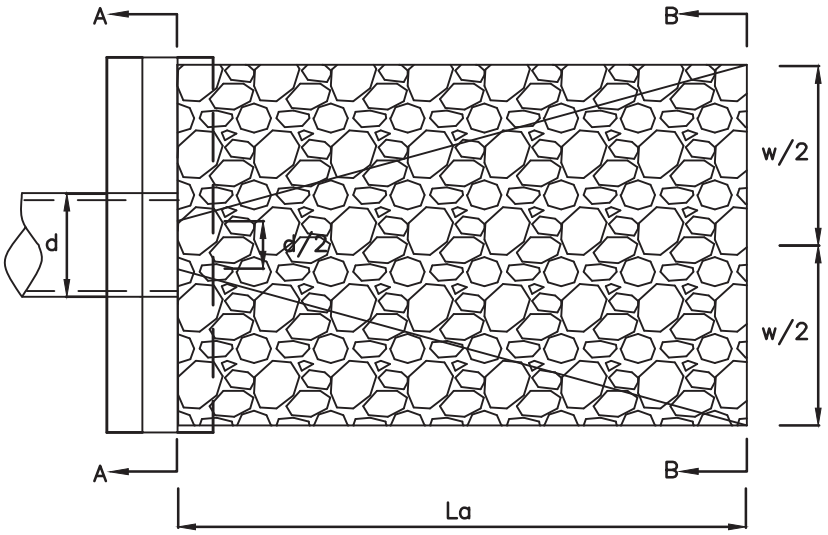
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
RIPRAP OUTLET PROTECTION
MINIMUM TAIL WATER

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

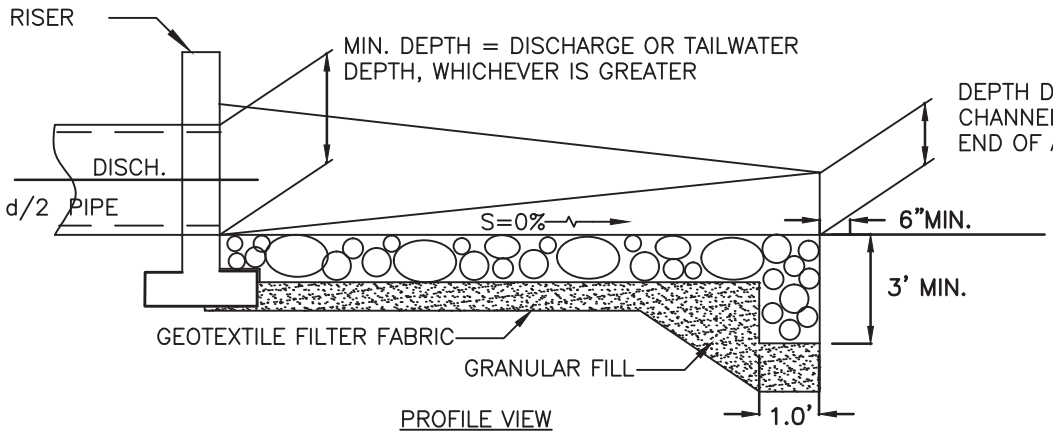
FIG. NO. 26

Sheet: 26 of 127
Type:

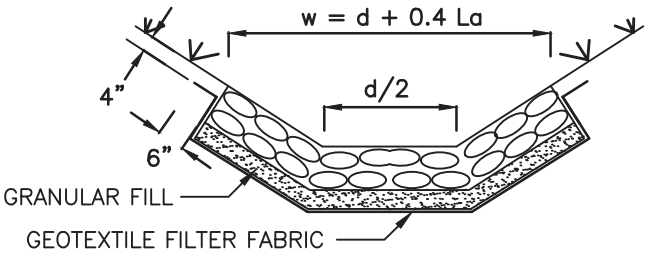


DISCHARGE TO SEMI–CONFINED SECTION (MAXIMUM TAILWATER CONDITION)

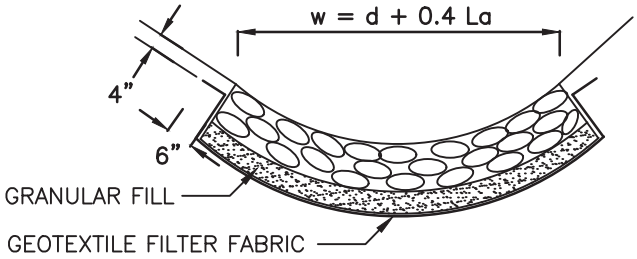
PLAN VIEW



PROFILE VIEW



SECTION A–A
(AT END OF CULVERT)



SECTION B–B
(AT END OF APRON)

NOTE:
SEE FIGURE 24 NOTES AND TABLE FOR MINIMUM RIPRAP THICKNESS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

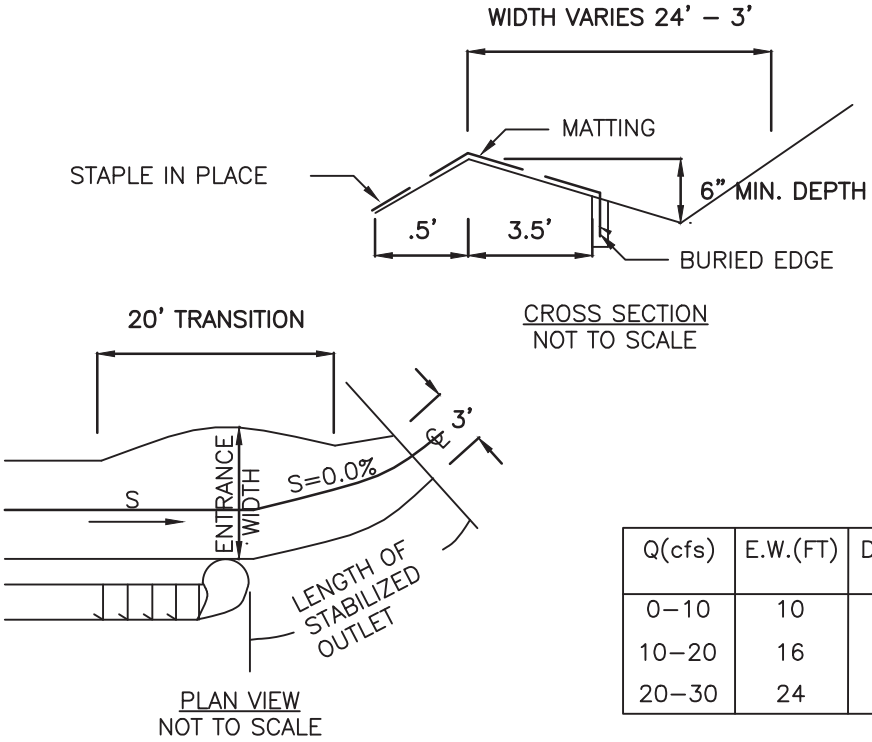
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
RIPRAP OUTLET PROTECTION
MAXIMUM TAIL WATER

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 27

Sheet: 27 of 127
Type:



Q(cfs)	E.W.(FT)	D(FT)	END WIDTH(FT)	LENGTH(FT)
0–10	10	0.5	3	10
10–20	16	0.6	3	20
20–30	24	0.7	3	30

CONSTRUCTION SPECIFICATIONS

1. THE MATTING SHOULD BE A MINIMUM OF 4FT. WIDE EXTENDING 6 INCHES OVER THE LIP AND BURIED 6 INCHES DEEP IN A VERTICAL TRENCH ON THE LOWER EDGE. THE UPPER EDGE SHOULD BUTT AGAINST SMOOTHLY CUT SOD AND BE SECURELY HELD IN PLACE WITH CLOSELY SPACED HEAVY DUTY WIRE STAPLES AT LEAST 12 INCHES IN LENGTH.
2. ENSURE THAT THE LIP IS LEVEL TO UNIFORMLY SPREAD DISCHARGE.
3. THE LIP SHALL BE CONSTRUCTED ON UNDISTURBED SOIL NOT FILL.
4. A 20 FOOT TRANSITION SECTION WILL BE CONSTRUCTED FROM THE DIVERSION CHANNEL TO THE SPREADER TO SMOOTHLY BLEND THE DIFFERENT DIMENSION AND GRADES.
5. THE RUNOFF DISCHARGE WILL BE OUTLETED ONTO A STABILIZED VEGETATED SLOPE NOT EXCEEDING 10%.
6. SEED AND MULCH THE DISTURBED AREA IMMEDIATELY AFTER CONSTRUCTION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

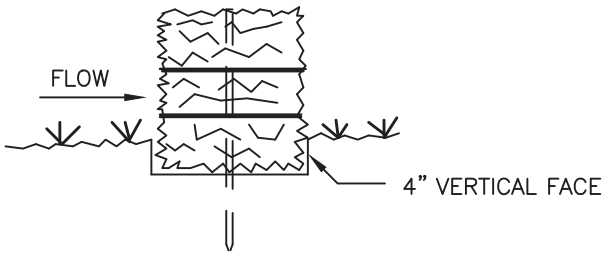
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
EARTHEN LEVEL SPREADER

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 28

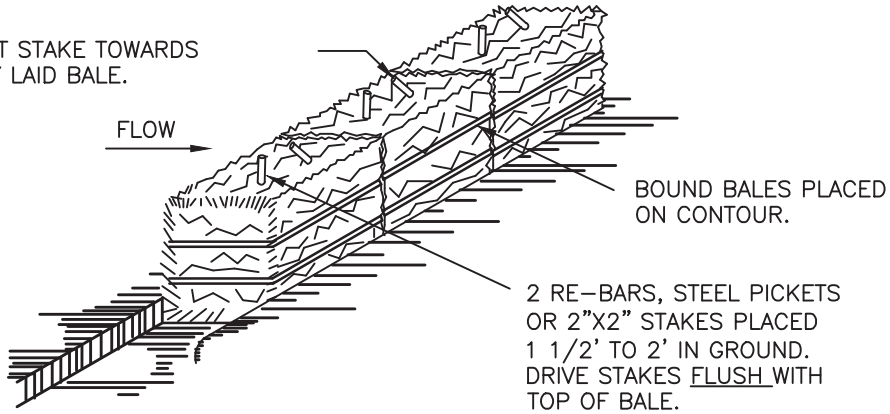
Sheet: 28 of 127
Type:

CONSTRUCTED SLOPE	PERCENT SLOPE	SLOPE LENGTH (FT)
2:1	50	25
3:1	33	50
4:1	25	75



BEDDING DETAIL
NOT TO SCALE

DRAINAGE AREA NO MORE THAN 1/4 ACRE PER 100 FEET OF STRAW BALE DIKE FOR SLOPES LESS THAN 25%.



ANCHORING DETAIL
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. 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.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULLNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
6. BALES SHALL NOT BE USED AS A SEDIMENT BARRIER IN LOCATIONS WHERE THEY ARE EXPECTED TO LAST LONGER THAN 3 MONTHS DUE TO NATURAL DEGRADATION.
7. LENGTH OF SLOPE ABOVE THE STRAW BALE DIKE SHOULD NOT EXCEED THE LIMITS BELOW.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
STRAW BALE DIKE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 29

Sheet: 29 of 127
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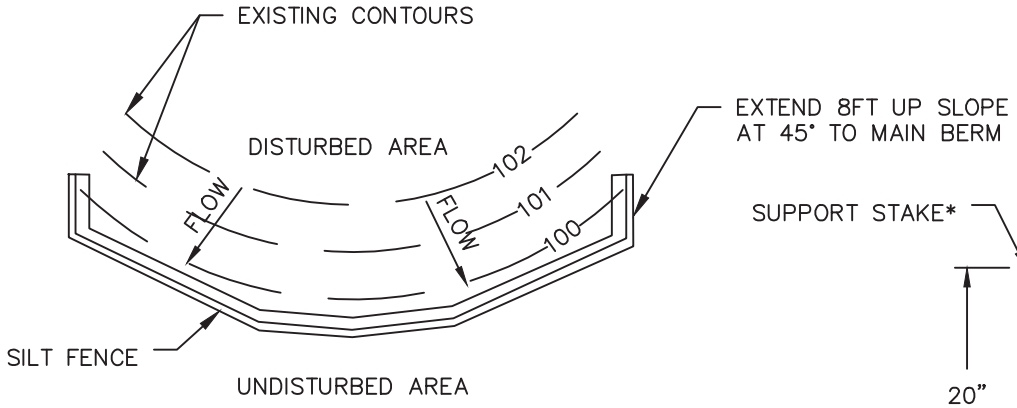
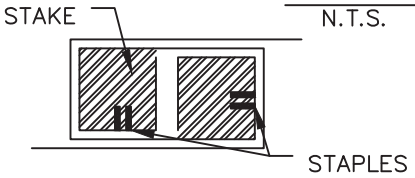
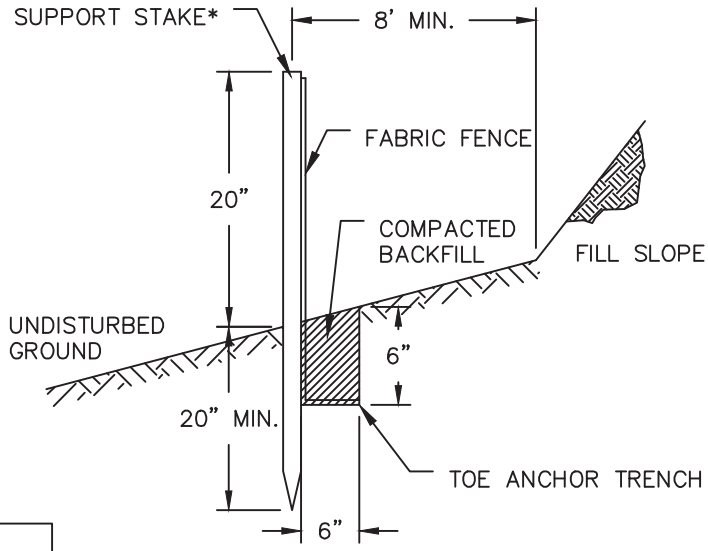


PLAN VIEW
N.T.S.

*STAKES SPACED @ 8' MAX. USE 2" X 2" (+/– 3/8") WOOD OR EQUIVALENT STEEL (U OR T) STAKES



JOINING FENCE SECTION
N.T.S.



ELEVATION VIEW
N.T.S.

CONSTRUCTED SLOPE	PERCENTMAX. SLOPE	SLOPE LENGTH (FT)
2:1	50	25
3:1	33	50
4:1	25	75
5:1	20	100

NOTES:

1. FABRIC SHALL HAVE THE MINIMUM PROPERTIES AS SHOWN IN THE TABLE BELOW.
2. FABRIC WIDTH SHALL BE 30" MINIMUM. STAKES SHALL BE HARDWOOD OR EQUIVALENT STEEL (U OR T) STAKES.
3. SILT FENCE SHALL BE PLACED AT LEVEL EXISTING GRADE. BOTH ENDS OF THE FENCE SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
4. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH HALF THE ABOVEGROUND HEIGHT OF THE FENCE.
5. ANY SECTION OF SILT FENCE WHICH HAS BEEN UNDERMINED OR TOPPED SHALL BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET
6. FENCE SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN TRIBUTARY AREA IS PERMANENTLY STABILIZED.
7. SILT FENCE SHOULD NOT BE INSTALLED ON UNCOMPACTED FILLS OR IN EXTREMELY LOOSE SOILS (E.G. SANDY LOAM), IN ROCKY SOIL WHERE ANCHORING MAY BE DIFFICULT, OR IN FORESTED AREAS WHERE TREE ROOTS MAY BE SEVERED DURING INSTALLATION.
8. MAXIMUM ALLOWABLE SLOPE LENGTHS FOR RUNOFF CONTRIBUTING TO SILT FENCING ARE SHOWN ABOVE.

FABRIC PROPERTIES FOR SILT FENCE		
FABRIC PROPERTY	MINIMUM ACCEPTABLE VALUE	TEST METHOD
GRAB TENSILE STRENGTH (LB)	120	ASTM D1682
ELONGATION AT FAILURE (%)	50% MAX.	ASTM D1682
MULLEN BURST STRENGTH (PSI)	200	ASTM D3786
TRAPEZOIDAL TEAR STRENGTH (LB)	50	
PUNCTURE STRENGTH (LB)	40	ASTM D751 (MODIFIED)
SLURRY FLOW RATE (GAL/MIN/SF)	0.3	ASTM 5141
EQUIVALENT OPENING SIZE	40 – 80	US STD. SIEVE CW–02215
ULTRAVIOLET RADIATION STABILITY (%)	90	ASTM G–26

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
STANDARD SILT FENCE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 30

Sheet: 30 of 127
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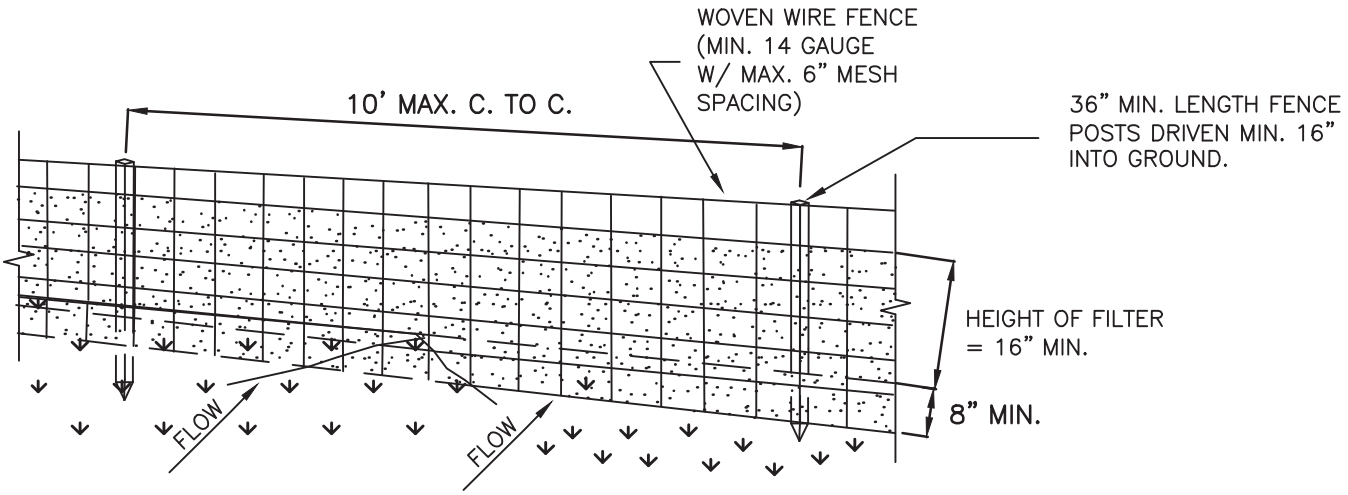
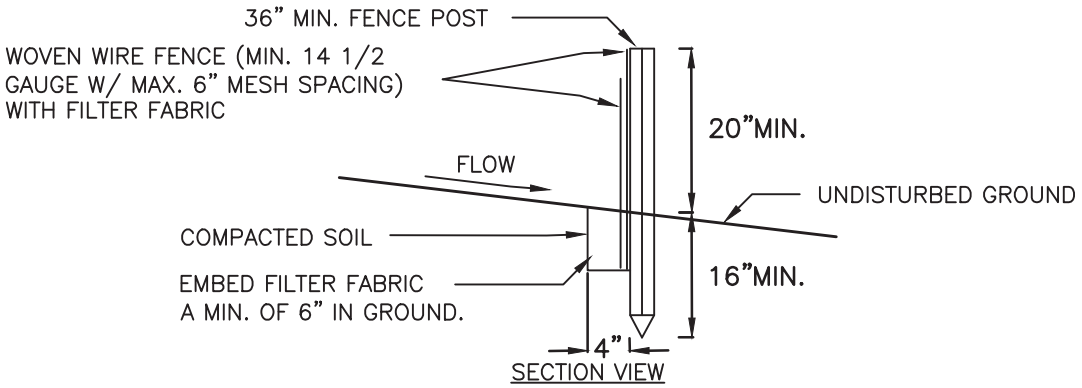


PERSPECTIVE VIEW



SECTION VIEW

CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 14 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER THEY SHALL BE OVER–LAPPED BY SIX INCHES AND FOLDED. FILTER FABRIC SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
6. MAXIMUM DRAINAGE AREA FOR OVERLAND FLOW TO A SILT FENCE SHALL NOT EXCEED 1/4 ACRE PER 100 FEET OF FENCE.
7. MAXIMUM ALLOWABLE SLOPE LENGTHS CONTRIBUTING RUNOFF TO SILT FENCE PLACED ON A SLOPE ARE AS FOLLOWS:

SLOPE STEEPNESS	MAXIMUM LENGTH (FT)
2:1	25
3:1	50
4:1	75
5:1 OR GREATER	100

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
REINFORCED SILT FENCE

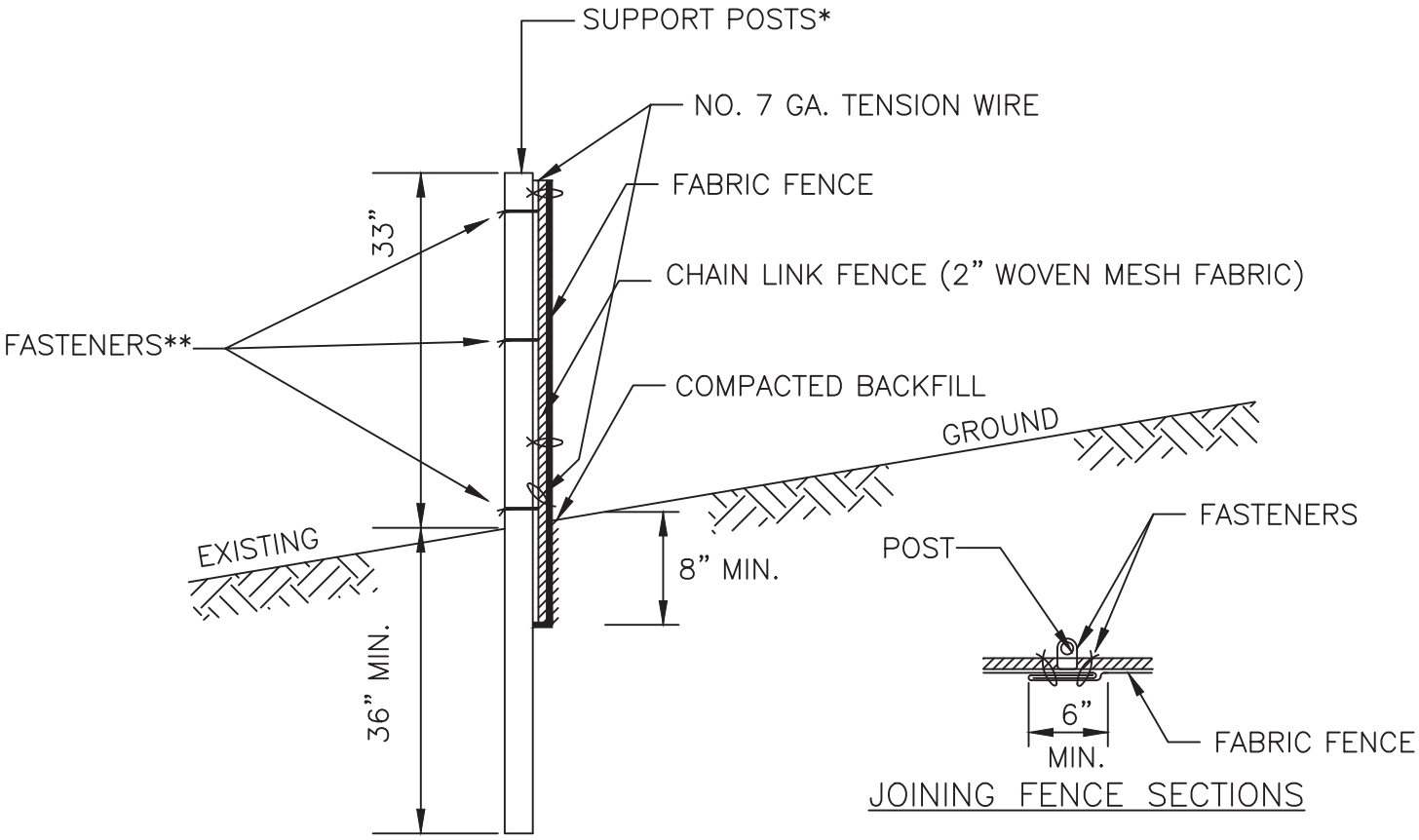
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 31

Sheet: 31 of 127

Type:

STANDARD CONSTRUCTION DETAIL #22
Super Filter Fabric Fence



* POSTS SPACED @ 10' MAX. USE 2 1/2" DIA. GALVANIZED OR ALUMINUM POSTS.

** CHAIN LINK TO POST FASTENERS SPACED @ 14" MAX. USE NO. 6 GA. ALUMINUM WIRE OR NO. 9 GALVANIZED STEEL PRE–FORMED CLIPS. CHAIN LINK TO TENSION WIRE FASTENERS SPACED @ 60" MAX. USE NO. 10 GA. GALVANIZED STEEL WIRE. FABRIC TO CHAIN FASTENERS SPACED @ 24" MAX. C TO C.

NO. 7 GA. TENSION WIRE INSTALLED HORIZONTALLY AT TOP AND BOTTOM OF CHAIN–LINK FENCE.

FILTER FABRIC FENCE MUST BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER MUST BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT.

SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SUPER SILT FENCE (1)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 32

Sheet: 32 of 127
Type:

NOTES:
1. SILT FENCE MUST BE LEFT IN PLACE UNTIL PERMANENT STABILIZATION.
2. FILTER FABRIC FENCE MUST BE INSTALLED AT EXISTING LEVEL GRADE.
3. SEDIMENT MUST BE REMOVED WHERE ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.
4. AT A MINIMUM, THE FABRIC SHOULD HAVE THE FOLLOWING PROPERTIES:

FABRIC PROPERTY	MINIMUM ACCEPTABLE VALUE	TEST METHOD
GRAB TENSILE STRENGTH (lb)	120	ASTM D1682
ELONGATION AT FAILURE (%)	20% MAX.	ASTM D1682
MULLEN BURST STRENGTH (lb)	200	ASTM D3786
TRAPEZOIDAL TEAR STRENGTH (lb)	50	
PUNCTURE STRENGTH (lb)	40	ASTM D 751 (MODIFIED)
SLURRY FLOW RATE (gal/min/sf)	0.3	ASTM 5141
EQUIVALENT OPENING SIZE	30	US STD. SIEVE CW-02215
ULTRAVIOLET RADIATION STABILITY (%)	80	ASTM G-26

5. SILT FENCE MUST BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER WILL BE EXTENDED 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT.
6. POSTS SHALL BE INSTALLED USING A POST HOLE DRILL.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SUPER SILT FENCE (2)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 33

Sheet: 33 of 127
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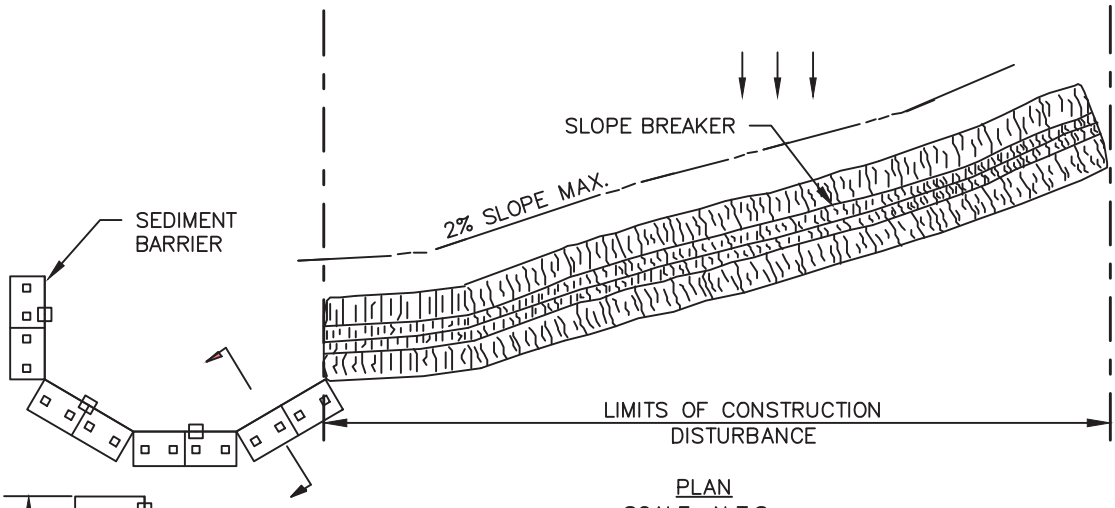

PLAN
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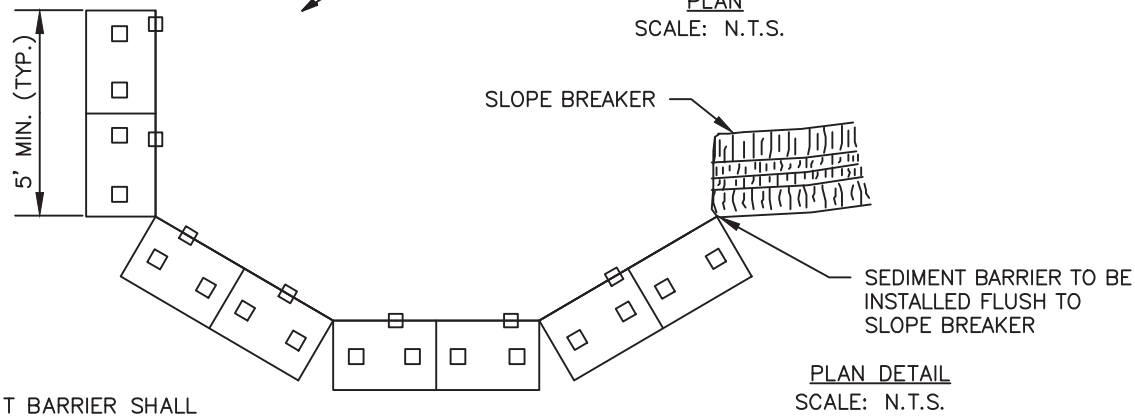

PLAN DETAIL
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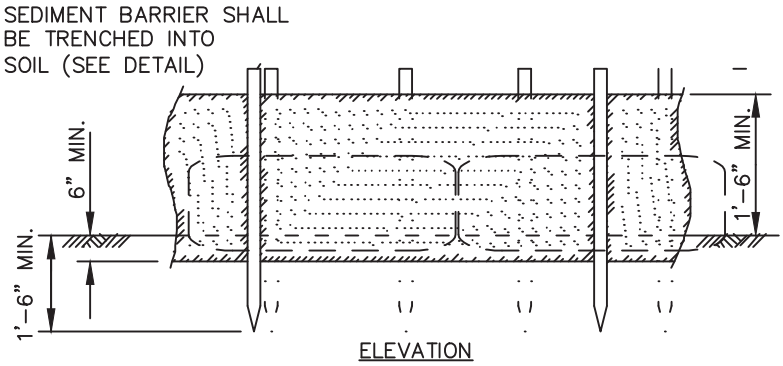

ELEVATION
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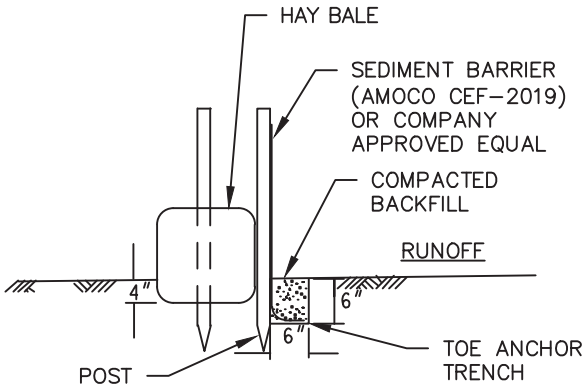

SEDIMENT BARRIER DETAIL
SCALE: N.T.S.

NOTES:

1. REINFORCED SEDIMENT BARRIER HOOKS SHALL BE PLACED AT THE OUTLET OF SLOPE BRAEAKERS AS SHOWN ON THE PLAN.
2. ONCE THE DISTURBED AREA IS STABILIZED, THE REINFORCED SEDIMENT BARRIER HOOK SHALL BE REMOVED AND ANY DISTURBED AREAS CAUSED BY REMOVAL SHALL BE RETURNED TO ORIGINAL CONDITION AND REVEGETATED.
3. SEDIMENT SHALL BE REMOVED WHEN IT REACHES HALF THE HEIGHT OF THE SEDIMENT BARRIER.
4. STAKES SHALL BE 2"X2"X48" HARDWOOD OR EQUIVALENT STEEL ("U" OR "T") STAKES.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
REINFORCED SEDIMENT BARRIER HOOK
OUTLET STRUCTURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 34

Sheet: 34 of 127
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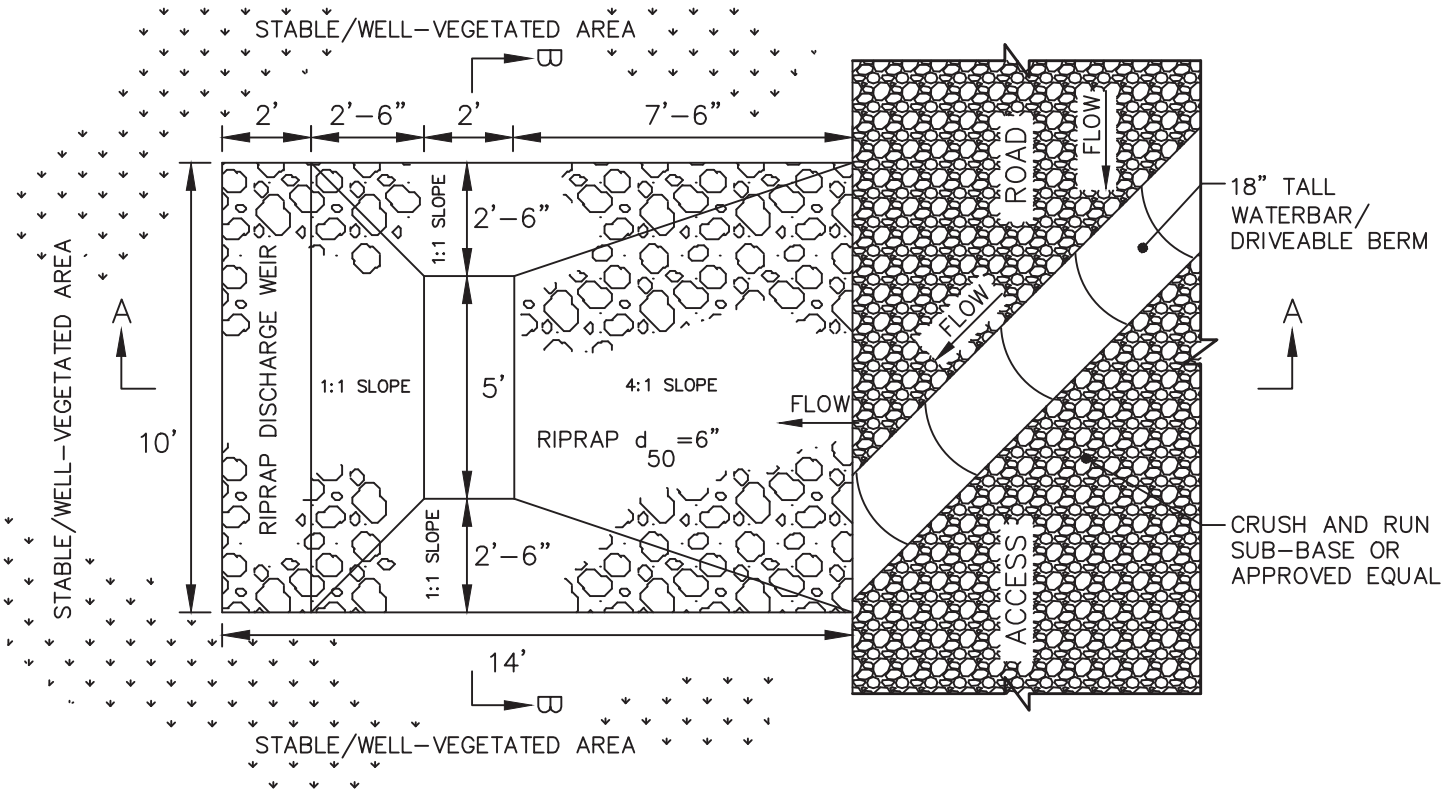
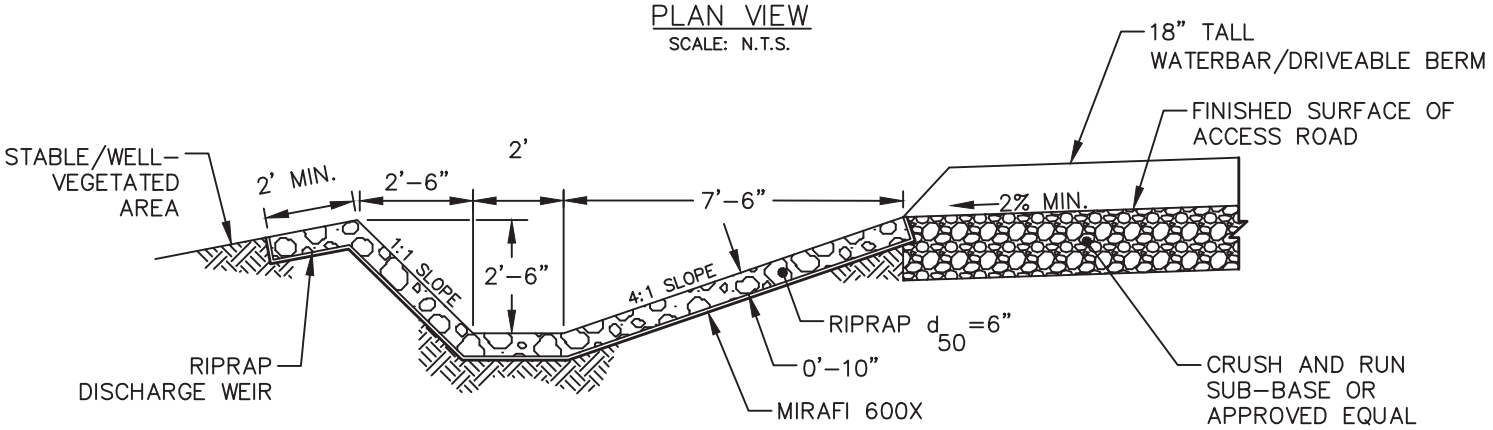


PLAN VIEW
SCALE: N.T.S.

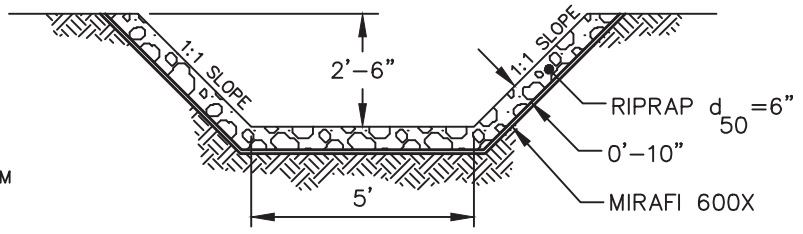


SECTION A–A
SCALE: N.T.S.

NOTES:

1. RIPRAP SHALL CONFORM TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION'S STANDARDS AND SPECIFICATIONS FOR SEDIMENT AND EROSION CONTROL.

2. ADDITIONAL BEST MANAGEMENT PRACTICES (BMPS) MAY BE REQUIRED TO BE UTILIZED IN CONJUNCTION WITH THE WATERBAR OUTLET APRON TO ENSURE THAT EROSION AND SEDIMENTATION DOES NOT OCCUR DOWNSTREAM OF THE APRON. SOME ADDITIONAL BMPS MAY INCLUDE BUT ARE NOT LIMITED TO SILT FENCE, STRAWBALE BARRIER AND EROSION CONTROL MATTING. THE CONTRACTOR SHALL COORDINATE WITH THE ENVIRONMENTAL INSPECTOR TO ENSURE THAT INSTALLATION OF ADDITIONAL BMPS ARE NOT REQUIRED.



SECTION B–B
SCALE: N.T.S.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
WATERBAR OUTLET APRON

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 35

Sheet: 35 of 127
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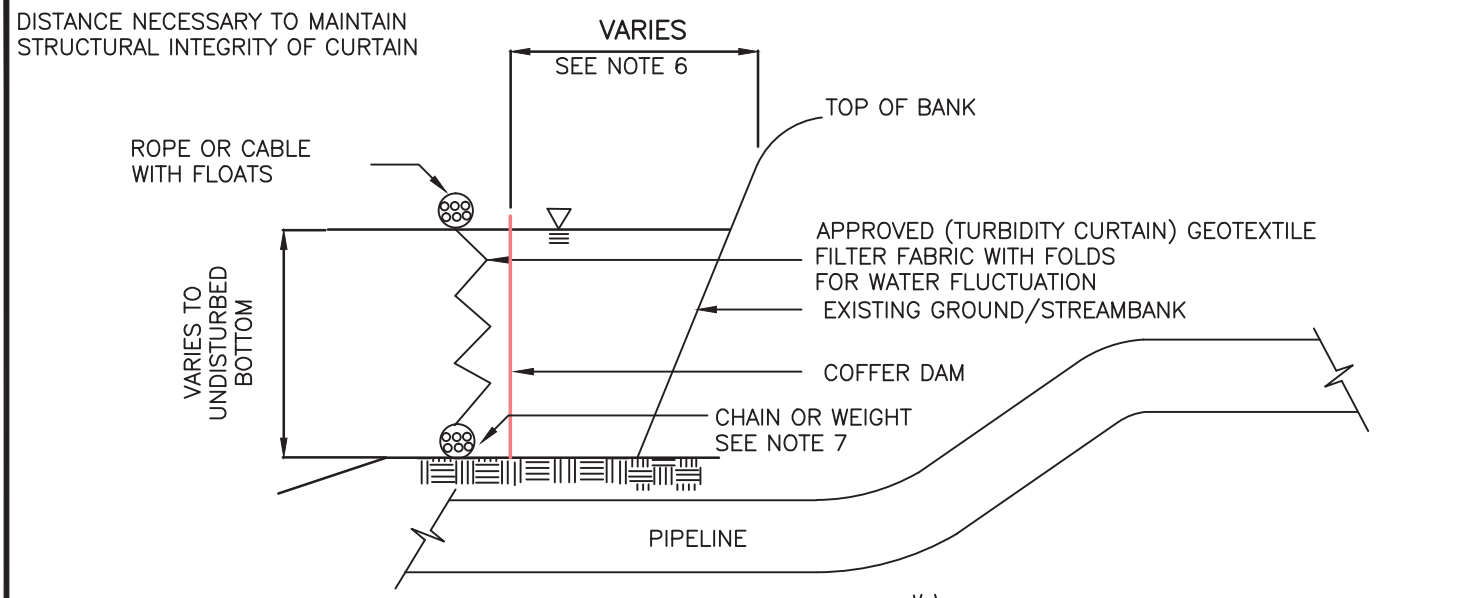
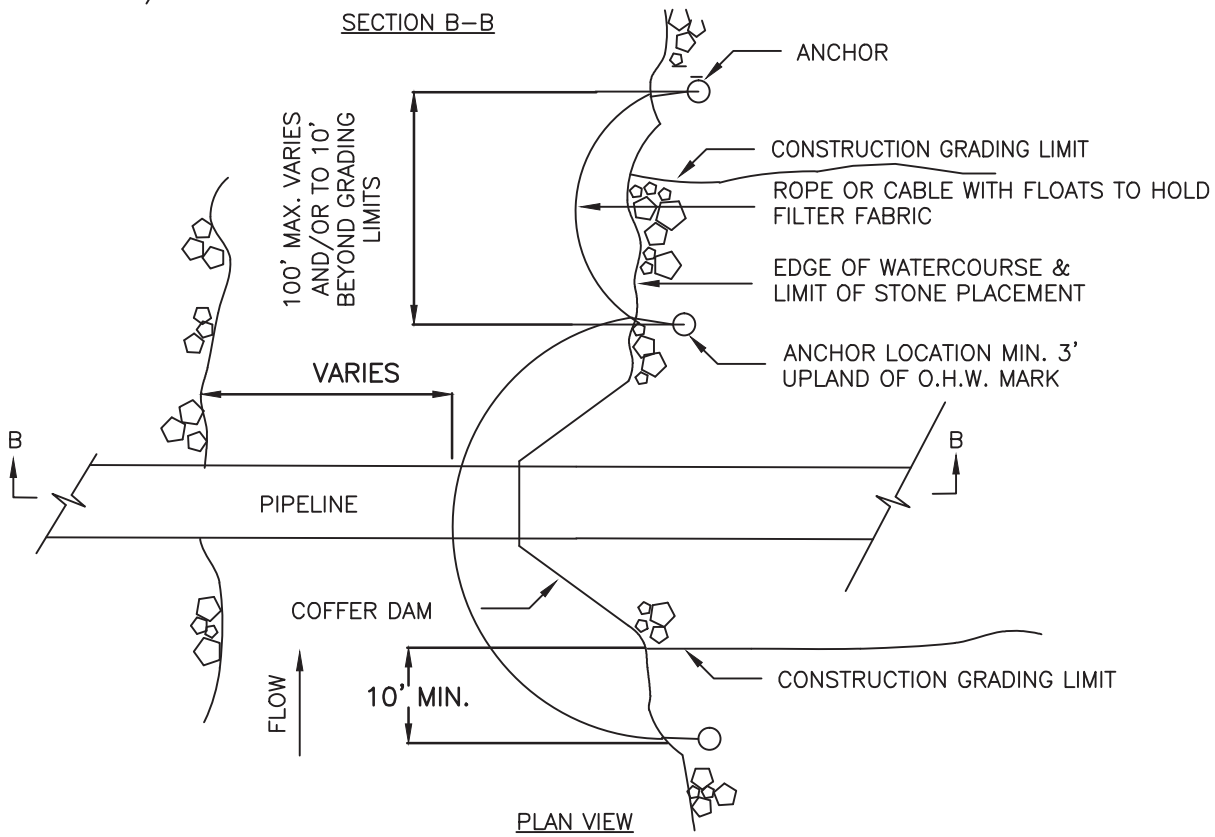


SECTION B–B



PLAN VIEW

NOTES:
1. TO BE USED IN AREAS AS OUTLINED IN THE CONSTRUCTION DRAWINGS OR AS ORDERED BY THE ENVIRONMENTAL INSPECTOR.
2. HEIGHT OF THE CURTAIN SHALL BE 20% GREATER THAN THE DEPTH OF THE WATER.
3. NOT PERMITTED FOR USE ACROSS WATERCOURSES.
4. AREA SHALL NOT CONTAIN LARGE CURVERT/DRAINAGE AREAS.
5. TURBIDITY CURTAIN SHALL BE A MAX OF 100' LONG FOR EACH SECTION OF CURTAIN REQUIRED. END SECTIONS SHALL TERMINATE 10' BEYOND THE LIMIT OF DISTURBANCE.
6. THE TURBIDITY CURTAIN SHALL BE PLACED AS CLOSE TO THE WORK AS POSSIBLE WITHOUT INTERFERING WITH CONSTRUCTION OPERATIONS.
7. THE WEIGHTED ANCHOR SYSTEM SHALL BE A TYPE THAT ALLOWS THE CURTAIN TO CONFORM TO THE CONTOUR OF THE BOTTOM OF THE WATERBODY.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TURBIDITY CURTAIN

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 36

Sheet: 36 of 127
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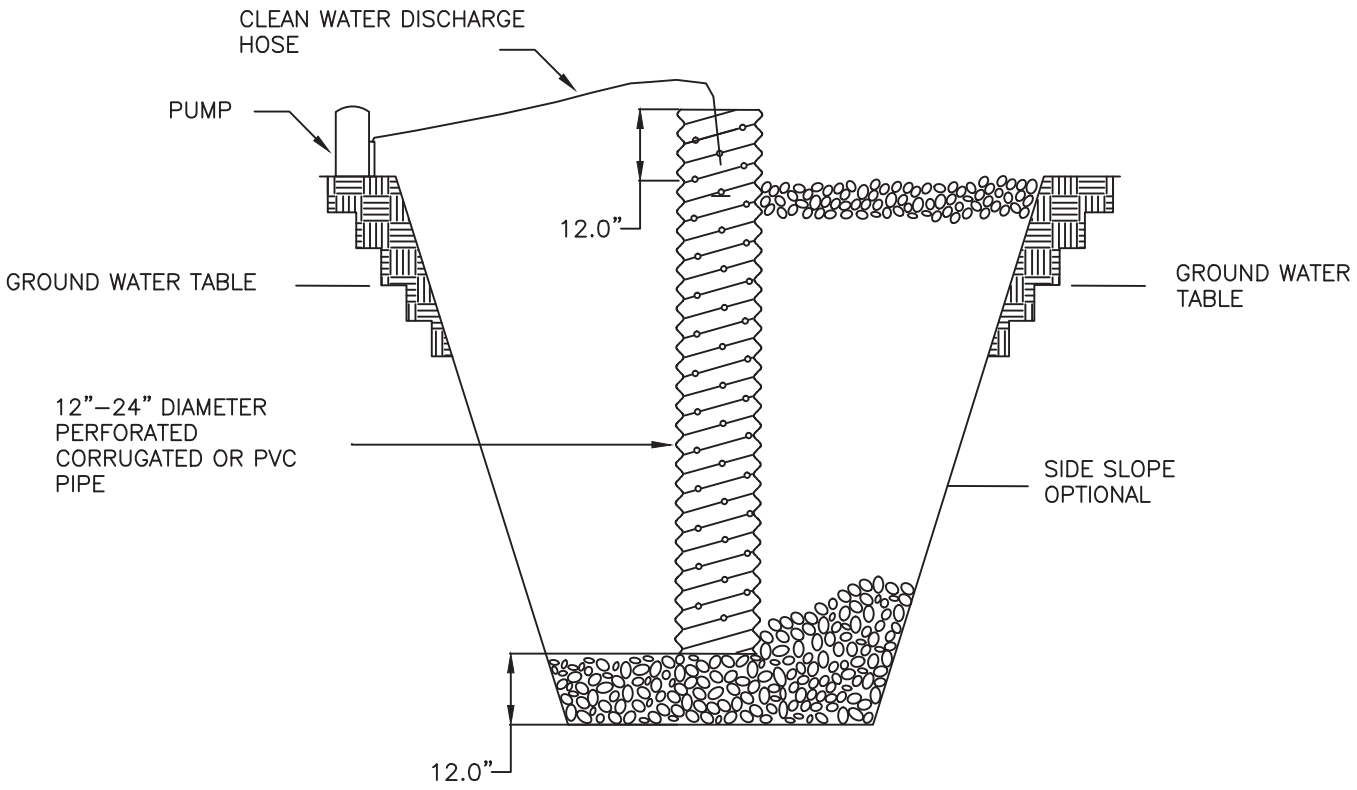

CONSTRUCTION SPECIFICATIONS

1. PIT DIMENSIONS ARE OPTIONAL.
2. THE STANDPIPE SHOULD BE CONSTRUCTED BY PERFORATING A 12–24" DIAMETER CORRUGATED OR PVC PIPE.
3. A BASE OF 2" AGGREGATE SHOULD BE PLACED IN THE PIT TO A DEPTH OF 12". AFTER INSTALLING THE STANDPIPE, THE PIT SURROUNDING THE STANDPIPE SHOULD BE BACKFILLED WITH 2" AGGREGATE.
4. THE STANDPIPE SHOULD EXTEND 12" ABOVE THE LIP OF THE PIT.
5. THE OUTLET SHALL BE FILTERED THROUGH AN APPROVED DEWATERING DEVICE TO PREVENT HEAVY SILT LADEN WATER FROM DIRECTLY ENTERING A WATERBODY OR WETLAND.
6. THE OUTLET SHOULD BE SITUATED IN A WELL VEGETATED AREA.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
WELL POINT / SUMP PIT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 37

Sheet: 37 of 127
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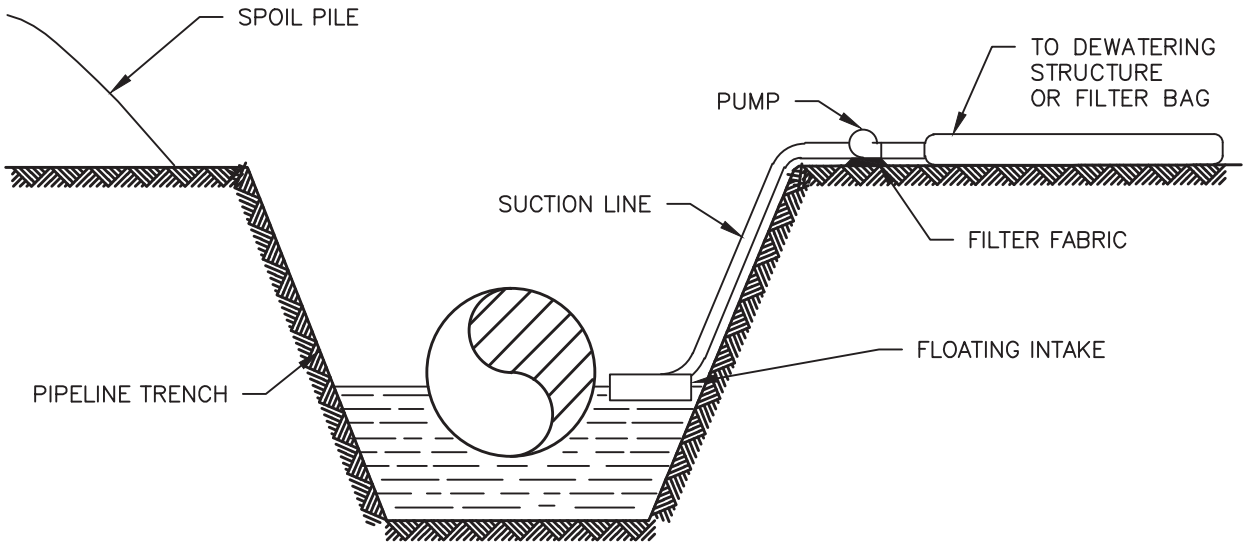

NOTES:

1. WATER PUMPED OUT OF TRENCH SHALL NOT BE DISCHARGED DIRECTLY INTO WATERBODIES. WATER SHALL BE DISCHARGED INTO A FILTER BAG OR DEWATERING STRUCTURE.
2. PUMP SHALL BE CONTROLLED SO THAT THE DISCHARGE DOES NOT OVERFLOW DEWATERING STRUCTURE. THE DEWATERING STRUCTURE SHALL BE RESIZED IF ADDITIONAL FLOW IS REQUIRED.
3. PUMP SUCTION HOSE MUST NOT BE ALLOWED TO COME IN CONTACT WITH TRENCH BOTTOM. PROVISIONS MUST BE MADE TO ELEVATE THE SUCTION HOSE TO AT LEAST ONE FOOT ABOVE THE BOTTOM OF THE PIPE TRENCH UNTIL BOTTOM DEWATERING IS NECESSARY.
4. DEWATERING SHALL NOT OCCUR DURING TIMES OF HEAVY RAINFALL EXCEPT AS REQUIRED TO PREVENT FLOODING OF CONSTRUCTION EQUIPMENT LOCATED IN BORE PITS AND TRENCHES.
5. PUMPS UTILIZED DURING DEWATERING SHALL BE PLACED WITHIN SECONDARY CONTAINMENT IF POSITIONED WITHIN 100 FEET OF A WETLAND OR WATERBODY.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TRENCH DEWATERING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 38

Sheet: 38 of 127
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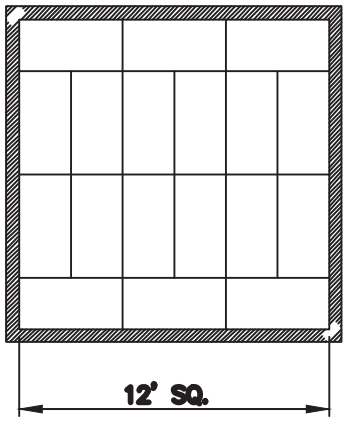
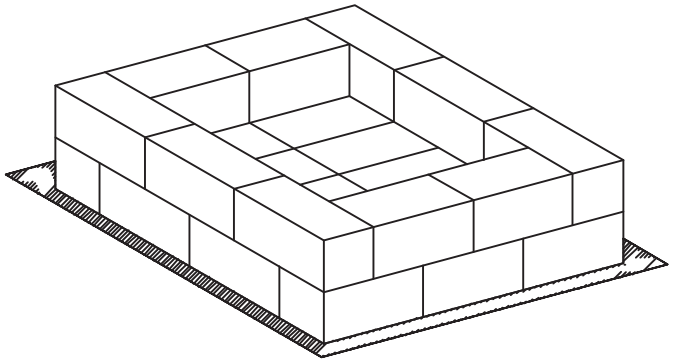
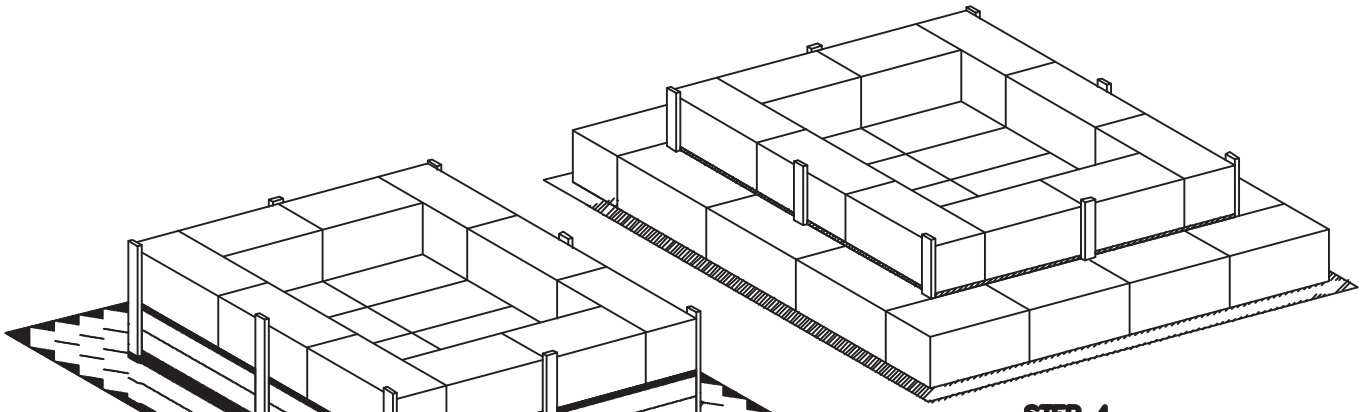


STEP 1
ARRANGE HAY BALES OVER GEOTEXTILE FABRIC OR STONE BASE ON LEVEL LAND TIGHTLY PACKED AS SHOWN TO COVER AN AREA APPROXIMATELY 12' x 12'

STEP 2
INSTALL ANOTHER LAYER OF HAY BALES ON THE OUTER EDGE AS SHOWN





STEP 3
INSTALL SEDIMENT BARRIER, IF REQUIRED BY THE ENVIRONMENTAL INSPECTOR, AROUND ENTIRE HAY BALE STRUCTURE AS SHOWN.

STEP 4
INSTALL ANOTHER LAYER OF HAY BALES ON THE OUTSIDE OF THE SEDIMENT BARRIER AND SECURE IN PLACE BY DRIVING REBAR OR WOODEN STAKE THROUGH EACH OF THE OUTER HAY BALES. (STAKES NOT SHOWN FOR CLARITY PURPOSES)

NOTES:

1. WHERE POSSIBLE, THE STRUCTURE SHALL BE PLACED ON A LEVEL, WELL VEGETATED UPLAND SITE SUCH THAT WATER WILL FLOW AWAY FROM STRUCTURE AND ANY WORK AREAS.
2. THE CONTRACTOR SHALL PROPERLY REMOVE AND PROPERLY DISPOSE OF THE DEWATERING STRUCTURE IMMEDIATELY UPON COMPLETION OF DEWATERING OPERATIONS. UNDER NO CIRCUMSTANCES SHALL USED DEWATERING STRUCTURES BE LEFT IN PLACE FOR A PERIOD OF TIME GREATER THAN 48 HOURS AFTER DEWATERING OPERATIONS ARE COMPLETE.
3. THE STRUCTURE SHOULD BE POSITIONED SUCH THAT WATER WILL NOT FLOW DIRECTLY INTO ANY WETLANDS OR WATERBODIES.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
DEWATERING STRUCTURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 39

Sheet: 39 of 127
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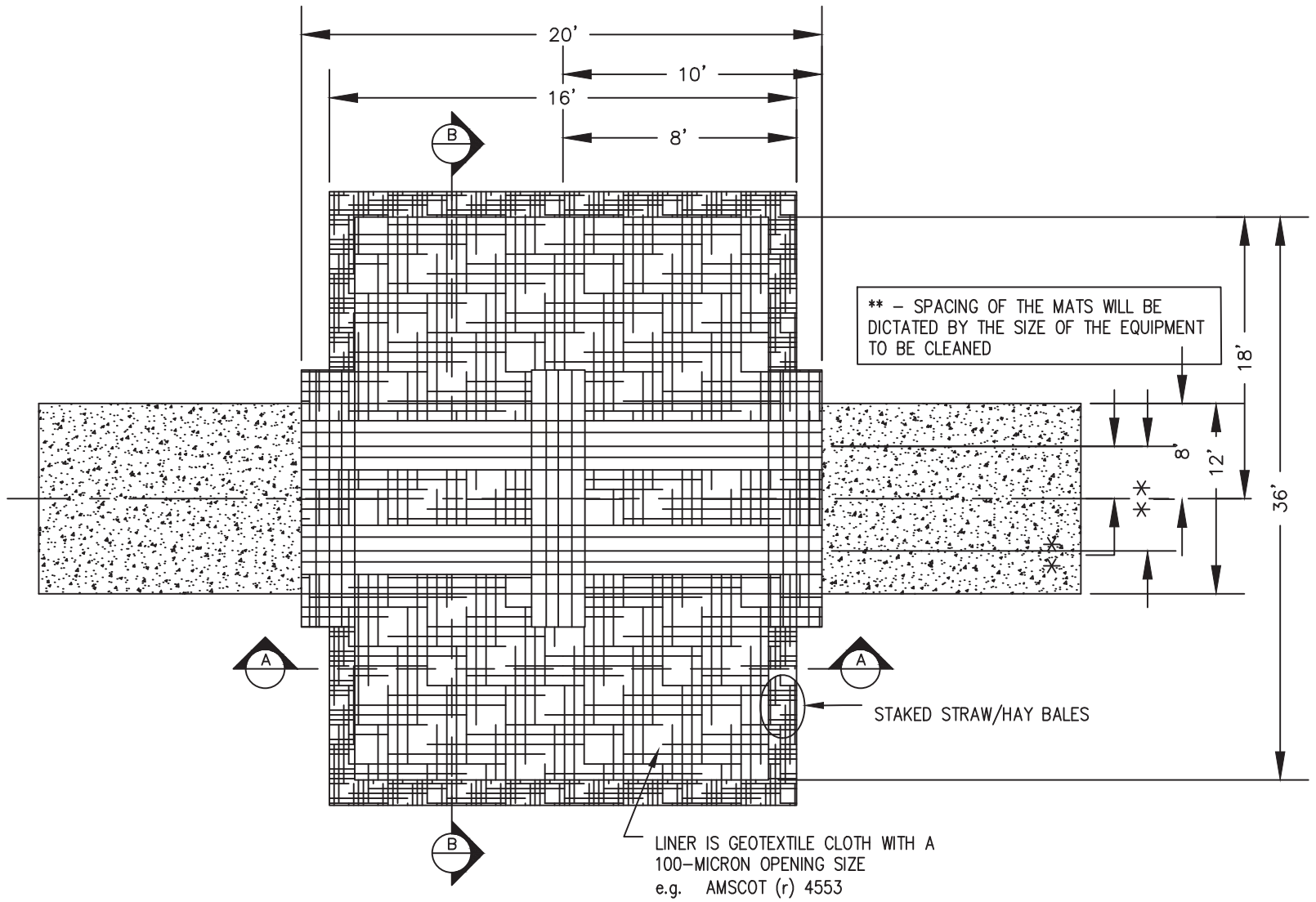

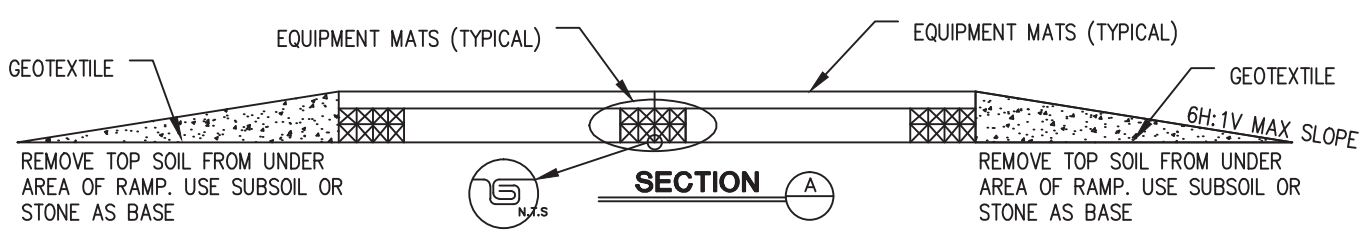

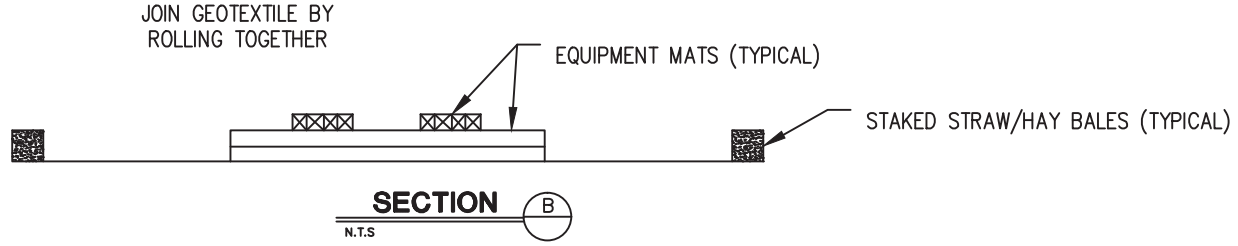

ELEVATED WASHRACK STATION LOCATIONS

	MILEPOST	LL	WETLAND ID	INVASIVE WETLANDS SPECIES IDENTIFIED	STATION POSITION COMMENTS

THIS TABLE WAS INTENTIONALLY LEFT BLANK AND SHOULD BE COMPLETED BY THE PLAN PREPARER

NOTES:

1. WASH STATION MUST BE WITHIN THE ENVIRONMENTALLY CLEARED RIGHT–OF–WAY AND OUTSIDE THE 100' WETLAND BUFFER ZONE.
2. IF WASH STATION IS IN AGRICULTURAL LANDS, REMOVE THE TOPSOIL AND STOCKPILE BEFORE THE TOPSOIL IS REPLACED. THE SUBSOIL MUST BE DECOMPACTED AND ROCKS REMOVED. THE TOPSOIL MOISTURE MUST PASS THE ATTERBERG TEST PRIOR TO SPREADING THE TOPSOIL.
3. THE LOCATION OF THE PUMPING EQUIPMENT, WATER SUPPLY AND SPRAY EQUIPMENT WILL BE DICTATED BY THE LOCATION OF THE WASH STATION.
4. AFTER THE EQUIPMENT WASHING IS COMPLETE, FOLD OR ROLL THE GEOTEXTILE (CAUTION WILL BE EXCERCISED NOT TO SPILL ANY OF THE CONTAINED MATERIAL) AND REMOVE TO AN APPROPRIATE DISPOSAL SITE. REMOVE THE CLEANING EQUIPMENT, RAMPS AND STRAW/HAY BALES AND COMPLETE THE CLEANUP.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Section: | Township: | Range:
Dft: | Date: | Scale:
Chk: | Date: | Filename:
Appr: | Date:

TENNESSE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
ELEVATED WASHRACK

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 40

Sheet: 40 of 127
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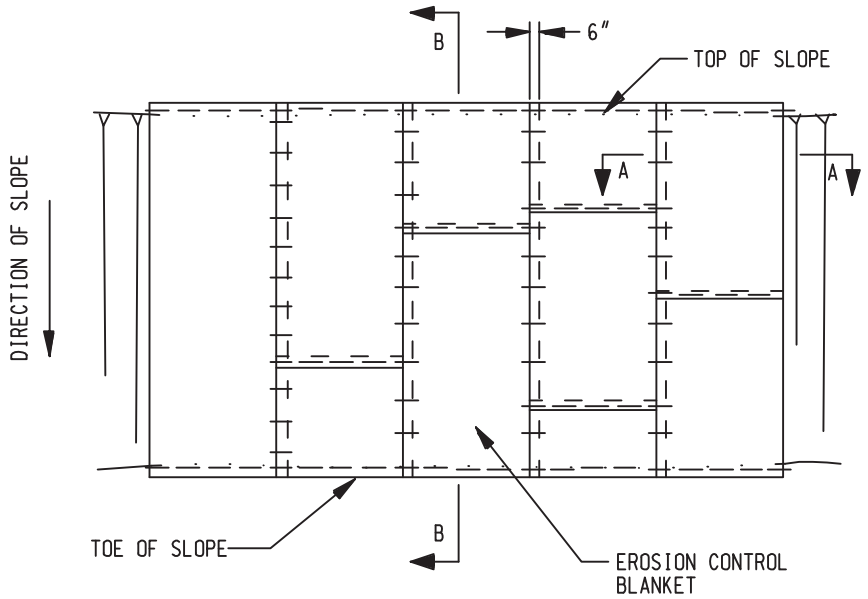
Sep 17, 2014 – 11:30AM



PLAN
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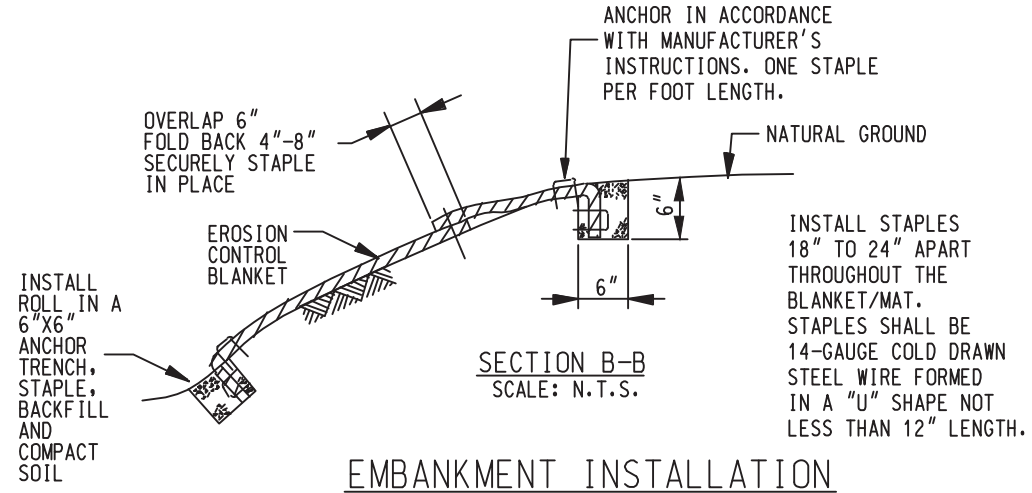
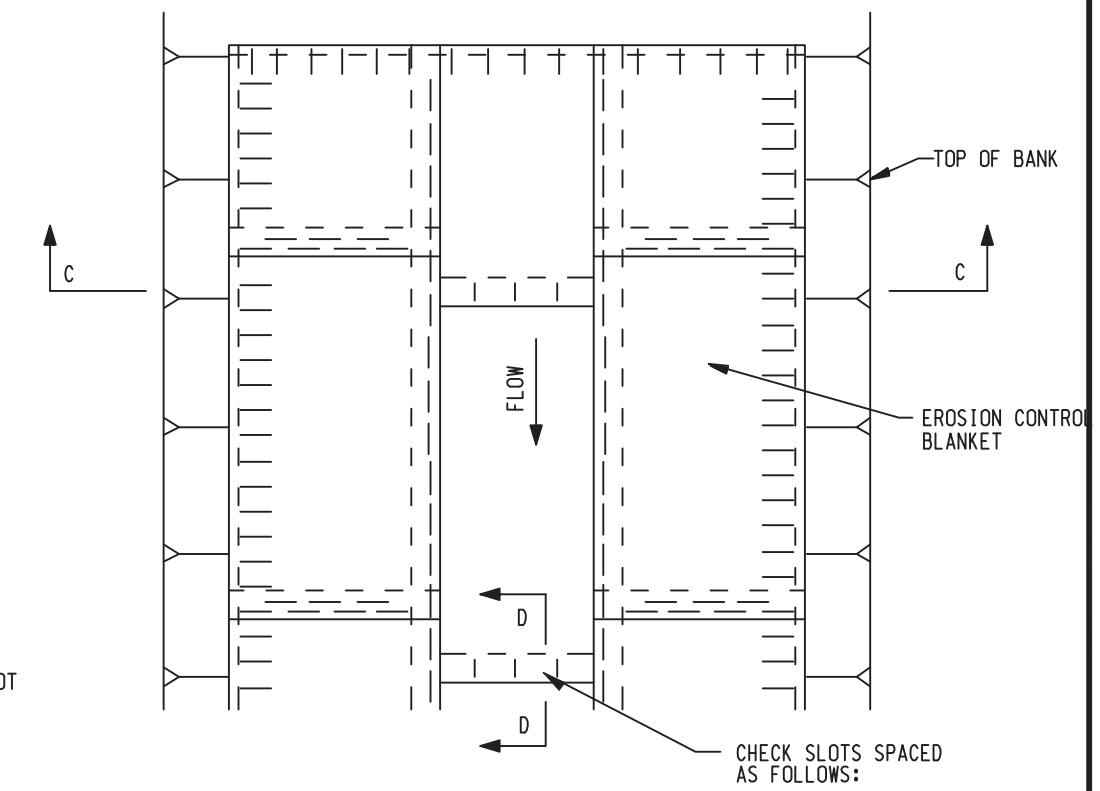


SECTION B-B
SCALE: N.T.S.

EMBANKMENT INSTALLATION



SLOPE	SPACING
0-3%	50'
> 3%	25'

PLAN
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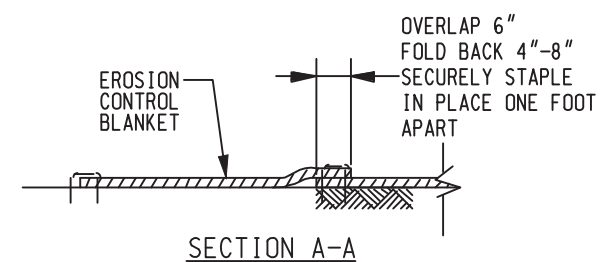
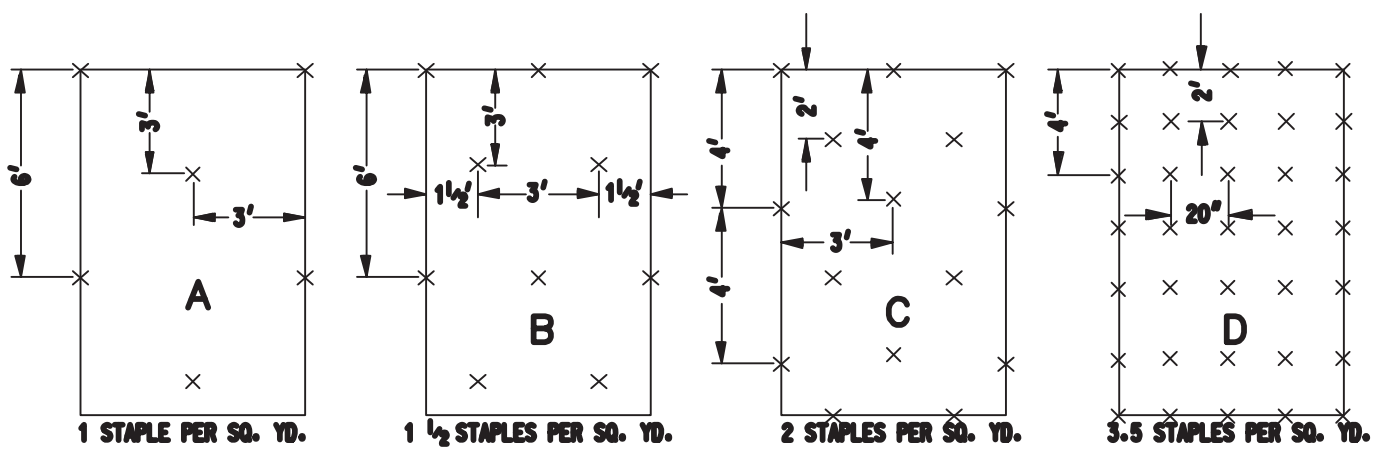
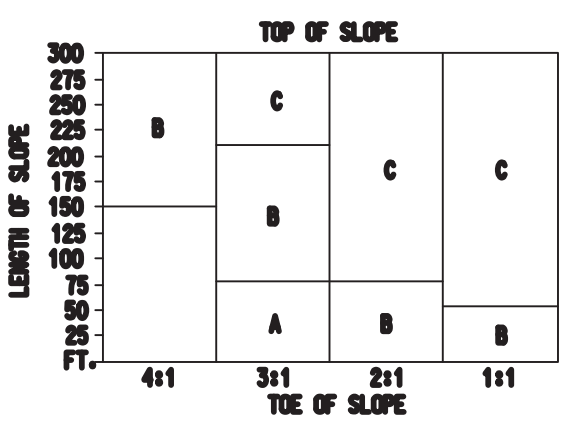


SECTION A-A
SCALE: N.T.S.



STAPLE PATTERN GUIDE



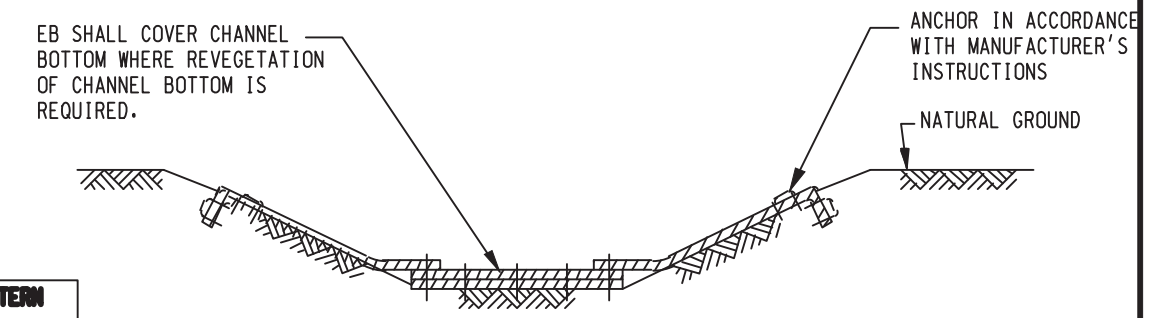
A EMBANKMENT INSTALLATION - STAPLE PATTERN TABLE (SEE STAPLE PATTERN GUIDE)

NOTES:

1. EROSION CONTROL BLANKETS SHALL EXTEND COMPLETELY ACROSS DISTURBED AREA TO PROTECT ERODIBLE SURFACES. THE SOIL SHALL BE PROPERLY PREPARED, SEEDED AND MULCHED PRIOR TO INSTALLATION.
2. INSTALL EROSION CONTROL BLANKETS ON FRESHLY GRADED EMBANKMENTS ON SLOPES IN EXCESS OF 3:1 (H:V) TO SUPPORT VEGETATION.
3. INSTALL BLANKETS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
4. BLANKET SHALL BE LOOSELY INSTALLED AND TAMPED OR ROLLED IN PLACE AFTER INSTALLATION. STAPLES SHALL BE DRIVEN FLUSH WITH THE GROUND.

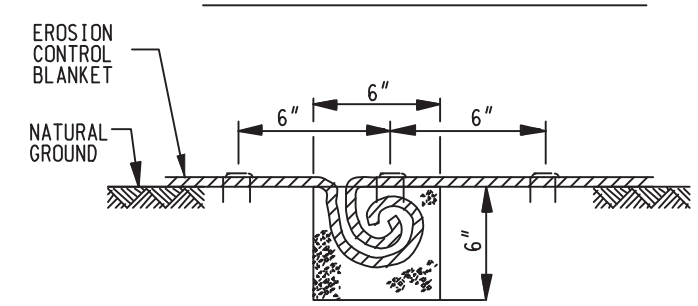
FLOW	STAPLE PATTERN TYPE
LOW VELOCITY	C
MED. TO HIGH VELOCITY	D

CHANNEL INSTALLATION - STAPLE PATTERN TABLE (SEE STAPLE PATTERN GUIDE)



SECTION C-C
SCALE: N.T.S.

CHANNEL INSTALLATION



OVERLAP 6" FOLD BACK 4"-8" TWO-THREE TIMES AND SECURELY STAPLE IN PLACE ALONG CHECK SLOT ONE FOOT APART

SECTION D-D
SCALE: N.T.S.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:		Op. Area.:
State:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Scale:
Chk:	Date:	Filename:
Appr:	Date:	

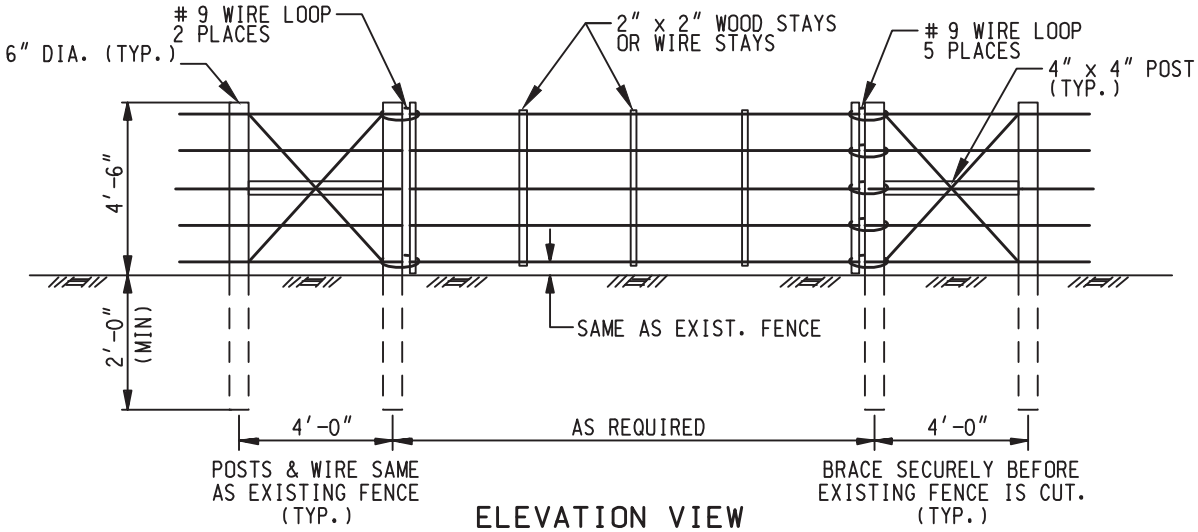
TENNESSE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
EROSION CONTROL BLANKET

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 41

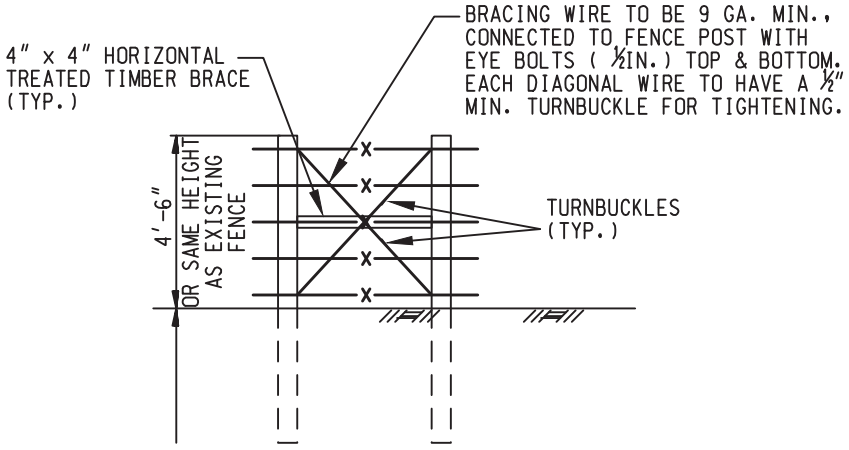
Sheet: 41 of 127
Type:

Sep 17, 2014 – 11:30AM



ELEVATION VIEW

SCALE: N.T.S.



NOTES:

1. THE CONTRACTOR SHALL FURNISH ALL NECESSARY MATERIAL TO CONSTRUCT A TEMPORARY FENCE GATE TO MATCH EXISTING FENCE.
2. BRACE THE SPAN TO BE CONSTRUCTED ON EACH SIDE OF PIPELINE RIGHT-OF-WAY, PRIOR TO INITIAL DISMANTLING OF FENCE.
3. THE CONTRACTOR SHALL RESTORE THE FENCE TO IT'S ORIGINAL CONDITION AND REMOVE ALL TEMPORARY MATERIALS AFTER COMPLETION OF PIPELINE CONSTRUCTION.
4. ACTUAL EMBEDMENT DEPTH REQUIRED WILL BE DETERMINED BY WHAT IS REQUIRED TO ACHIEVE A STABLE SUPPORT POST.
5. UNDER NO CIRCUMSTANCES SHALL FENCE POSTS BE PLACED DIRECTLY OVER THE PIPELINE. CONSULT COMPANY AUTHORIZED REPRESENTATIVES FOR LOCATIONS OF FENCE POSTS ADJACENT TO THE PIPELINE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
FENCE WITH TEMPORARY GATE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 42

Sheet: 42 of 127

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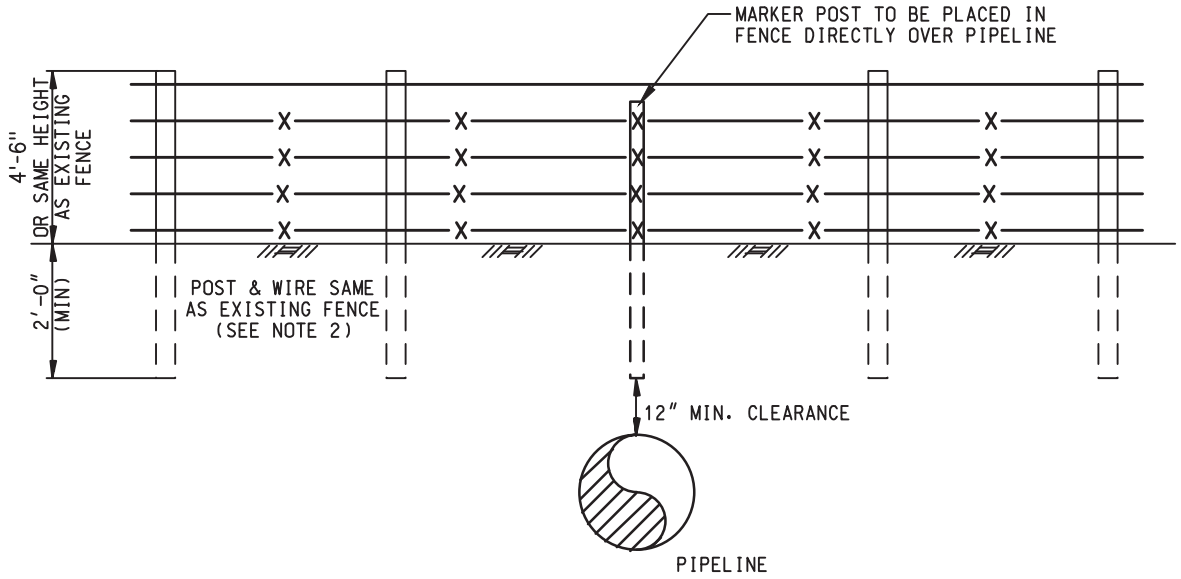

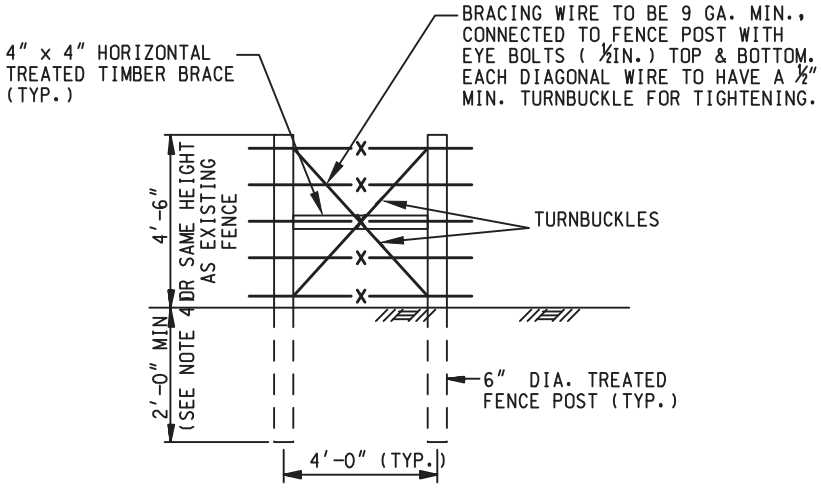

BRACE SPAN DETAIL (SEE NOTE 3)

NOTES:

1. THE CONTRACTOR SHALL FURNISH ALL NECESSARY MATERIAL TO RESTORE THE FENCE TO IT'S ORIGINAL CONDITION.
2. POSTS, WIRE AND OTHER MATERIAL SHALL BE THE SAME AS OR EQUIVALENT MATERIAL TO MATCH THE EXISTING FENCE.
3. BRACE SPAN TO BE CONSTRUCTED ON EACH SIDE OF PIPELINE RIGHT-OF-WAY, PRIOR TO INITIAL DISMANTLING OF FENCE.
4. ACTUAL EMBEDMENT DEPTH REQUIRED WILL BE DETERMINED BY WHAT IS REQUIRED TO ACHIEVE A STABLE SUPPORT POST.
5. UNDER NO CIRCUMSTANCES SHALL FENCE POSTS BE PLACED DIRECTLY OVER THE PIPELINE. CONSULT COMPANY AUTHORIZED REPRESENTATIVES FOR LOCATIONS OF FENCE POSTS ADJACENT TO THE PIPELINE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
FENCE RESTORATION

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 43

Sheet: 43 of 127
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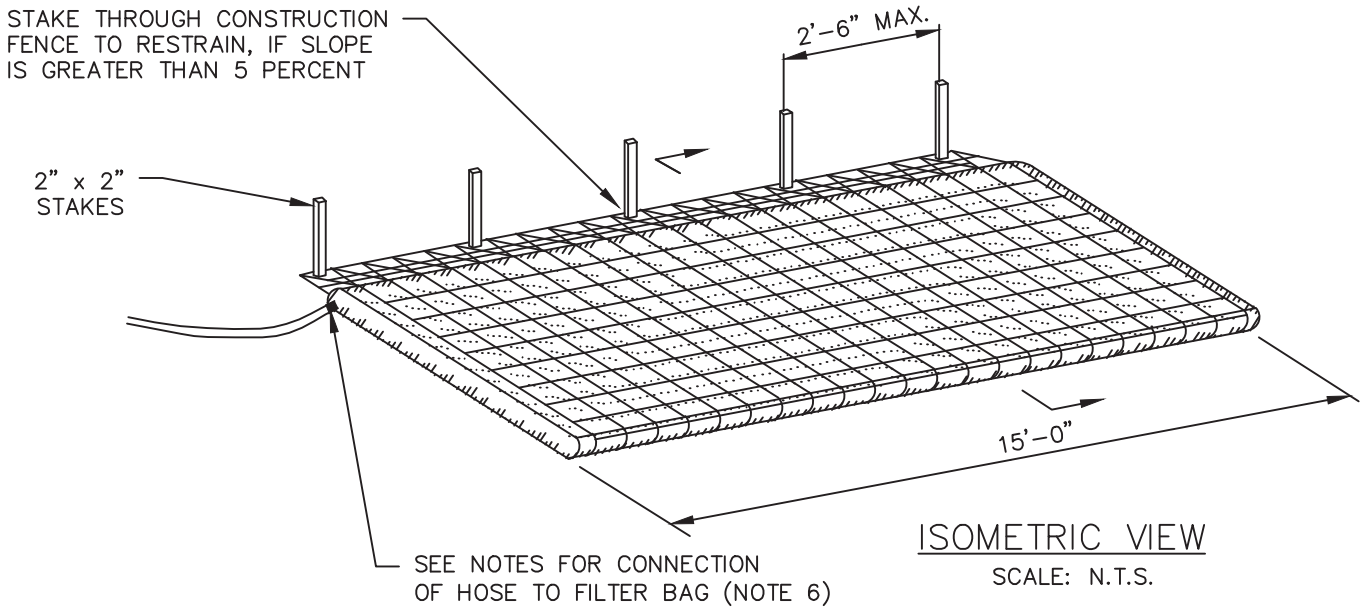
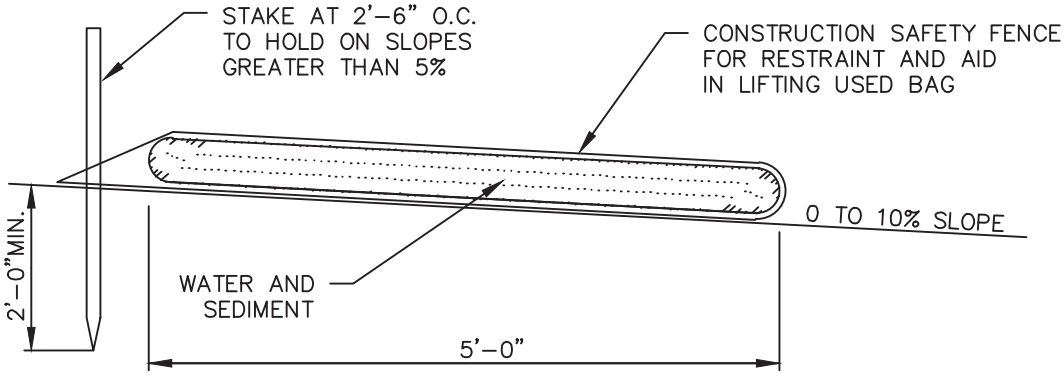


ISOMETRIC VIEW

SCALE: N.T.S.



SECTION

SCALE: N.T.S.

NOTES:

1. FILTER BAG SHALL BE PLACED ON A SLOPING OR LEVEL, WELL VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM THE DEVICE AND ANY WORK AREAS.
2. THE FILTER BAG MUST BE STAKED IN PLACE IF THE FILTER BAG IS PLACED ON A SLOPE GREATER THAN 5 PERCENT.
3. THE FILTER BAG SHALL NOT BE USED FOR DISCHARGE FLOWS GREATER THAN 300 GPM OR AS RECOMMENDED BY THE MANUFACTURER.
4. THE CONTRACTOR SHALL PROPERLY REMOVE AND PROPERLY DISPOSE OF USED FILTER BAGS IMMEDIATELY UPON COMPLETION OF DEWATERING OPERATIONS. UNDER NO CIRCUMSTANCES SHALL USED FILTER BAGS BE LEFT IN PLACE FOR A PERIOD OF TIME GREATER THAN 48 HOURS AFTER DEWATERING OPERATIONS ARE COMPLETE.
5. SEDIMENT FROM BAG, AT THE DISCRETION OF THE ENVIRONMENTAL INSPECTOR, MAY BE SPREAD IN UPLAND AREAS WITHIN THE CONSTRUCTION CORRIDOR AND THE AREA SHALL BE STABILIZED AND REVEGETATED.
6. TO ATTACH HOSE, CUT OPEN CORNER OF FILTER BAG, GATHER UP MATERIAL AND CLAMP TO A SHORT SECTION OF STEEL PIPE. CLAMP HOSE TO OTHER END OF PIPE. BOTH CONNECTIONS SHALL BE WATERTIGHT.
7. CONTRACTOR SHALL ONLY INSTALL ONE DEWATERING HOSE PER FILTER BAG.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
FILTER BAG

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 44

Sheet: 44 of 127

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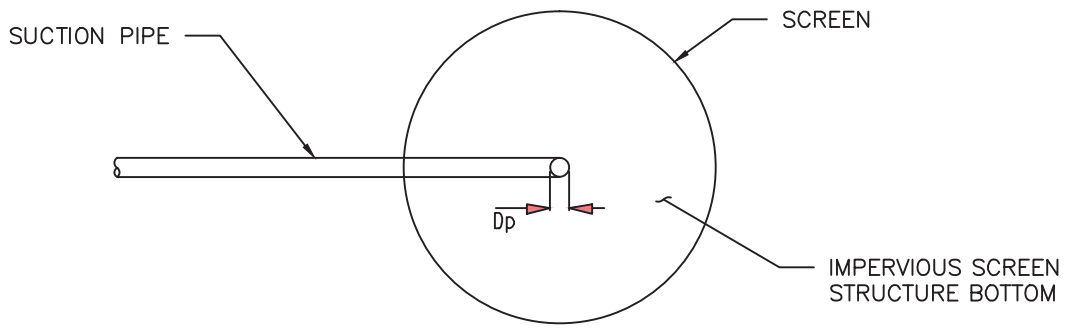
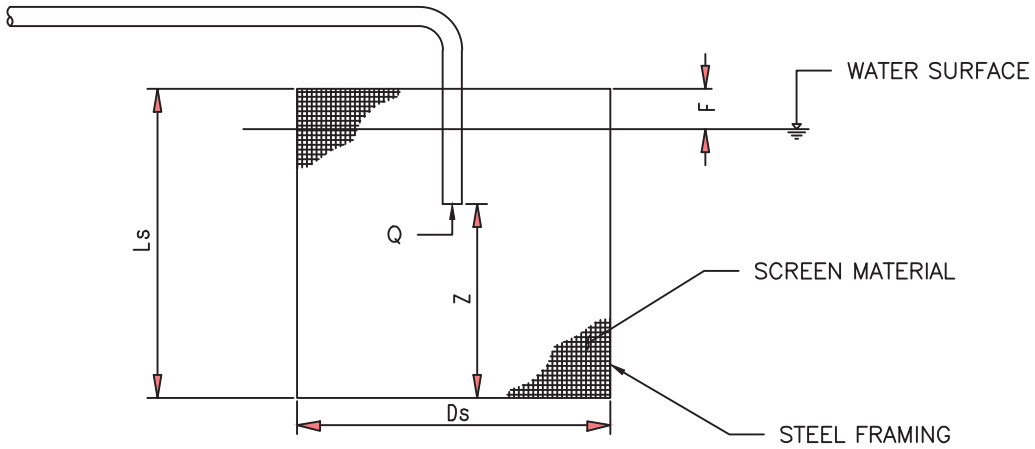


PLAN VIEW
N.T.S.



SIDE VIEW
N.T.S.

TO BE USED FOR HYDROSTATIC TESTING OF THE PIPELINE

NOTES:

1. CONTRACTOR SHALL NOT DEVIATE FROM THE SPECIFIED MATERIAL OR DIMENSIONS OF THE STRUCTURE WITHOUT WRITTEN APPROVAL FROM THE COMPANY.
2. THE FRAME OF THE SCREEN STRUCTURE SHALL BE OF STURDY CONSTRUCTION TO WITHSTAND ITS INTENDED USE.
3. SIDE AND TOP OF SCREEN STRUCTURE SHALL CONSIST OF 2MM X 2MM WIRE SCREEN.
4. THE SUCTION PIPE SHALL BE SECURED SO THAT THE INLET REMAINS WITHIN THE SCREEN STRUCTURE AND AT THE PROPER DEPTH ALL TIMES DURING PUMPING OPERATIONS. THE VERTICAL AXIS OF SUCTION PIPE SHALL BE ALIGNED WITH THE VERTICAL AXIS OF THE SCREEN STRUCURE.
5. SPECIFICATIONS:

Q =
Dp =
Ds =
Ls =
Z =
F =

DESIGN SPECIFICATIONS WILL VARY BASED ON SITE SPECIFIC APPLICATIONS. THE CONTRACTOR SHALL WORK WITH KINDER MORGAN INC. TO DEVELOP THE SITE SPECIFIC SPECIFICATIONS PRIOR TO TESTING.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
PUMP INLET SCREEN STRUCTURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 45

Sheet: 45 of 127
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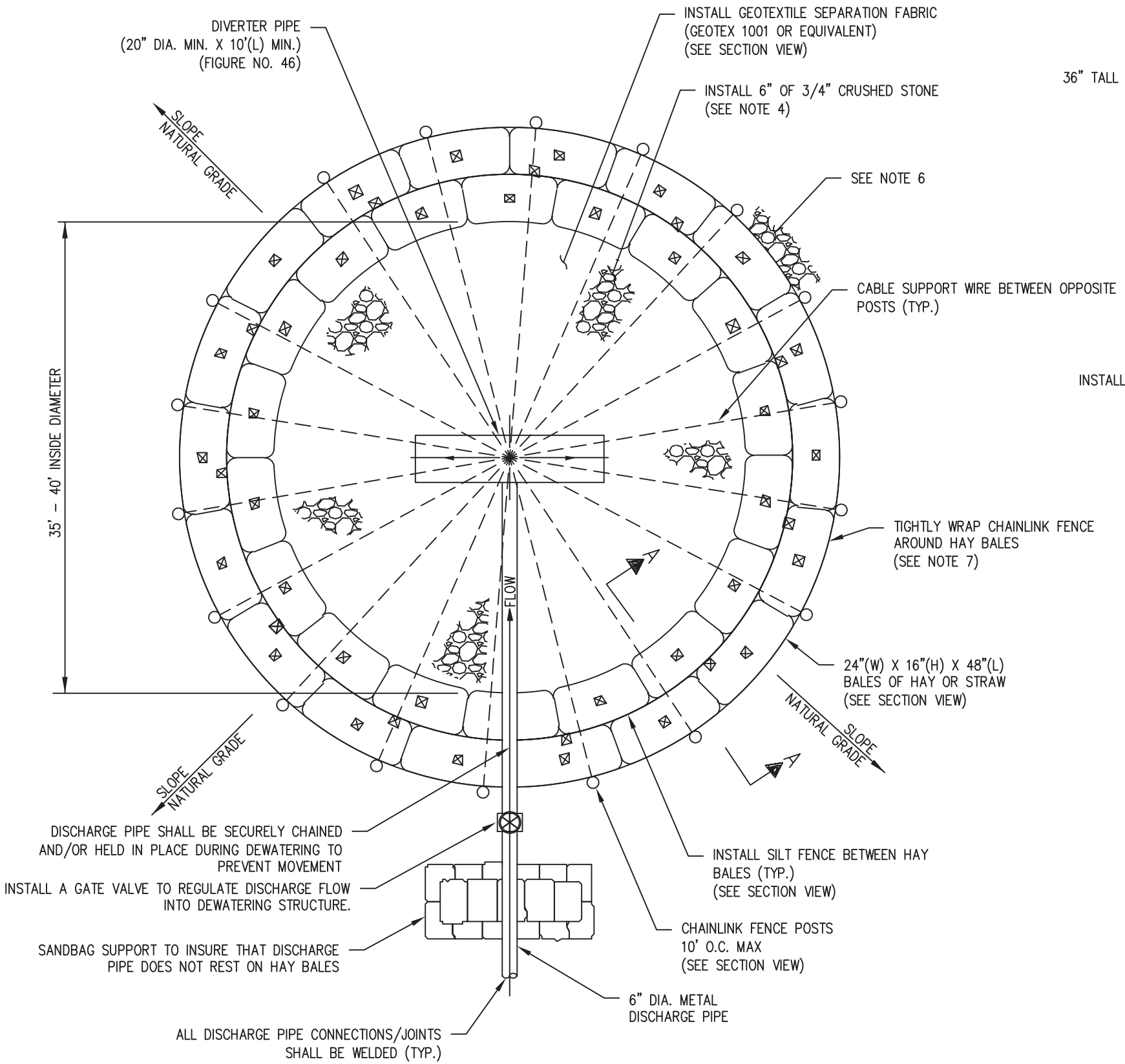

PLAN VIEW

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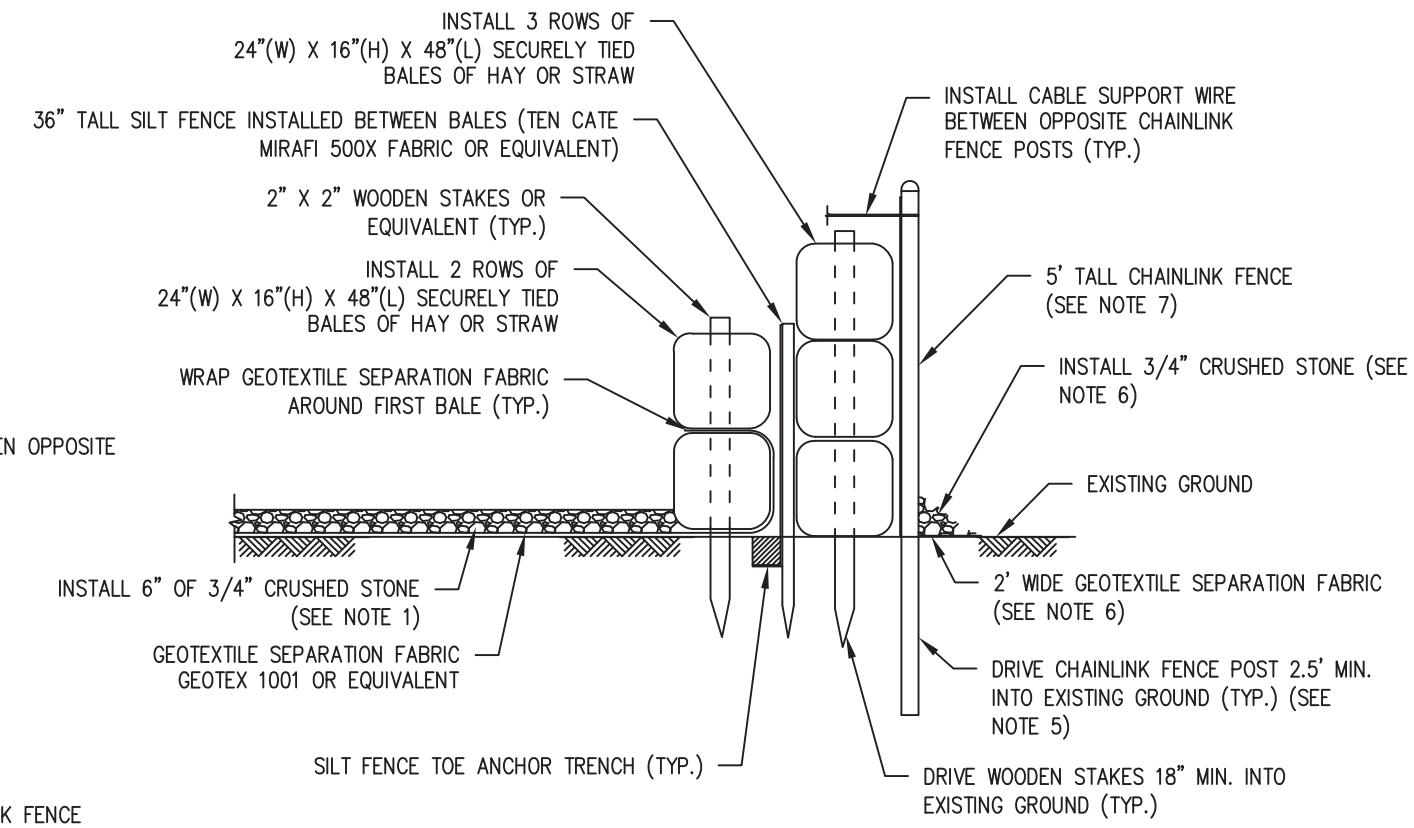

SECTION "A-A" VIEW

SCALE: N.T.S.

NOTES:

1. STRUCTURE SHALL BE PLACED ON A LEVEL WELL VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM STRUCTURE AND ANY WORK AREAS AND MINIMIZE EROSION OF THE SURROUNDING AREA TO THE EXTENT PRACTICABLE.
2. AT THE DISCRETION OF THE ENVIRONMENTAL INSPECTOR, ADDITIONAL EROSION AND SEDIMENTATION CONTROL DEVICES (E.G. RIPRAP CHECK DAMS, COMPOST FILTER SOCKS, ETC.) MAY BE REQUIRED TO BE INSTALLED DOWNSTREAM OF THE STRUCTURE IF EROSION BECOMES APPARENT DURING DEWATERING.
3. FLOW RATES THROUGH DISCHARGE AND DIVERTER PIPES SHALL BE SUCH THAT STRUCTURE WILL NOT OVERFLOW. A MINIMUM FREEBOARD OF 3", MEASURED FROM THE TOP OF THE THIRD ROW OF HAYBALES TO THE WATER SURFACE ELEVATION, SHALL BE MAINTAINED AT ALL TIMES.
4. THE 3/4" CRUSHED STONE INSTALLED WITHIN THE BASIN SHALL BE WASHED TO REMOVE ALL DIRT/FINE PARTICLES PRIOR TO INSTALLATION.
5. THE CHAINLINK FENCE POSTS SHALL BE DRIVEN A MINIMUM OF 2.5 FT. INTO STABLE, EXISTING GROUND. THE CONTRACTOR MAY BE REQUIRED TO INSTALL THE POLES DEEPER IF STABLE SUBSOILS ARE NOT ACHIEVED WITHIN 2.5 FT.
6. AT THE DISCRETION OF THE ENVIRONMENTAL INSPECTOR, ADDITIONAL GEOTEXTILE SEPARATION FABRIC AND 3/4" CRUSHED STONE MAY BE REQUIRED TO BE INSTALLED AROUND THE OUTSIDE EDGE OF THE DEWATERING STRUCTURE.
7. CHAINLINK FENCE SHALL INSTALLED TIGHTLY AGAINST THE HAY BALES AND SECURELY FASTENED TOGETHER AT ALL JOINTS WITH CABLE TENSION WIRE AND STRETCHER BARS.
8. THE ENVIRONMENTAL INSPECTOR SHALL HAVE THE AUTHORITY TO MODIFY THE DESIGN AS REQUIRED TO PREVENT EROSION AND SEDIMENTATION DOWNSTREAM OF THE STRUCTURE.
9. HAY BALES SHALL BE STACKED SUCH THAT THE JOINTS ARE STAGGERED.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area.:
State:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Scale:
Chk:	Date:	Filename:
Appr:	Date:	

TENNESSE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
HYDROSTATIC DEWATERING STRUCTURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 46

Sheet: 46 of 127

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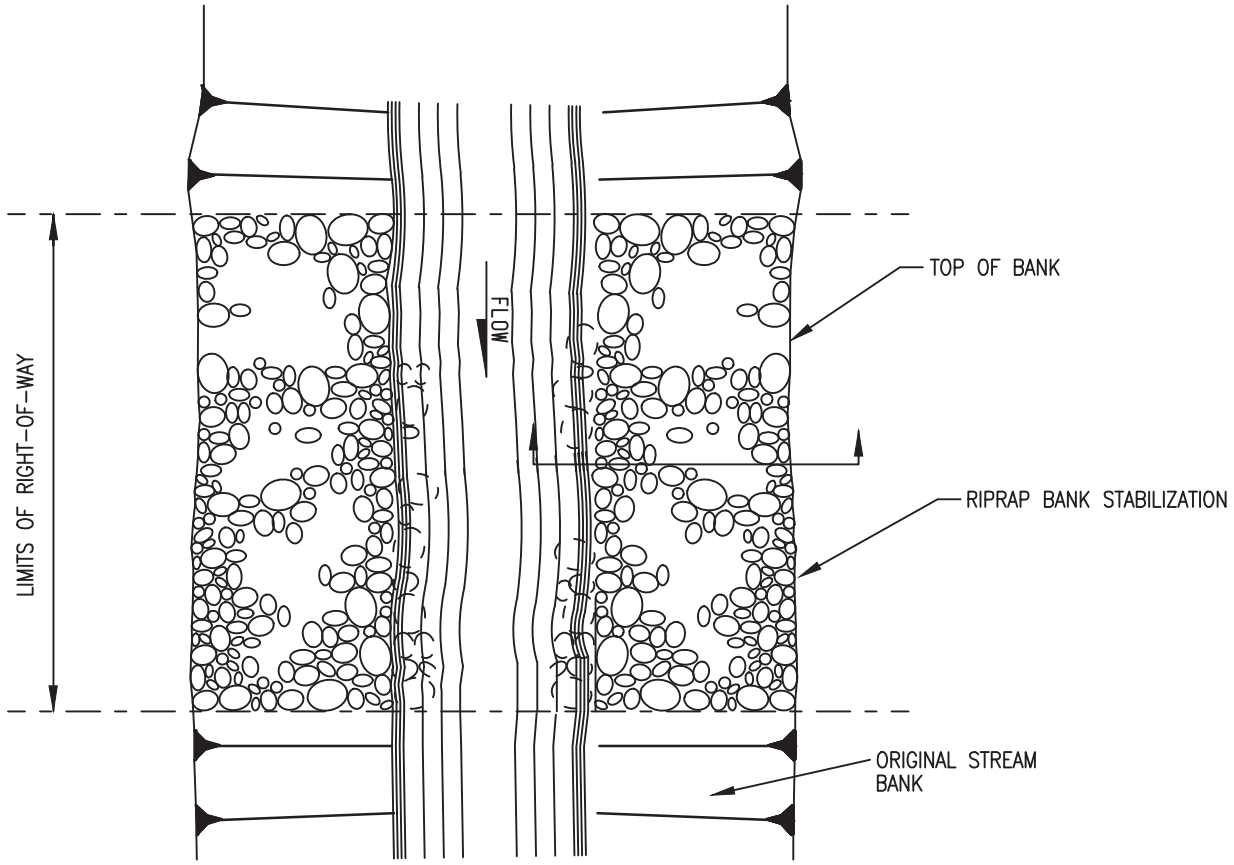
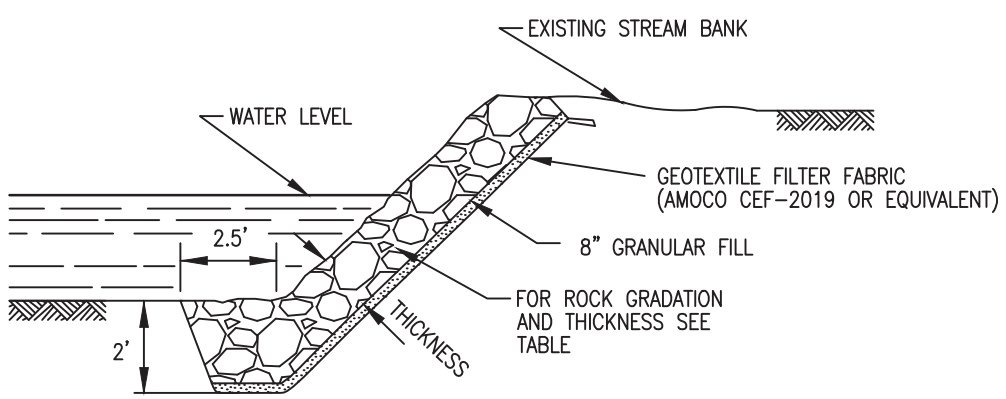
Sep 17, 2014 – 4:05PM



PLAN VIEW
SCALE: N.T.S.



SECTION
SCALE: N.T.S.

TABLE: RIPRAP GRADUATIONS

Class	Layer Thickness (in.)	Max Velocity (ft./s.)	Wave Height (ft.)		PERCENT FINER BY WEIGHT											
					D_{10}			D_{50}			D_{85}			D_{100}		
					Wt. (lbs.)	d_o (in.)	d□ (in.)	Wt. (lbs.)	d_o (in.)	d□ (in.)	Wt. (lbs.)	d_o (in.)	d□ (in.)	Wt. (lbs.)	d_o (in.)	d□ (in.)
I	18	8.5	-		5	5	4	50	10	8	100	13	10	150	15	12
II	18	10	-		17	7	6	170	15	12	340	19	15	500	22	18
III	24	12	2		46	10	8	460	21	17	920	26	21	1400	30	24
IV	36	14	3		150	15	12	1500	30	25	3000	39	32	4500	47	36
V	48	17	4.8		370	20	16	3700	42	34	7400	53	43	11,000	60	49

d_o = gravel material d□ = angular rock riprap
Wt = weight in pounds

NOTES:

1. ROCK UTILIZED FOR RIPRAP SHALL CONSIST OF SOUND, DURABLE ROCK, INSOLUBLE IN WATER, AND RESISTANT TO WEATHERING.
2. ALL MATERIAL SHALL BE FREE OF STRUCTURAL DEFECTS, SHALE SEAMS AND ORGANIC MATTER.
3. INDIVIDUAL PIECES SHOULD BE SHARPLY ANGULAR, BLOCK SHAPED AND HAVE A MINIMUM SPECIFIC GRAVITY OF 2.5.
4. NO PIECE SHALL HAVE A LENGTH EXCEEDING THREE (3) TIMES ITS WIDTH OR DEPTH.
5. EACH LOAD OF ROCK SHALL BE OF WELL-GRADED MIXTURE. A WELL-GRADED MIXTURE, AS USED HEREIN, IS DEFINED AS A MIXTURE COMPOSED PRIMARILY OF LARGER STONE, BUT WITH A SUFFICIENT MIXTURE OF SMALLER SIZES TO FILL THE VOIDS.
6. MATERIAL SHALL MEET SPECIFICATIONS AS NOTED IN ABOVE TABLE.
7. IF STREAM WIDTH IS EQUAL TO OR LESS THAN 2 TIMES THE TOE WIDTH, RIPRAP SHALL BE PLACED ACROSS THE ENTIRE STREAM WIDTH.
8. RIPRAP SHALL BE PLACED TO THE FULL COURSE THICKNESS IN ONE CONTINUOUS OPERATION. OPERATIONS WHICH CAUSE SEGREGATION OF THE MATERIALS SHALL NOT BE PERMITTED. INDIVIDUAL ROCKS MAY BE REARRANGED, AND THE VOIDS FILLED WITH HAND PLACED SMALLER ROCK IN ORDER TO ACHIEVE THE DESIRED UNIFORM ARMOR.
9. SLOPE SHALL BE GRADED TO 2:1 OR FLATTER PRIOR TO PLACING FILTER, FILTER FABRIC, OR RIPRAP.
10. ENDS OF THE RIPRAP SHALL BE KEYED INTO A STABLE BANK. WHEN TYING INTO OTHER STRUCTURES, LARGER RIPRAP CAN BE LAID IN STEPS OR STACKED AS NEEDED TO FIT. STONES LARGER THAN THOSE DESIGNED FOR FLOW SHALL BE USED FOR THIS PURPOSE.
11. REMAINING DISTURBED AREAS SHALL BE GRADED AND PERMANENTLY SEEDED AND MULCHED.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division: | Op. Area.:
State: | Co./Par.:
Section: | Township: | Range:
Dft: | Date: | Scale:
Chk: | Date: | Filename:
Appr: | Date:

TENNESSE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
RIPRAP STREAM BANK STABILIZATION

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 47
Sheet: 47 of 127
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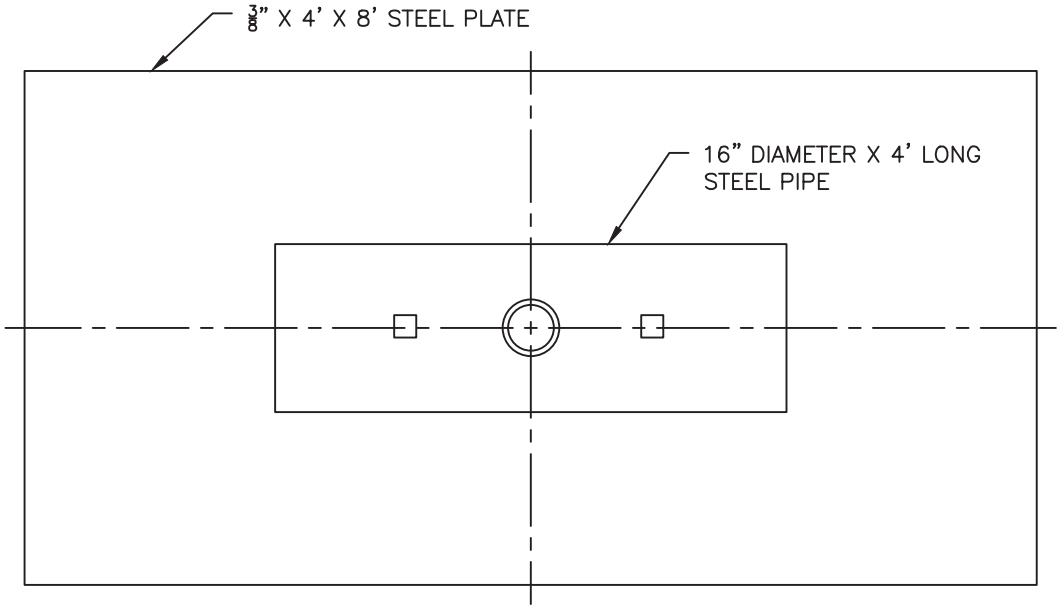
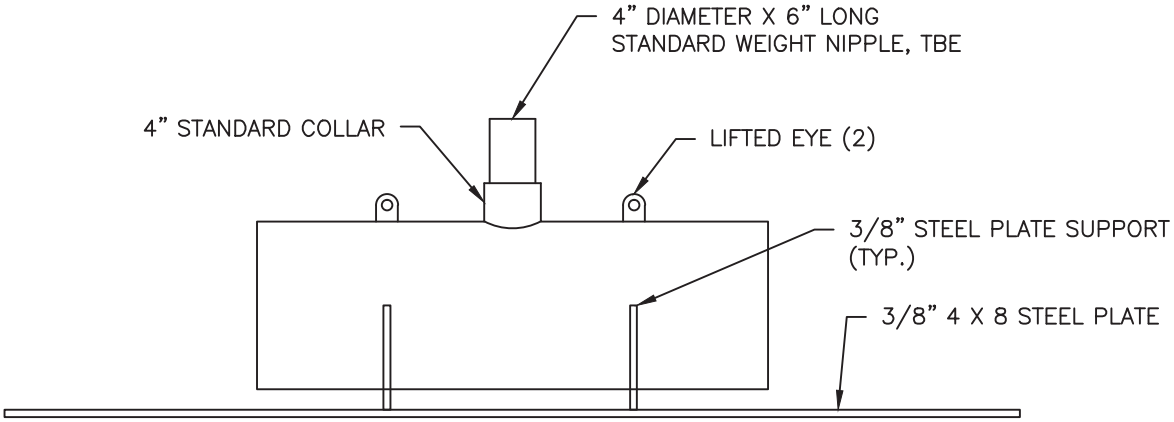
Sep 17, 2014 - 11:30AM



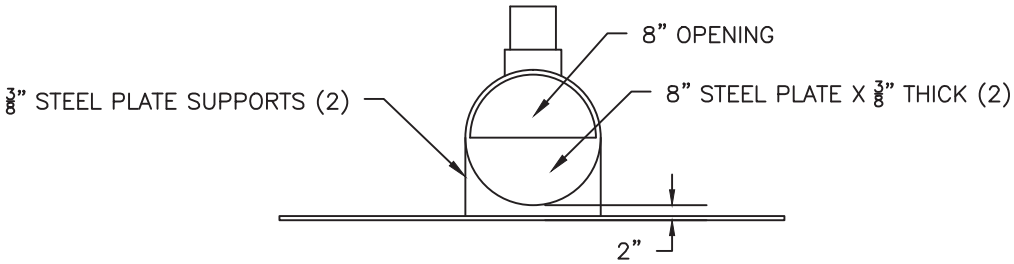
PLAN VIEW

N.T.S.



SECTION VIEW

N.T.S.



PROFILE VIEW

N.T.S.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:		Op. Area:
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Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

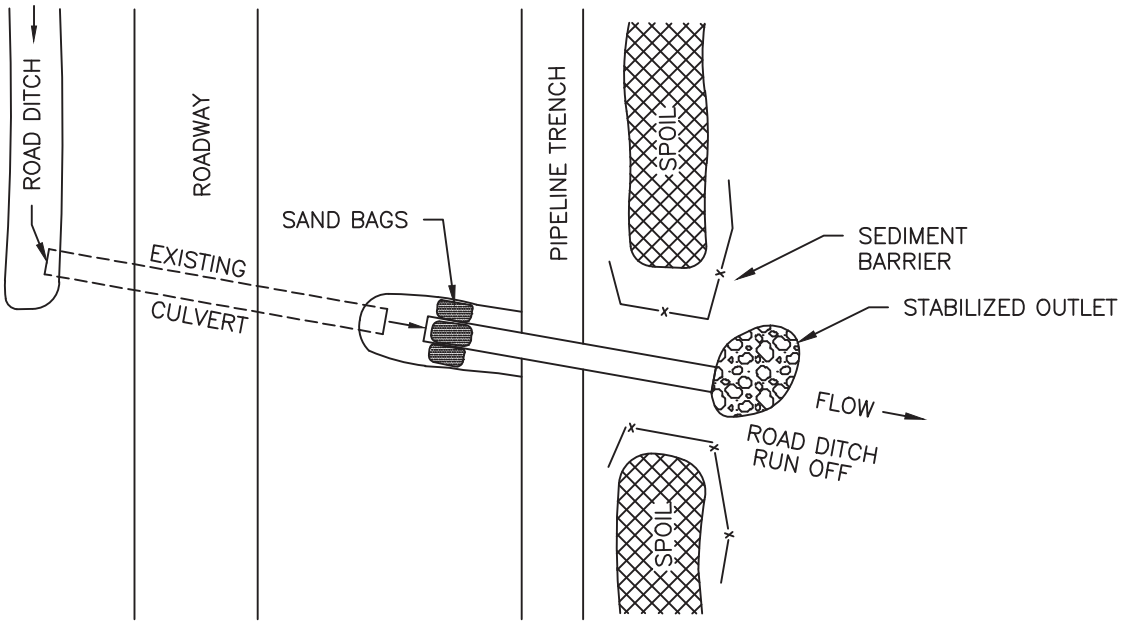
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
PIPE ENERGY DISSIPATER

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 48

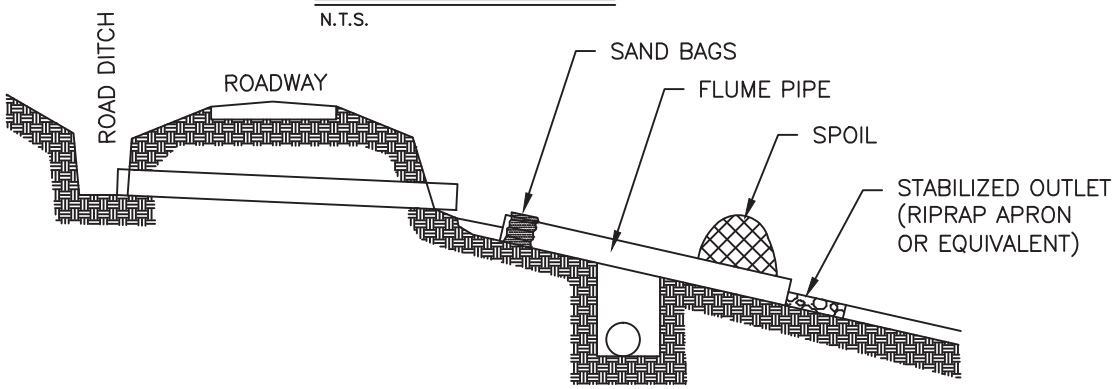
Sheet: 48 of 127

Type:



PLAN VIEW

N.T.S.



NOTES:

1. INSTALL THE TEMPORARY CULVERT ACROSS THE PIPELINE TRENCH AT ROAD CULVERT LOCATIONS WHERE THE PIPELINE TRENCH IS LOCATED BELOW THE ROAD SURFACE. AN 8" MINIMUM DIAMETER CULVERT IS TO BE INSTALLED, HOWEVER, THE TEMPORARY PIPE SHALL BE SIZED TO ADEQUATELY CONVEY THE MAXIMUM ANTICIPATED FLOW AT THE TIME OF CROSSING.

2. REMOVE CULVERT WHILE BACK FILLING AND RESTORE AND STABILIZE ROAD DITCH RUN OFF TO ORIGINAL CONDITION.

SECTION VIEW

N.T.S.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

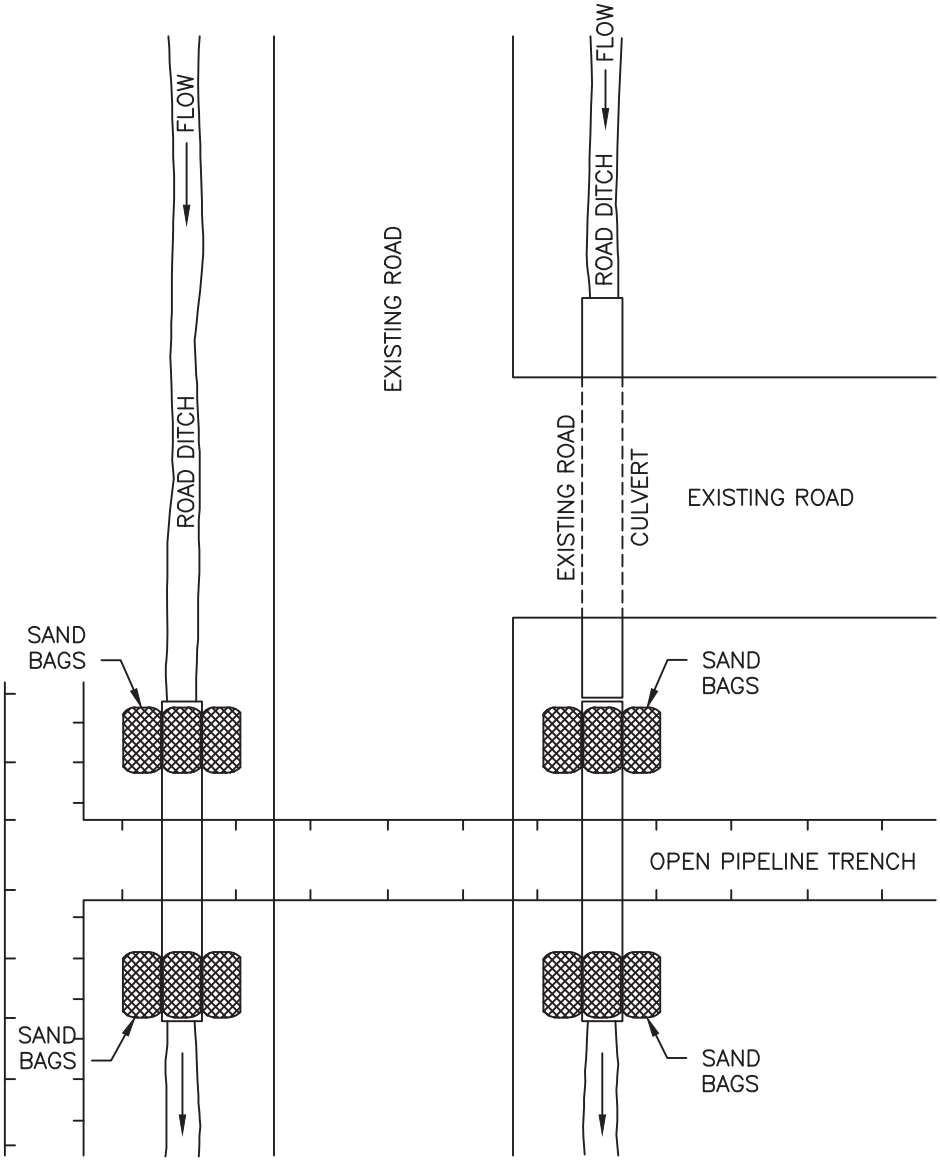
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
ROAD CULVERT EXTENSION ACROSS
PIPELINE TRENCH

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 49

Sheet: 49 of 127

Type:



NOTES:

1. INSTALL TEMPORARY CULVERT IN ROAD DITCH, ACROSS OPEN PIPELINE TRENCH. AN 8" MINIMUM DIAMETER CULVERT IS TO BE INSTALLED. HOWEVER, THE TEMPORARY PIPE SHALL BE SIZED TO ADEQUATELY CONVEY THE MAXIMUM ANTICPATED FLOW AT THE TIME OF CROSSING.

2. REMOVE CULVERT WHEN BACK FILLING AND RESTORE AND STABILIZE ROAD DITCH TO ORIGINAL CONDITION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

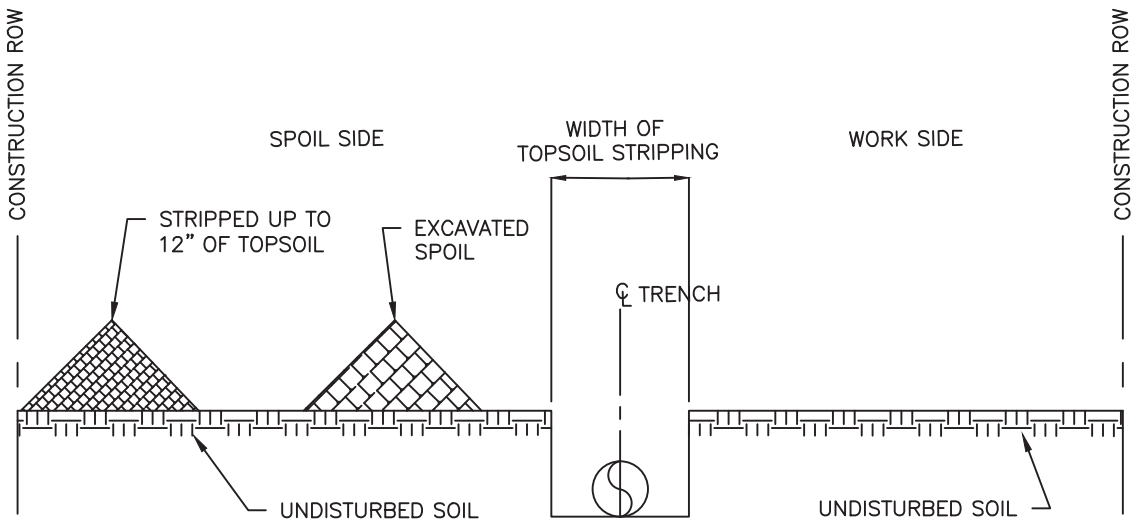
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TEMPORARY CULVERT ACROSS
OPEN TRENCH

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 50

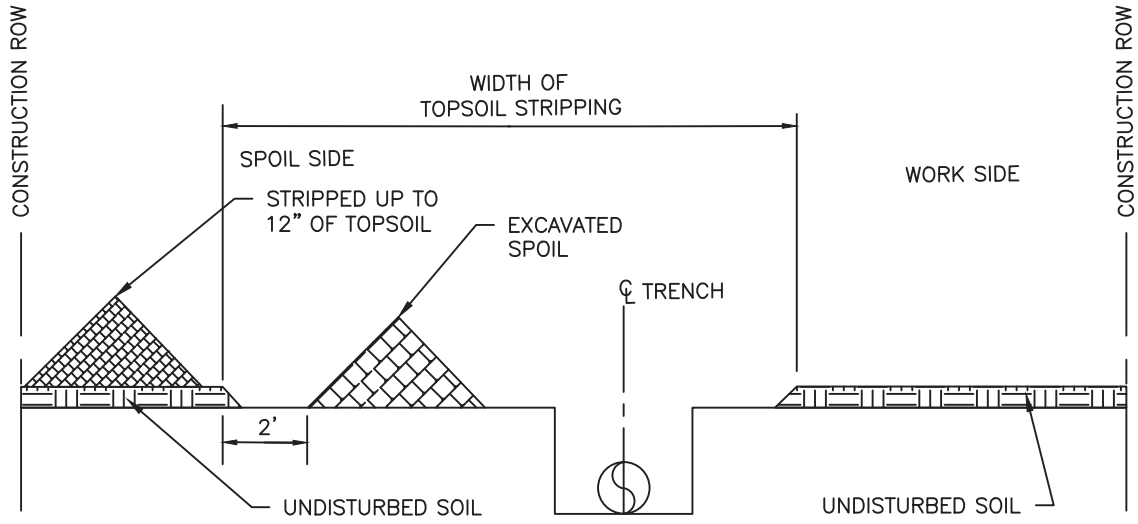
Sheet: 50 of 127
Type:



DITCH LINE TOPSOIL STRIPPING

N.T.S.

ALSO USED IN NON–SATURATED WETLANDS



DITCH PLUS SPOIL SIDE SEGREGATION

N.T.S.

NOTES:

1. ALLOW FOR A 3' SEPERATION BETWEEN THE TOPSOIL PILE AND THE TRENCH SPOIL.
2. RETURN TRENCH SPOIL TO TRENCH AND COMPACT. FEATHER OUT EXCESS SPOIL OVER STRIPPED AREA LEAVING A LOW CROWN CENTERED OVER THE TRENCH. ALLEVIATE COMPACTION OF SUBSOILS OVER THE STRIPPED AREA.
3. RETURN TOPSOIL EVENLY OVER THE STRIPPED AREA AFTER TRENCH HAS SUFFICIENTLY SETTLED OR HAS BEEN COMPACTED.
4. ALLEVIATE COMPACTION OF TOPSOIL OVER ENTIRE RIGHT–OF–WAY.
5. SEGREGATED TOPSOIL MAY NOT BE USED FOR PADDING THE PIPE.
6. INSTALL SEDIMENT BARRIER AS REQUIRED.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

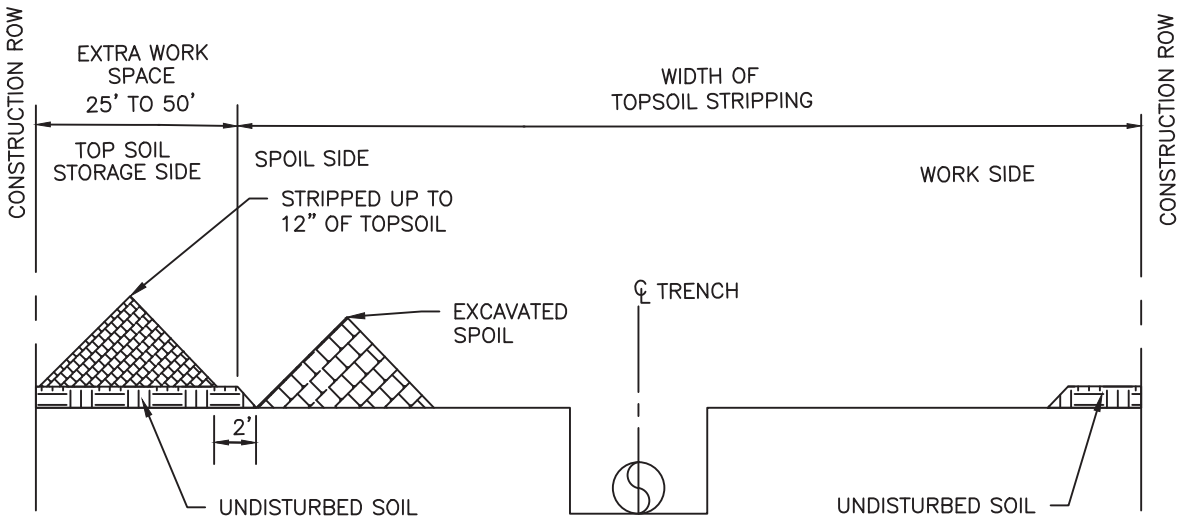
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TOPSOIL SEGREGATION (1)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

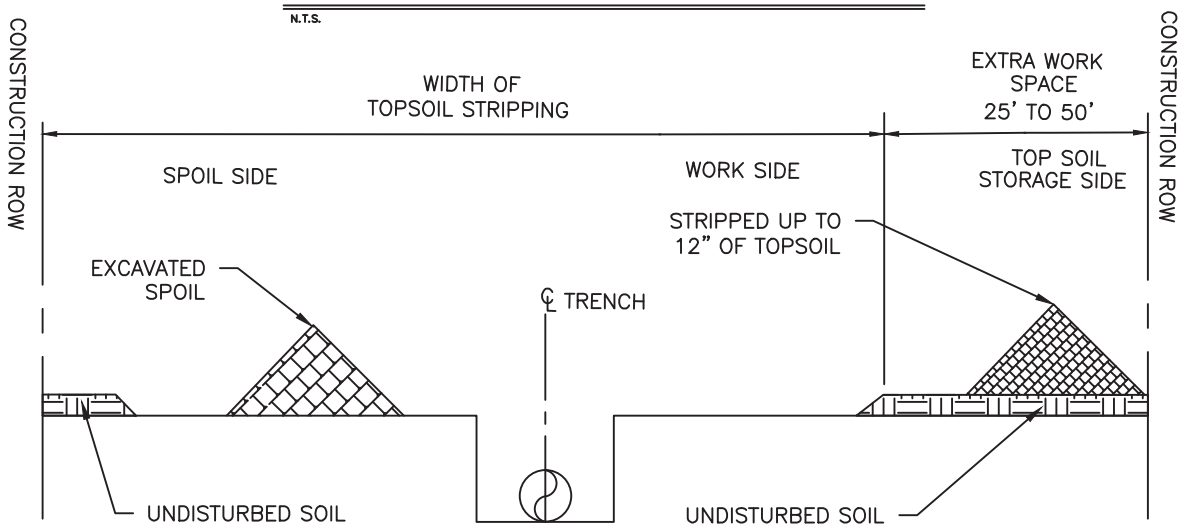
FIG. NO. 51

Sheet: 51 of 127
Type:



FULL RIGHT-OF-WAY TOPSOIL STRIPPING - A

N.T.S.



FULL RIGHT-OF-WAY TOPSOIL STRIPPING - B

N.T.S.

NOTES:

1. ALLOW FOR A 3' SEPERATION BETWEEN THE TOPSOIL PILE AND THE TRENCH SPOIL.
2. RETURN TRENCH SPOIL TO TRENCH AND COMPACT. FEATHER OUT EXCESS SPOIL OVER STRIPPED AREA LEAVING A LOW CROWN CENTERED OVER THE TRENCH. ALLEVIATE COMPACTION OF SUBSOILS OVER THE STRIPPED AREA.
3. RETURN TOPSOIL EVENLY OVER THE STRIPPED AREA AFTER TRENCH HAS SUFFICIENTLY SETTLED OR HAS BEEN COMPACTED
4. ALLEVIATE COMPACTION OF TOPSOIL OVER ENTIRE RIGHT–OF–WAY.
5. SEGREGATED TOPSOIL MAY NOT BE USED FOR PADDING THE PIPE
6. INSTALL SEDIMENT BARRIER AS REQUIRED

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

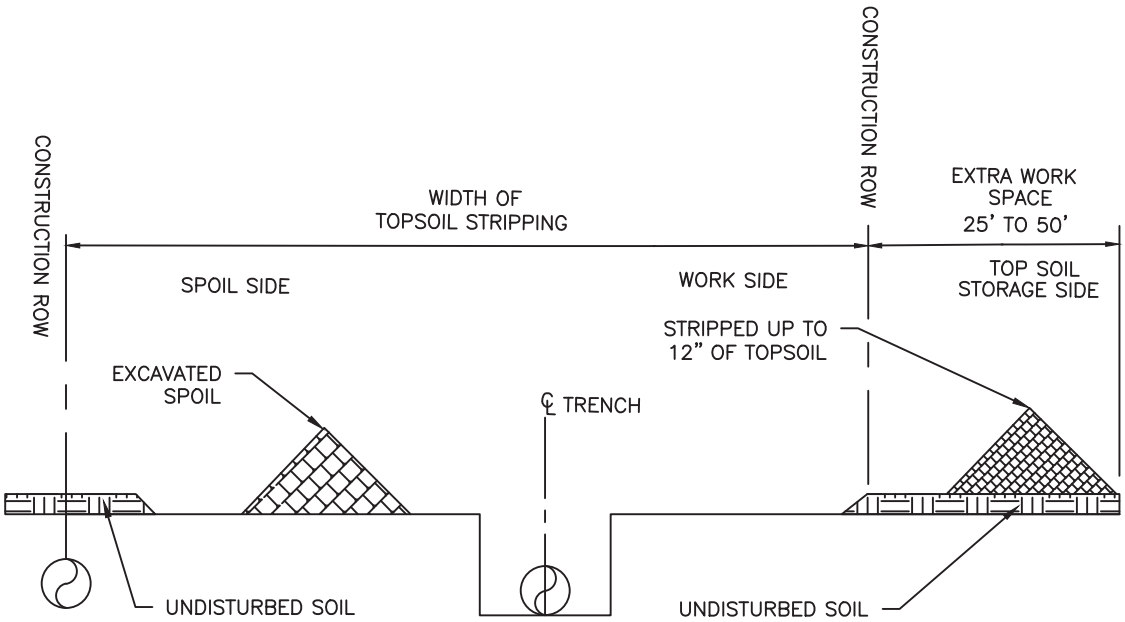
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TOPSOIL SEGREGATION (2)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

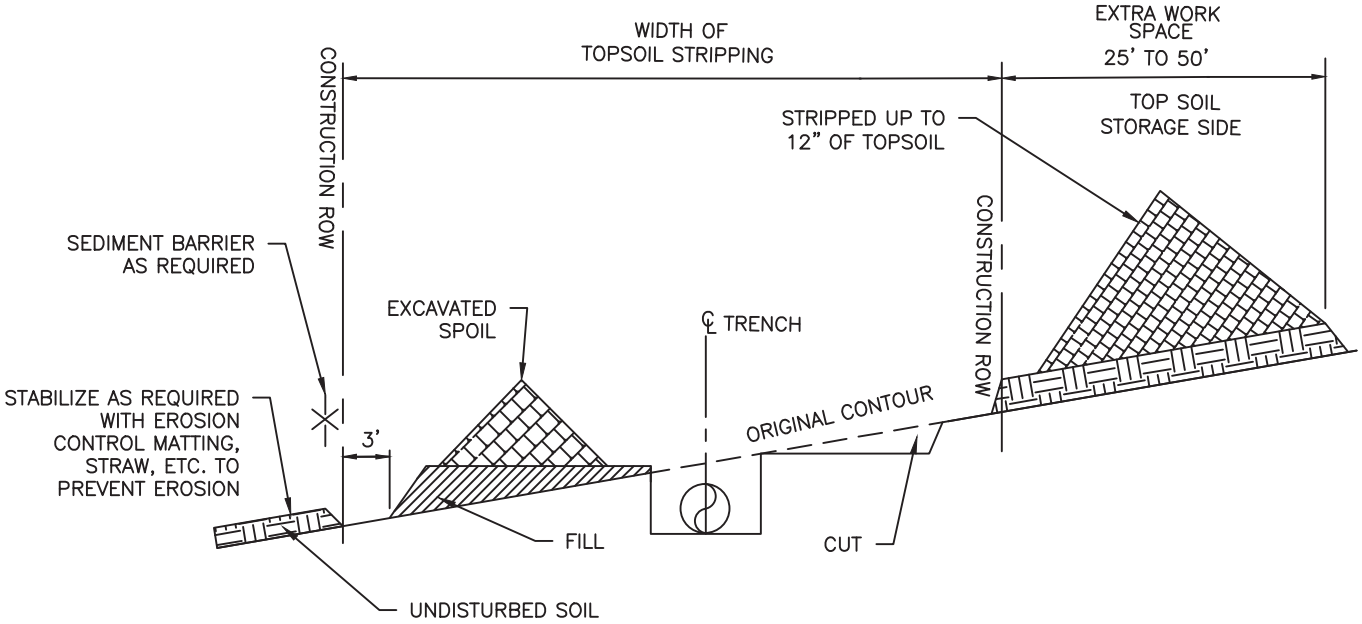
FIG. NO. 52

Sheet: 52 of 127
Type:



FULL RIGHT-OF-WAY TOPSOIL STRIPPING-PARALLELING PIPELINES

N.T.S.



FULL RIGHT-OF-WAY TOPSOIL STRIPPING-SIDE SLOPES

N.T.S.

NOTES:

1. ALLOW FOR A 3' SEPERATION BETWEEN THE TOPSOIL PILE AND THE TRENCH SPOIL.
2. RETURN TRENCH SPOIL TO TRENCH AND COMPACT. FEATHER OUT EXCESS SPOIL OVER STRIPPED AREA LEAVING A LOW CROWN CENTERED OVER THE TRENCH. ALLEVIATE COMPACTION OF SUBSOILS OVER THE STRIPPED AREA.
3. RETURN TOPSOIL EVENLY OVER THE STRIPPED AREA AFTER TRENCH HAS SUFFICIENTLY SETTLED OR HAS BEEN COMPACTED.
4. ALLEVIATE COMPACTION OF TOPSOIL OVER ENTIRE RIGHT–OF–WAY.
5. SEGREGATED TOPSOIL MAY NOT BE USED FOR PADDING THE PIPE.
6. INSTALL SEDIMENT BARRIER AS REQUIRED.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TOP SOIL SEGREGATION (3)

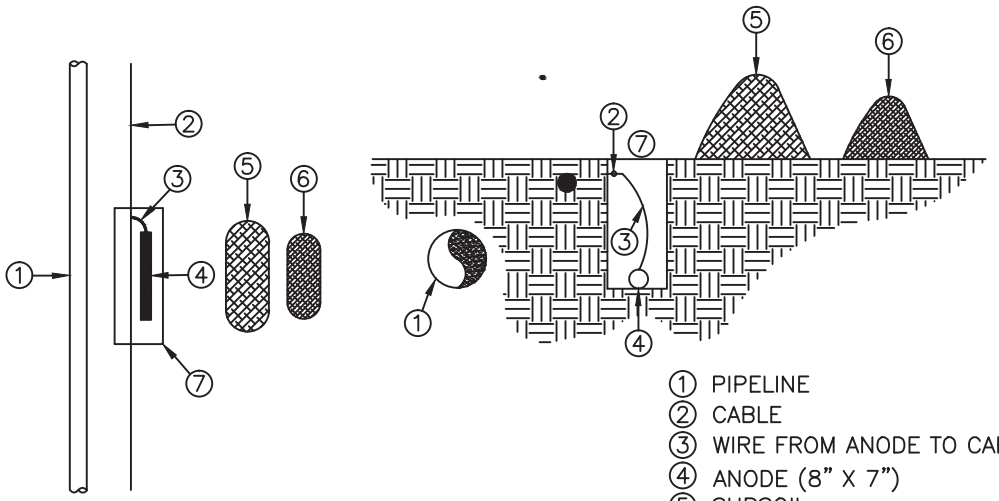
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 53

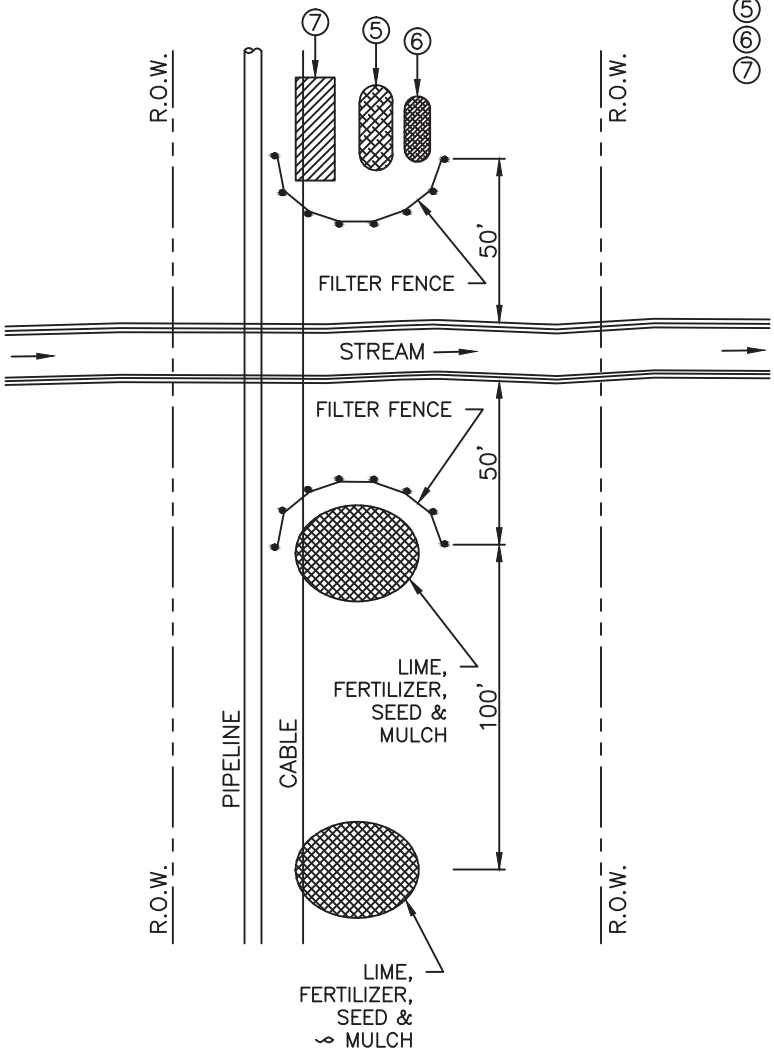
Sheet: 53 of 127

Type:

TYPICAL ANODE INSTALLATION



1. PIPELINE
2. CABLE
3. WIRE FROM ANODE TO CABLE
4. ANODE (8" X 7")
5. SUBSOIL
6. TOPSOIL
7. OPENING (4'W X 10'L X 5'D)



NOTES:

1. ANODES INSTALLED A MINIMUM OF 50' FROM EDGE OF WATER

2. INSTALL FILTER FENCE ACROSS THE DISTURBED AREAS AT ANODE INSTALLATIONS ADJACENT TO STREAMS.

3. LIME, FERTILIZER, SEED AND MULCH IMMEDIATELY AFTER BACKFILLING AS APPROVED BY THE EI OR LOCAL PERMITTING AGENCY. ALL DISTURBED AREAS WITHIN 50' OF THE TOP OF BANK WILL BE STABILIZED. LIME AND FERTILIZER SHALL NOT BE USED WITHIN WETLANDS OR WATERBODIES UNLESS APPROVED AS ABOVE.

4. PLACEMENT OF EROSION CONTROLS WILL BE ADJUSTED AS NECESSARY TO PREVENT THE TRANSPORTATION OF SEDIMENT INTO WETLANDS AND/OR WATERBOSIES

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

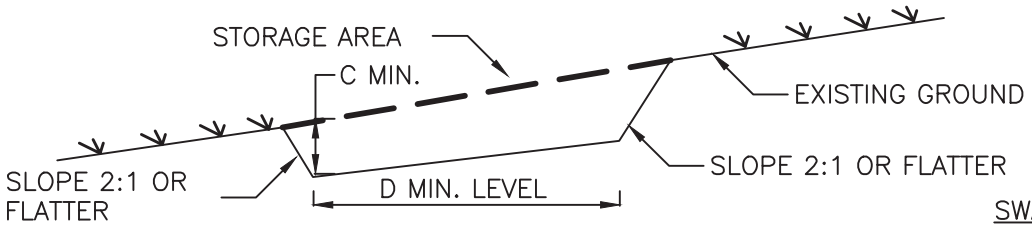
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
CATHODIC PROTECTION
ANODE INSTALLATION

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 54

Sheet: 54 of 127
Type:

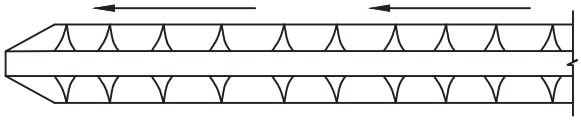


CROSS SECTION

	SWALE A	SWALE B
C	1'	1'
D	4'	6'

POSITIVE DRAINAGE: 0.5% OR STEEPER DEPENDENT ON TOPOGRAPHY

OUTLET AS REQUIRED
SEE ITEM 8 BELOW.



PLAN VIEW

CONSTRUCTION SPECIFICATIONS

1. ALL TEMPORARY SWALES SHALL HAVE UNINTERUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON–EROSIVE VELOCITY.
4. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE SWALE.
5. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
6. FILLS SHALL BE COMPACTED BY EARTH MOVING EQUIPMENT.
7. ALL EARTH REMOVED AND NOT NEEDED FOR CONSTRUCTION SHALL BE PLACED SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE SWALE.
8. STABILIZATION SHALL BE AS PER THE FLOW CHANNEL STABILIZATION CHART BELOW:

TYPE OF TREATMENT	CHANNEL GRADE	A(5 AC. OR LESS)	B(5 AC –10AC)
1	0.5–3.0%	SEED AND STRAW MULCH	SEED AND STRAW MULCH
2	3.1–5.0%	SEED AND STRAW MULCH	SEED USING JUTE OR EXCELSIOR
3	5.1–8.0%	SEED WITH JUTE OR EXCELSIOR, SOD	LINED WITH 4–8" RIP–RAP OR RECYCLED CONCRETE EQUIVALENT
4	8.1–20.%	LINED WITH 4–8" RIP–RAP	ENGINEERED DESIGN

9. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

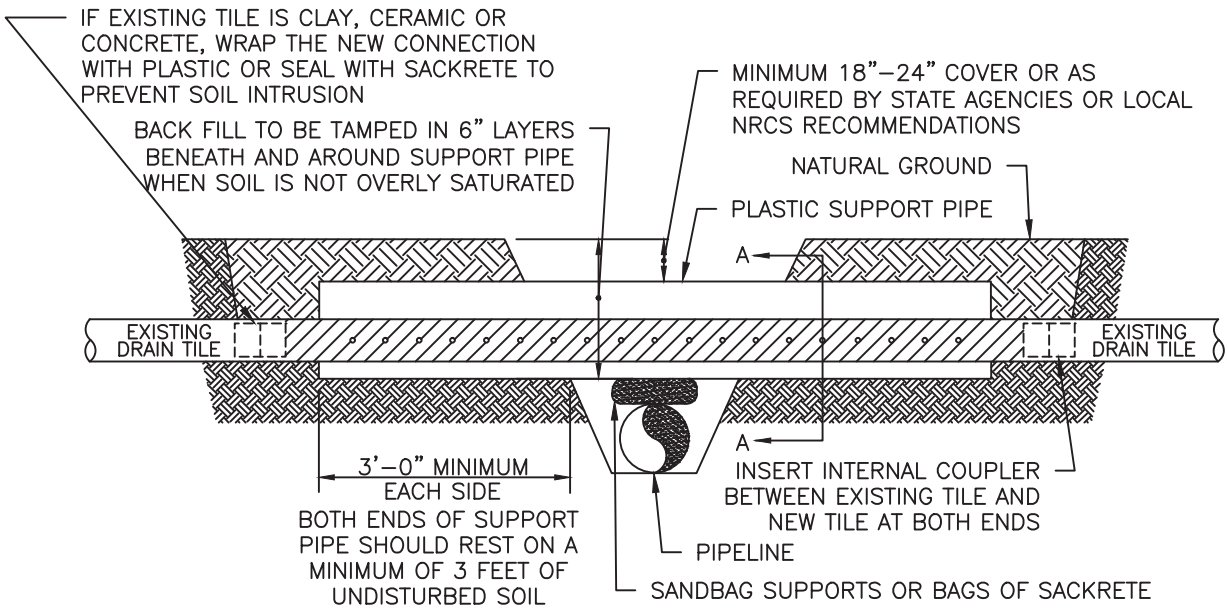
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TEMPORARY SWALE

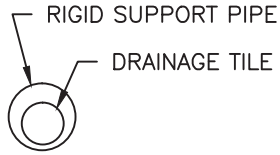
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 55

Sheet: 55 of 127
Type:

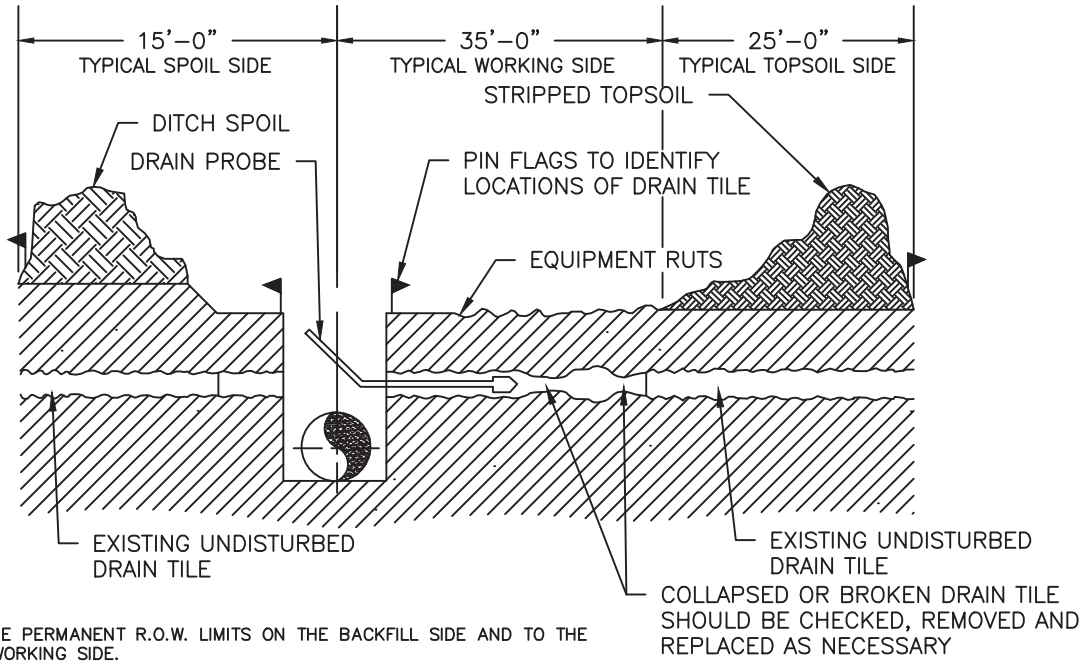


DRAINAGE TILE	SUPPORT SIZE
3" TO 5"	6" PIPE
6"	8" PIPE
7" TO 8"	10" PIPE
9" TO 10"	12" PIPE
12"	W12 X 14
15" TO 18"	W16 X 26
OVER 18"	W18 X 46



SECTION A–A
FOR UP TO 10" DRAIN TILE

NOTES:
1. SUPPORT PIPE TO BE OF 0.250" WALL THICKNESS OR HEAVIER. WHERE THE SUPPORT PIPE IS OVER 30" IN LENGTH OR IN SATURATED AREAS. PERFORATIONS TO THE SUPPORT PIPE MAY BE REQUESTED.
2. REPLACEMENT TILE TO BE HEAVY DUTY HIGHWAY GRADE PERFORATED PLASTIC DRAIN TUBING (ADS TYPE N–12) CONFORMING TO THE AASHTO M.252 SPECIFICATION.
3. IF THE TRENCH WIDTH EXCEEDS 10 FEET, SUFFICIENT STABILITY SHALL BE PROVIDED TO THE SUPPORT PIPE TO PREVENT SAGGING.



NOTES:
1. CLEAN OUT DRAIN TILES TO THE PERMANENT R.O.W. LIMITS ON THE BACKFILL SIDE AND TO THE TEMPORARY R.O.W. LIMIT ON THE WORKING SIDE.

2. REPLACE DAMAGED TILES AND REPAIR TILES AND JOINTS THAT REQUIRE WORK AND ARE WITHIN THE AREAS OF CONSTRUCTION ACTIVITIES.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

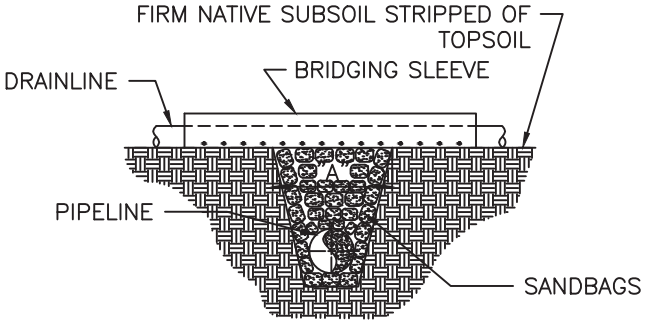
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL DRAIN TILE REPAIR ACROSS TRENCH (1)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

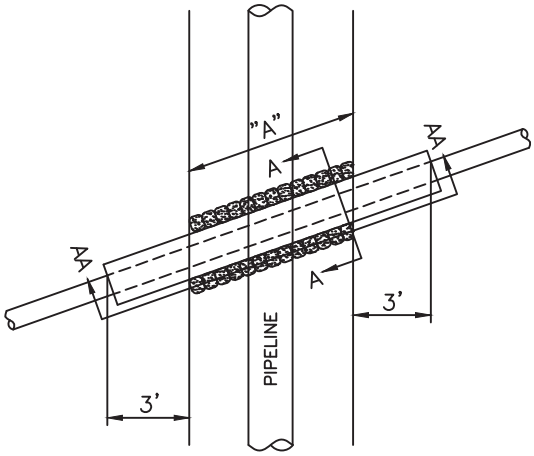
FIG. NO. 56

Sheet: 56 of 127
Type:

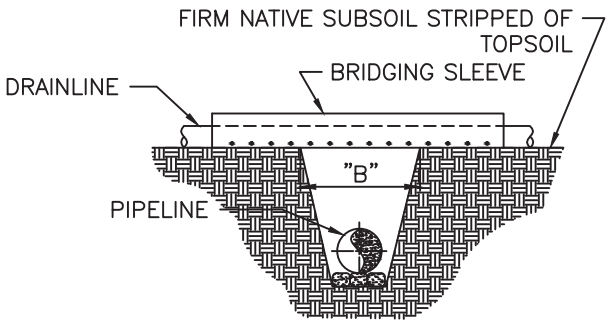


IF DISTANCE "A" EXCEEDS 10 FEET, THE SCHEDULE 80 PERFORATED BRIDGING–SLEEVE REQUIRES A MODIFIED SANDBAG TRENCH BREAKER UNDER THE BRIDGING SLEEVE.

SECTION AA-AA

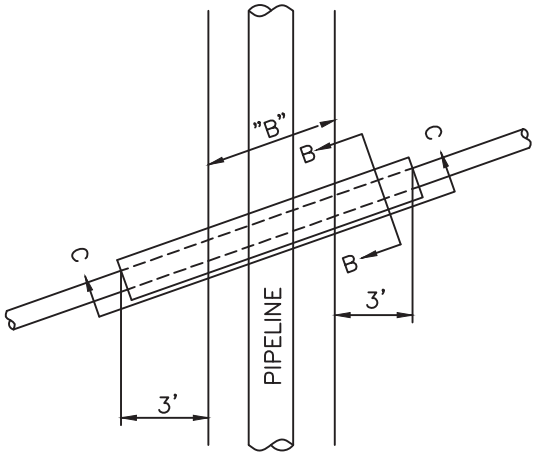


PLAN VIEW

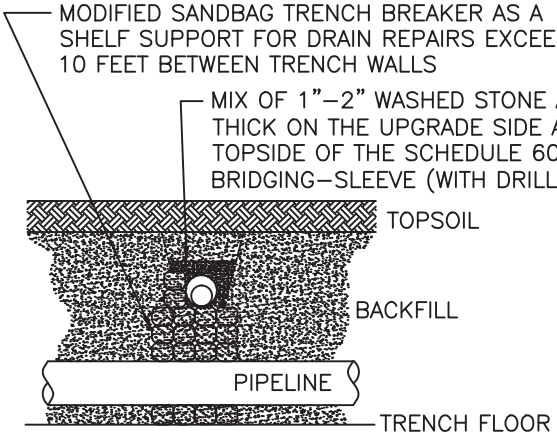


IF DISTANCE "B" DOES NOT EXCEED 10 FEET, THE SCHEDULE 80 PERFORATED BRIDGING–SLEEVE DOES NOT REQUIRE SUPPORT UNDER THE BRIDGING–SLEEVE.

SECTION C-C



PLAN VIEW



CROSS SECTION "B–B" IS THE SAME AS CROSS SECTION "A–A", MINUS THE SAND BAG TRENCH BREAKER. MINIMUM OF 1"–2" WASHED STONE, 4"–6" THICK UNDERNEATH,TO BE PLACED AROUND THE SIDES AND OVER TOP OF THE BRIDGING SLEEVE.

THE BRIDGING–SLEEVE DRAIN REPAIR RESTS ON THE UPGRADIENT SIDE OF THE MODIFIED SANDBAG TRENCH BREAKER. THE HIGHER PORTION OF THE TRENCH BREAKER IS ON THE DOWN GRADIENT SIDE OF THE REPAIR.

NOTE:

1.IF THE REPAIR OF THE SEVERED DRAINLINE CROSSES THE PIPELINE TRENCH AT AN ANGLE REQUIRING MORE THAN 20' OF BRIDGING–SLEEVE BETWEEN THE FARTHEST ENDS OF THE FIRM SHELVES, MODIFY THE CROSSING ANGLE TO SHORTEN THE TOTAL LENGTH OF THE CROSSING AND THEN TIE TO THE EXISTING DRAIN TILE.

2. ALL DRAIN TILE REPAIRS CONSISTING OF PLASTIC PIPE SHALL CONFORM TO THE AASHTO M.252 SPECIFICATION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

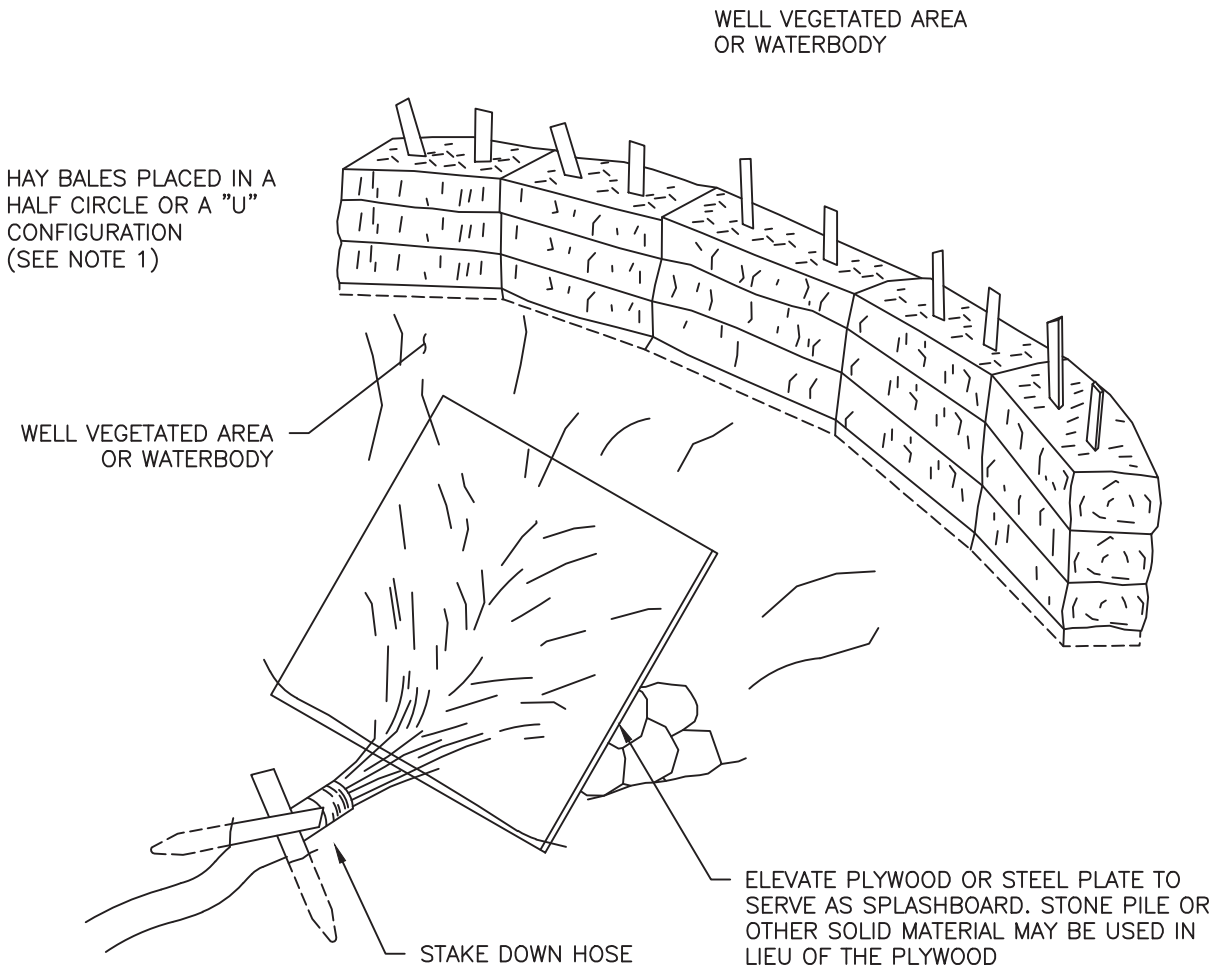
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL DRAIN TILE REPAIR ACROSS TRENCH (2)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 57

Sheet: 57 of 127
Type:



USED FOR TRENCH DE–WATERING AND DAM AND PUMP
WATERBODY CROSSINGS

NOTE:

1. THIS DISSIPATER MAY BE USED WITHIN A WATERBODY DURING A DAM AND PUMP DEWATERING OPERATION. THE HAYBALES WILL NOT BE INSTALLED IF UTILIZED IN A WATERBODY.
2. THIS SHALL NOT BE USED WHEN TRENCH DEWATERING IS REQUIRED AND THERE IS SILT LADEN WATER THAT WILL DISCHARGE DIRECTLY INTO A WETLAND OR WATERBODY.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

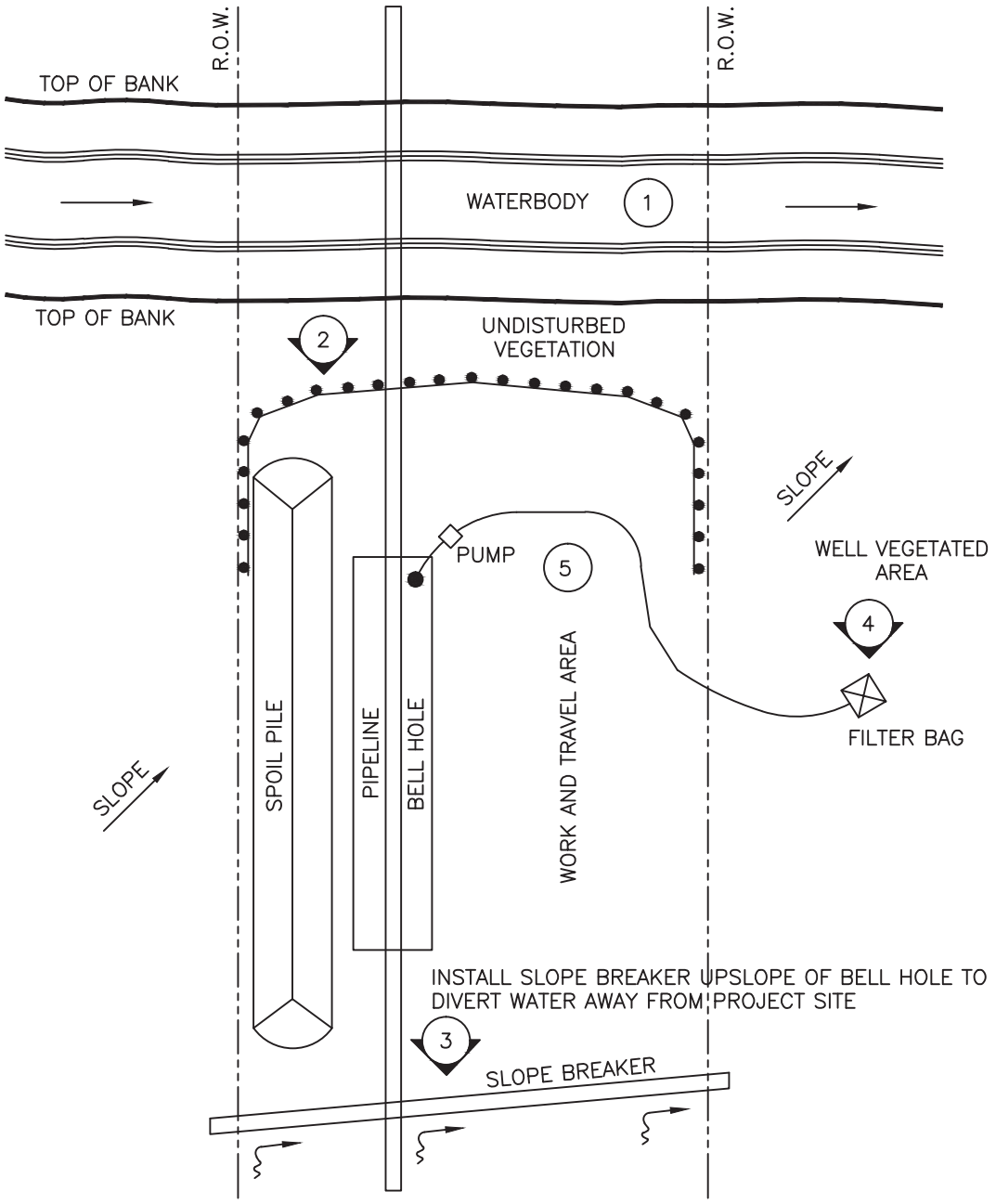
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
ENERGY DISSIPATER

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 58

Sheet: 58 of 127
Type:



1. (IF NEEDED) EQUIPMENT CROSSING, SEE CROSSING DETAILS FOR PROPER INSTALLATION
2. SEDIMENT BARRIER
3. SLOPE BREAKER
4. BELL HOLE DEWATERING OUTLET, SEE TRENCH DEWATERING DETAILS FOR PROPER METHODOLOGY
5. LIME, FERTILIZE, SEE AND MULCH ALL DISTURBED AREAS IMMEDIATELY AFTER BACKFILLING AS APPROVED BY THE EI OR LOCAL PERMITTING AGENCY. LIME AND FERTILIZER SHALL NOT BE USED WITHIN WETLANDS OR WATERBODIES UNLESS APPROVED AS NOTED ABOVE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

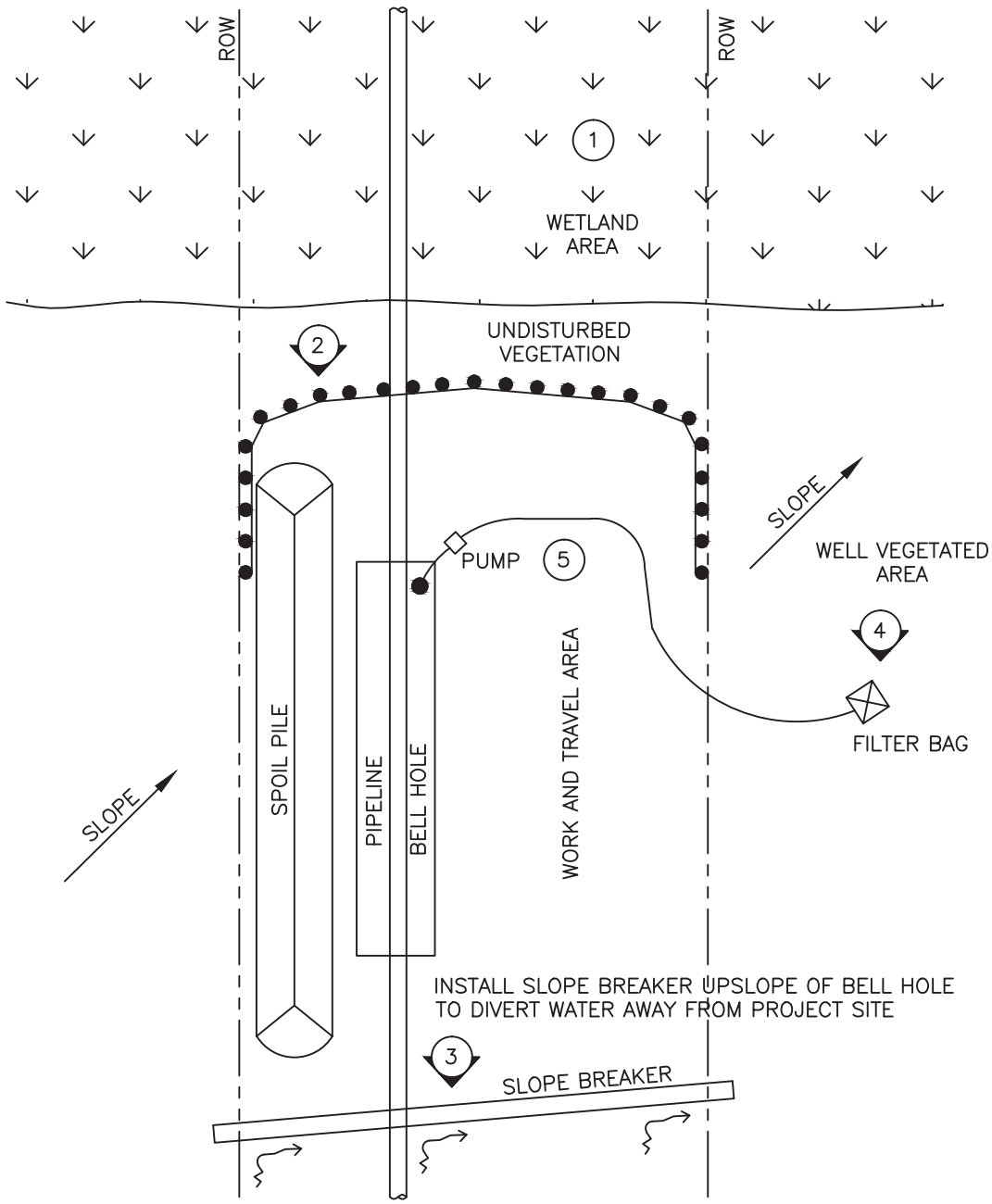
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
BELL HOLE NEXT TO WATERBODY

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 59

Sheet: 59 of 127
Type:



1. (IF NEEDED) EQUIPMENT CROSSING, SEE CROSSING DETAILS FOR PROPER INSTALLATION
2. SEDIMENT BARRIER
3. SLOPE BREAKER
4. BELL HOLE DEWATERING OUTLET, SEE TRENCH DEWATERING DETAILS FOR PROPER METHODOLOGY
5. LIME, FERTILIZE, SEED AND MULCH ALL DISTURBED AREAS IMMEDIATELY AFTER BACKFILLING AS APPROVED BY RGE EI OR LOCAL PERMITTING AGENCY. LIME AND FERTILIZER SHALL NOT BE USED WITHIN WETLANDS OR WATERBODIES UNLESS APPROVED AS NOTED ABOVE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
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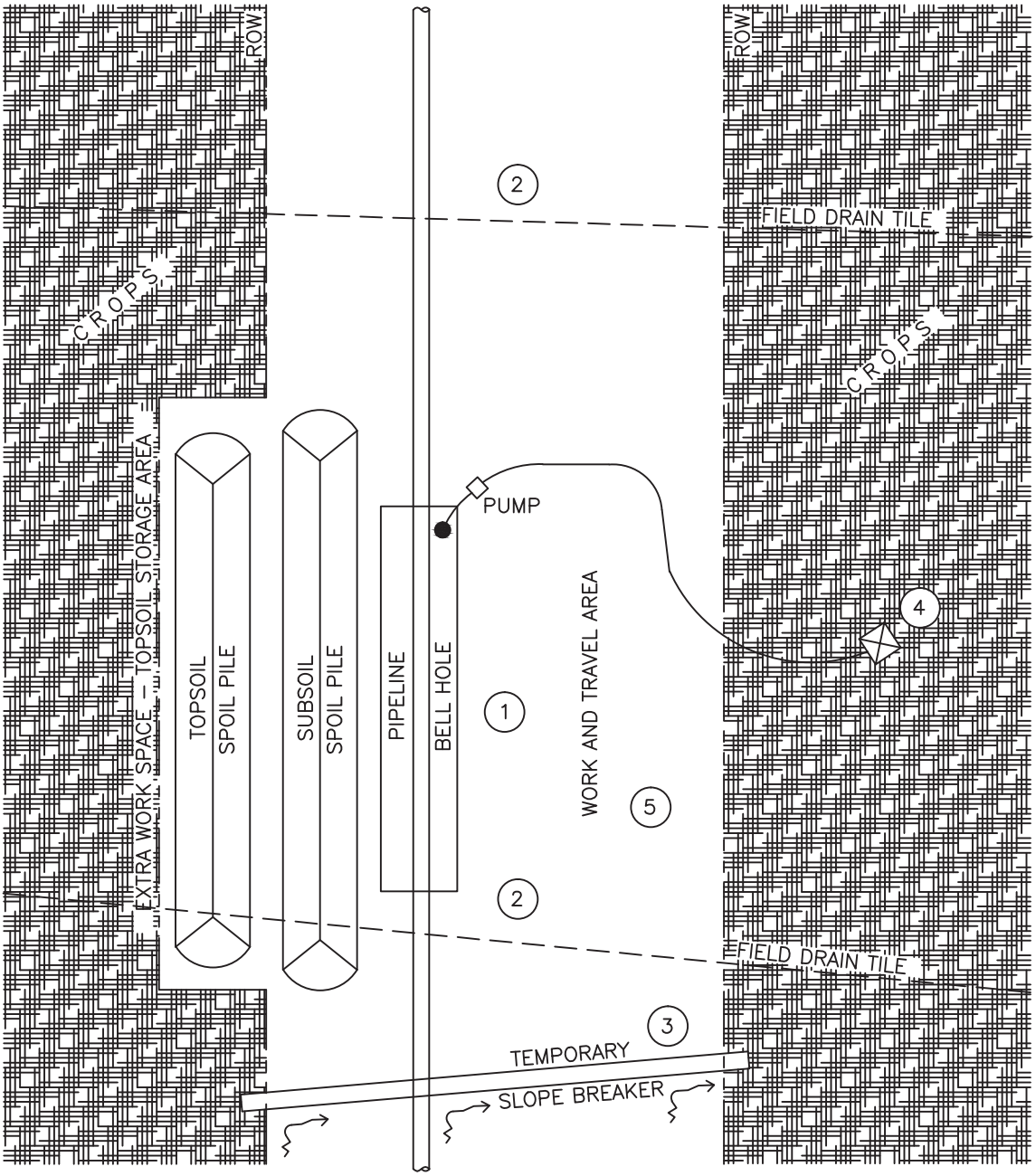
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
BELL HOLE NEXT TO WETLAND

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 60

Sheet: 60 of 127
Type:



1. FULL RIGHT OF WAY TOPSOIL SEGREGATION
2. DRAIN TILE, REPAIR AS REQUIRED.
3. (IF NEEDED) TEMPORARY SLOPE BREAKER
4. BELL HOLE DEWATERING OUTLET, SEE TRENCH DEWATERING DETAILS FOR PROPER METHODOLOGY
5. SOIL COMPACTION MITIGATION, SEE DECOMPACTION PLAN FOR PROPER PROCEDURE

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

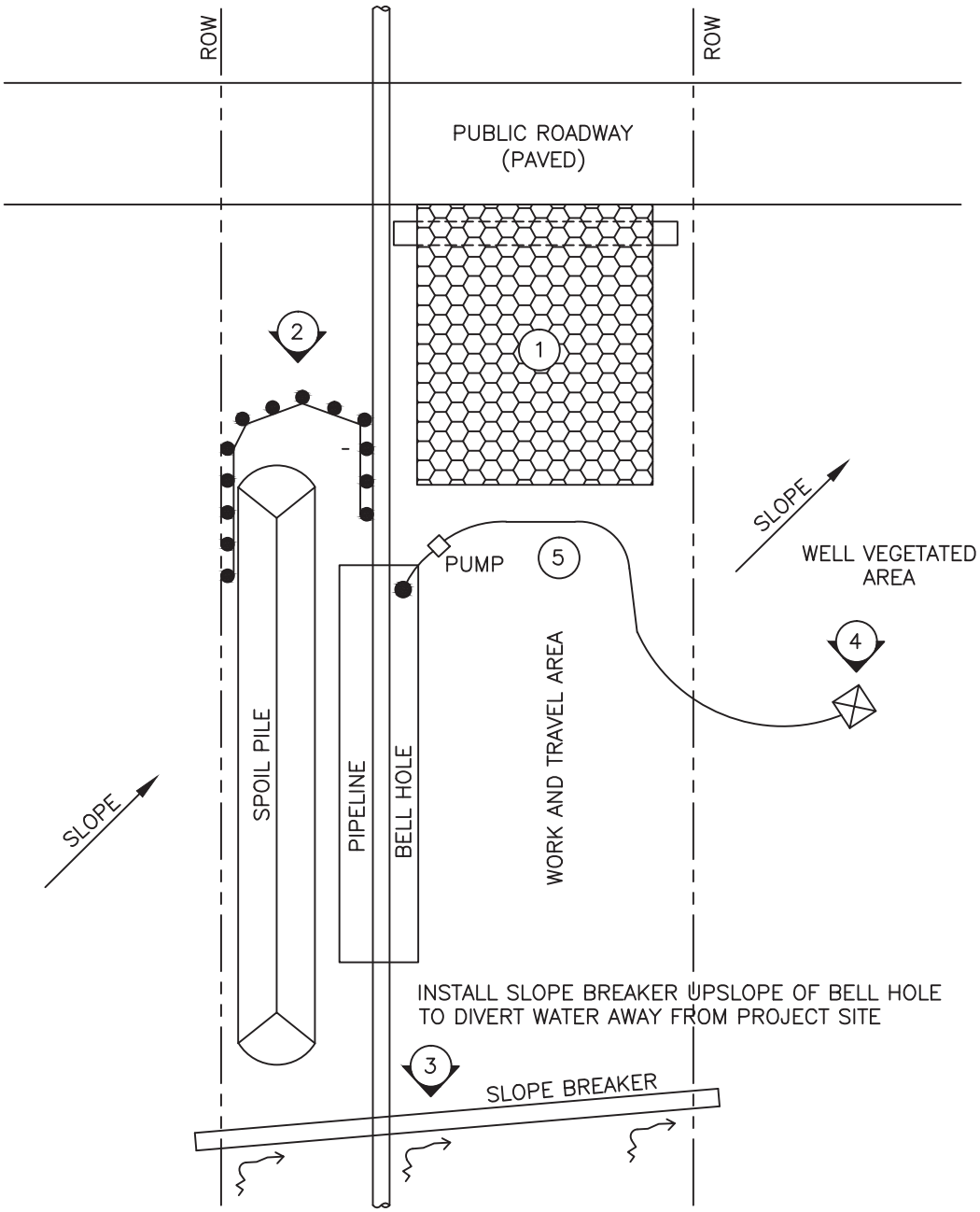
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
BELL HOLE NEXT TO
AGRICULTURAL FIELD

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 61

Sheet: 61 of 127
Type:



1. CONSTRUCTION ENTRANCE
2. SEDIMENT BARRIER
3. SLOPE BREAKER
4. BELL HOLE DEWATERING OUTLET, SEE TRENCH DEWATERING DETAILS FOR PROPER METHODOLOGY
5. LIME, FERTILIZE, SEED AND MULCH ALL DISTURBED AREAS IMMEDIATELY AFTER BACKFILLING

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

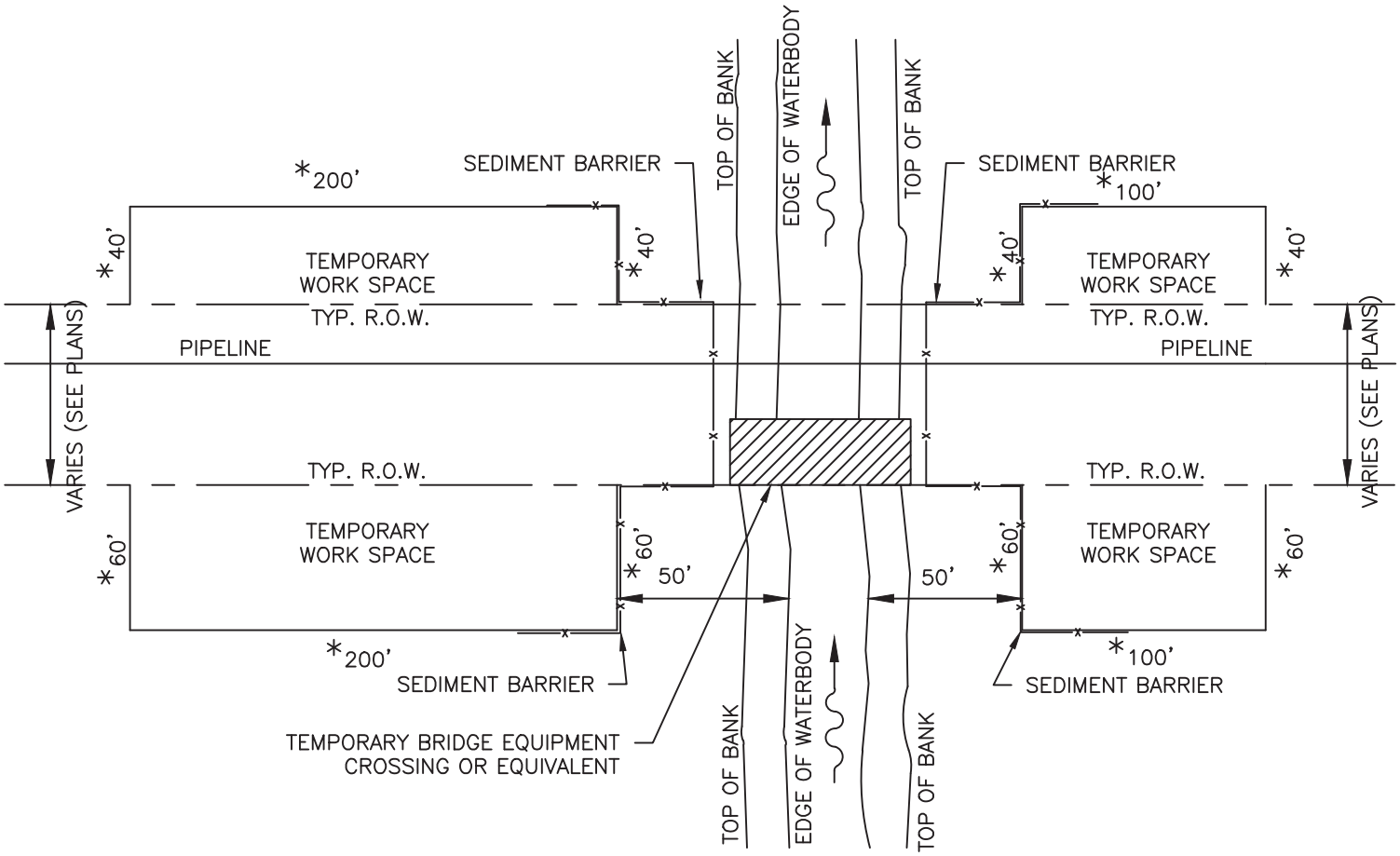
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
BELL HOLE NEXT TO
PUBLIC ROADWAY

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 62

Sheet: 62 of 127
Type:



* FOOTAGES SHOWN ARE FOR EXAMPLE PURPOSES ONLY. ACTUAL EXTRA WORK SPACE AREAS WILL VARY DEPENDING ON INDIVIDUAL PROJECTS.

NOTES:

1) ALL EXTRA WORK SPACES SHALL BE LOCATED AT LEAST 50 FEET FROM THE WATERS EDGE, EXCEPT WHERE THE ADJACENT UPLAND CONSISTS OF ACTIVELY CULTIVATED OR ROTATED CROPLAND OR OTHER DISTURBED LAND.
2) THE CONSTRUCTION ROW SHALL BE LIMITED TO 75 FT WIDE WITHIN 50 FT FROM THE WATERS EDGE UNLESS APPROVED OTHERWISE ON THE CERTIFICATE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

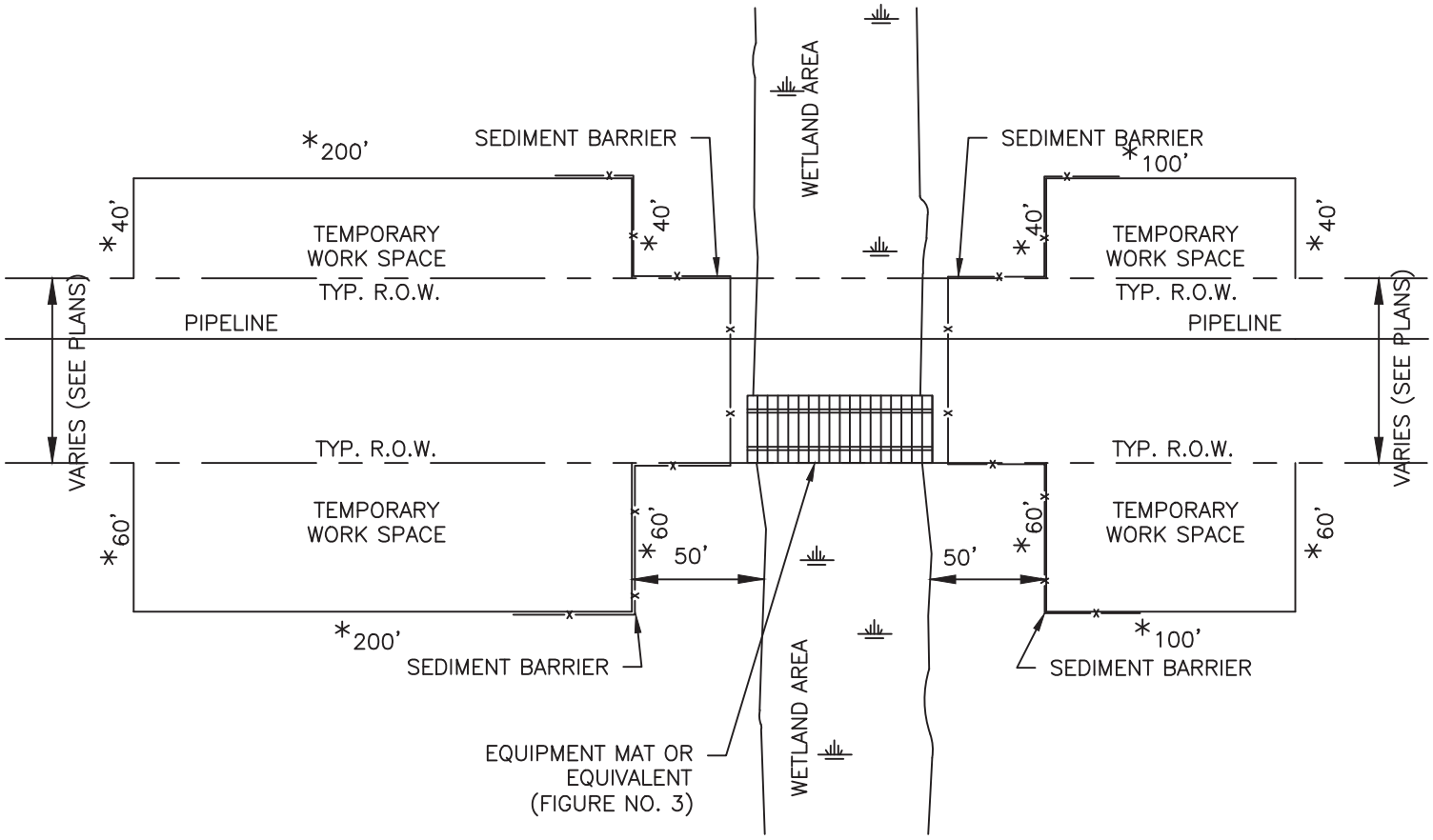
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL EXTRA WORK SPACES AT WATERBODY CROSSINGS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 63

Sheet: 63 of 127
Type:



* FOOTAGES SHOWN ARE FOR EXAMPLE PURPOSES ONLY. ACTUAL EXTRA WORK SPACE AREAS WILL VARY DEPENDING ON INDIVIDUAL PROJECTS.

NOTES:

1) ALL EXTRA WORK SPACES SHALL BE LOCATED AT LEAST 50 FEET FROM THE EDGE OF WETLAND, EXCEPT WHERE THE ADJACENT UPLAND CONSISTS OF ACTIVELY CULTIVATED OR ROTATED CROPLAND OR OTHER DISTURBED LAND.
2) THE CONSTRUCTION ROW SHALL BE LIMITED TO 75 FT WIDE WITHIN 50 FT FROM THE EDGE OF WETLANDS UNLESS APPROVED OTHERWISE ON THE CERTIFICATE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

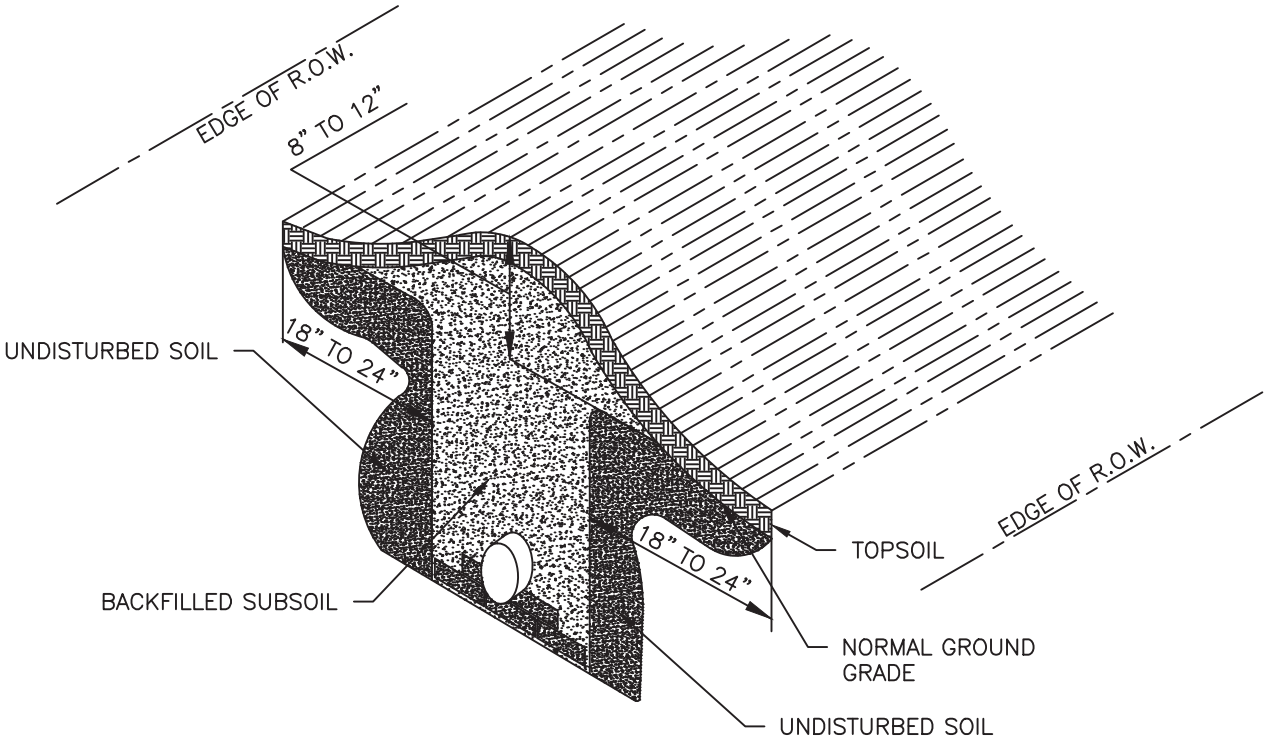
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL EXTRA WORK SPACES AT WETLAND CROSSINGS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 64

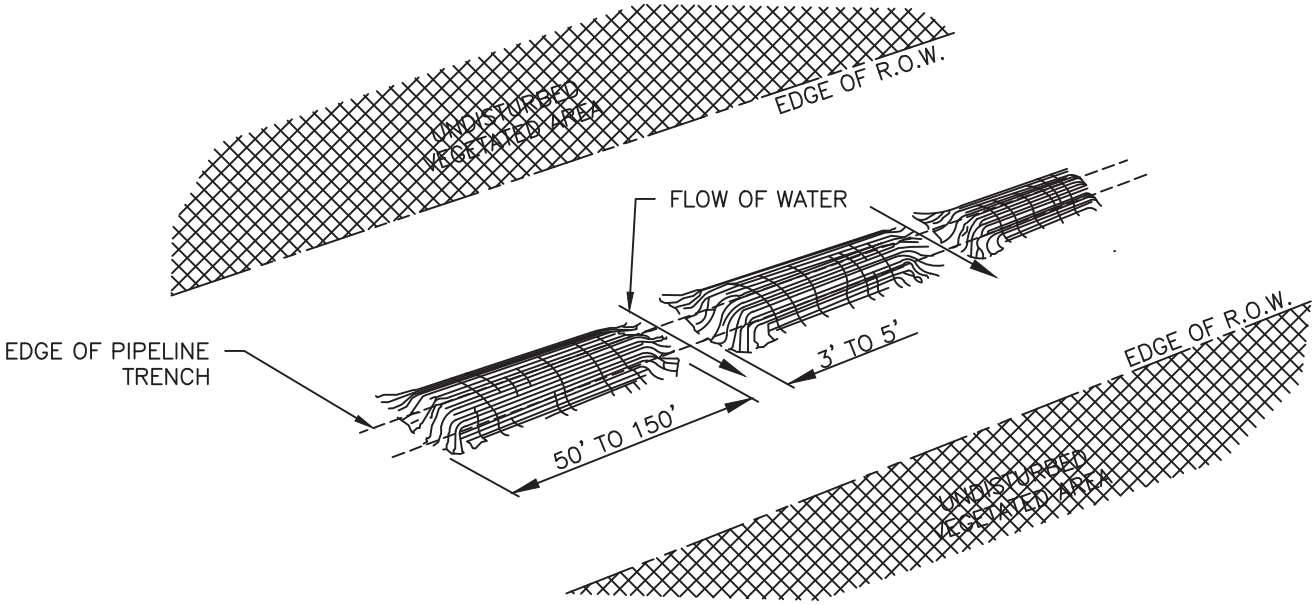
Sheet: 64 of 127
Type:

CREST OF BACKFILL TO BE 8" TO 12" HIGH OVER CENTER LINE OF TRENCH AND FEATHERED OUT TO ZERO 18" TO 24" FROM TRENCH WALL



ISOMETRIC SECTION

N.T.S.



ISOMETRIC VIEW

N.T.S.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

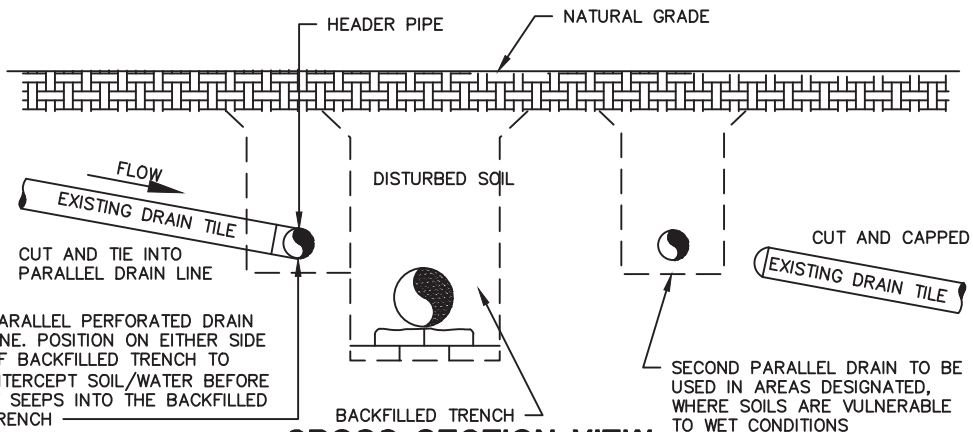
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
RIGHT–OF–WAY CROWNING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 65

Sheet: 65 of 127

Type:

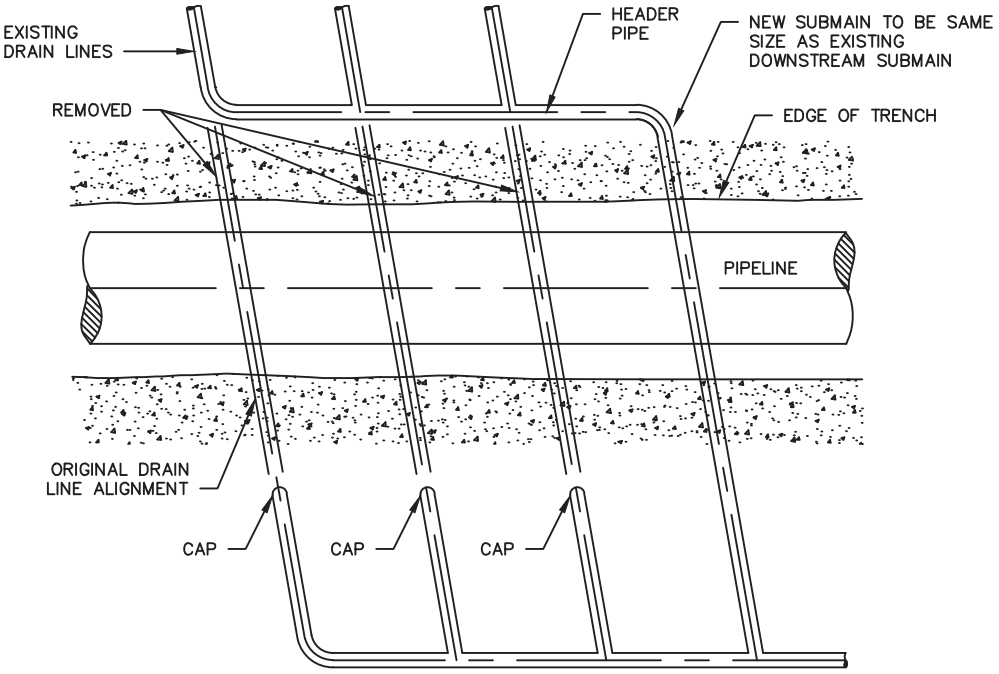


CROSS SECTION VIEW

N.T.S.

NOTE:

1. PARALLEL DRAINAGE TILE INSTALLATION TO BE APPROVED FOR SITE SPECIFIC AGRICULTURAL SOILS WHERE REPAIR OF EXISTING CROSS TILES WOULD BE LESS EFFECTIVE FOR EXAMPLE:
   A. SHALLOW BEDROCK.
   B. INTERFERENCE BY OTHER UTILITY LINES.
   C. HEADER TO CLOSELY SPACED, SHALLOW TILES AND FRENCH DRAINS.



PLAN VIEW TILE SYSTEM WITH NEW SUBMAIN

N.T.S.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

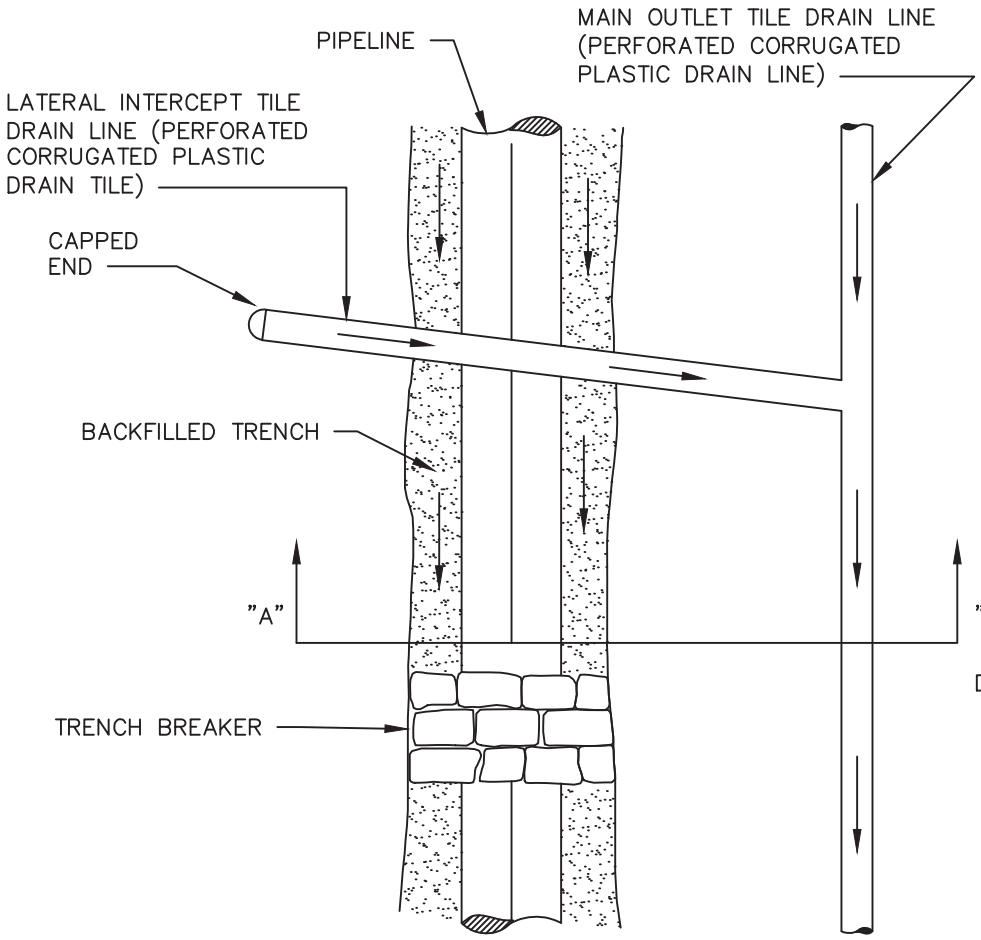
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
PARALLEL / NEW SUBMAIN
TILE INSTALLATION

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

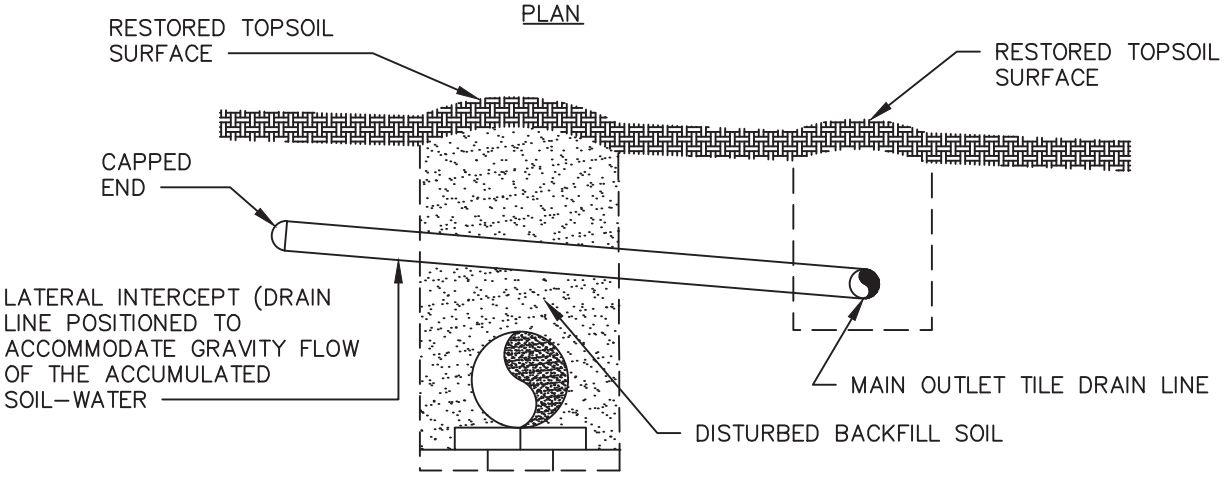
FIG. NO. 66

Sheet: 66 of 127

Type:



PLAN



PROFILE – SECTION "A"–"A"

NOTES:
1. TRENCH BREAKERS PREVENT GULLY EROSION WHILE THE TRENCH IS OPEN AND HELP INHIBIT WATER PIPING AND WATER BLOWOUTS DOWN THE COURSE OF THE PIPELINE AFTER BACKFILLING.
2. INTERCEPT DRAIN LINES ABSORB THE WATER WHICH DRAIN NATURALLY FROM THE UNDISTURBED SOIL PROFILE INTO THE DISTURBED BACKFILL SOIL MATERIAL OF THE TRENCH. THE INTERCEPT DRAIN LINES HELP PREVENT SATURATED SOIL CONDITIONS.
3. AGRICULTUTRAL CROPLAND MAY REQUIRE CROSS TRENCH DRAINAGE OR PARALLEL DRAINAGE.
4. ALL DRAIN TILE REPAIRS CONSISTING OF PLASTIC PIPE SHALL CONFORM TO THE AASHTO M.252 SPECIFICATION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

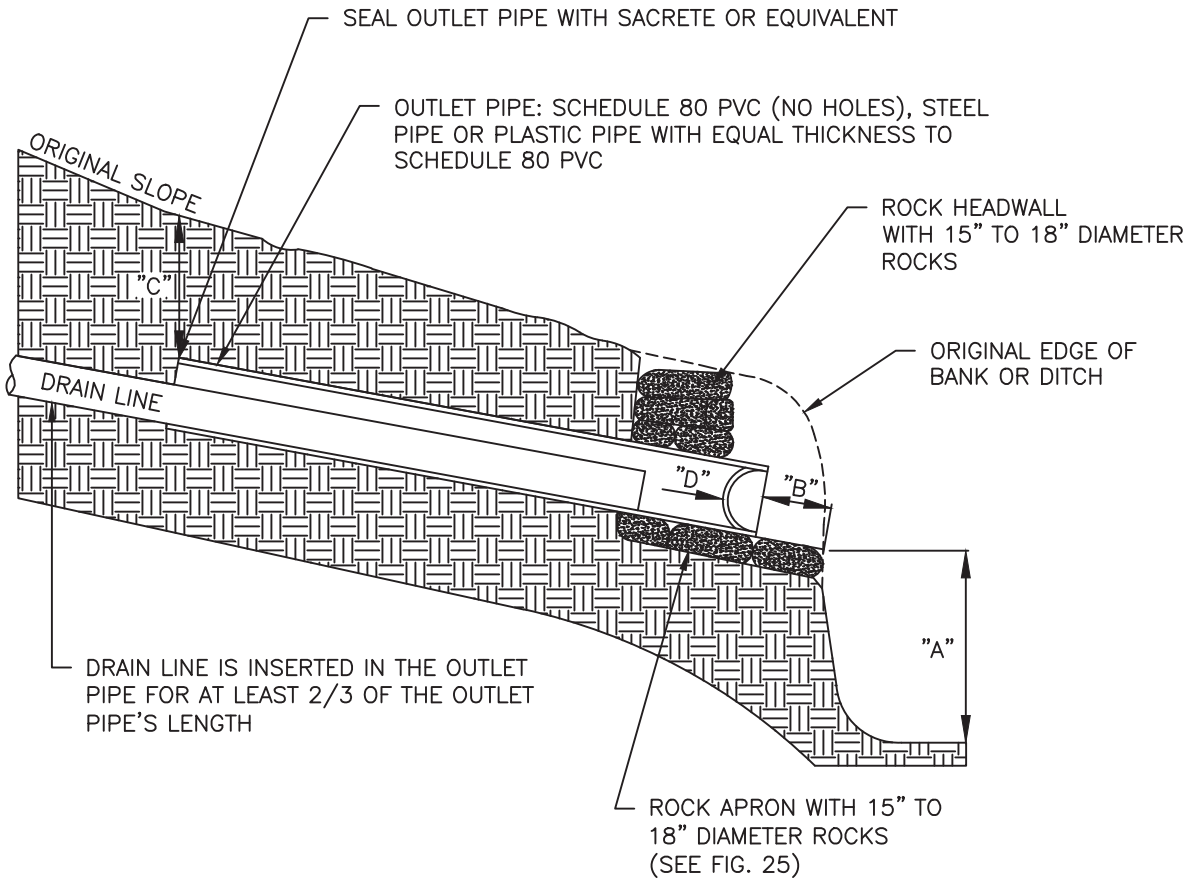
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
LATERAL INTERCEPT DRAIN

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 67

Sheet: 67 of 127
Type:



"A" – THE FREE DROP OR OUTFALL DISTANCE OF THE DRAINAGE WATER TO ITS UNRESTRICTED (FREE) DAYLIGHT OUTLET. GUIDELINE IS 2 FEET BUT NOT LESS THAN 1 FOOT WITHOUT SPECIAL DESIGN APPROVAL.

"B" – THE RECESS BACK FROM THE EDGE OF THE BANK OR DITCH OR OTHER POINT OF DAYLIGHT. GUIDELINE IS 2 FEET RECESSED BACK TO AVOID FUTURE DAMAGE.

"C" – THE MINIMUM DEPTH OF COVER OVER THE DRAIN LINE AT WHICH THE OUTLET PIPE MUST BEGIN. THE MINIMUM IS 2 FEET.

"D" – AN INTERNALLY HINGED ANIMAL (RODENT) GUARD. BOLTED FROM THE OUTSIDE. MOUNT THE GUARD 4"–6" BACK INSIDE THE OUTLET PIPE.

NOTE:
ALL DRAIN TILE REPAIRS CONSISTING OF PLASTIC PIPE SHALL CONFORM TO THE AASHTO M.252 SPECIFICATION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

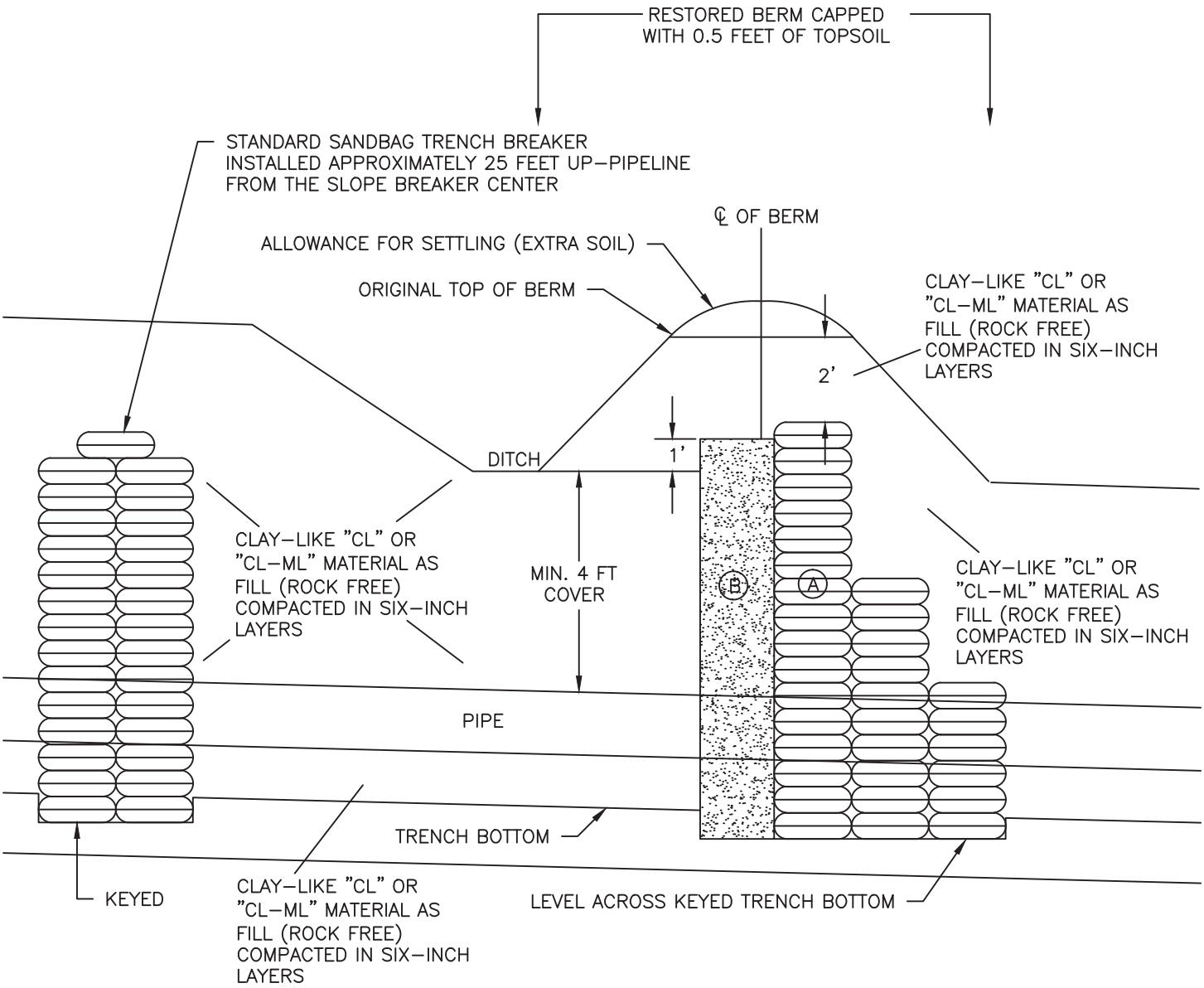
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL DRAIN TILE OUTLET

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 68

Sheet: 68 of 127
Type:



NOTES:

1. ALL CLAY–LIKE "CL" OR "CL–ML" MATERIAL USED FOR SLOPE BREAKER RE–ENGINEERED REPAIR / RECONSTRUCTION WILL BE VERIFIED BY THE INSPECTOR TO ENSURE THE MATERIAL IS ROCK–FREE (NO STONES / ROCKS LARGER THAN 3–4 INCHES IN DIAMETER), AND DOES NOT CONTAIN ANY TOPSOIL NOR OTHER ORGANIC MATERIALS (E.G. CLUMPS OF SOD, TREE AND BRUSH ROOTS). THE CLAY–LIKE "CL" OR "CL–ML" MATERIAL SHALL BE COMPACTED AT ALL AREAS IN SIX–INCH LIFTS WHEN THE MATERIAL IS MOIST, NOT WET NOR DRY. THE MAJORITY OF COMPACTION SHALL BE ACHIEVED INSIDE THE TRENCH ZONE WITH A VIBRATORY JUMPER COMPACTION, AND MAY INCLUDE FINAL SURFACE COMPACTION OF BERM WITH A SHEEPSFOOT ROLLER.

A. THE SANDBAG TRENCH BREAKER SHALL BE SNUGLY EMPLACED WITH 3 BAGS ACROSS THE BOTTOM WIDTH AS WELL AS AROUND THE PIPE AND OTHER LOWER LAYERS TO MID–LEVEL, 2 BAGS WIDTH ABOVE MID–LEVEL, AND 1 BAG WIDTH ACROSS UPPER SECTION.

B. CONCRETE–GRADE SAND APPLIED IN SIX–INCH LIFTS, EACH LIFT COMPACTED WITH A VIBRATORY JUMPER–COMPACTION (E.G. WACKER WITH AN 8" X 10" COMPACTOR PAD). MINIMUM WIDTH OF THE SAND COLUMN IS TWO (2) FEET ACROSS FOR ENTIRE HEIGHT (BOTTOM TO TOP). THE SAND MATERIAL SHOULD BE COMPACTED WHEN MOIST BUT NOT WHEN DRY NOR WET.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

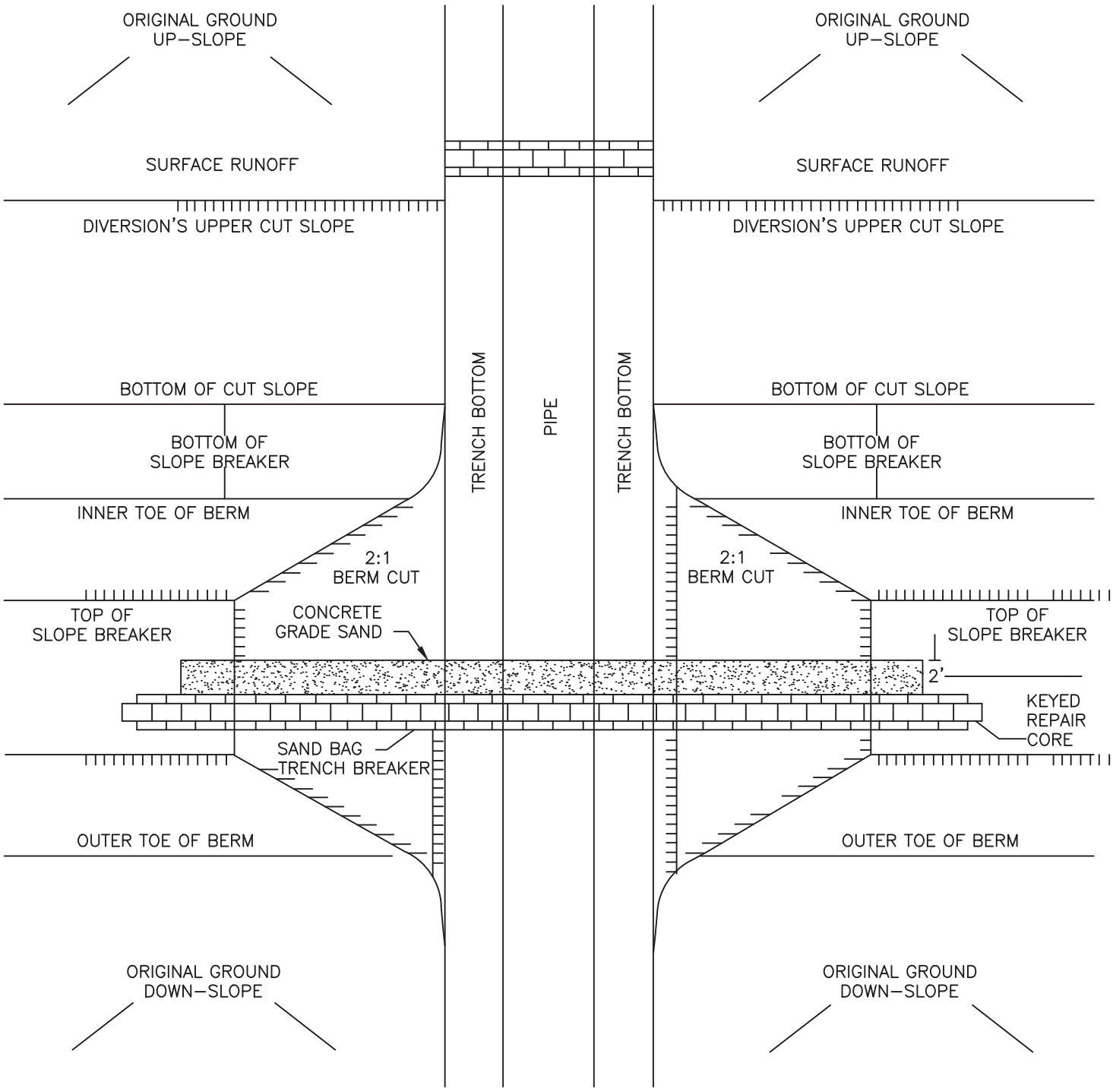
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SLOPE BREAKER (WATERBAR)
REPAIR (1)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 69

Sheet: 69 of 127
Type:



NOTES:

1. KEYED–BACK CORE REPAIR ORIGINAL BERM TEN FEET NOMINAL BEYOND THE 2:1 BERM CUT

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

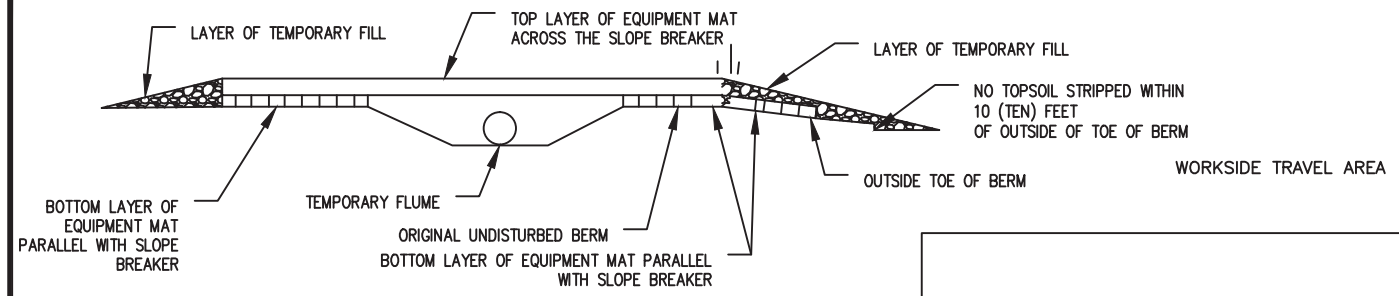
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SLOPE BREAKER (WATERBAR)
REPAIR (2)

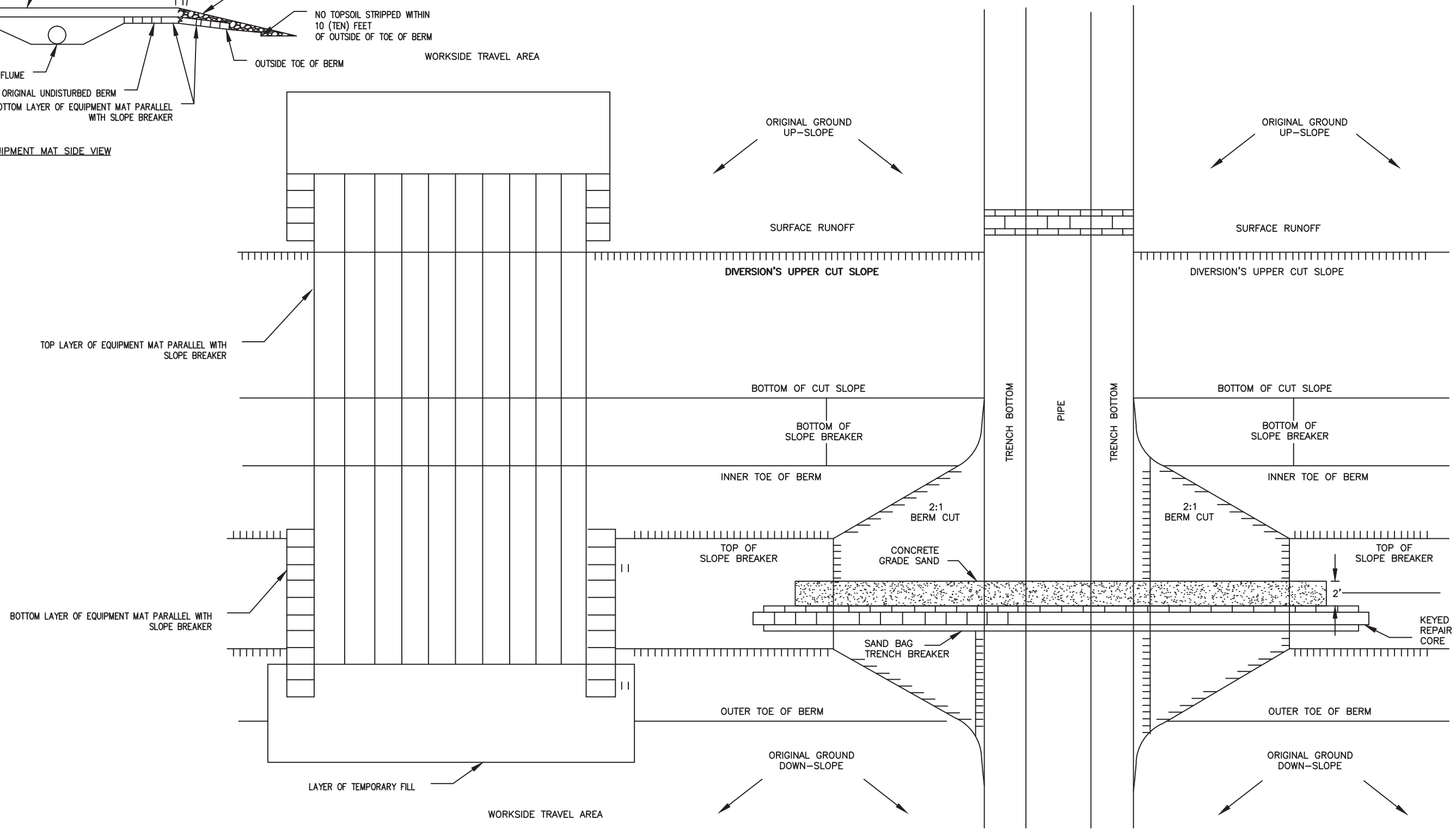
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 70

Sheet: 70 of 127
Type:



EQUIPMENT MAT SIDE VIEW



EQUIPMENT MAT TOP VIEW

NOTES:

1. THE ONLY PORTION OF DIVERSION TO BE DISTURBED IS THE PIPELINE TRENCH AND THE 2:1 BERM CUT, DURING CONSTRUCTION; AND THE BERM'S KEYED-IN REPAIR CORE DURING THE RECONSTRUCTION OF THE SLOPE BREAKER.
2. ALL OTHER ORIGINAL FEATURES OF THE DIVERSION TERRACE ARE PROTECTED THROUGHOUT THE RIGHT OF WAYS CONSTRUCTION AND RESTORATION STAGES OF WORK AND ACCESS BY TEMPORARY FILL LAYERS AND TIMBER BRIDGING.
3. A TEMPORARY FLUME WILL BE MAINTAINED UNTIL THE SLOPE BREAKER IS FULLY RECONSTRUCTED.
4. FILTER FENCE WILL BE INSTALLED AT THE UPSLOPE AND DOWNSLOPE SIDES OF THE SLOPE BREAKERS (AT THE LIMITS OF THE TOPSOIL STRIPPING) TO LIMIT ACCESS AND DISTURBANCE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area.:
State:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Scale:
Chk:	Date:	Filename:
Appr:	Date:	

TENNESSE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SLOPE BREAKER
(WATERBAR) PROTECTION

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 71

Sheet: 71 of 127
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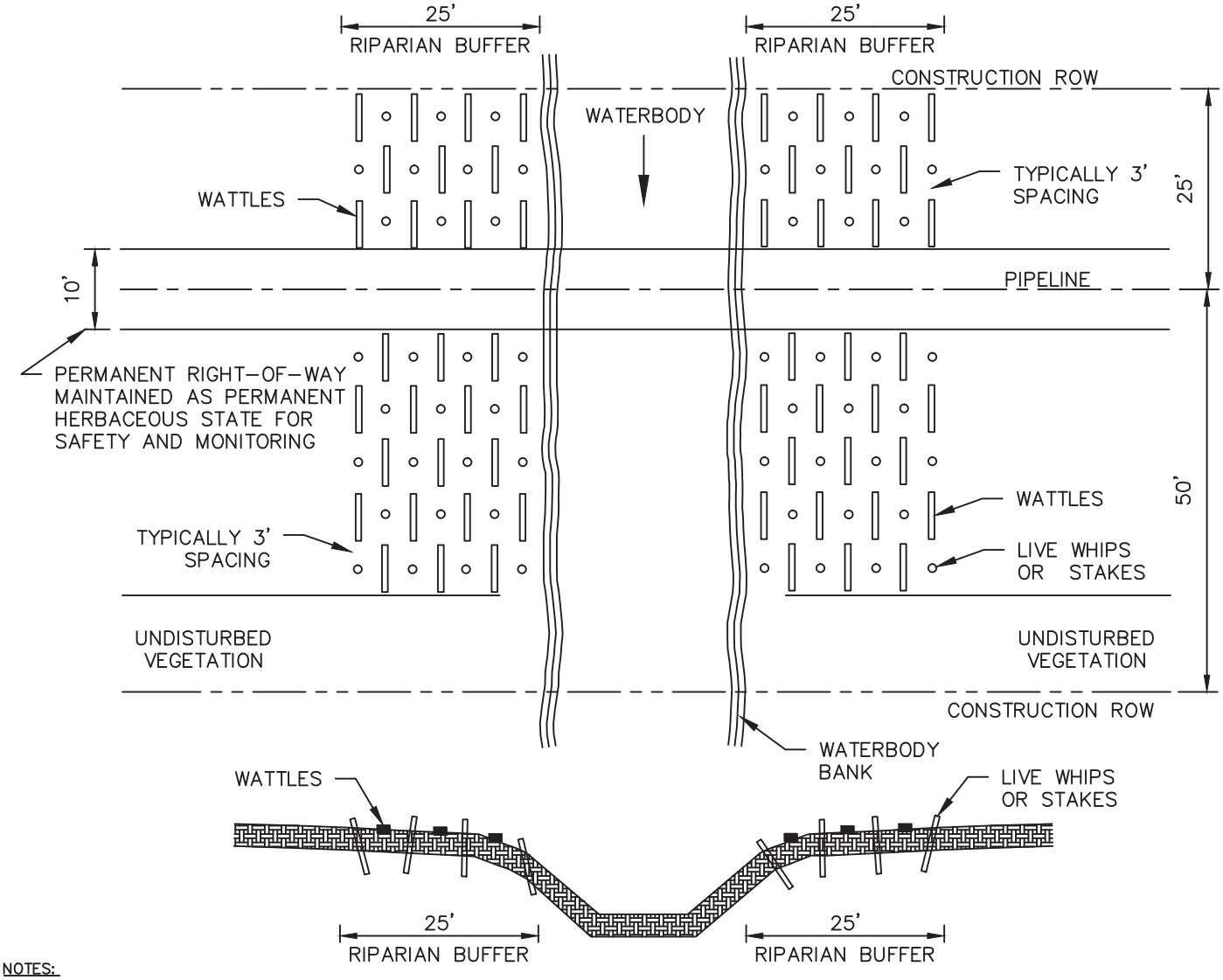
Sep 17, 2014 – 11:30AM



NOTES:

1. RESTORATION OF THE ROW SHALL INCLUDE PLANTING 25-FOOT RIPARIAN BUFFERS ALONG WATERBODIES WITH NATIVE PLANT SPECIES. RESTORATION OF CROSSINGS OF STATE DESIGNATED FISHERY WATERBODIES SHALL INCLUDE PLANTINGS OF NATIVE WOODY SPECIES TO RESTORE THE STREAM-SHADING CONDITIONS WITHIN A 25-FOOT RIPARIAN BUFFER.

2. SPACING OF WATTLE AND LIVE WHIP PLANTINGS ASSUMED TO BE APPROXIMATELY 3' IN A TRIANGLE PATTERN BASED ON NURSERY GUIDANCE AND VENDOR RECOMMENDATIONS. SPACING TO BE MODIFIED AS NEEDED BASED ON EACH SPECIFIC LOCATION CONDITION.

3. PLANTINGS SHALL BE PLACED WITHIN THE 25-FOOT RIPARIAN BUFFER AND OUTSIDE OF THE 10-FOOT MAINTAINED PERMANENT RIGHT-OF-WAY AS NEEDED. RIPARIAN BUFFER RESTORATION PLANTINGS SHALL NOT CONFLICT WITH EXISTING LAND USE OUTSIDE OF THE RIGHT-OF-WAY (E.G., AGRICULTURAL FIELDS).

4. PLANTINGS TO RESTORE THE STREAM-SHADING CONDITIONS SHALL INCLUDE NATIVE WOODY SPECIES, SUCH AS WILLOW (SALIX SPECIES) AND DOGWOOD (CORNUS SPECIES).

5. LIVE WHIPS ARE SLENDER, LIVE WOODY MATERIAL. THEY ARE GENERALLY 3/8"-1" DIAMETER. THEY ARE PUSHED INTO THE GROUND AS FAR AS THEY WILL GO, WITH AT LEAST TWO-THIRDS OF THE WHIP COVERED WITH SOIL. THEY CAN BE INSTALLED EITHER LAYING ON AN ANGLE OR ERECT IN THE SOIL. LIVE STAKES SHALL BE 1"-2" IN DIAMETER AND 2'-6' LONG DEPENDING ON THE APPLICATION. A MINIMUM OF 2"-4" OF LIVE STAKE SHALL BE EXPOSED AND SHALL INCLUDE TWO LIVE BUDS.

6. WATTLES ARE LIVING BRANCHES BOUND TOGETHER IN LONG, TUBULAR BUNDLES. THEY ARE PLACED IN SHALLOW TRENCHES ACROSS THE SLOPE AND SECURED WITH LIVE OR DEAD STAKES AT 2' OR 3' INTERVALS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
STREAM PLANTINGS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 72

Sheet: 72 of 127
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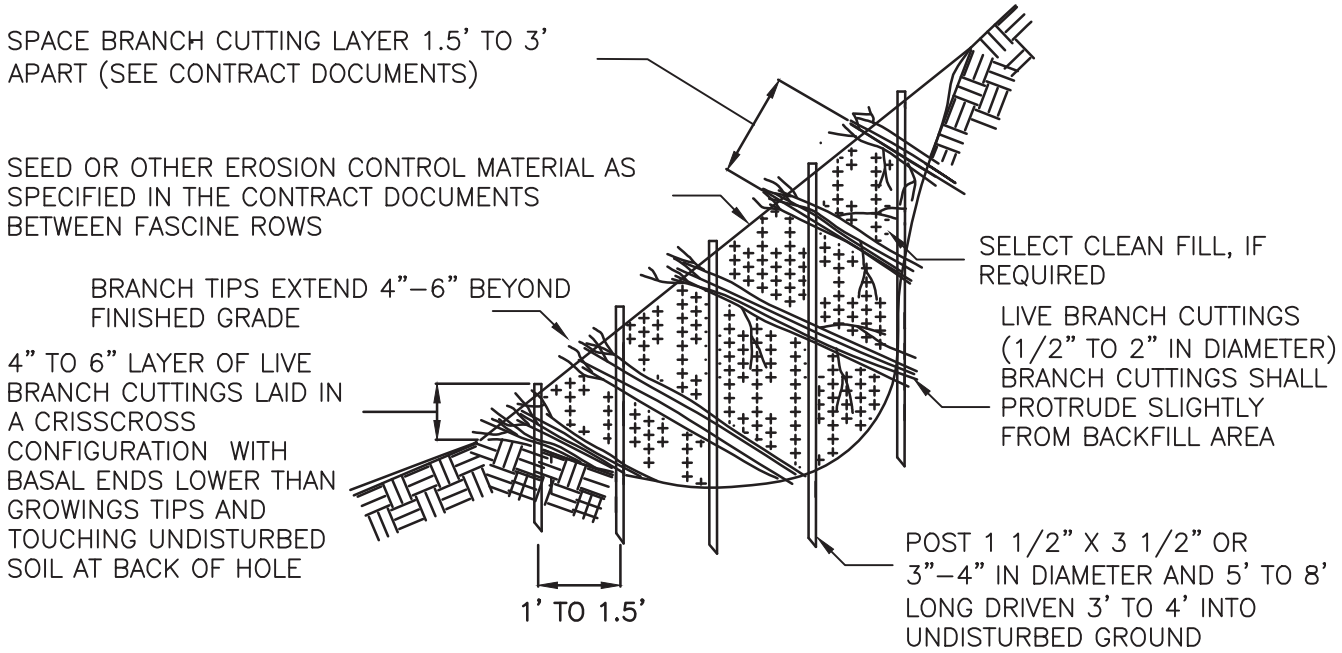


CROSS SECTION – NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. STARTING AT THE LOWEST POINT DRIVE THE WOODEN POSTS VERTICALLY 3' TO 4' INTO THE GROUND. SET THEM 1' TO 1.5' APART.
2. A LAYER OF LIVING BRANCHES 4" TO 6" THICK IS PLACED IN THE BOTTOM OF THE HOLE, BETWEEN THE VERTICAL POSTS. THEY SHALL BE PLACED IN A CRISSCROSS CONFIGURATION WITH THE GROWING TIPS GENERALLY ORIENTED TOWARD THE SLOPE FACE. SOME OF THE BASAL ENDS OF THE BRANCHES FROM EACH LAYER SHALL TOUCH THE BACK OF THE HOLE OR SLOPE.
3. EACH LAYER OF BRANCHES SHALL BE INSTALLED WITH THE BASAL ENDS LOWER THAN THE GROWING TIPS OF THE BRANCHES.
4. THE FINAL INSTALLATION SHALL MATCH THE EXISTING SLOPE. BRANCHES SHOULD PROTRUDE ONLY SLIGHTLY FROM THE FILLED FACE.
5. EACH LAYER OF BRANCHES SHALL BE FOLLOWED BY A 1' LAYER OF SOIL HAND TAMPED TO ENSURE CONTACT WITH THE BRANCH CUTTINGS.
6. THE SOIL SHALL BE MOIST OR MOISTENED TO ENSURE THAT LIVE BRANCHES DO NOT DRY OUT.
7. WHERE SPECIFIED, LIVE STAKES SHALL BE USED IN PLACE OF POSTS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

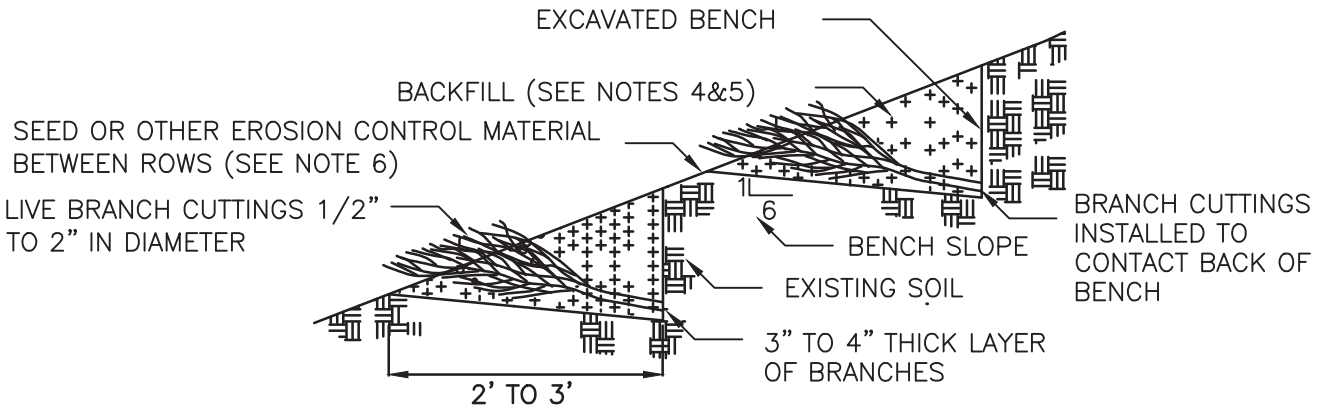
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
BRANCH PACKING

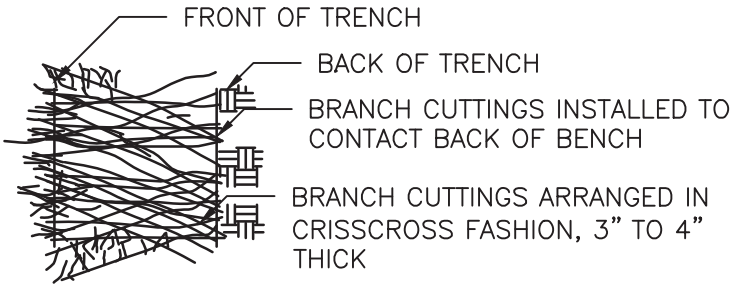
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 73

Sheet: 73 of 127
Type:



CROSS SECTION OF BRUSHLAYER ON CUT SLOPE
NOT TO SCALE



PLAN VIEW
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. BENCH SHALL BE ANGLED SO OUTSIDE EDGE IS HIGHER THAN BACK OF BENCH.
2. LIVE BRANCH CUTTINGS SHALL BE PLACED ON THE BENCH IN A CRISSCROSS OR OVERLAP CONFIGURATION, 3" TO 4" THICK.
3. GROWING TIPS SHALL BE ALIGNED OUT OF THE SLOPE FACE AND SHALL EXTEND SLIGHTLY BEYOND THE FILL AREA.
4. FILL EACH LOWER BENCH WITH SOIL EXCAVATED FROM THE BENCH ABOVE. TOP BENCH TO BE BACKFILLED WITH INITIAL EXCAVATION.
5. PLACE BACKFILL ON TOP OF BRANCHES AND HAND TAMP IN 6" LIFTS TO REDUCE AIR POCKETS.
6. SEED OR OTHER EROSION CONTROL MATERIAL SHALL BE USED BETWEEN THE ROWS AS STATED IN THE CONTRACT DOCUMENTS.
7. BRUSHLAYER BENCHES SHALL BE FROM 3' TO 5' VERTICAL APART, DEPENDING ON SLOPE, AS SHOWN ON THE PLANS MEASURED BETWEEN FRONT EDGE OF BENCHES.
7. RECOMMENDED ON SLOPES IUP TO 2:1 IN STEEPNESS AND TWENTY FEET IN HEIGHT.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
BRUSH LAYER

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 74

Sheet: 74 of 127
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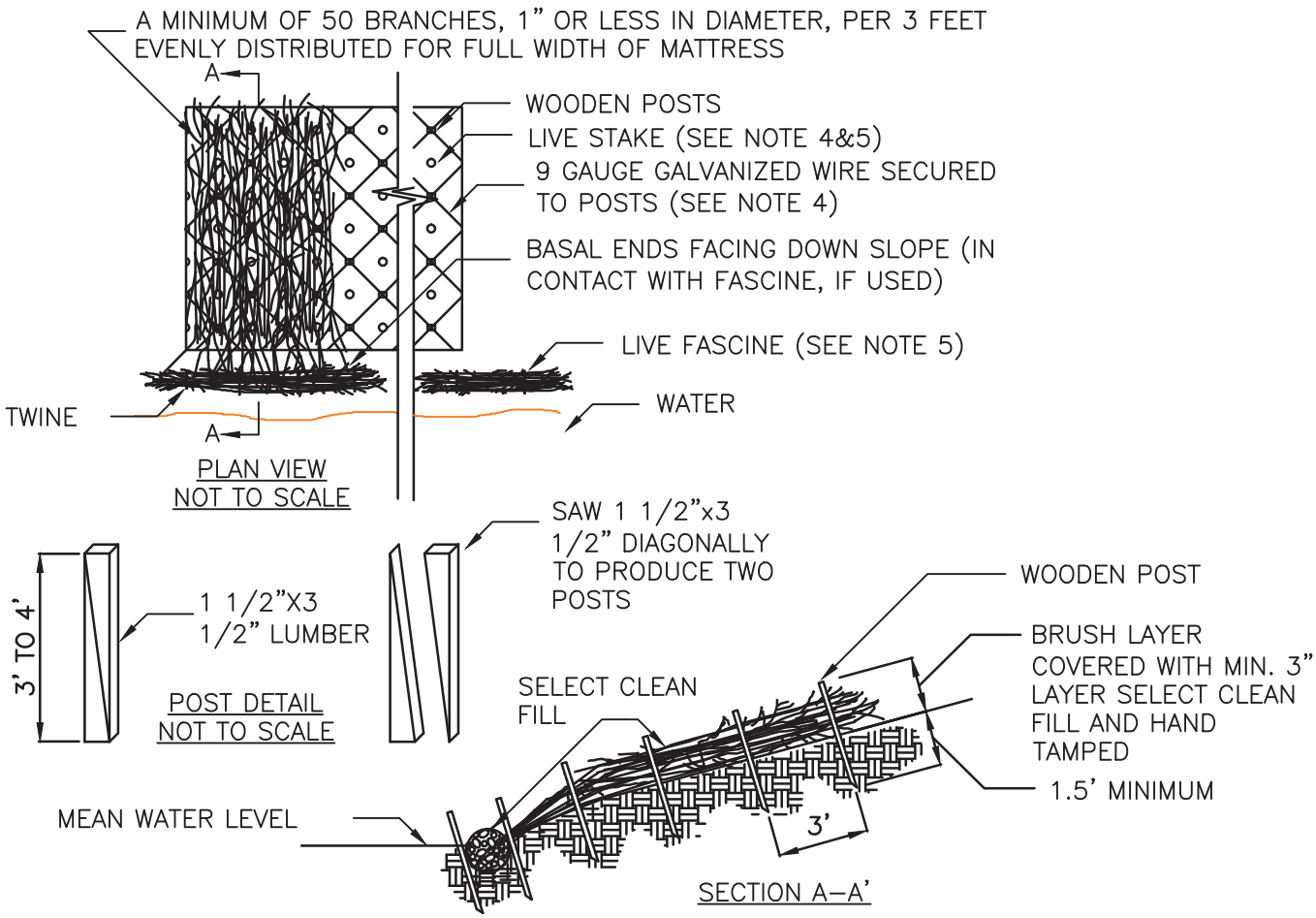


CONSTRUCTION SPECIFICATIONS

1. LAYERS SHALL BE COMPRISED OF LIVE QUICK–ROOTING SPECIES. SEE CONTRACT DOCUMENTS.
2. FILL MATTRESS WITH SOIL AND EVENLY DISTRIBUTE TO APPROXIMATELY 4" IN DEPTH AND HAND TAMP.
3. PLACE POSTS EVENLY OVER THE GRADED FACE USING 3' SQUARE SPACING. IF LIVE STAKES ARE SPECIFIED, ALTERNATE EVERY OTHER ON WITH THE POSTS.
4. STRETCH 9 GAUGE GALVANIZED WIRE DIAGONALLY FROM ONE POST TO ANOTHER BY TIGHTLY WRAPPING WIRE AROUND POSTS, NO CLOSER THAN 6" FROM THE TOP OF POST. WIRE SHALL NOT BE ATTACHED TO LIVE STAKES, IF THEY ARE SPECIFIED. POUND STAKES TO COMPRESS MATTRESS.
5. LIVE FASCINES AND LIVE STAKES ARE INSTALLED WHEN AND WHERE DIRECTED ON THE PLAN SHEET.
6. RECOMMENDED FOR STREAMBANKS WHERE VELOCITY IS <6 FT/SEC MAX SLOPE 1.5:1

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

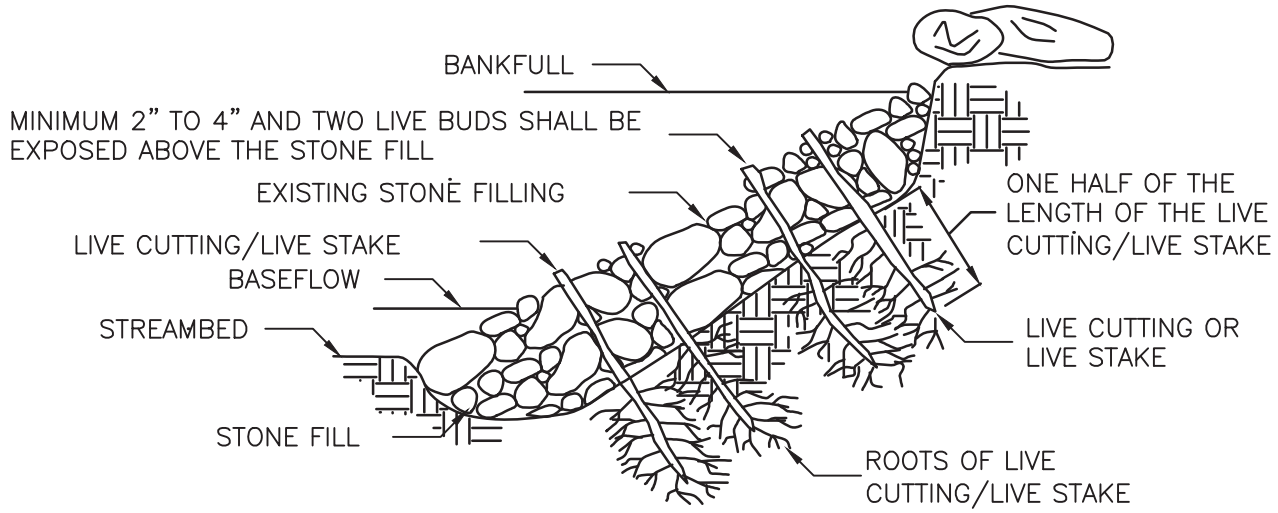
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
BRUSH MATTRESS

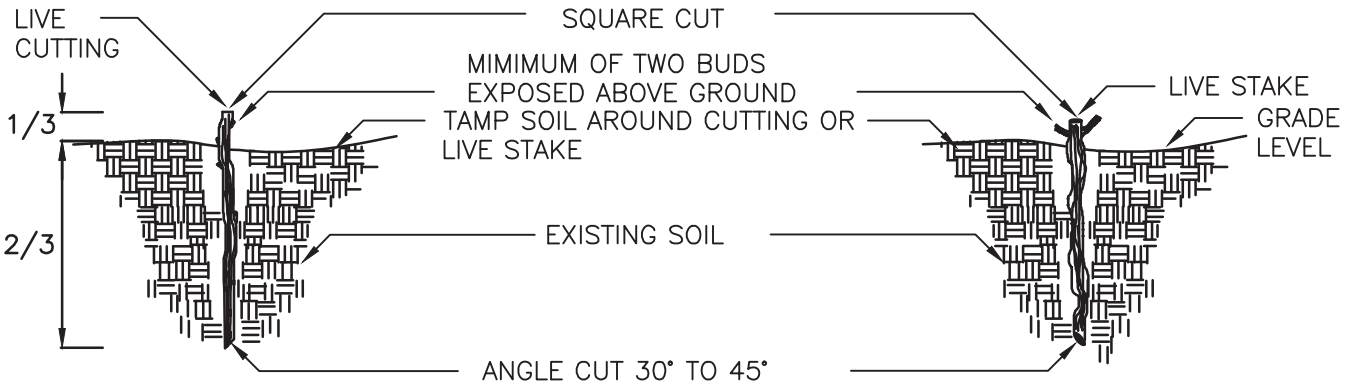
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 75

Sheet: 75 of 127
Type:



LIVE CUTTING/LIVE STAKE JOINT PLANTING CROSS SECTION



LIVE CUTTING CROSS SECTION
NOT TO SCALE

LIVE STAKE CROSS SECTION
NOT TO SCALE

NOTE:
1. NOT INTENDED FOR STRUCTURAL INTEGRITY NOR TO RESIST LARGE LATERAL EARTH PRESSURES.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
LIVE CUTTINGS LIVE STAKINGS
PLANTINGS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 76

Sheet: 76 of 127
Type:

LIVE STAKES SPECIFICATIONS

1. CARE SHALL BE TAKEN NOT TO DAMAGE THE LIVE CUTTINGS/LIVE STAKES DURING INSTALLATION. THOSE DAMAGED SHALL BE LEFT IN PLACE AND SUPPLEMENTED WITH AN INTACT LIVE CUTTING/LIVE STAKE.
2. THE LENGTHS OF LIVE CUTTINGS/LIVE STAKES DEPENDS UPON THE APPLICATION. THE LENGTH SHALL EXTEND THROUGH THE SURFACE OF THE STONE FILL. AT LEAST HALF THE LENGTH SHALL BE INSERTED IN TO THE SOIL, BELOW THE STONE FILL.
3. A PILOT HOLE IS REQUIRED TO ENSURE THAT THE LIVE CUTTING/LIVE STAKE IS NOT DAMAGED WHEN DRIVEN THROUGH THE STONE FILLING. ACCESS SHALL BE MADE THROUGH THE USE OF A DIBBLE BAR, OR SIMILAR TOOL TO WORK AN OPENING THROUGH THE ROCK LAYER.
4. MINIMUM 2" TO 4" AND TWO LIVE BUDS OF THE LIVE CUTTING/LIVE STAKE SHALL BE EXPOSED ABOVE THE STONE FILLING.

LIVE CUTTINGS SPECIFICATIONS

1. LIVE CUTTINGS SHALL RANGE FROM 1/2" TO 1" IN DIAMETER AND BE FROM 1' TO 4' IN LENGTH.
2. LIVE STAKES SHALL RANGE FROM 1" TO 4" IN DIAMETER AND BE FROM 5' TO 6' IN LENGTH.
3. SEE CONTRACT DOCUMENTS FOR SPECIES, SIZE, SPACING, LOCATION, AND FINAL DETERMINATION ON USE OF CUTTINGS OR STAKES.
4. LIVE CUTTINGS/LIVE STAKES SHALL BE CUT TO A POINT ON THE BASAL END FOR INSERTION IN THE GROUND.
5. USE A DEAD BLOW HAMMER TO DRIVE STAKES INTO THE GROUND. (HAMMER HEAD FILLED WITH SHOT OR SAND.) A DIBBLE, IRON BAR, OR SIMILAR TOOL SHALL BE USED TO MAKE A PILOT HOLE TO PREVENT DAMAGING THE MATERIAL DURING INSTALLATION.
6. LIVE CUTTINGS SHALL BE INSERTED BY HAND INTO PILOT HOLES.
7. WHEN POSSIBLE, TAMP SOIL AROUND LIVE CUTTING/LIVE STAKES.
8. ANY LIVE CUTTING/LIVE STAKE THAT IS DAMAGED SHALL BE LEFT IN PLACE AND SUPPLEMENTED WITH AN INTACT LIVE CUTTING/LIVE STAKE.
9. NO LEAF BUDS SHALL HAVE INITIATED GROWTH BEYOND ¼" AND CAMBIUM LAYER SHALL BE MOIST, GREEN AND HEALTHY.

GENERAL SPECIFICATION

1. FREQUENT INSPECTION IS RECOMMENDED DURING FIRST 1–2 YEARS DUE TO PHYSICAL CONSTRAINTS, CLIMATE CONDITIONS AND ANIMAL POPULATION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
LIVE CUTTINGS LIVE STAKINGS
PLANTINGS SPECFICACTIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 77

Sheet: 77 of 127
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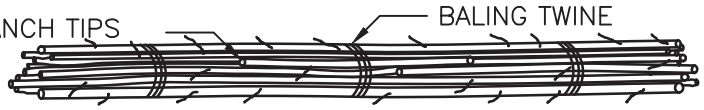
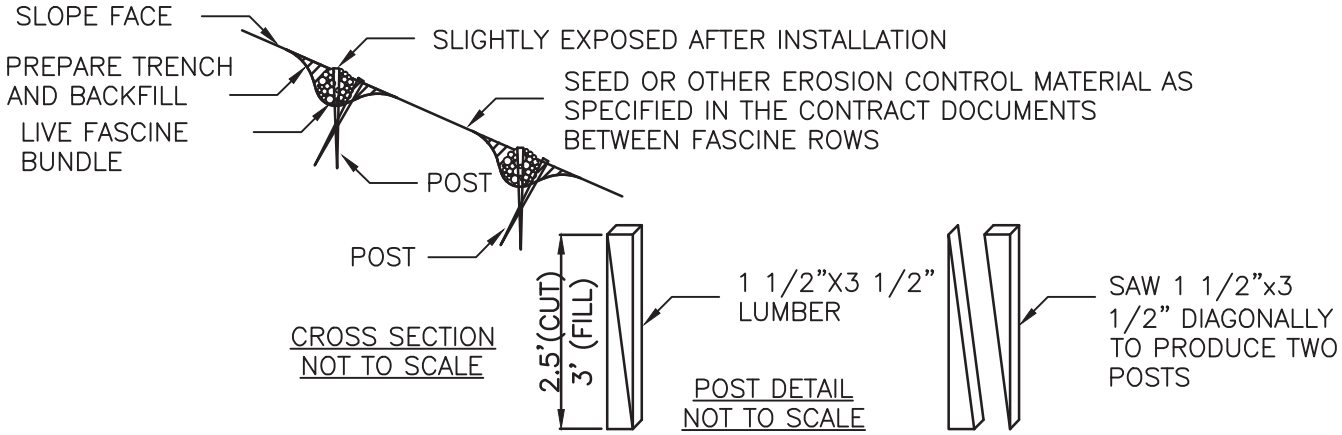


4" TO 8" DIAMETER AND MINIMUM LENGTH OF 8' REQUIRED

FASCINE BUNDLE DETAIL
NOT TO SCALE



CROSS SECTION
NOT TO SCALE

POST DETAIL
NOT TO SCALE

LIVE FACINE SPECIFICATIONS

1. LIVE FASCINES SHALL BE PREPARED FROM FRESHLY CUT DORMANT PLANTS AND INSTALLED WITHIN 8 HOURS OF THE TIME THE MATERIAL IS HARVESTED, UNLESS PROPERLY STORED.
2. LIVE FASCINE SHALL BE OBTAINED FROM SOURCES APPROVED BY THE ENGINEER.
3. LIVE FASCINES SHALL BE 4" TO 8" IN DIAMETER. LENGTHS MAY VARY TO SUIT CONDITIONS. A MINIMUM LENGTH OF 8' IS REQUIRED.
4. THE TIPS OF THE BRANCHES WITHIN THE LIVE FASCINE SHALL BE STAGGERED.
5. LIVE FASCINES SHALL BE PLACED AS INDICATED IN THE CONTRACT DOCUMENTS.
6. BEGINNING AT THE BASE OF THE SLOPE, A TRENCH SHALL BE DUG LARGE ENOUGH TO CONTAIN THE LIVE FASCINES. THE LIVE FASCINES SHALL BE PLACED IN THE TRENCH. WHERE ENDS MEET IN THE TRENCH, THE FASCINES SHALL OVERLAP BY 18".
7. WOOD POSTS SHALL BE INSTALLED FLUSH TO THE TOP OF THE FASCINE EVERY 18" ALONG THE LENGTH OF THE BUNDLES AS SHOWN ON THE CROSS SECTION. WHERE SPECIFIED LIVE STAKES MAY BE USED IN PLACE OF POSTS.
8. THE TRENCH SHALL BE BACKFILLED WITH MOIST SOIL AND HAND TAMPED. THE TOP OF THE FASCINE SHALL BE SLIGHTLY EXPOSED WHEN THE INSTALLATION IS COMPLETE AS SHOWN ON THE CROSS SECTION.
9. SEED OR OTHER EROSION CONTROL MATERIAL SHALL BE USED BETWEEN THE FASCINE ROWS, AS SPECIFIED IN THE CONTRACT DOCUMENTS.
10. LIVE FASCINE TRENCHES SHALL BE FROM 3' TO 8' APART, ACCORDING TO SLOPE AND/OR THE CONTRACT DOCUMENTS.
11. SLOPES MUST BE 1:1 OR FLATTER.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
LIVE FASCINE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 78

Sheet: 78 of 127
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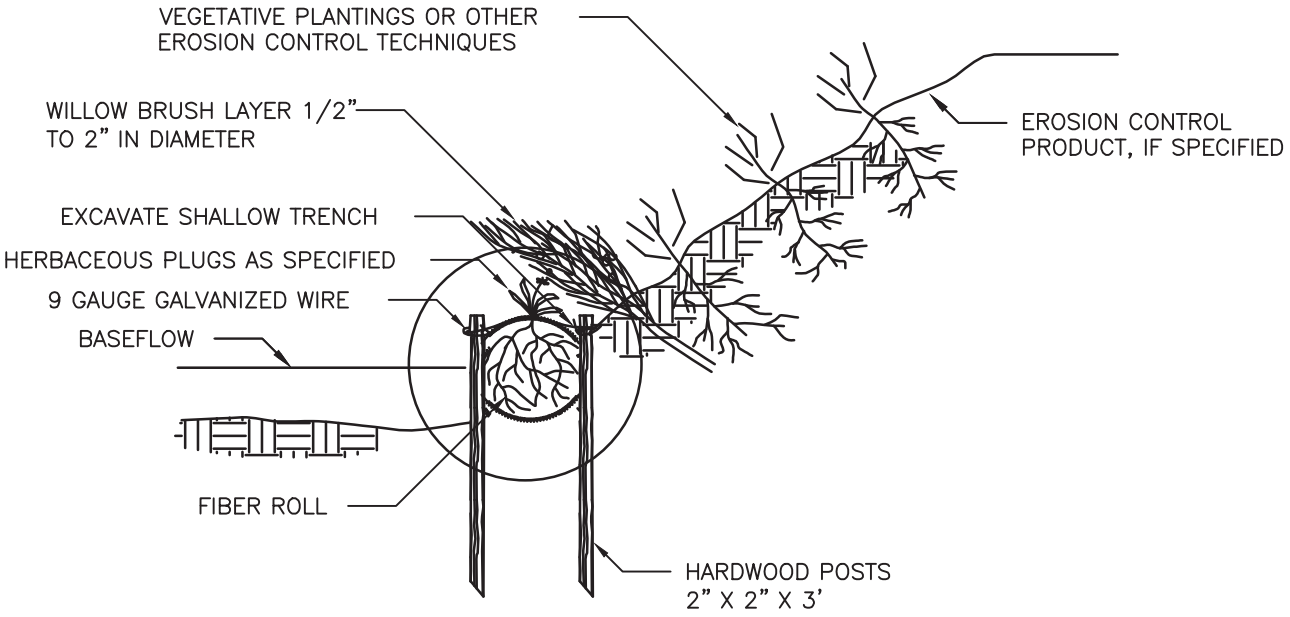

CROSS SECTION
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. EXCAVATE A SHALLOW TRENCH AT THE TOE OF SLOPE TO SLIGHTLY BELOW BASEFLOW.

2. PLACE THE ROLL IN THE TRENCH AND ANCHOR WITH 2" x 2" x 3' POSTS PLACED ON BOTH SIDES OF THE ROLL AND SPACED LATERALLY ON 2' TO 4' CENTERS. TRIM THE TOP OF THE POSTS EVEN WITH THE EDGE OF THE ROLL, IF NECESSARY.

3. NOTCH THE POSTS AND TIE TOGETHER, ACROSS THE ROLL, WITH 9 GAUGE GALVANIZED WIRE OR 1/8" DIAMETER BRAIDED NYLON ROPE.

4. PLACE SOIL EXCAVATED FROM THE TRENCH BEHIND THE ROLL AND HAND TAMP. PLANT WITH SUITABLE HERBACEOUS OR WOODY VEGETATION AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS. VEGETATION SHALL BE PLACED IMMEDIATELY ADJACENT TO THE ROLL TO PROMOTE ROOT GROWTH INTO THE FIBER. HERBACEOUS VEGETATION, IF SPECIFIED, SHALL BE PLANTED INTO THE FIBER ROLL.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
FIBER ROLL

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 79

Sheet: 79 of 127
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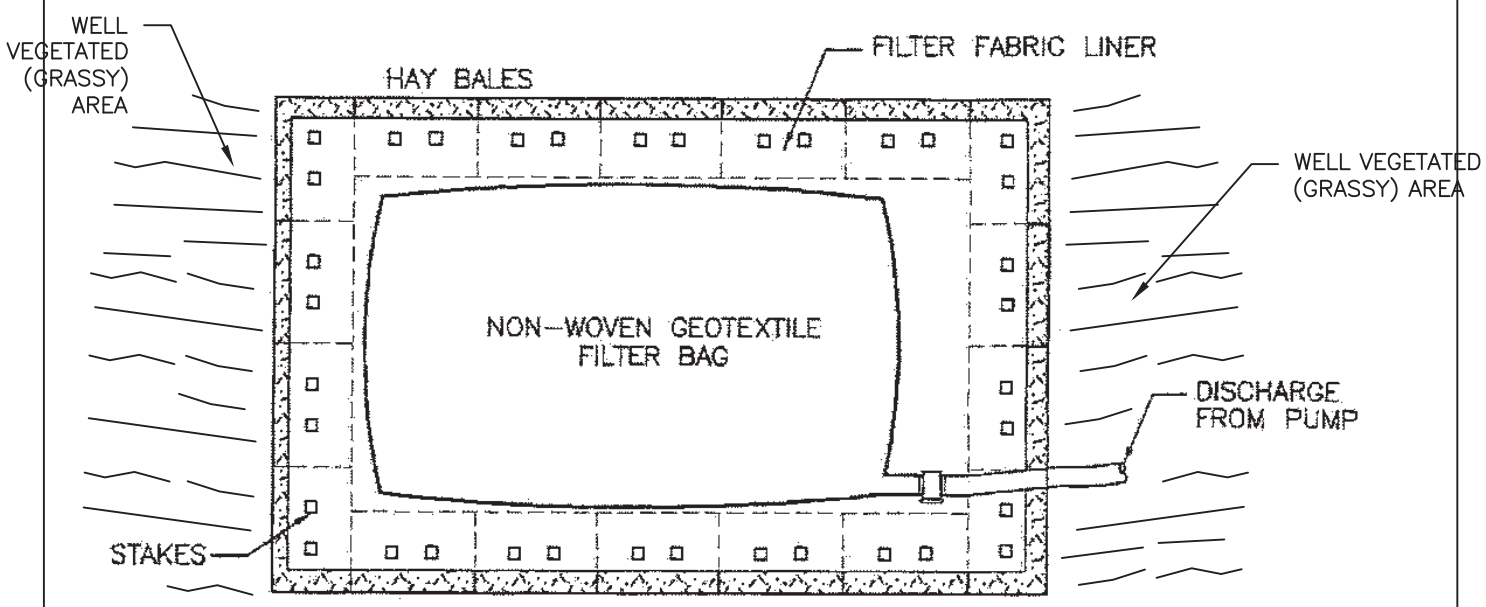
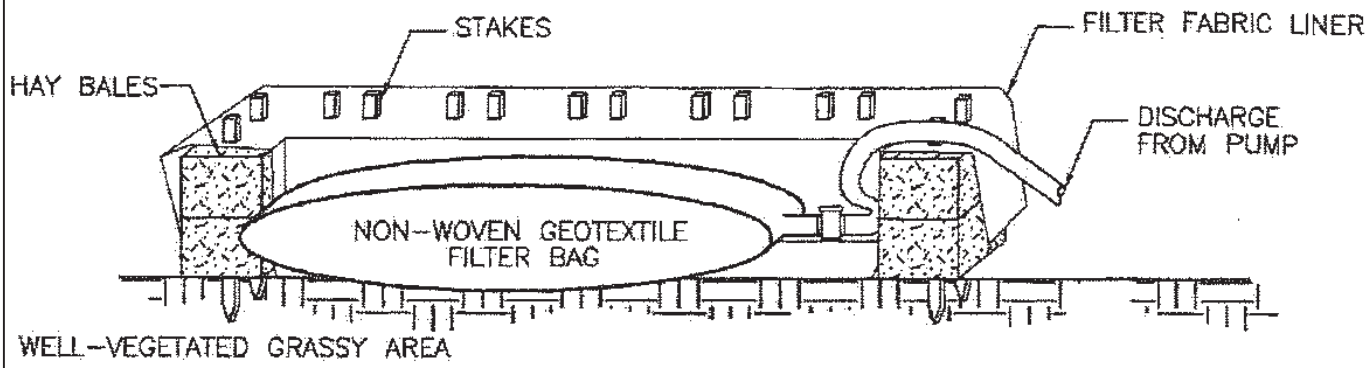


PLAN VIEW



ELEVATION VIEW

NOTES:

1. RECTANGULAR DEWATERING DISCHARGE AREA CONSTRUCTED OUT OF HAY BALES STACKED ONE OR TWO ROWS HIGH AND SECURED WITH WOODEN STAKES.
2. FILTER FABRIC LINER INSTALLED COVERING ENTIRE INTERIOR OF STRUCTURE AND SECURED ON TOP OF THE HAY BALES WITH WOODEN STAKES.
3. THE DEWATERING DEVICE SHALL BE LOCATED IN A WELL-VEGETATED (GRASSY) AREA AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH SHALL BE PROVIDED. A DISCHARGE DEVICE SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%.
4. FOR LESS TURBID WATER DISCHARGE, THE GEOTEXTILE FILTER BAG IS OPTIONAL AND THE STRUCTURE MAY UTILIZE JUST FILTER FABRIC LINER WITH NO FILTER BAG.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TRENCH DEWATERING SEDIMENT CORRAL

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 80

Sheet: 80 of 127
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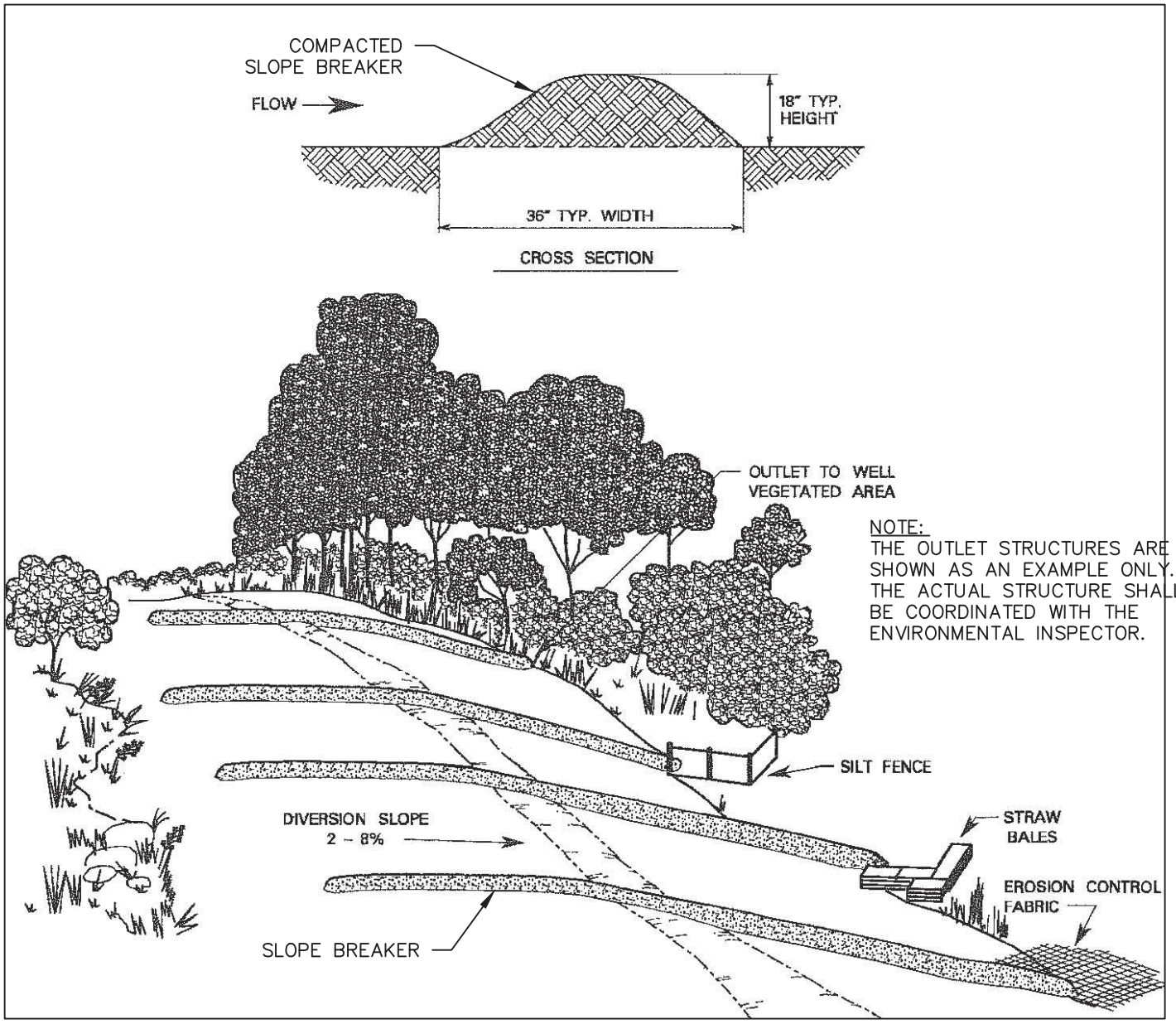


INSTALLATION REQUIREMENTS:

- INSTALL PERMANENT SLOPE BREAKERS IN ALL AREAS EXCEPT RESIDENTIAL OR AGRICULTURAL AS NECESSARY TO AVOID EXCESSIVE EROSION (UNLESS AUTHORIZED BY LANDOWNER OR LAND MANAGING AGENCY IN AGRICULTURAL OR RESIDENTIAL AREA).
- MUST BE INSTALLED WHERE THE BASE OF THE SLOPE IS LESS THAN 50 FEET FROM A WATERBODY, WETLAND OR ROAD CROSSING AND AT THE FOLLOWING MINIMUM SPACING:

SLOPE (%)	SPACING (FT.)
< 50	125
5–10	100
10–20	75
20–35	50
< 35	25

- CONSTRUCT USING COMPACTED EARTH AND ROCK FOR PERMANENT BREAKERS.
- INSTALL WITH A 2–8% OUTFALL ANGLE
- POSITION OUTFALL TO PREVENT SEDIMENT DISCHARGE INTO WETLANDS, WATERBODIES, OR OTHER SENSITIVE RESOURCES.
- FILTER RUN–OFF WATER BY CONSTRUCTING THE OUTLET IN A WELL VEGETATED STABLE AREA OR BY USING AN ENERGY DISSIPATING DEVICE (SILT FENCE, STRAW BALES, EROSION CONTROL FABRIC), AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

MAINTENANCE REQUIREMENTS:

- INSPECT DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
- KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.
- SEED AND MULCH PERMANENT SLOPE BREAKERS FOLLOWING CONSTRUCTION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

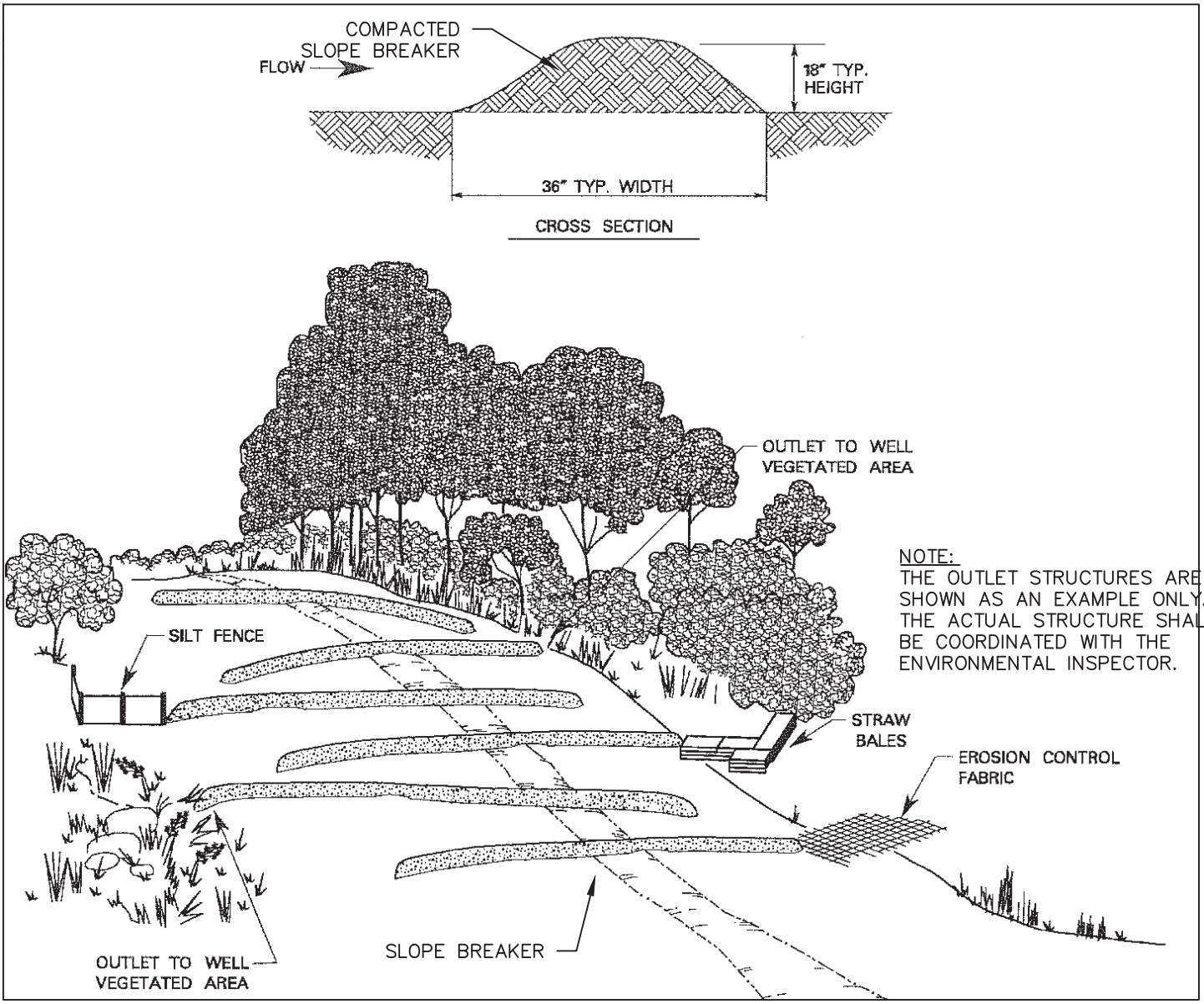
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
INTERCEPTOR SLOPE BREAKER
INSTALLATION

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 81

Sheet: 81 of 127
Type:



NOTE:
THE OUTLET STRUCTURES ARE SHOWN AS AN EXAMPLE ONLY. THE ACTUAL STRUCTURE SHALL BE COORDINATED WITH THE ENVIRONMENTAL INSPECTOR.

INSTALLATION REQUIREMENTS:

- INSTALL IN ALL AREAS EXCEPT RESIDENTIAL OR AGRICULTURAL (UNLESS AUTHOIRZED BY LANDOWNER OR LAND MANAGING AGENCY).
- CONSTRUCT USING COMPACTED EARTH AND ROCK FOR PERMANENT BREAKERS.
- INSTALL WITH A 2 – 8% OUTFALL ANGLE.
- FOR TEMPORARY CHEVRON SLOPE BREAKERS, POSITION OUTFALL TO PREVENT SEDIMENT DISCHARGE INTO WETLANDS, WATERBODIES, OR OTHER SENSITIVE RESOURCES.
- FILTER RUN–OFF WATER BY CONSTRUCTING AN OUTLET USING AN ENERGY DISSIPATING DEVICE (SILT FENCE, STRAW BALES, EROSIONS CONTROL FABRIC), AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
- ALTHOUGH ALTERNATING, ALL SLOPE BREAKERS MUST BE INSTALLED WHERE THE BASE OF THE SLOPE IS LESS THAN 50 FEET FROM A WATERBODY, WETLAND OR ROAD CROSSING AND AT THE FOLLOWING MINIMUM SPACING:

SLOPE (%)	SPACING (FT.)
< 50	125
5–10	100
10–20	75
20–35	50
> 35	25

MAINTENANCE REQUIREMENTS:

- INSPECT DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
- KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.
- SEED AND MULCH PERMANENT SLOPE BREAKERS FOLLOWING CONSTRUCTION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
CHEVRON INTERCEPTOR SLOPE
BREAKER INSTALLATION & MAINTENANCE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 82

Sheet: 82 of 127
Type:

NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL ALONG THE SITE. THE CONTRACTOR SHALL COORDINATE WITH THE ENVIRONMENTAL INSPECTOR TO DETERMINE WHICH PRACTICES ACCOMMODATE THEIR NEEDS BASED ON SPECIFIC SITE AND WEATHER CONDITIONS. SOME OF THE TYPICAL PRACTICES INCLUDE THE FOLLOWING:

   - SPRINKLING/IRRIGATION. SPRINKLING THE GROUND SURFACE WITH WATER UNTIL IT IS MOIST IS AN EFFECTIVE DUST CONTROL METHOD FOR HAUL ROADS AND OTHER TRAFFIC ROUTES (SMOLEN ET AL., 1988). THIS PRACTICE CAN BE APPLIED TO ALMOST ANY SITE.
   - VEGETATIVE COVER. IN AREAS NOT EXPECTED TO HANDLE VEHICLE TRAFFIC, VEGETATIVE STABILIZATION OF DISTURBED SOIL IS OFTEN DESIRABLE. VEGETATIVE COVER PROVIDES COVERAGE TO SURFACE SOILS AND SLOWS WIND VELOCITY AT THE GROUND SURFACE, THUS REDUCING THE POTENTIAL FOR DUST TO BECOME AIRBORNE.
   - MULCH. MULCHING CAN BE A QUICK AND EFFECTIVE MEANS OF DUST CONTROL FOR A RECENTLY DISTURBED AREA (SMOLEN ET AL., 1988).
   - WIND BREAKS. WIND BREAKS ARE BARRIERS (EITHER NATURAL OR CONSTRUCTED) THAT REDUCE WIND VELOCITY THROUGH A SITE AND THEREFORE REDUCE THE POSSIBILITY OF SUSPENDED PARTICLES. WIND BREAKS CAN BE TREES OR SHRUBS LEFT IN PLACE DURING SITE CLEARING OR CONSTRUCTED BARRIERS SUCH AS A WIND FENCE, SNOW FENCE, TARP CURTAIN, HAY BALE, CRATE WALL, OR SEDIMENT WALL (USEPA, 1992).
   - TILLAGE. DEEP TILLAGE IN LARGE OPEN AREAS BRINGS SOIL CLODS TO THE SURFACE WHERE THEY REST ON TOP OF DUST, PREVENTING IT FROM BECOMING AIRBORNE.
   - STONE. STONE MAY BE AN EFFECTIVE DUST DETERRENT FOR CONSTRUCTION ROADS AND ENTRANCES OR AS A MULCH IN AREAS WHERE VEGETATION CANNOT BE ESTABLISHED.
   - SPRAY–ON CHEMICAL SOIL TREATMENTS. THE PENNSYLVANIA DIRT AND GRAVEL ROAD PROGRAM HAS PLACED STRICT LIMITATIONS ON THE USE OF PRODUCTS THAT MAY CAUSE DAMAGE TO THE ENVIRONMENT. WITH THIS IN MIND, IT HAS APPROVED A NUMBER OF CHEMICAL DUST SUPPRESSANTS. WHEN CONSIDERING CHEMICAL APPLICATION TO SUPPRESS DUST, CONSIDERATION SHOULD BE TAKEN AS TO WHETHER THE CHEMICAL IS BIODEGRADABLE OR WATER–SOLUBLE AND WHAT EFFECT ITS APPLICATION COULD HAVE ON THE SURROUNDING ENVIRONMENT, INCLUDING WATERBODIES AND WILDLIFE.

2. TABLE H.1 SHOWS APPLICATION RATES FOR SOME COMMON DUST SUPPRESSANTS, AS RECOMMENDED BY THE PENNSYLVANIA DIRT AND GRAVEL ROAD PROGRAM.

TABLE H.1. APPLICATION RATES FOR DUST SUPPRESSANTS

PRODUCT	WATER DILUTION	TYPE
PENN SUPPRESS "D"	1:4 EMULSION TO WATER (MINIMUM)	PETROLEUM EMULSION
ULTRABOND 2000	1:4 EMULSION TO WATER (MINIMUM)	PETROLEUM EMULSION
COHEREX	1:10 EMULSION TO WATER (MINIMUM)	PETROLEUM EMULSION
DUST BOND	1:10 EMULSION TO WATER (MINIMUM)	PETROLEUM EMULSION
EK 35	100% ACTIVE, NOT WATER REQUIRED FOR APPLICATION	SYNTHETIC FLUID
ENVIROKLEEN	100% ACTIVE, NOT WATER REQUIRED FOR APPLICATION	SYNTHETIC FLUID
PAVE–CYRL SUPPRESS	AS RECEIVED (51% SOLIDS)	ACRYLIC POLYMER (PVA)
PAVE–CYRL SUPPRESS PLUS	AS RECEIVED (51% SOLIDS)	ACRYLIC POLYMER (PVA)
DIRT GLUE	AS RECEIVED (51% SOLIDS)	ACRYLIC POLYMER (PVA)

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
DUST CONTROL

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 83

Sheet: 83 of 127
Type:

NOTES:

1. WATER–SOLUBLE ANIONIC POLYACRYLAMIDE (PAM) MAY BE APPLIED TO A DISTURBED AREA AS A TEMPORARY SOIL–BINDING AGENT TO REDUCE EROSION DUE TO WIND AND WATER. THIS PRACTICE IS RECOMMENDED FOR AREAS WHERE TIMELY ESTABLISHMENT OF A VEGETATIVE COVER IS NOT FEASIBLE (E.G. NON–GERMINATING SEASON), WHEREVER SOILS HAVE HIGH CLAY CONTENT, OR WHERE THE VEGETATIVE COVER IS INADEQUATE TO PROVIDE PROTECTION FROM EROSION. WHEREVER USED, THE APPLICATION MUST COMPLY WITH ALL FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS GOVERNING ANIONIC PAM.

2. PAM SPECIFICATIONS
   - ANIONIC PAM MIXTURES MUST BE ENVIRONMENTALLY SAFE AND NON–TOXIC TO FISH AND OTHER AQUATIC SPECIES, WILDLIFE, AND PLANTS. IT SHOULD ALSO BE NON–COMBUSTIBLE.
   - CATIONIC PAM MAY NOT BE USED DUE TO ITS TOXICITY TO AQUATIC SPECIES.
   - ANIONIC PAM MIXTURES MUST HAVE < 0.05% FREE ACRYLAMIDE MONOMER BY WEIGHT AS ESTABLISHED BY THE FOOD AND DRUG ADMINISTRATION (FDA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA).
   - ACUTE TOXICITY TEST DATA SHOULD BE PROVIDED FROM EACH MANUFACTURER OR SUPPLIER.
   - THE MANUFACTURER SHOULD PROVIDE A PRODUCT EXPIRATION DATE FOR ANIONIC PAM BASED UPON EXPIRATION OF PAM IN THE PURE FORM.

3. APPLICATION
   - ANIONIC PAM SHOULD BE APPLIED IN ACCORDANCE WITH THE RECOMMENDED METHODS PROVIDED BY THE MANUFACTURER OR SUPPLIER FOR THE SPECIFIC SITE CONDITIONS (E.G. SLOPE AND SOIL TYPE). A RECORD OF THE APPLICATION, INCLUDING THE DATE OF APPLICATION, PRODUCT TYPE, WEATHER CONDITIONS, METHOD OF APPLICATION, AND THE NAME OF THE APPLICATOR, SHOULD BE KEPT ON SITE.
   - APPLICATION RATES SHOULD NOT EXCEED THE MANUFACTURER'S RECOMMENDATIONS. REPEATED APPLICATIONS MAY BE MADE IF NECESSARY TO ENSURE ADEQUATE COVERAGE.
   - THE APPLICATION METHOD USED SHOULD PROVIDE UNIFORM COVERAGE TO THE TARGET AREA WHILE AVOIDING DRIFT TO NON–TARGET AREAS, ESPECIALLY PAVED AREAS.
   - MANUFACTURER'S RECOMMENDATIONS FOR SAFE STORAGE, MIXING, AND USE OF THE PRODUCT SHOULD BE FOLLOWED.
   - USE OF ANIONIC PAM SHOULD BE IN CONJUNCTION WITH THE OTHER BMPS SPECIFIED IN THE APPROVED E&S PLAN.
   - ANIONIC PAM MAY NOT BE USED INSTEAD OF A PROTECTIVE LINER IN A CHANNEL OR IN PLACE OF MULCH ON A SEEDED AREA. HOWEVER, SEED MAY BE ADDED TO THE MIXTURE AT THE TIME OF APPLICATION.
   - DISPOSAL OF EXCESS MATERIAL MUST BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AS WELL AS FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS.
   - ANIONIC PAM MAY NOT BE APPLIED WITHIN THE FLOODWAY OF A RECEIVING STREAM CHANNEL OR WITHIN 25 FEET OF OTHER WATER BODIES.
   - ANIONIC PAM MAY BE USED TO TEMPORARILY STABILIZE TOPSOIL STOCKPILES. HOWEVER, ANIONIC PAM MAY LOSE ITS EFFECTIVENESS IN AS LITTLE AS TWO MONTHS. THEREFORE, IT MIGHT BECOME NECESSARY TO REAPPLY THE MIXTURE.
   - ANIONIC PAM IS NOT RECOMMENDED FOR APPLICATION ON SURFACES OF PURE SAND OR GRAVELS WITH NO FINES OR ON SNOW–COVERED SURFACES.
   - A VISIBLE TRACER OR COLORANT MAY BE ADDED TO THE MIXTURE TO VISUALLY TRACK ITS APPLICATION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

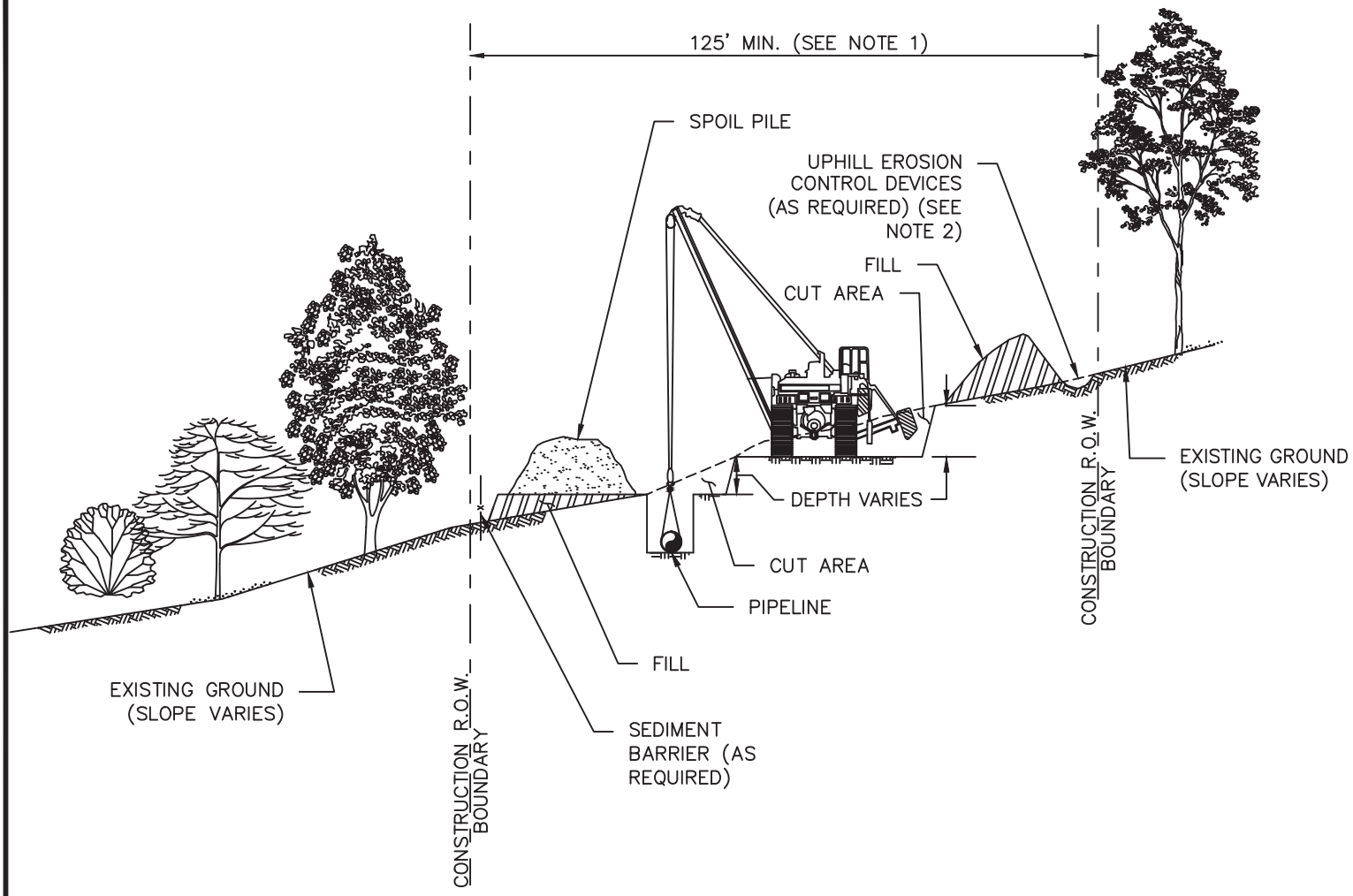
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
POLYACRYLAMIDE (PAM) SOIL BINDER

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 84

Sheet: 84 of 127
Type:



CROSS SECTION

SCALE: N.T.S.

CONSTRUCTION PROCEDURE NOTES:

1. TWO–TONE THE RIGHT–OF–WAY TO LIMIT THE NEED FOR DEEP CUTS AND ADDITIONAL RIGHT–OF–WAY ON STEEP SLOPES. THE MINIMUM WORKSPACE WIDTH ALONG STEEP SIDE SLOPES SHALL BE 125'. ADDITIONAL TEMPORARY WORKSPACE MAY BE REQUIRED FOR WORKER SAFETY DEPENDING ON THE SEVERITY OF THE GRADE.
2. EMPLOY EROSION CONTROL MEASURES SUCH AS BREAKERS, CROSS DITCHES AND BERMS, TEMPORARY DRAINAGE PIPES, TEMPORARY SWALES, TEMPORARY OUTLET PROTECTION, ETC. AS REQUIRED TO PREVENT EROSION AND SEDIMENTATION OUTSIDE OF THE CONSTRUCTION RIGHT–OF–WAY. CLEAR AND STAKE ADDITIONAL RIGHT–OF–WAY TO ALLOW FOR EXTRA SPOIL.
3. ENSURE SIDE BOOM TRACTORS ARE EQUIPPED WITH BOOM EXTENDERS AND COUNTERWEIGHTS IF REQUIRED.
4. USE BACKHOE TO ASSIST BULLDOZERS WITH REPLACING CUTS.
5. RESTORE GRADE TO NEAR PRE–CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL MEASURES AS REQUIRED.
6. REVEGETATE / SEED DISTURBED AREAS AS NOTED IN THE CONSTRUCTION DOCUMENTS OR AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

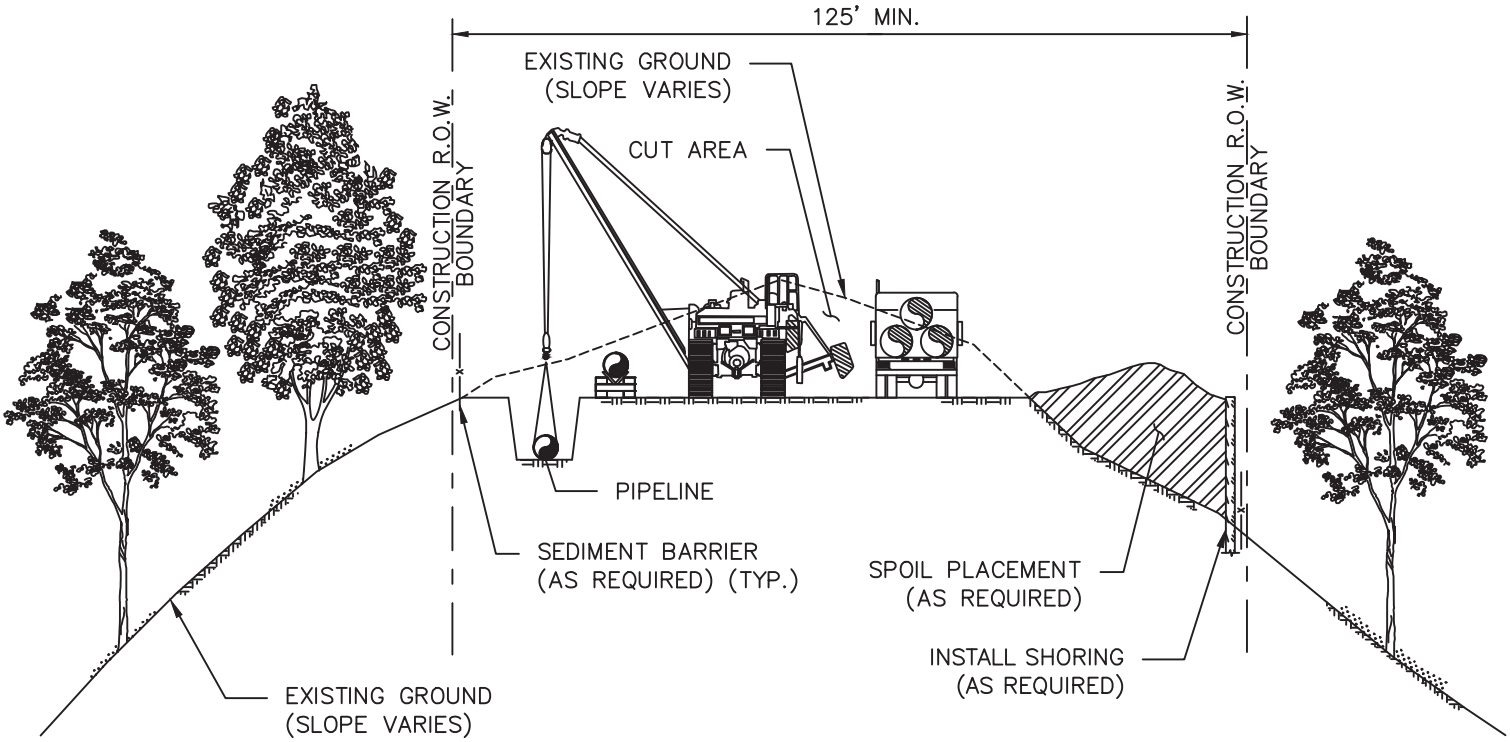
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SIDE SLOPE (TWO–TONE)
CONSTRUCTION PROCEDURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 85

Sheet: 85 of 127
Type:



CROSS SECTION

SCALE: N.T.S.

CONSTRUCTION PROCEDURE NOTES:

1. EMPLOY EROSION CONTROL MEASURES SUCH AS BREAKERS, CROSS DITCHES AND BERMS, TEMPORARY DRAINAGE PIPES, TEMPORARY SWALES, TEMPORARY OUTLET PROTECTION, ETC. AS REQUIRED TO PREVENT EROSION AND SEDIMENTATION OUTSIDE OF THE CONSTRUCTION RIGHT–OF–WAY. CLEAR AND STAKE ADDITIONAL RIGHT–OF–WAY TO ALLOW FOR EXTRA SPOIL.
2. ENSURE SIDE BOOM TRACTORS ARE EQUIPPED WITH BOOM EXTENDERS AND COUNTERWEIGHTS IF REQUIRED.
3. USE BACKHOE TO ASSIST BULLDOZERS WITH REPLACING CUTS.
4. RESTORE GRADE TO NEAR PRE–CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL MEASURES AS REQUIRED.
5. REVEGETATE / SEED DISTURBED AREAS AS NOTED IN THE CONSTRUCTION DOCUMENTS OR AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

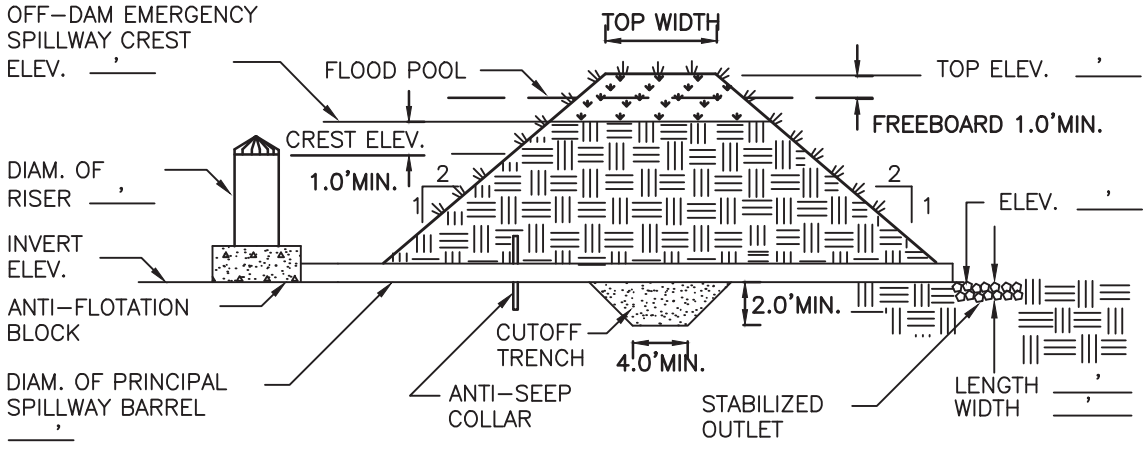
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
RIDGE–TOP CONSTRUCTION PROCEDURE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

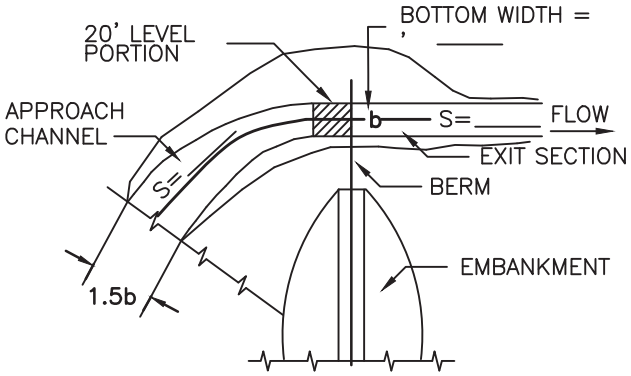
FIG. NO. 86

Sheet: 86 of 127
Type:

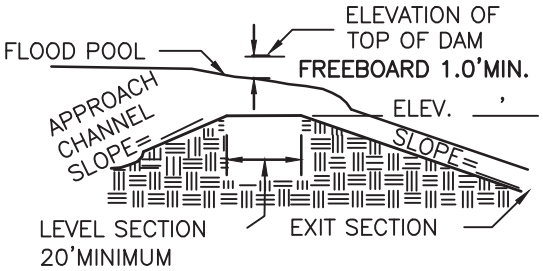


PRINCIPAL SPILLWAY PROFILE
NOT TO SCALE

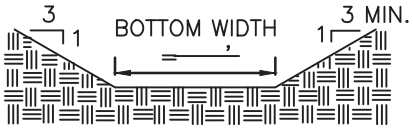
MAXIMUM DRAINAGE AREA = 100 ACRES



EMERGENCY SPILLWAY PLAN VIEW
NOT TO SCALE



PROFILE ALONG ℄ OF SPILLWAY
NOT TO SCALE



CROSS SECTION AT CONTROL SECTION
NOT TO SCALE

NOTE: THE ELEVATIONS AND DIMENSIONS WILL BE COMPLETED AS REQUIRED FOR THE FINAL SUBMISSION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

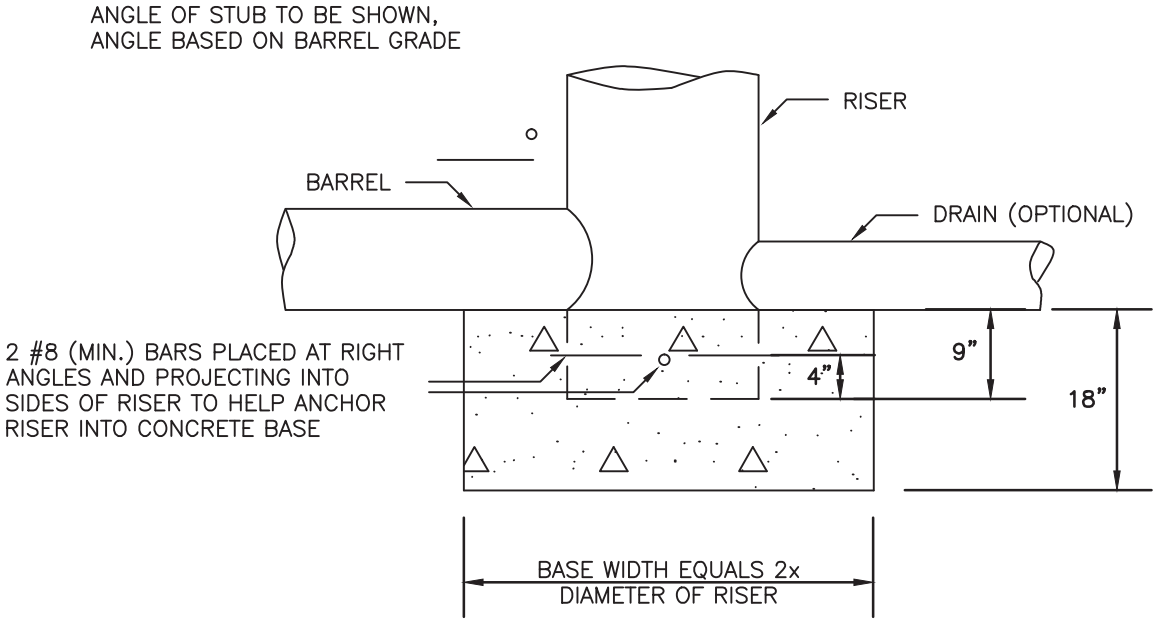
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SEDIMENT BASIN DETAILS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 87

Sheet: 87 of 127
Type:



CONSTRUCTION SPECIFICATIONS

NOTES:

1. THE CONCRETE BASE SHALL BE POURED IN SUCH A MANNER TO INSURE THAT THE CONCRETE FILLS THE BOTTOM OF THE RISER TO THE INVERT OF THE OUTLET PIPE TO PREVENT THE RISER FROM BREAKING AWAY FROM THE BASE.
2. WITH ALUMINUM OR ALUMINIZED PIPE, THE EMBEDDED SECTION MUST BE PAINTED WITH CHROMATE OR EQUIVALENT.
3. RISER BASE MAY BE SIZED AS COMPUTED USING FLOATATION WITH A FACTOR OF SAFETY OF 1.2.

NOTE: THE ELEVATIONS AND DIMENSIONS WILL BE COMPLETED AS REQUIRED FOR THE FINAL SUBMISSION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

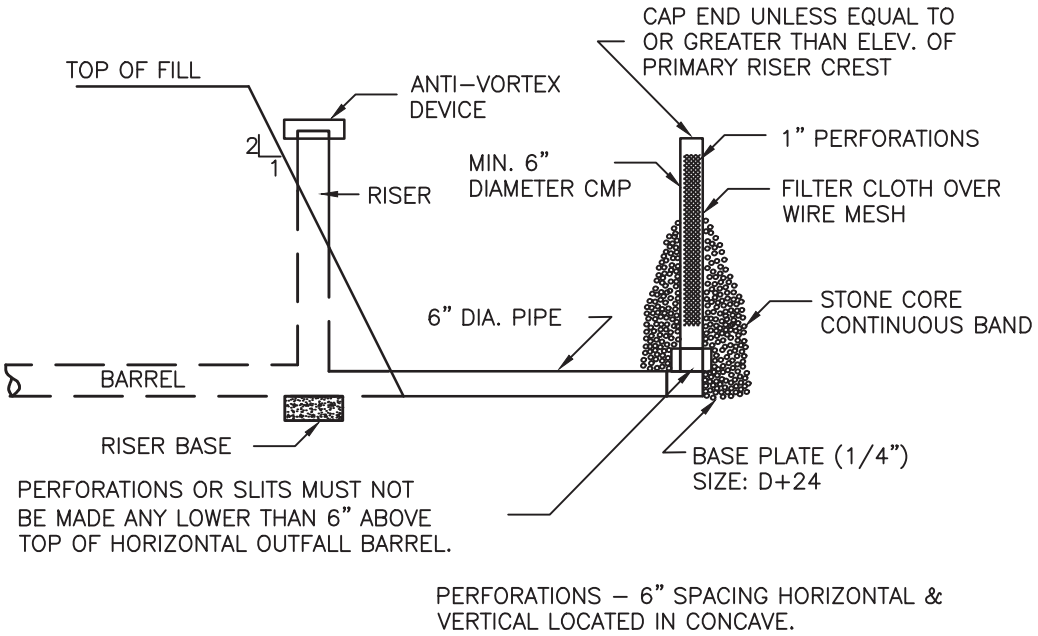
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SEDIMENT BASIN RISER BASE DETAIL

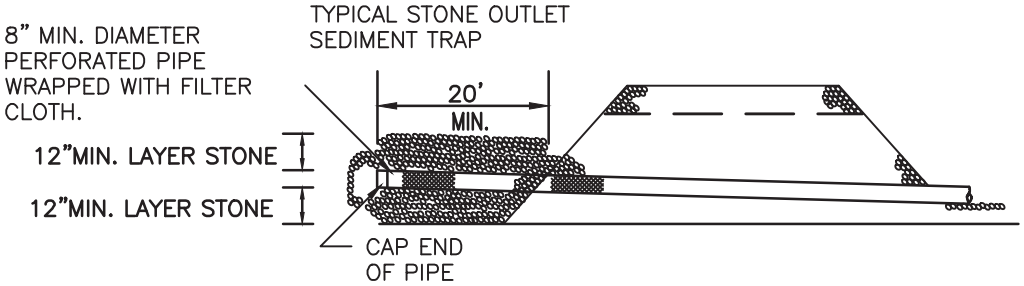
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 88

Sheet: 88 of 127
Type:



OPTIONAL SEDIMENT TRAP DEWATERING DEVICE – 1 WITH 6" PERFORATED RISER



OPTIONAL SEDIMENT TRAP DEWATERING DEVICE – II

NOTE: THE ELEVATIONS AND DIMENSIONS WILL BE COMPLETED AS REQUIRED FOR THE FINAL SUBMISSION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

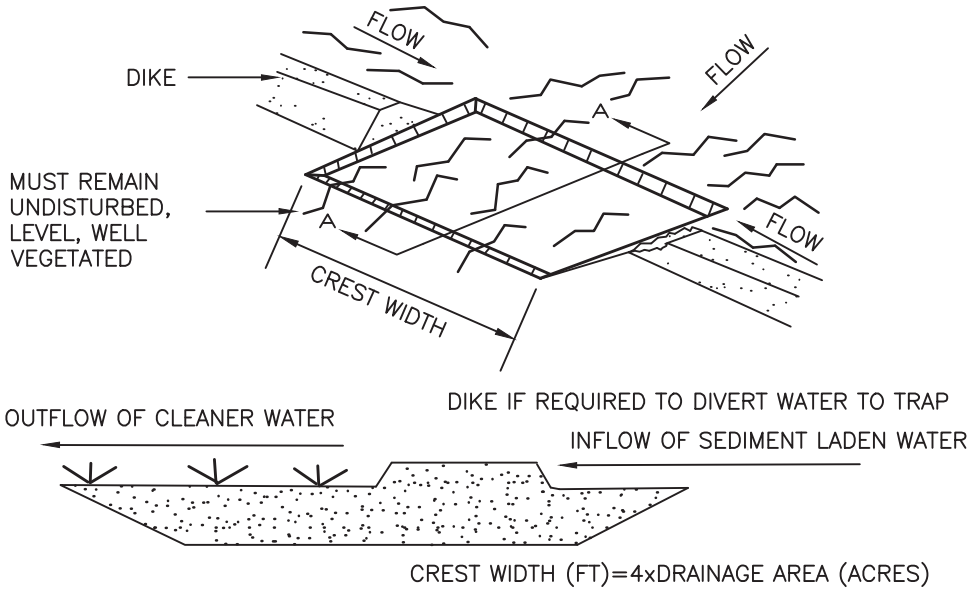
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
OPTIONAL SEDIMENT TRAP
DEWATERING DEVICES

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 89

Sheet: 89 of 127
Type:



SECTION A – A
EXCAVATED GRASS OUTLET SEDIMENT TRAP

CONSTRUCTION SPECIFICATIONS

1. VOLUME OF SEDIMENT STORAGE SHALL BE 1800 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE AREA.
2. MINIMUM CREST WIDTH SHALL BE 4 x DRAINAGE AREA
3. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
4. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
5. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION SHALL BE MINIMIZED.
6. THE SEDIMENT TRAP SHALL BE REMOVED AND AREA STABILIZED WHEN THE REMAINING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
7. ALL CUT SLOPES SHALL BE 1:1 OR FLATTER.

MAXIMUM DRAINAGE AREA: 5 ACRES

NOTE: THE ELEVATIONS AND DIMENSIONS WILL BE COMPLETED AS REQUIRED FOR THE FINAL SUBMISSION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

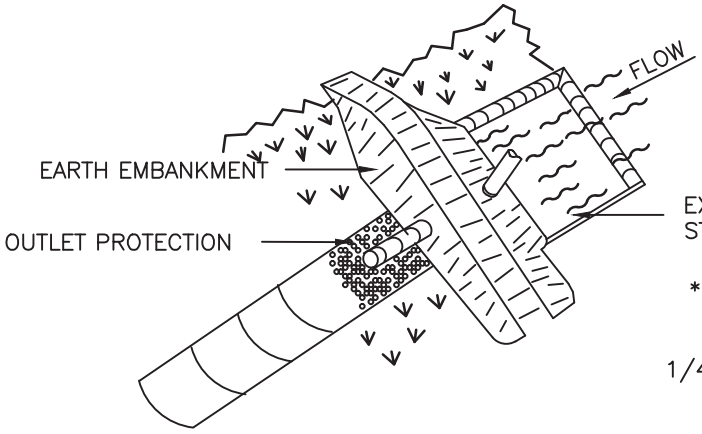
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
GRASS OUTLET SEDIMENT TRAP

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 90

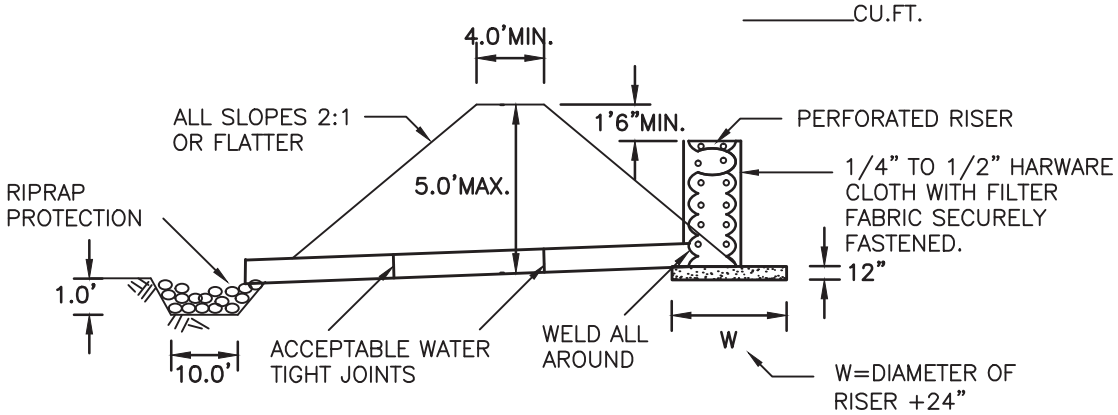
Sheet: 90 of 127
Type:



EXCAVATE IF NECESSARY FOR STORAGE

* RISER EMBEDDED 9" INTO CONCRETE
OR
1/4" METAL PLATE WELDED ALL AROUND.

DESIGN VOLUME IS _____CU.FT.



EMBANKMENT SECTION THRU RISER

SIZES OF PIPE NEEDED:

BARREL DIAMETER: _____
RISER DIAMETER: _____

NOTE:
CONSTRUCTION SPECIFICATION SHOULD BE ATTACHED TO THIS DETAIL TO COMPLETE DESIGN.

MAXIMUM DRAINAGE AREA: 5 ACRES

NOTE: THE ELEVATIONS AND DIMENSIONS WILL BE COMPLETED AS REQUIRED FOR THE FINAL SUBMISSION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SEDIMENT TRAP PIPE OUTLET

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 91

Sheet: 91 of 127
Type:

CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION AS WELL AS OVER–SIZED STONES, ROCKS, ORGANIC MATERIAL, OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. VOLUME OF SEDIMENT STORAGE SHALL BE 1800 CUBIC FEET PER ACRE OF CONTRIBUTORY DRAINAGE.
4. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
5. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
6. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION ARE MINIMIZED.
7. THE STRUCTURE SHALL BE REMOVED AND AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
8. ALL FILL SLOPES SHALL BE 2:1 OR FLATTER; CUT SLOPES 1:1 OR FLATTER.
9. ALL PIPE CONNECTIONS SHALL BE WATERTIGHT.
10. THE TOP 2/3 OF THE RISER SHALL BE PERFORATED WITH ONE (1) INCH DIAMETER HOLES OR SLITS SPACED SIX (6) INCHES VERTICALLY AND HORIZONTALLY AND PLACED IN THE CONCAVE PORTION OF PIPE. NO HOLES WILL BE ALLOWED WITHIN SIX (6) INCHES OF THE HORIZONTAL BARREL.
11. THE RISER SHALL BE WRAPPED WITH 1/4 TO 1/2 INCH HARDWARE CLOTH WIRE THEN WRAPPED WITH FILTER CLOTH (HAVING AN EQUIVALENT SIEVE SIZE OF 40–80). THE FILTER CLOTH SHALL EXTEND SIX (6) INCHES ABOVE THE HIGHEST HOLE AND SIX (6) INCHES BELOW THE LOWEST HOLE. WHERE ENDS OF THE FILTER CLOTH COME TOGETHER, THEY SHALL BE OVER–LAPPED, FOLDED AND STAPLED TO PREVENT BYPASS.
12. STRAPS OR CONNECTING BANDS SHALL BE USED TO HOLD THE FILTER CLOTH AND WIRE FABRIC IN PLACE. THEY SHALL BE PLACED AT THE TOP AND BOTTOM OF THE CLOTH.
13. FILL MATERIAL AROUND THE PIPE SPILLWAY SHALL BE HAND COMPACTED IN FOUR (4) INCH LAYERS. A MINIMUM OF TWO (2) FEET OF HAND COMPACTED BACKFILL SHALL BE PLACED OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH CONSTRUCTION
14. THE RISER SHALL BE ANCHORED WITH EITHER A CONCRETE BASE OR STEEL PLATE BASE TO PREVENT FLOTATION. FOR CONCRETE BASED THE DEPTH SHALL BE TWELVE (12) INCHES WITH THE RISER EMBEDDED NINE (9) INCHES. A 1/4 INCH MINIMUM THICKNESS STEEL PLATE SHALL BE ATTACHED TO THE RISER BY A CONTINUOUS WELD AROUND THE BOTTOM TO FORM A WATERTIGHT CONNECTION AND THEN PLACE TWO (2) FEET OF STONE, GRAVEL, OR TAMPED EARTH ON THE PLATE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

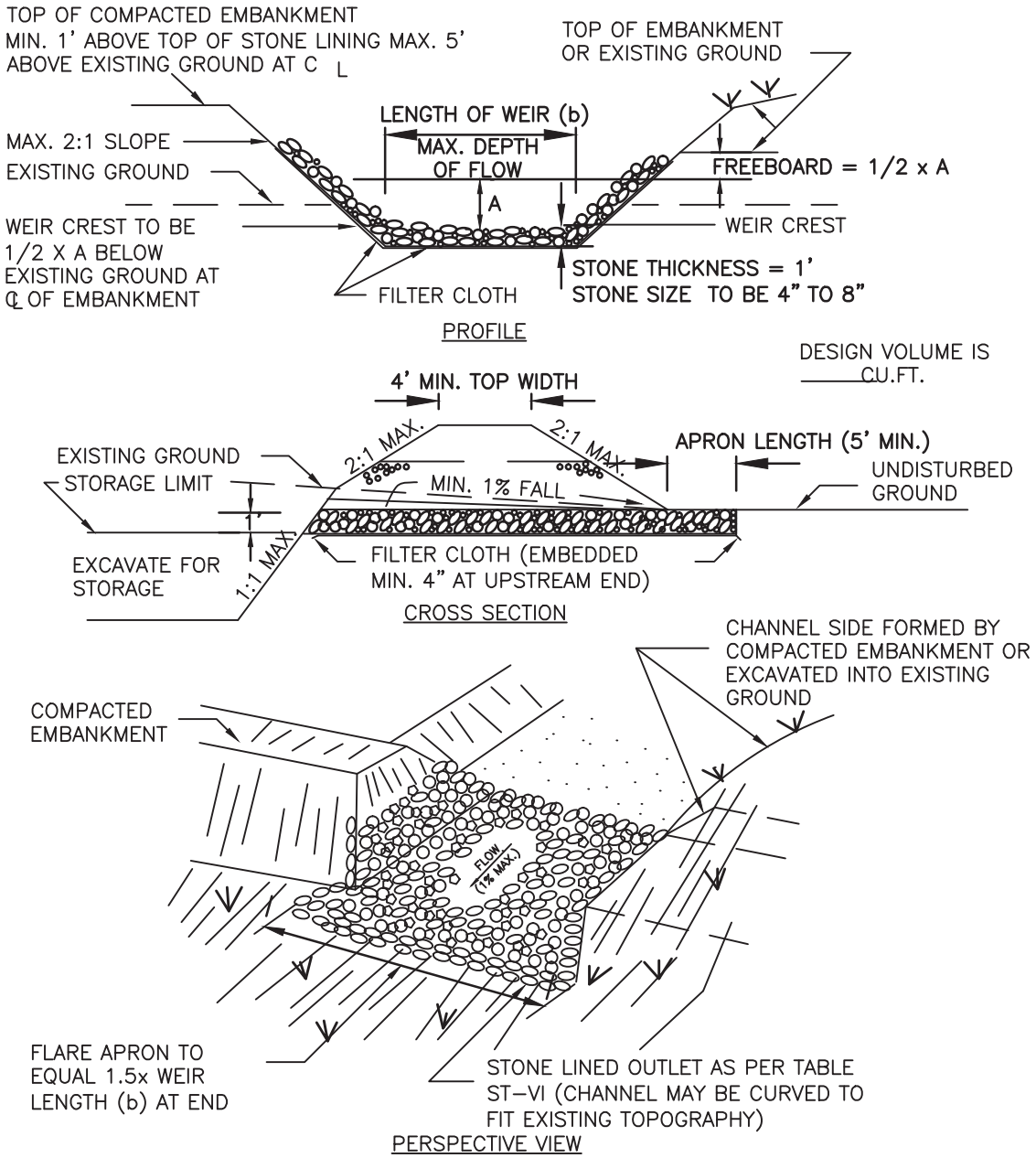
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SEDIMENT TRAP PIPE OUTLET
SPECIFICATIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 92

Sheet: 92 of 127
Type:



MAXIMUM DRAINAGE AREA = 15 ACRES

NOTE: THE ELEVATIONS AND DIMENSIONS WILL BE COMPLETED AS REQUIRED FOR THE FINAL SUBMISSION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
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Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SEDIMENT TRAP RIPRAP OUTLET

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 93

Sheet: 93 of 127
Type:

CONSTRUCTION SPECIFICATIONS

1. THE AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION AS WELL AS OVER–SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED. MAXIMUM HEIGHT OF OF EMBANKMENT SHALL BE FIVE (5) FEET, MEASURED AT CENTERLINE OF EMBANKMENT.
3. ALL FILL SLOPES SHALL BE 2:1 OR FLATTER, CUT SLOPES 1:1 OR FLATTER.
4. ELEVATION OF THE TOP OF ANY DIKE DIRECTING WATER INTO TRAP MUST EQUAL OR EXCEED THE HEIGHT OF EMBANKMENT.
5. STORAGE AREA PROVIDED SHALL BE FIGURED BY COMPUTING THE VOLUME AVAILABLE BEHIND THE OUTLET CHANNEL UP TO AN ELEVATION OF ONE (1) FOOT BELOW THE LEVEL WEIR CREST.
6. FILTER CLOTH SHALL BE PLACED OVER THE BOTTOM AND SIDES OF THE OUTLET CHANNEL PRIOR TO PLACEMENT OF STONE. SECTIONS OF FABRIC MUST OVERLAP AT LEAST ONE (1) FOOT WITH SECTION NEAREST THE ENTRANCE PLACED ON TOP. FABRIC SHALL BE EMBEDDED AT LEAST SIX (6) INCHES INTO EXISTING GROUND AT ENTRANCE OUTLET CHANNEL.
7. STONE USED IN THE OUTLET CHANNEL SHALL BE FOUR (4) TO EIGHT (8) INCH RIPRAP. TO PROVIDE A FILTERING EFFECT, A LAYER OF FILTER CLOTH SHALL BE EMBEDDED ONE (1) FOOT WITH SECTION NEAREST ENTRANCE PLACED ON TOP. FABRIC SHALL BE EMBEDDED AT LEAST SIX (6) INCHES INTO EXISTING GROUND AT ENTRANCE OF OUTLET
8. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
9. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRED AS NEEDED.
10. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION ARE MINIMIZED.
11. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
12. DRAINAGE AREA FOR THIS PRACTICE IS LIMITED TO 15 ACRES OR LESS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

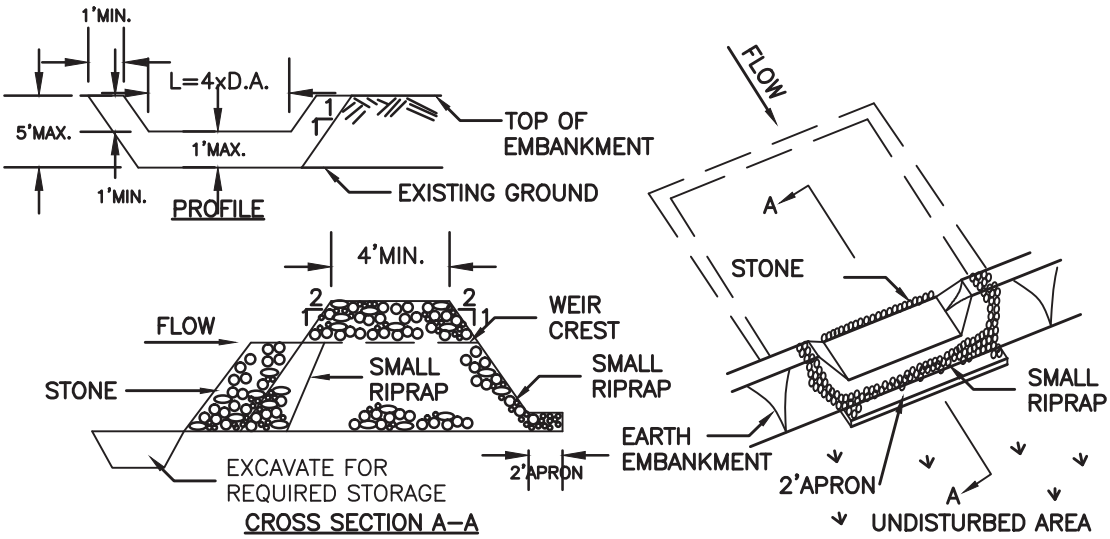
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SEDIMENT TRAP RIPRAP OUTLET
SPECIFICATIONS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 94

Sheet: 94 of 127
Type:



CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER–SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"–8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP–GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMEN–SIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION IS MINIMIZED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

MAXIMUM DRAINAGE AREA 5 ACRES

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SEDIMENT TRAP STONE OUTLET

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 95

Sheet: 95 of 127
Type:

FILTER STRIPS

FILTER STRIPS ARE VEGETATED AREAS ALONG WATER BODIES, DESIGNED TO SLOW THE MOVEMENT OF OVERLAND FLOW OF WATER SO THAT SEDIMENT WILL BE LEFT BEHIND, PROVIDE AN OPPORTUNITY FOR VEGETATION TO REMOVE NUTRIENTS FROM SUBSURFACE FLOW, PROVIDE SHADE TO THE ADJACENT WATER BODY TO MAINTAIN COOL WATER TEMPERATURE, AND PROTECT BANK STABILITY AND PREVENT EROSION.

REQUIRED BMPS

FILTER STRIPS ARE REQUIRED ALONG ALL PONDS, LAKES, REGULATED STREAMS, AND CERTIFIED VERNAL POOLS.

FILTER STRIPS WILL EXTEND 50 FEET BACK FROM THE BANK, MEASURED ALONG THE SLOPE. EXCEPTIONS TO THIS FILTER STRIP WIDTH ARE:

1. SLOPES GREATER THAN 30%: FILTER STRIPS SHALL BE 100 FEET IN WIDTH, OR TO THE POINT BETWEEN 50 AND 100 FEET FROM THE BANK, WHERE A BREAK IN THE TOPOGRAPHY REDUCES THE SLOPE TO LESS THAN 30%.

2. STREAMS GREATER IN WIDTH THAN 25 FEET BANK TO BANK, PONDS 10 ACRES OR LARGER IN AREA, AND ALONG OUTSTANDING RESOURCE WATERS AND THEIR TRIBUTARIES: IN THESE CIRCUMSTANCES, VARIABLE–WIDTH FILTER STRIPS MUST BE USED IN ACCORDANCE WITH TABLE 4.

SLOPE (%)	FILTER STRIP WIDTH (FT)
0	50
10	90
20	130
30	170
40	210
50	250
60	290
70	330
80	370
90	410
100	450

NO LOGGING EQUIPMENT MAY OPERATE IN A FILTER STRIP UNLESS IT IS INCLUDED IN AN APPROVED FOREST CUTTING PLAN, AND IT:

- WILL REDUCE ENVIRONMENTAL DAMAGE;
- IS AT AN APPROVED STREAM CROSSING;
- IS ON A PRE–EXISTING LOGGING ROAD, OR;
- IS IN FILTER STRIPS GREATER THAN 50 FEET IN WIDTH, EQUIPMENT CAN OPERATE BEYOND 50 FEET OF THE WATERBODY. HOWEVER, NO PRINCIPAL SKID TRAILS MAY BE LOCATED IN THIS AREA, THE DISTURBANCE OF THE FORREST FLOOR MUS T BE MINIMIZED, AND ANY DISTRIBUTED SOIL MUST BE PROMPTLY STABILIZED.

NO MORE THAN 50% OF THE BASAL AREA MAY BE CUT AT ANY ONE TIME, AND A WAITING PERIOD OF FIVE YEARS MUST ELAPSE BEFORE ANOTHER CUT IS MADE. THE RESIDUAL STAND WILL BE COMPOSED OF HEALTHY GROWING TREES WELL DISTRIBUTED OVER THE AREA. EXCEPTIONS TO THIS STANDARD MAY BE MADE BY THE SERVICE FORESTER IF IT IS SHOWN IN THE FOREST CUTTING PLAN THAT A HEAVIER CUT IS NECESSARY TO PROTECT THE STREAM, BANK, OR WATER QUALITY.

CUT TREES WILL BE PULLED OUT OF THE FILTER STRIP AND SLASH WILL BE DISPOSED OF ACCORDING TO THE SLASH LAW OF MASSACHUSETTS.

THE FOLLOWING GUIDELINES MAY BE USED TO PROVIDE ADDITIONAL PROTECTION TO SENSITIVE STREAMS (E.G., TRIBUTARIES TO WATER SUPPLY RESERVOIRS, COLDWATER FISH RESOURCES, AND WILDLIFE HABITAT IN RIPARIAN CORRIDORS):

- LEAVE A 15 FOOT NO CUT BUFFER.
- AVOID SOIL COMPACTION AND RUTTING WITHIN 200 FEET OF A STREAM.
- MAINTAIN AREAS WITHIN 200 FEET OF A STREAM IN A FORRESTED CONDITION.
- PRESERVE IMPORTANT HABITAT CHARACTERISTICS WITHIN 200 FEET OF A STREAM, SUCH AS TREES WITH CAVITIES, DOWNED LOGS, STONE WALLS, AND ROCK JUMBLES.
- USE VARIABLE–WIDTH FILTER STRIP GUIDELINES ABOVE.
- MINIMIZE THE CUTTING OF TREES DIRECTLY ON THE STREAM BANK.

*MASSACHUSETTS LOOP ONLY

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

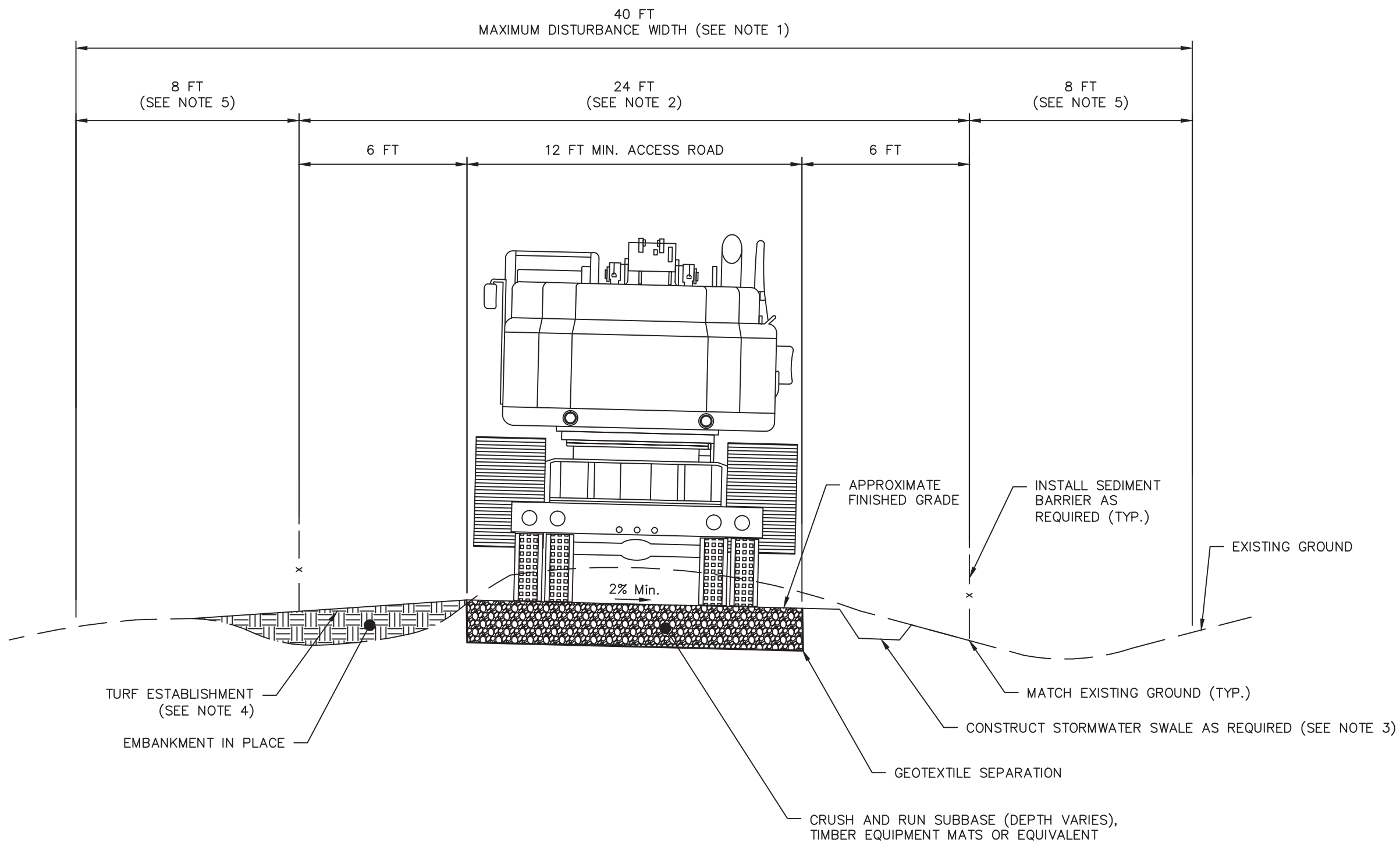
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
FILTER STRIPS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 96

Sheet: 96 of 127
Type:



NOTES:

1. THE MAXIMUM DISTURBANCE WIDTH ASSOCIATED WITH THE CONSTRUCTION OF ACCESS ROADS WILL BE 40FT.
2. ACCESS ROADS WILL TYPICALLY INCLUDE A 12 FT TRAVEL LANE AND 12 FT OF GRADING DISTURBANCE. THE GRADING DISTURBANCE WILL BE REQUIRED TO MATCH INTO EXISTING GROUND AND CONSTRUCT REQUIRED EROSION CONTROL MEASURES (E.G. SILT FENCE) AND SEDIMENT CONTROL DEVICES (E.G. STORMWATER SWALE). ADDITIONAL CONSTRUCTION WIDTH MAY BE REQUIRED IN AREAS THAT REQUIRED TRUCK PULL OFFS, TRUCK TURNAROUNDS, AND AROUND SHARP CURVES WHERE EQUIPMENT TRAILERS HAVE LARGE TURNING RADIUSES.
3. REFER TO THE STORMWATER SWALE TABLES FOR LOCATIONS AND SIZES OF ALL SWALES REQUIRED ALONG ACCESS ROADS.
4. SEED MIXES TO BE UTILIZED FOR TURF ESTABLISHMENT ALONG ACCESS ROADS SHALL CONFORM TO THE SEED MIXES OUTLINED IN THE ENVIRONMENTAL CONSTRUCTION PLANS (ECPs).
5. THE ADDITIONAL 16 FT OF DISTURBANCE MAY BE REQUIRED TO ACCOMMODATE TRUCK PULL–OFFS, TRUCK TURNAROUNDS, AND INCREASED TRAVEL LANE WIDTHS AROUND CURVES DUE TO THE LARGE TRUCK TURNING RADIUSES.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area.:
State:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Scale:
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TENNESSE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL ACCESS ROAD
CROSS SECTION

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 97

Sheet: 97 of 127
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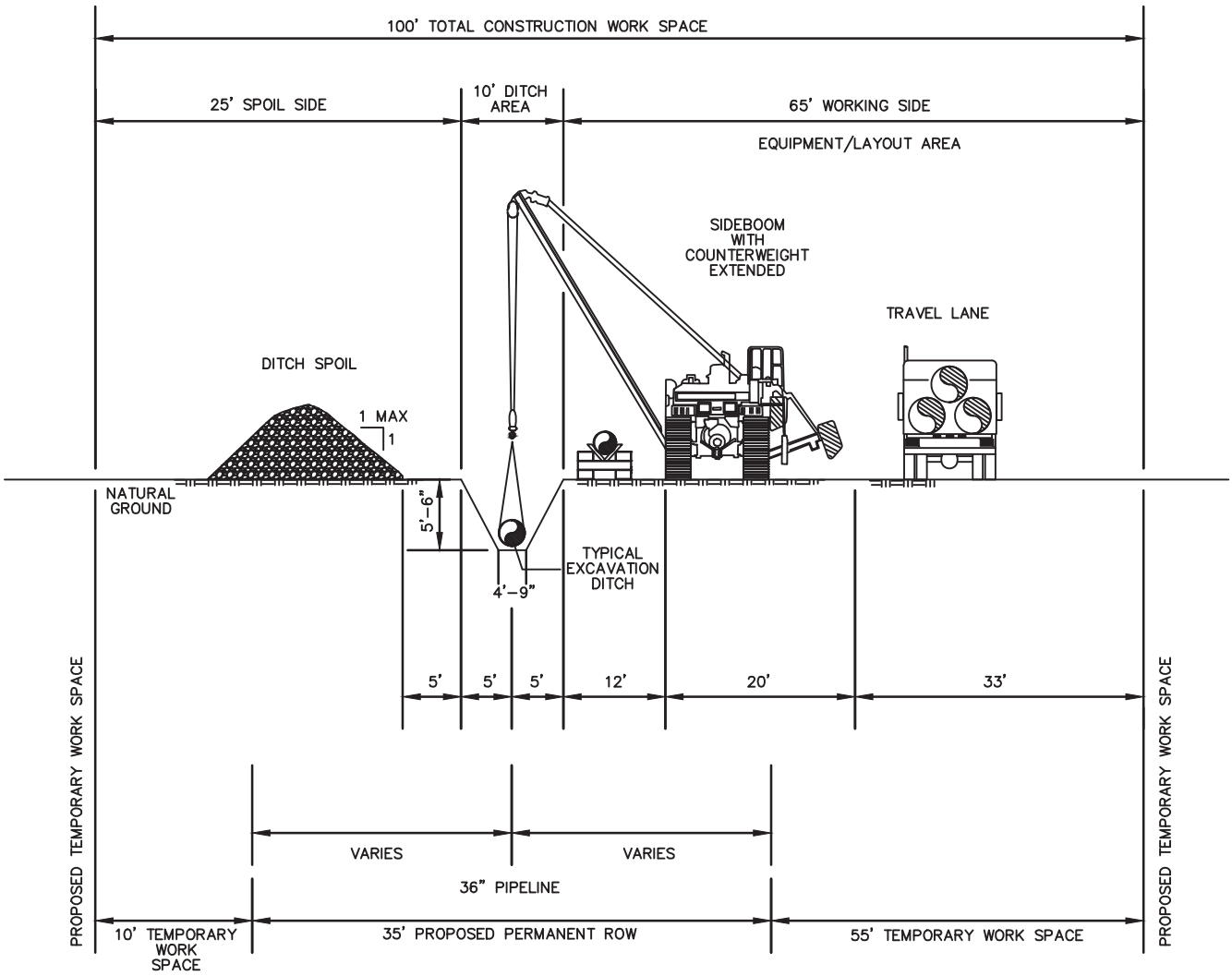

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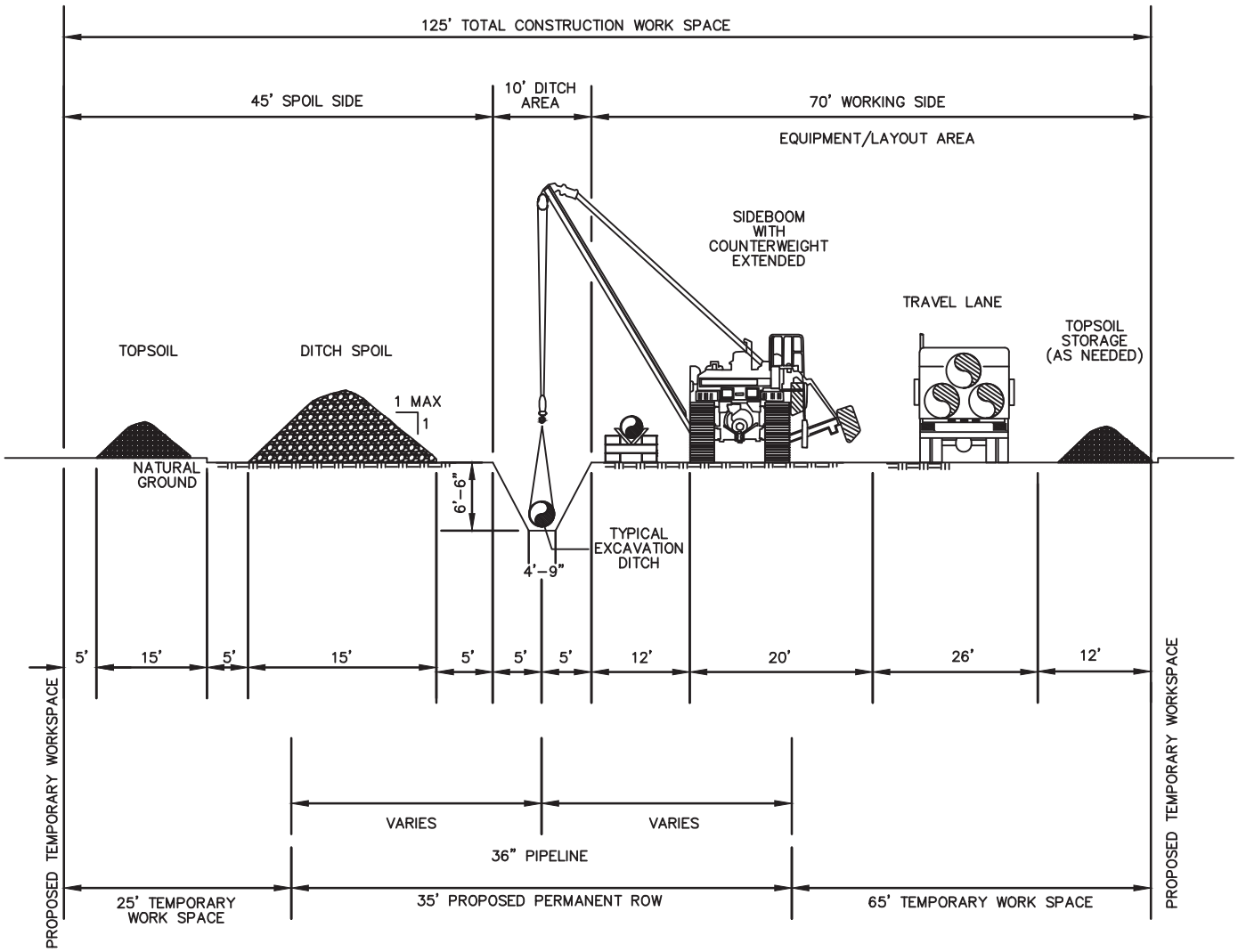
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL ROW CROSS SECTION
CONVENTIONAL CONSTRUCTION

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 98

Sheet: 98 of 127
Type:



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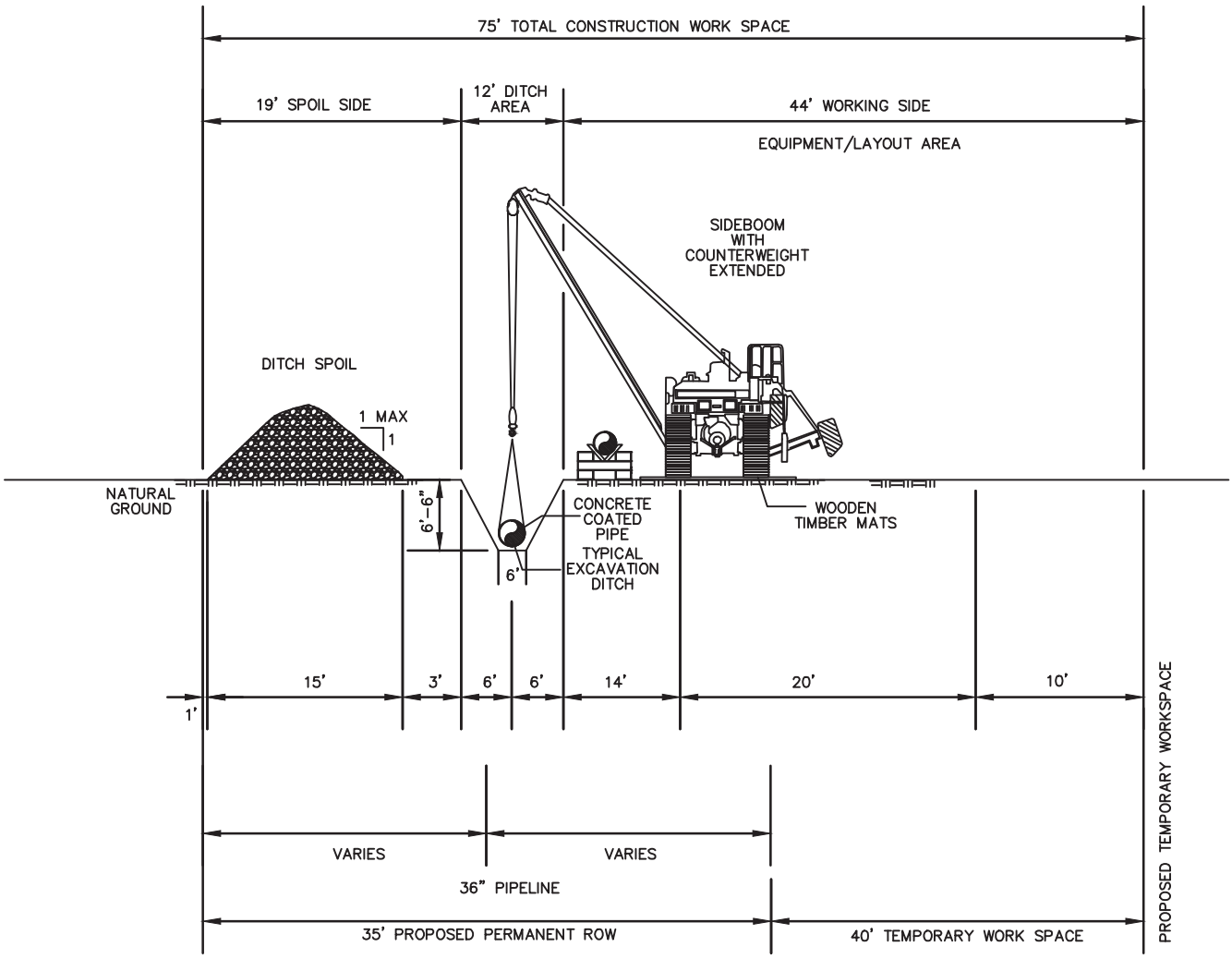
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL ROW CROSS SECTION ACROSS AGRICULTURAL LAND

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 99

Sheet: 99 of 127
Type:



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St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

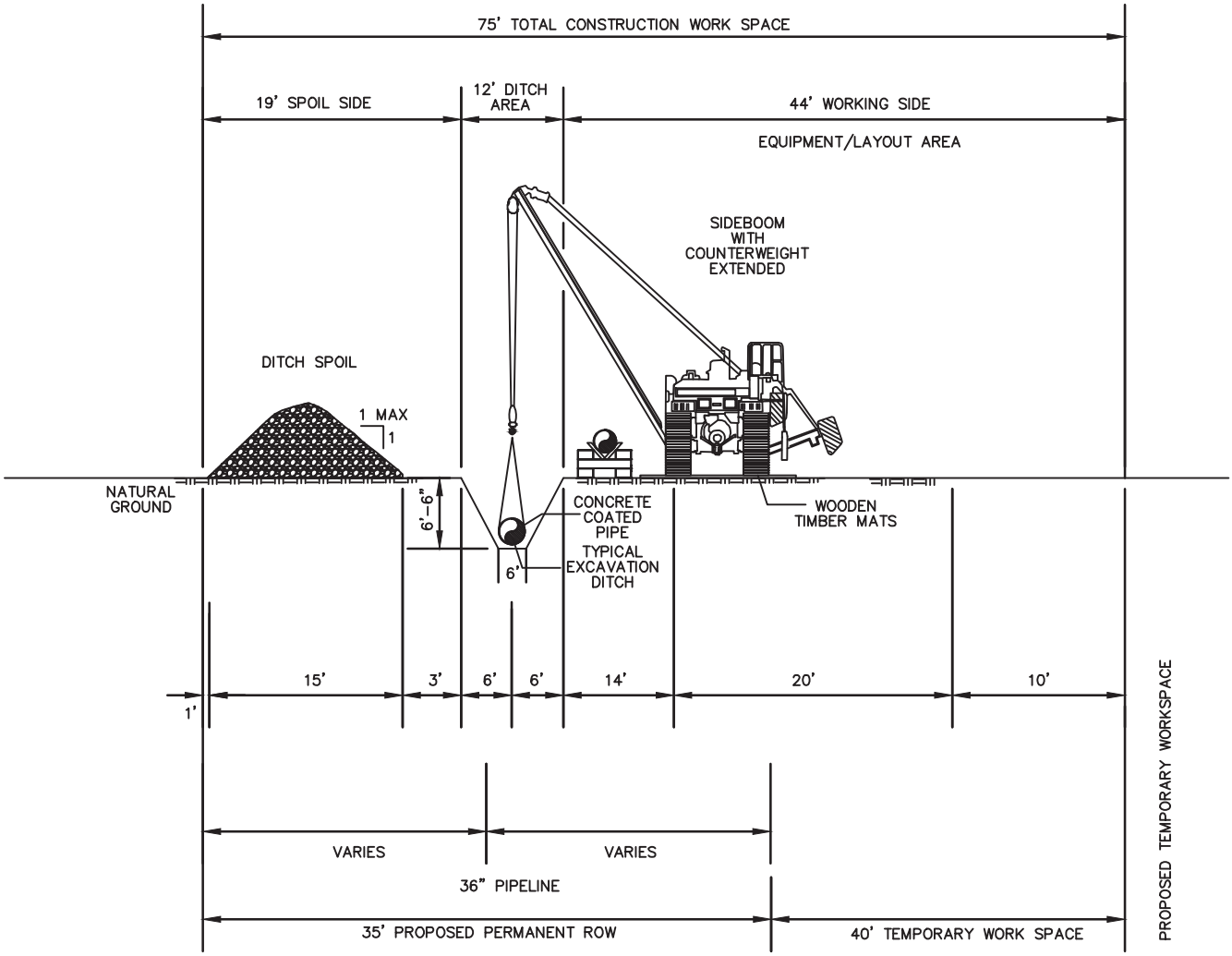
TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL ROW CROSS SECTION
ACROSS SATURATED WETLAND

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 100

Sheet: 100 of 127

Type:



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Chk:	Date:	Scale:
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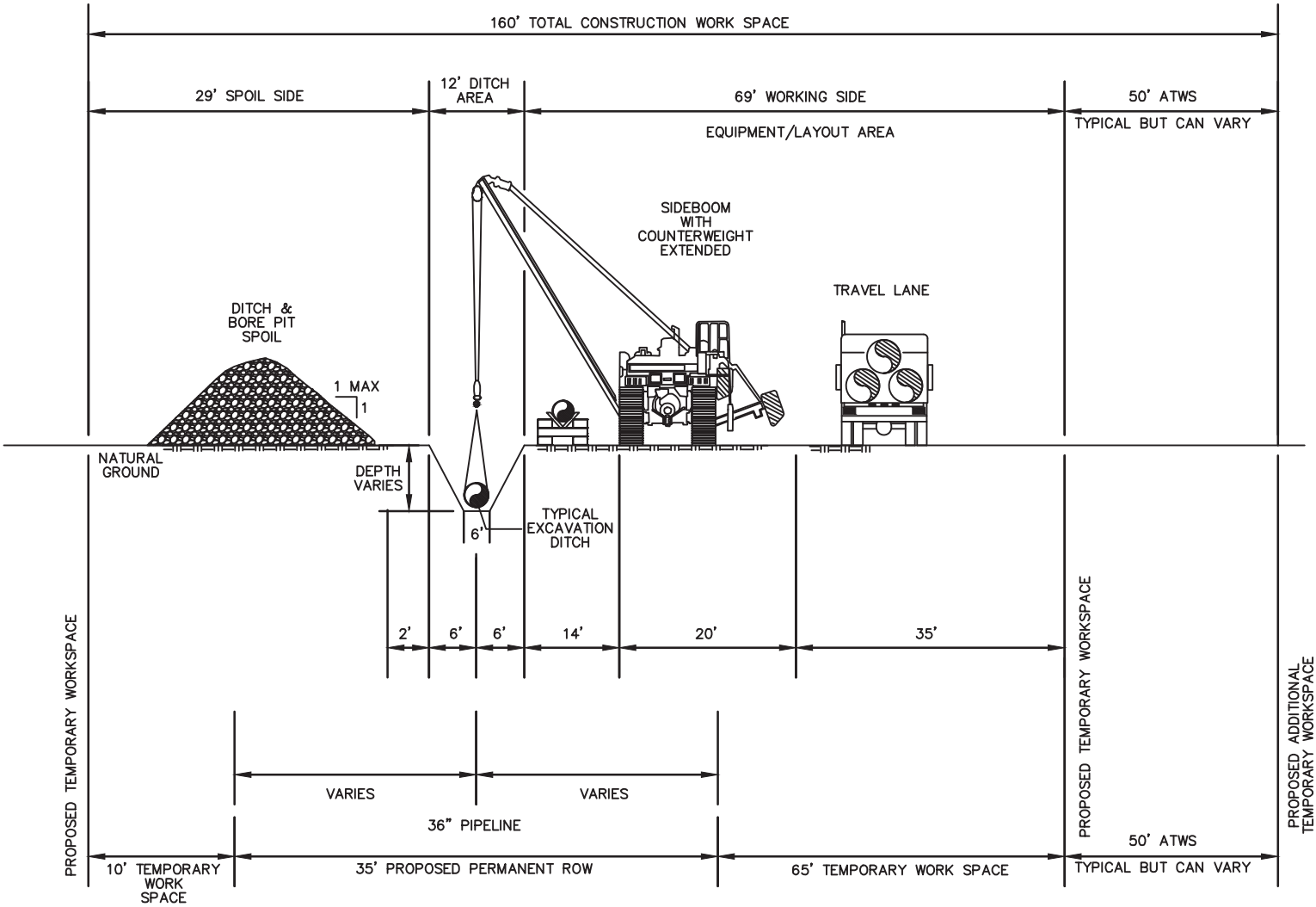
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL ROW CROSS SECTION–
ACROSS NON–SATURATED WETLANDS

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 101

Sheet: 101 of 127

Type:



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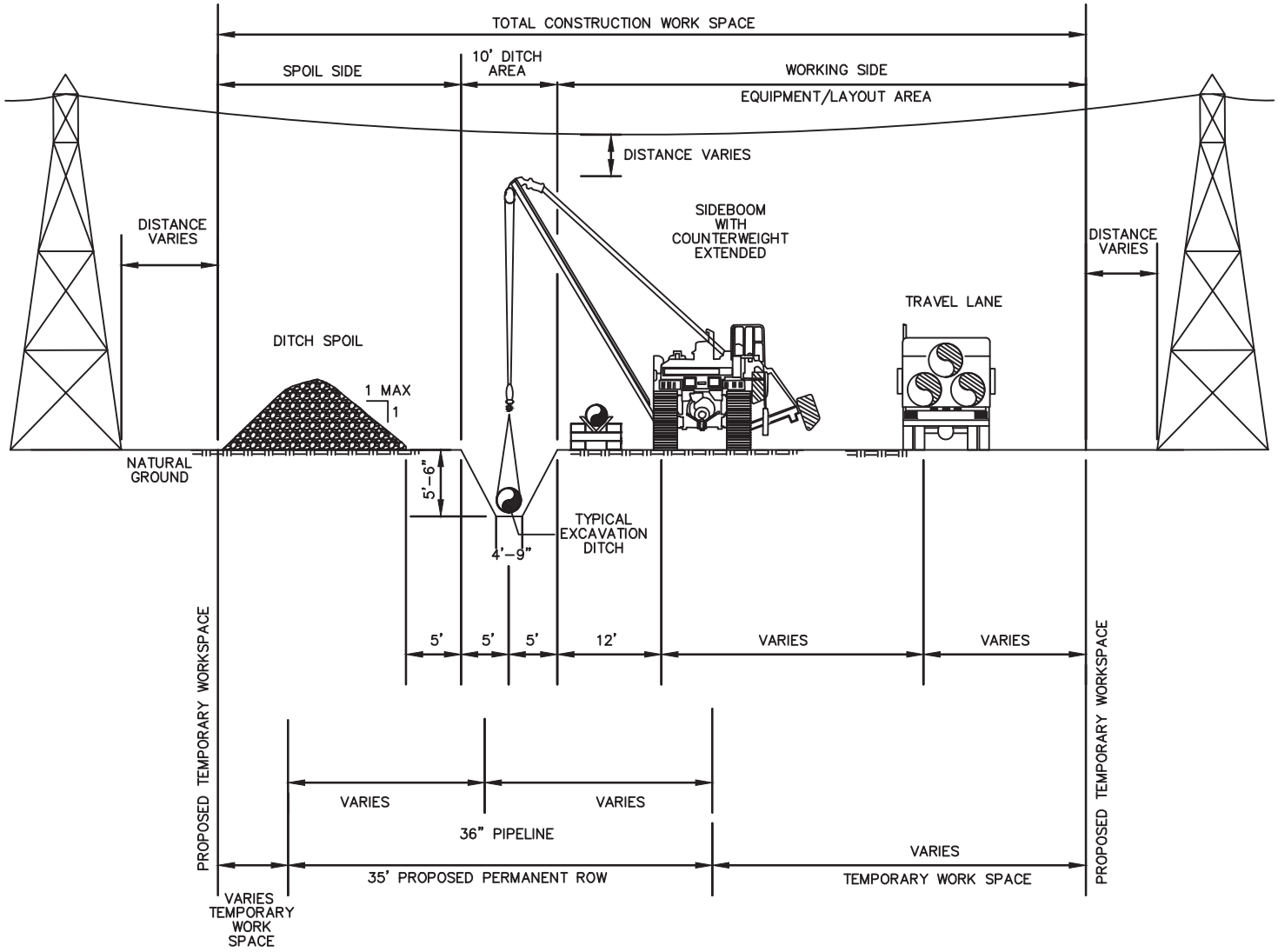
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL ROW CROSS SECTION–
CONSTRUCTION AT ROAD CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 102

Sheet: 102 of 127
Type:



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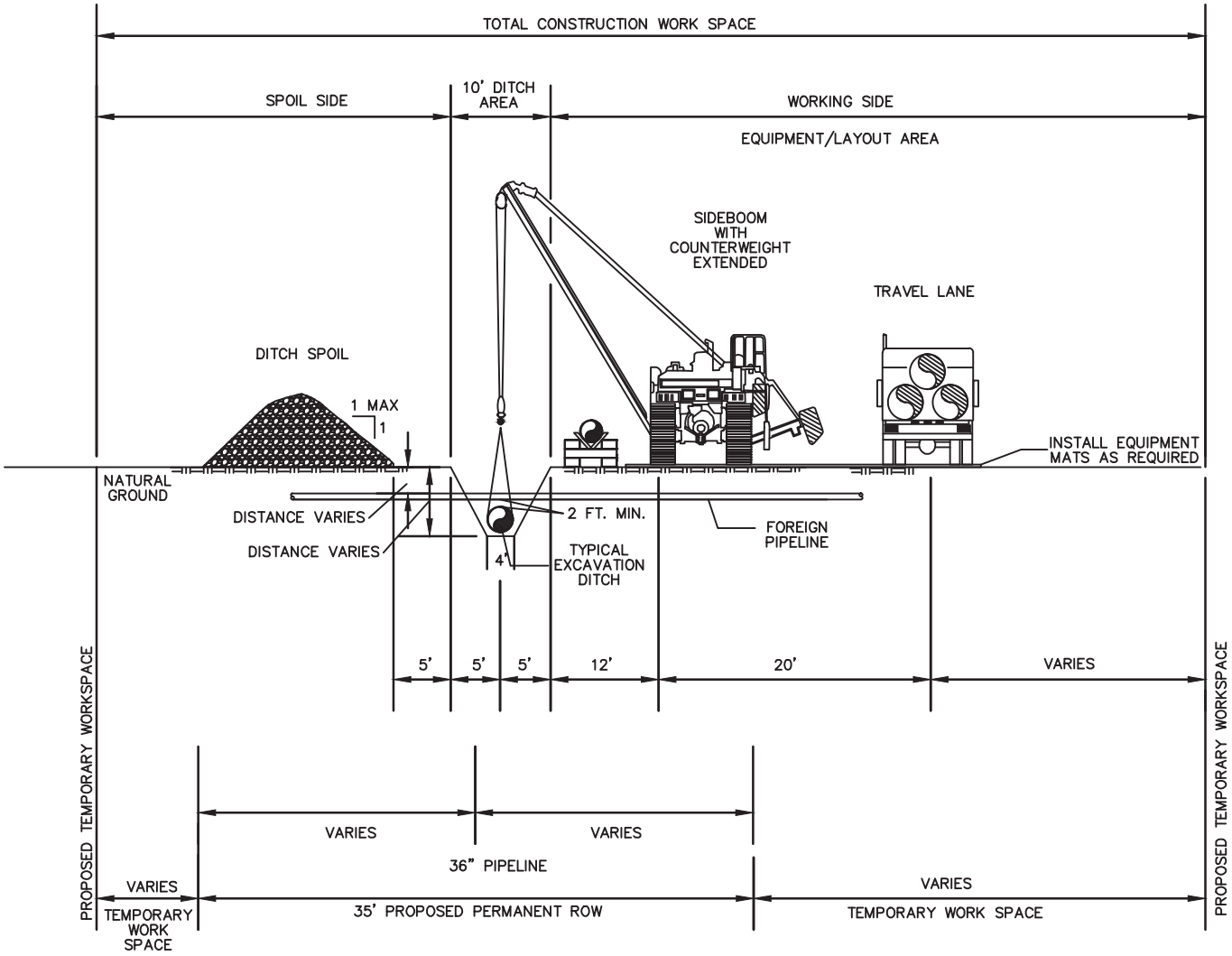
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYP. ROW CROSS SECTION–CONVENTIONAL
CONSTR. WITH OVERHEAD UTILITY LINE CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 103

Sheet: 103 of 127
Type:



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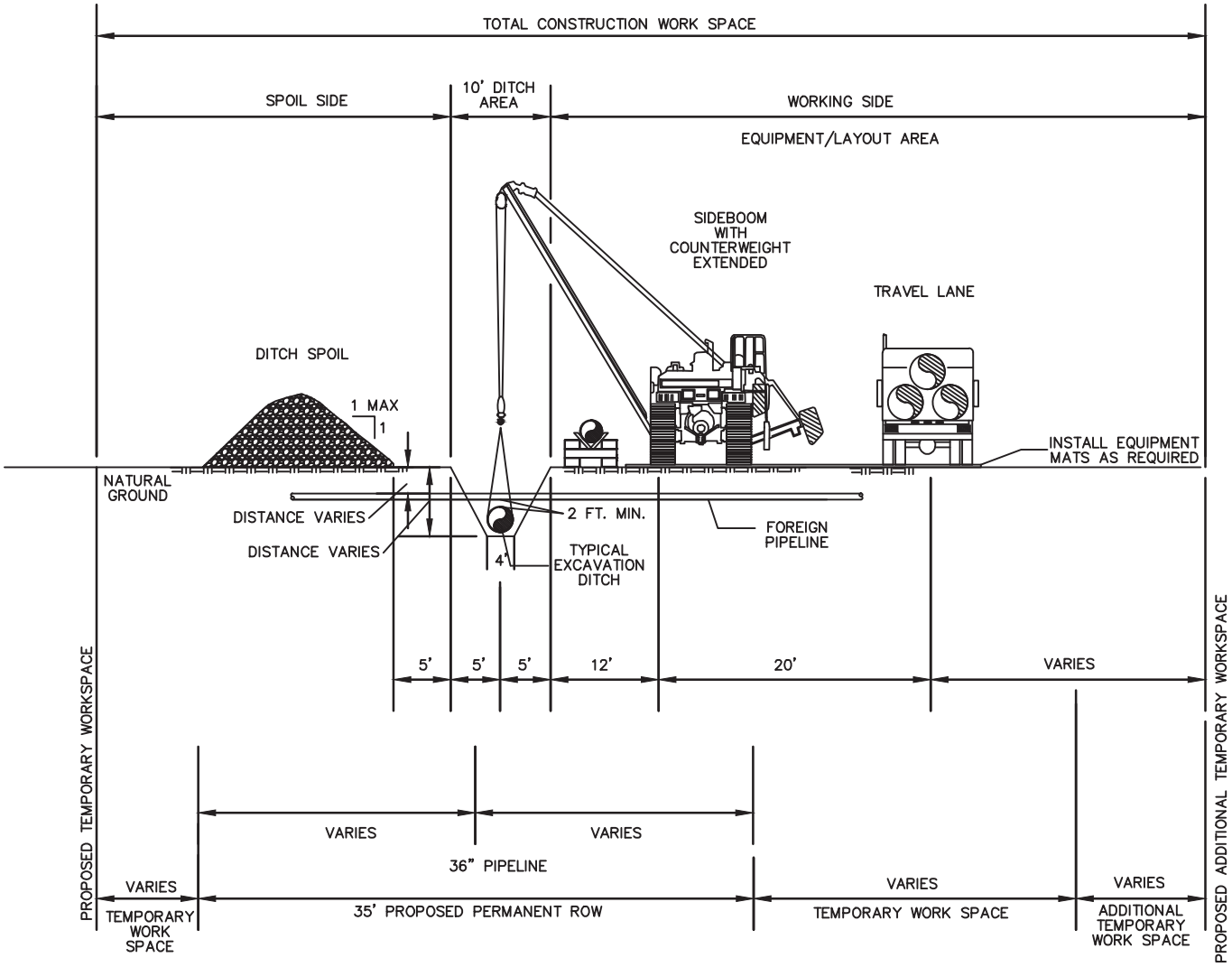
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYP. ROW CROSS SECTION–NORMAL CONSTR.
WITH FOREIGN PIPELINE CROSSING–TWS LEFT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 104

Sheet: 104 of 127
Type:



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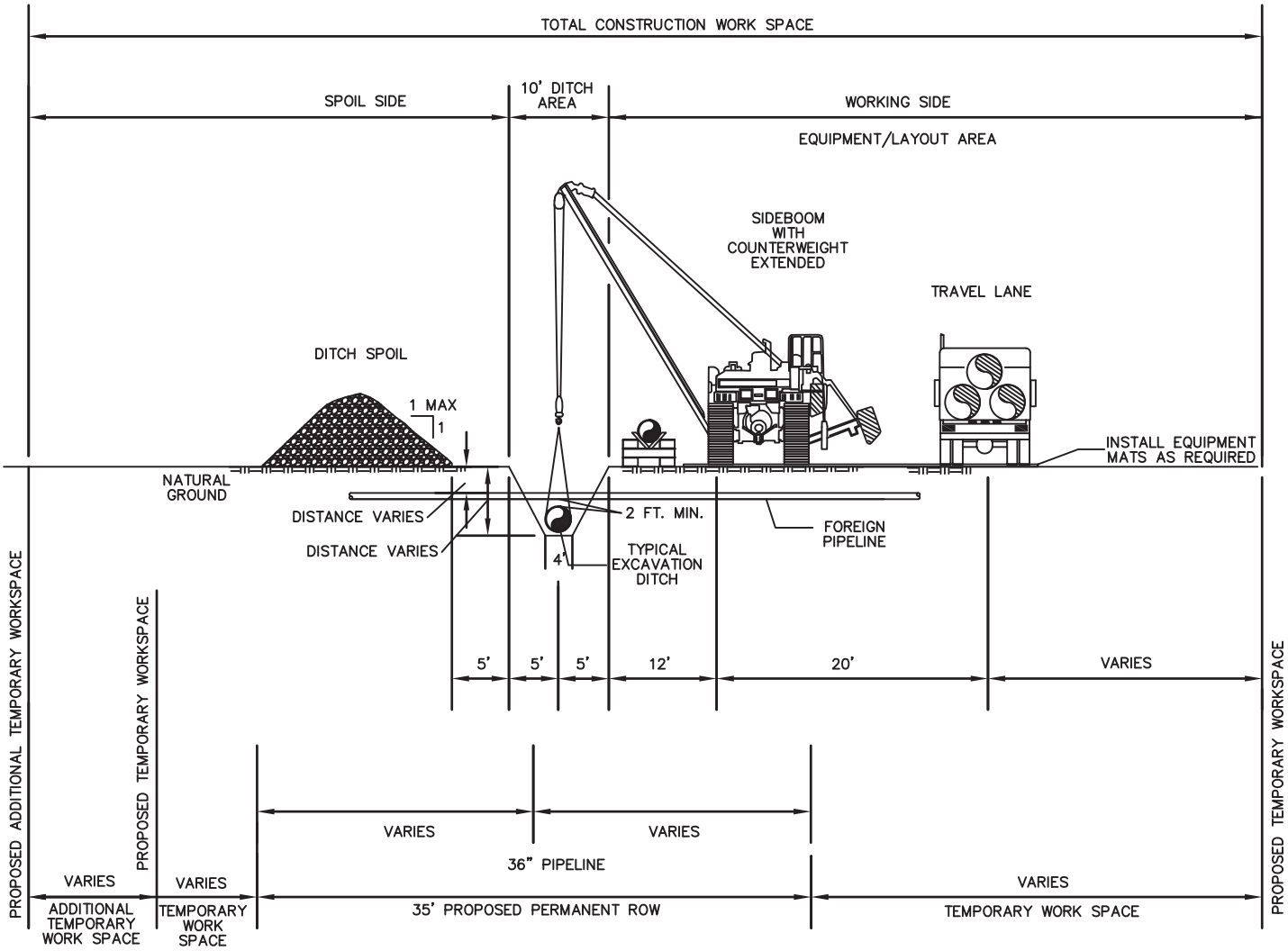
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYP. ROW CROSS SECTION–CONVENTIONAL CONSTR.
WITH FOREIGN PIPELINE CROSSING–A TWS LEFT & RIGHT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 105

Sheet: 105 of 127
Type:



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Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

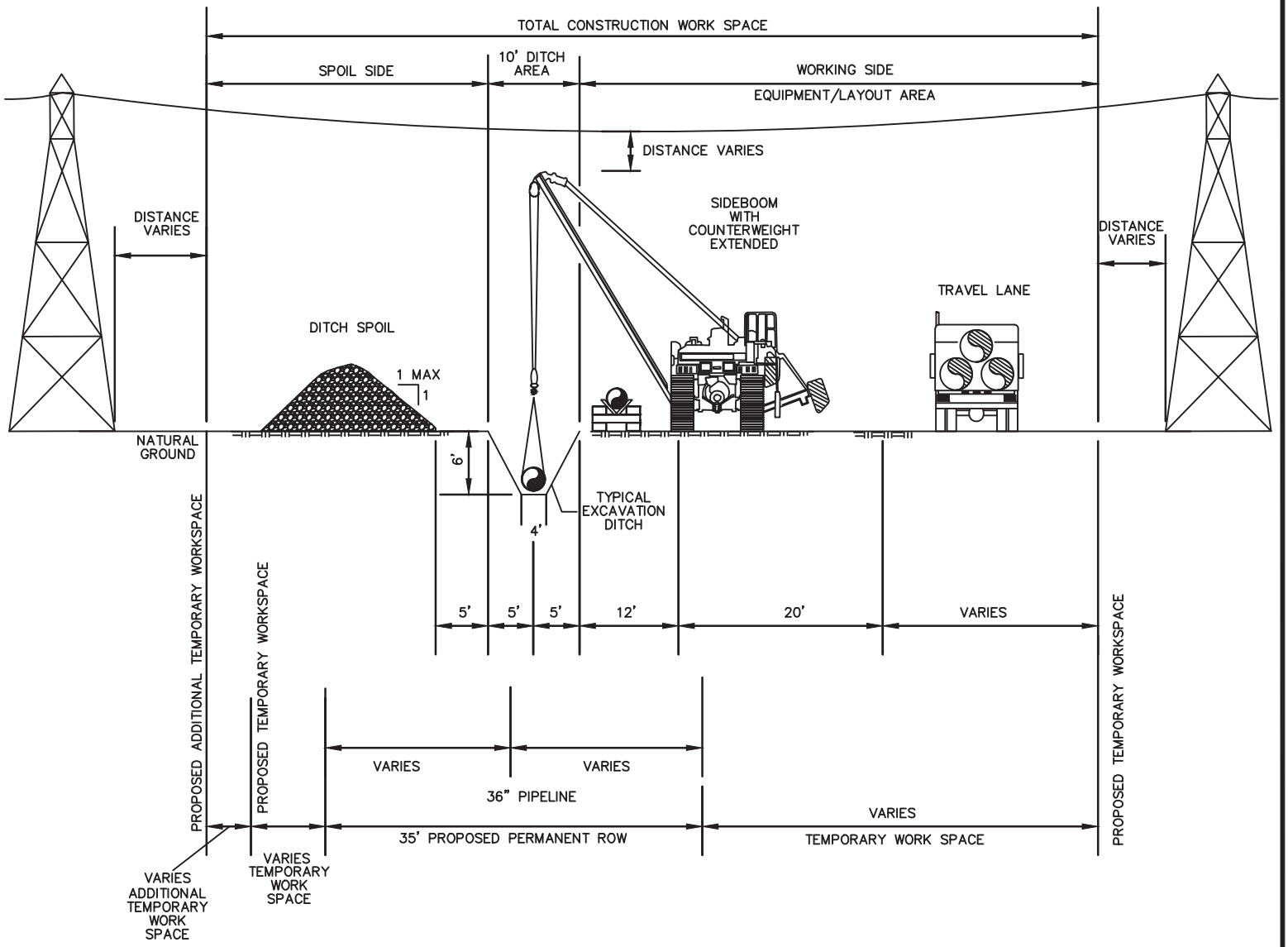
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYP. ROW CROSS SECTION–CONVENTIONAL CONSTR.
WITH FOREIGN PIPELINE CROSSING–ATWS LEFT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 106

Sheet: 106 of 127

Type:



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Chk:	Date:	Scale:
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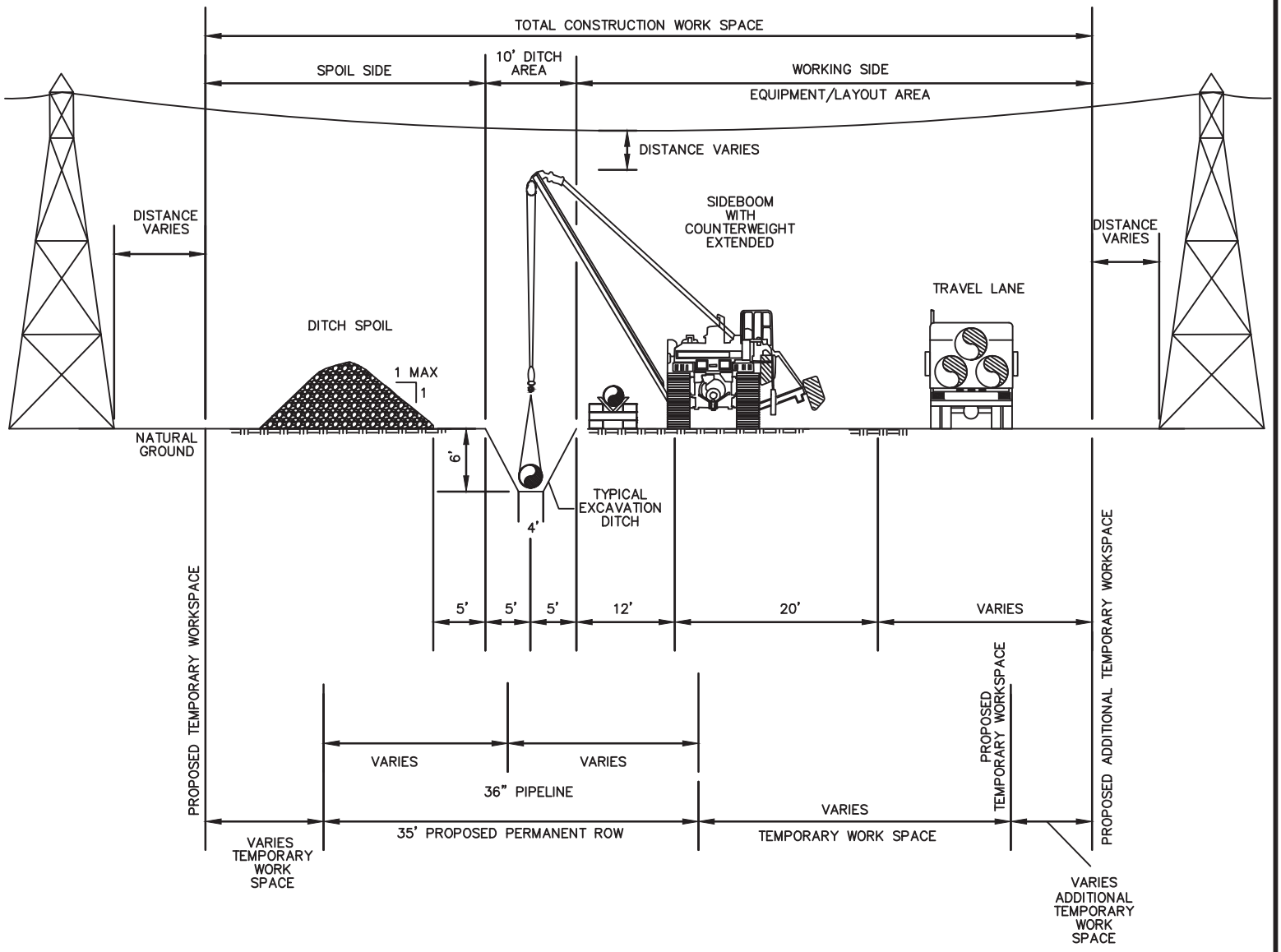
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYP. ROW CROSS SECTION–CONVENTIONAL CONSTR.
WITH OVERHEAD UTILITY LINE CROSSING–ATWS LEFT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 107

Sheet: 107 of 127
Type:



NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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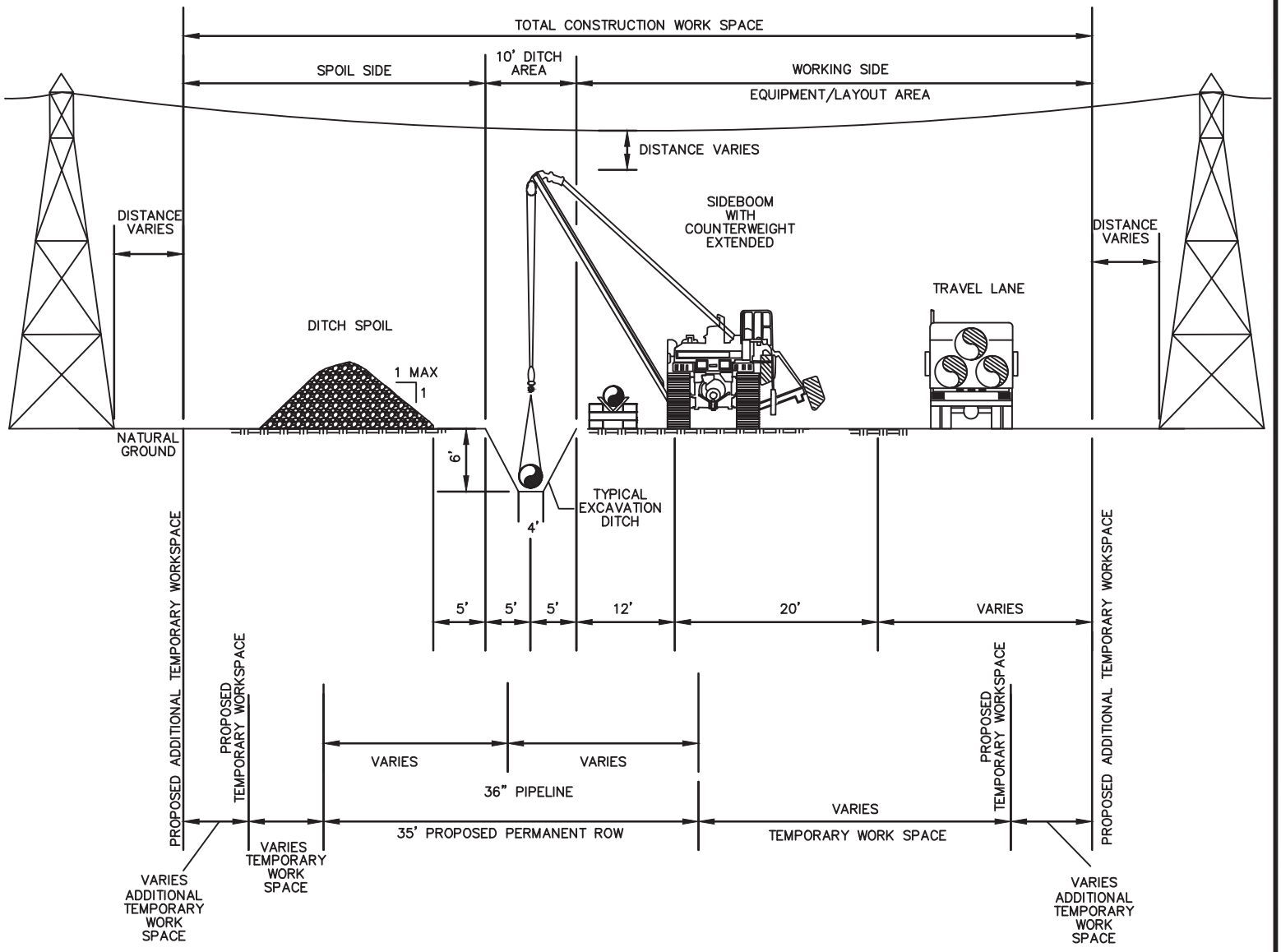
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYP. ROW CROSS SECTION–CONVENTIONAL CONSTR.
WITH OVERHEAD UTILITY LINE CROSSING–ATWS RIGHT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 108

Sheet: 108 of 127
Type:



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St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

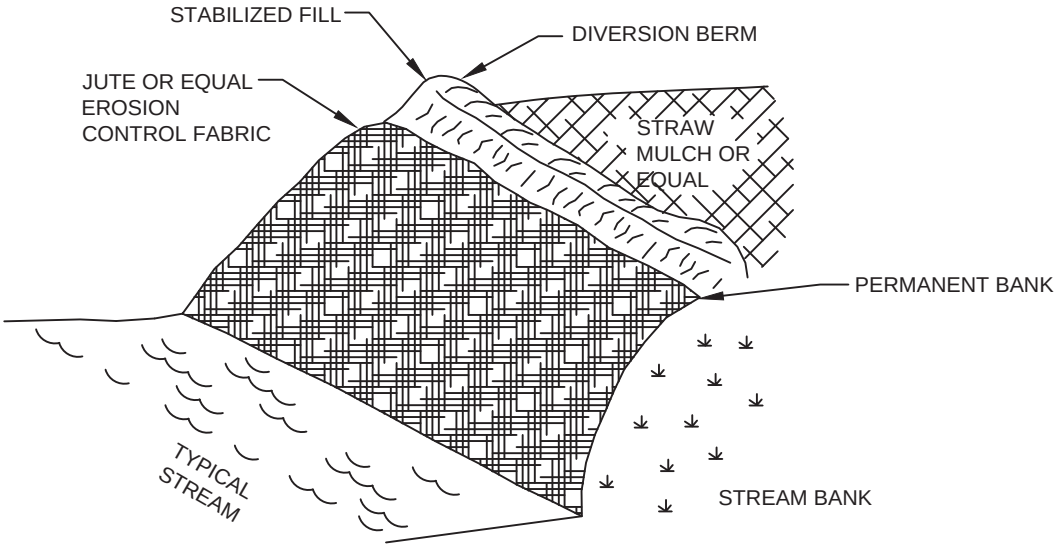
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYP. ROW CROSS SECTION–CONVENTIONAL CONSTR.
WITH OVERHEAD UTILITY LINE CROSSING–ATWS LT & RT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

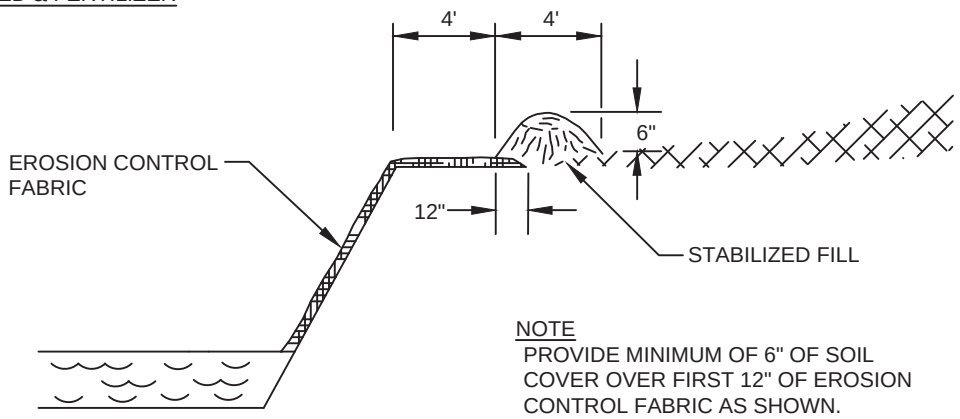
FIG. NO. 109

Sheet: 109 of 127
Type:

STAKE TO THE SLOPE WITH WOOD PEGS OR STAPLE
PER MANUFACTURERS SPECIFICATION



STRAW MULCH OR EQUAL
OVER SEED & FERTILIZER



NOTE
PROVIDE MINIMUM OF 6" OF SOIL
COVER OVER FIRST 12" OF EROSION
CONTROL FABRIC AS SHOWN.

SLOPE SECTION

NOTES:

EROSION CONTROL MATTING WILL BE INSTALLED WITHIN 50' OF BANK FOR ALL HQ/EV WATERSHEDS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

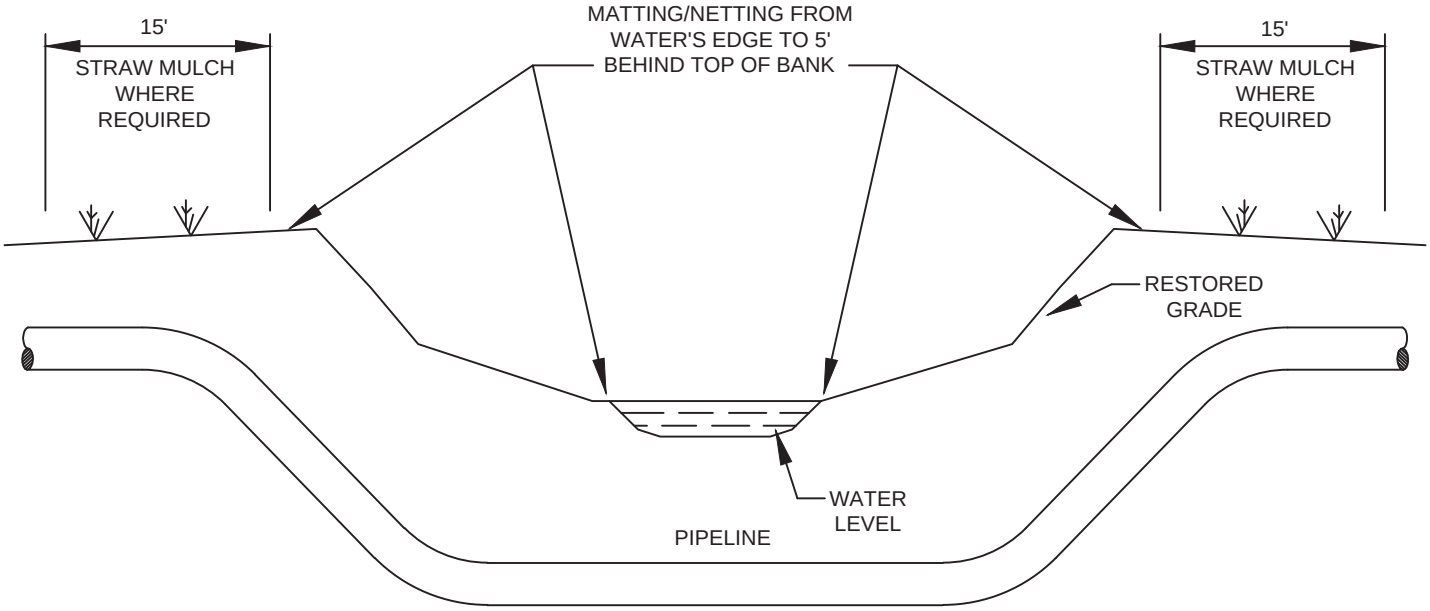
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL EROSION
CONTROL FABRIC

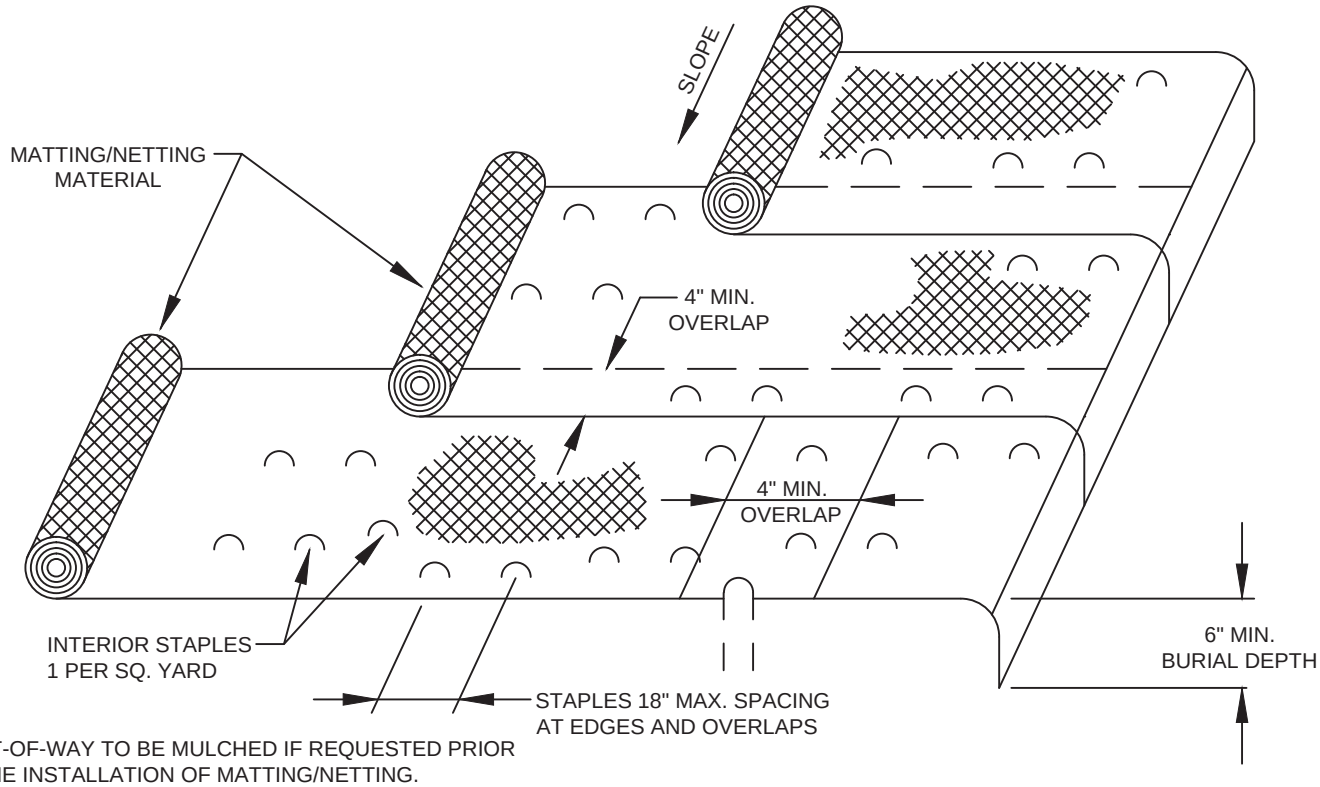
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 110

Sheet: 110 of 127
Type:



PROFILE
(NOT TO SCALE)



NOTES:

1. RIGHT-OF-WAY TO BE MULCHED IF REQUESTED PRIOR TO THE INSTALLATION OF MATTING/NETTING.
2. MATTING/NETTING SHALL BE RUN HORIZONTAL AND PARALLEL TO THE GROUND CONTOUR.
3. STAPLES SHALL BE 10"-LONG, STANDARD MATTING/NETTING STAPLES.
4. **EROSION CONTROL MATTING WILL BE INSTALLED WITHIN 50' OF BANK FOR ALL HQ/EV WATERSHEDS.**

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

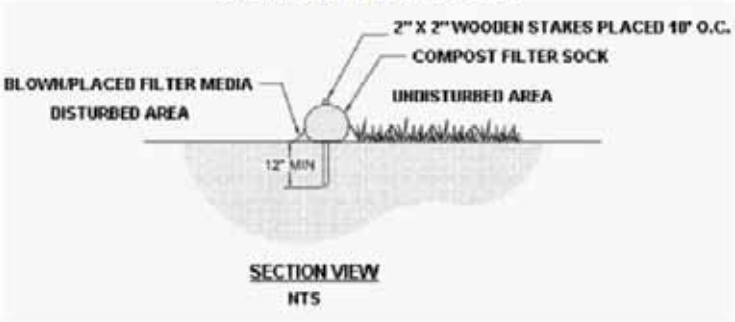
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL MATTING/NETTING
INSTALLATION FOR WATER CROSSING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

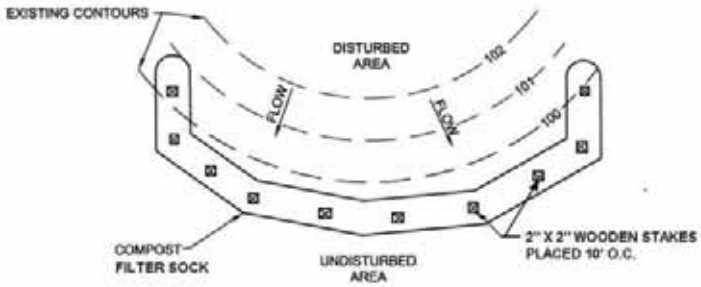
FIG. NO. 111

Sheet: 111 of 127
Type:

STANDARD CONSTRUCTION DETAIL 4-1
COMPOST FILTER SOCK



SECTION VIEW
NTS



PLAN VIEW
NTS

Adapted from Filtrexx

Sock fabric shall meet standards of Table 4.1. Compost shall meet the following standards:

Organic Matter Content	80% - 100% (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 – 8.0
Moisture Content	35% - 55%
Particle Size	98% pass through 1" screen
Soluble Salt Concentration	5.0 dS Maximum

NOTES:

COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE SOCK SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN SOCK ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY SOCK SHALL NOT EXCEED 500 FEET.

TRAFFIC SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.

ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE SOCK AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.

SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUN OFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURE'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.

BIODEGRADABLE FILTER SOCK SHALL BE REPLACED AFTER 6 MONTHS; PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND MULCH SPREAD AS SOIL SUPPLEMENT.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

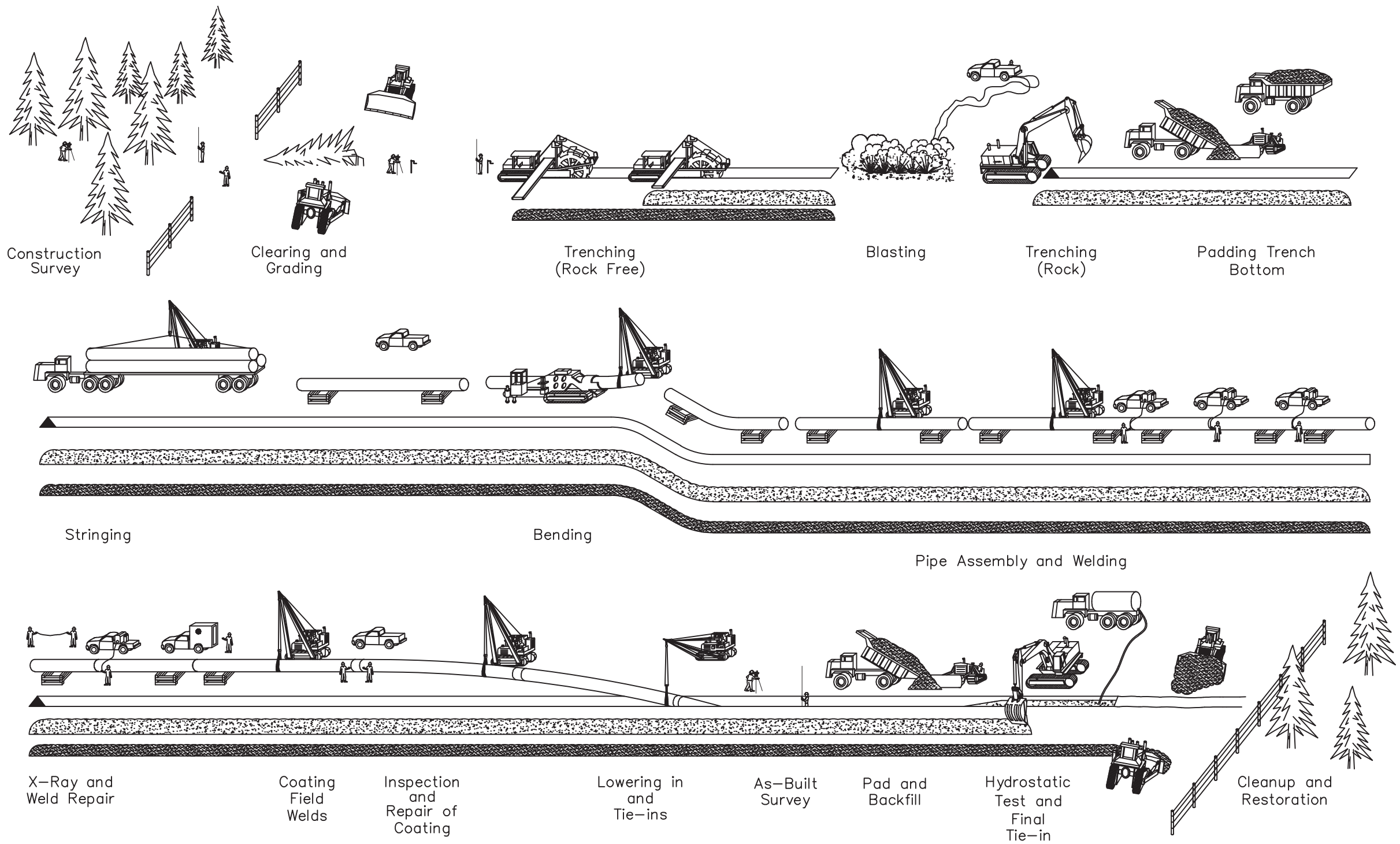
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
STANDARD CONSTRUCTION DETAIL,
COMPOST FILTER SOCK

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 112

Sheet: 112 of 127
Type:



NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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State:		Co./Par.:
Section:	Township:	Range:
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TENNESSE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL PIPELINE CONSTRUCTION SEQUENCE

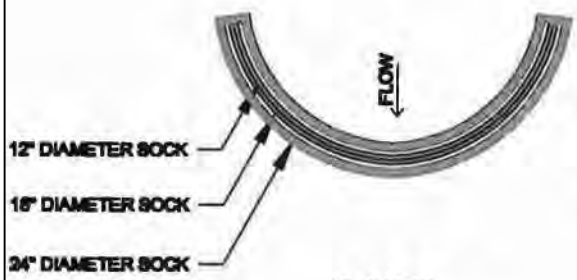
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 113

Sheet: 113 of 127
Type:

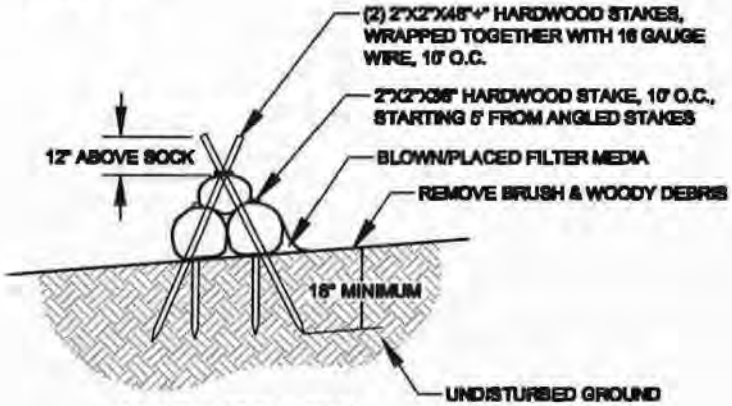
Sep 17, 2014 – 11:30AM

COMPOST SOCK SEDIMENT TRAP



PLAN VIEW

1. COMPOST SOCK SEDIMENT TRAP SHALL BE SIZED TO PROVIDE 2,000 CUBIC FEET OF STORAGE CAPACITY FOR EACH ACRE TRIBUTARY TO THE TRAP.
2. MINIMUM BASE WIDTH IS EQUIVALENT TO THE HEIGHT.
3. SEDIMENT ACCUMULATION SHALL NOT EXCEED 1/3 THE TOTAL HEIGHT OF THE TRAP.
4. SOCKS SHALL BE OF LARGER DIAMETER AT THE BASE OF THE TRAP AND DECREASE IN DIAMETER FOR SUCCESSIVE LAYERS AS INDICATED TO THE LEFT.
5. ENDS OF THE TRAP SHALL BE A MINIMUM OF 1 FOOT HIGHER IN ELEVATION THAN THE MID-SECTION, WHICH SHALL BE LOCATED AT THE POINT OF DISCHARGE.



ADAPTED FROM FILTREXX
STAKING DETAIL

SOCK MATERIAL SHALL MEET THE STANDARDS OF TABLE 4.1 COMPOST SHALL MEET THE FOLLOWING STANDARDS:

ORGANIC MATTER CONTENT	80%-100% (DRY WEIGHT BASIS)
ORGANIC PORTION	FIBROUS AND ELONGATED
pH	5.5-8.0
MOISTURE CONTENT	35%-55%
PARTICLE SIZE	98% PASS THROUGH 1" SCREEN
SOLUBLE SALT CONCENTRATION	5.0 dS MAXIMUM

COMPOST SOCK TRAPS SHALL NOT EXCEED THREE SOCKS IN HEIGHT AND SHALL BE STACKED IN PYRAMIDAL FORM AS SHOWN ABOVE. MINIMUM TRAP HEIGHT IS ON 24" DIAMETER SOCK. ADDITIONAL STORAGE MAY BE PROVIDED BY MEANS OF AN EXCAVATED SUMP 12" DEEP EXTENDING 1 TO 3 FEET UPSLOPE OF THE SOCKS.

COMPOST SOCK TRAPS SHALL PROVIDE 2,000 CUBIC FEET STORAGE CAPACITY WITH 12" FREEBOARD FOR EACH TRIBUTARY DRAINAGE AREA.

THE MAXIMUM TRIBUTARY DRAINAGE AREA IS 5.0 ACRES. SINCE COMPOST SOCKS ARE "FLOW-THROUGH", NO SPILLWAY IS REQUIRED.

COMPOST SOCK TRAPS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/3 THE HEIGHT OF THE SOCK.

PHOTODEGRADABLE AND BIODEGRADABLE SOCKS SHALL NOT BE USED FOR MORE THAN 1 YEAR.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

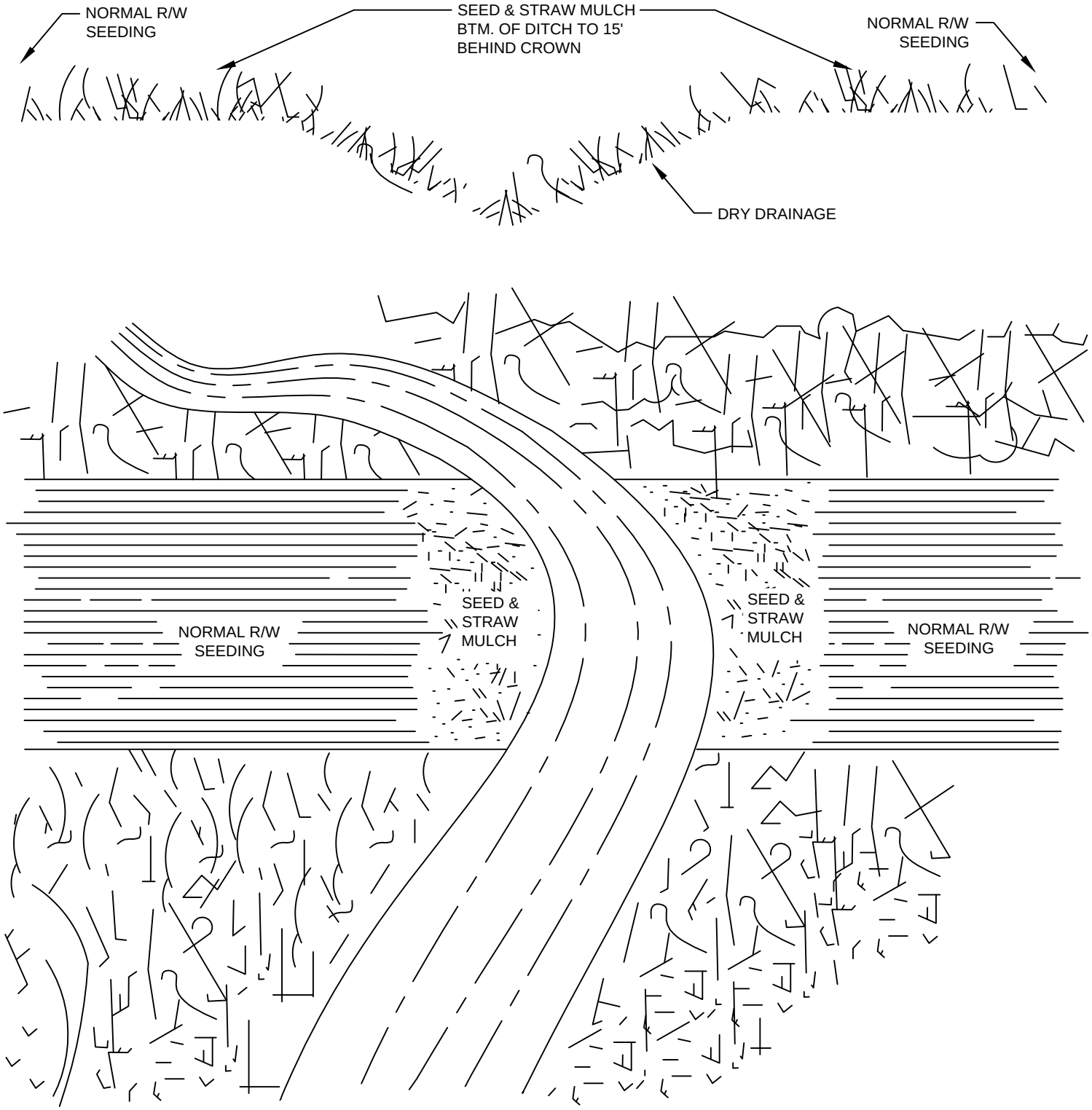
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
COMPOST SOCK
SEDIMENT TRAP

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 114

Sheet: 114 of 127
Type:



NOTES:

EROSION CONTROL MATTING WILL BE INSTALLED WITHIN 50' OF BANK FOR ALL HQ/EV WATERSHEDS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

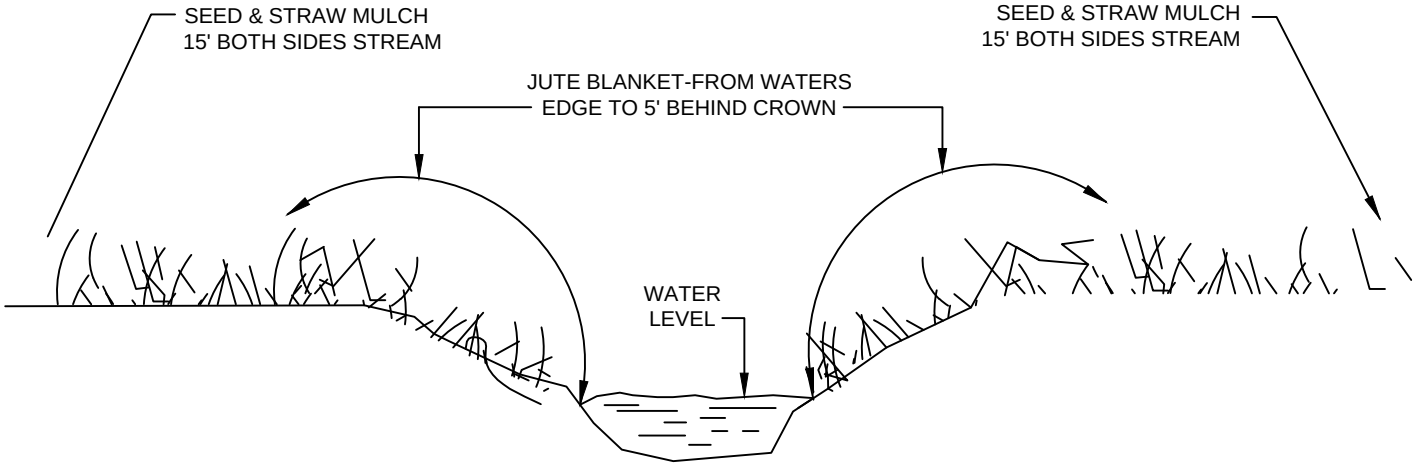
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

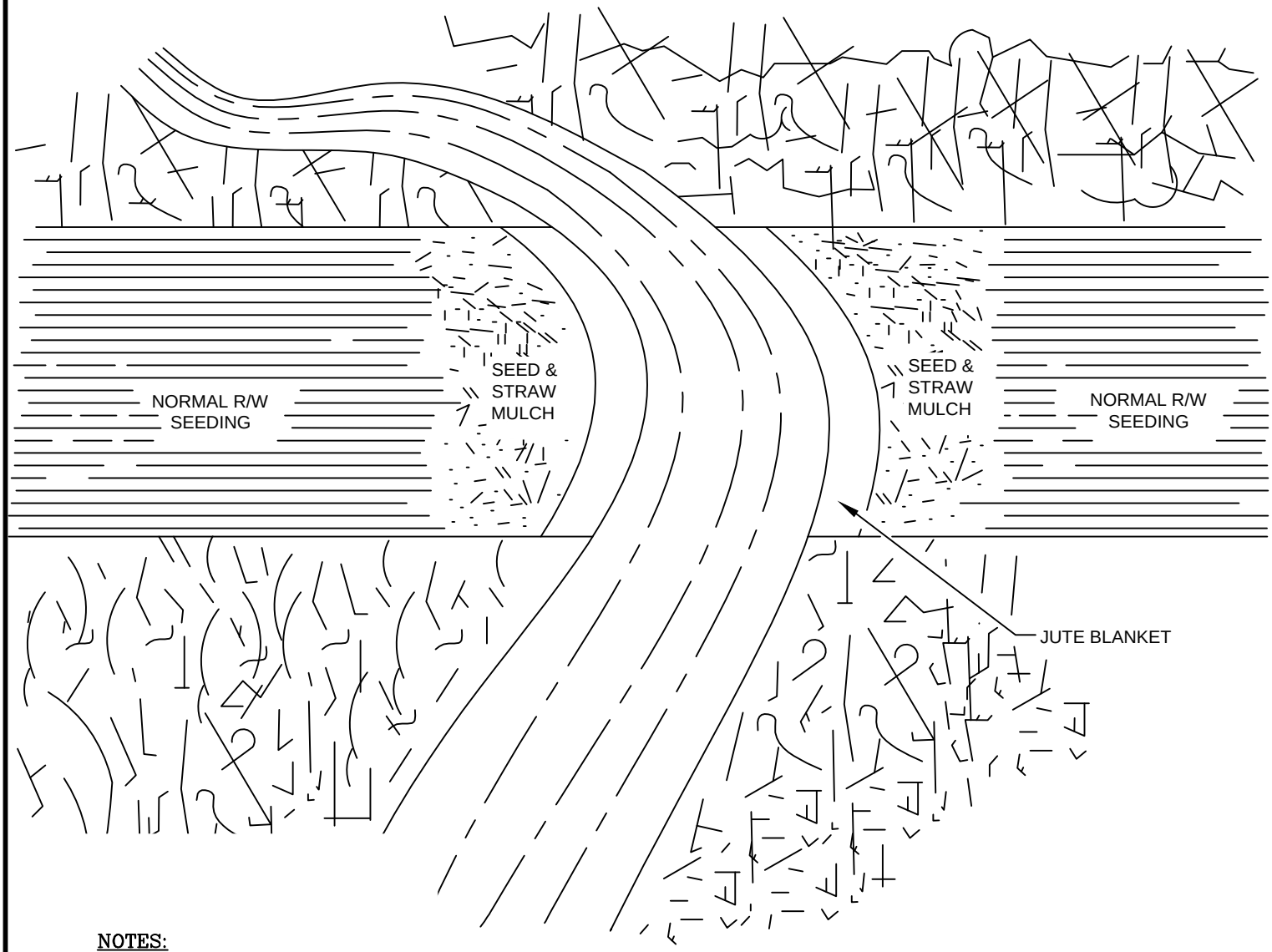
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
FINAL STREAM
BANK STABILIZATION (1)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 115

Sheet: 115 of 127
Type:





NOTES:

EROSION CONTROL MATTING WILL BE INSTALLED WITHIN 50' OF BANK FOR ALL HQ/EV WATERSHEDS.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:	Op. Area:	
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Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

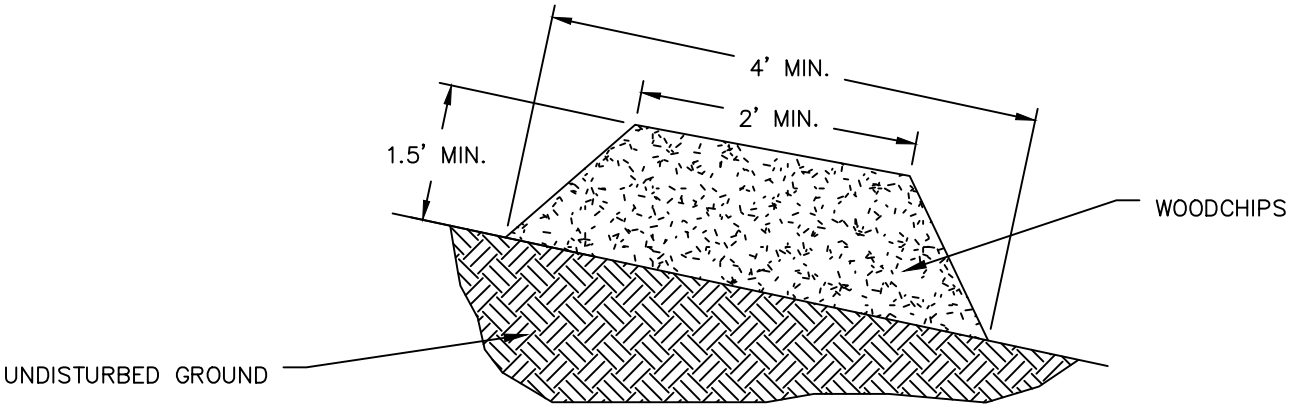
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
FINAL STREAM BANK
STABILIZATION (2)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 116

Sheet: 116 of 127

Type:



PRIOR TO PLACEMENT OF THE BERM, OBSTRUCTIONS SUCH AS TREE LIMBS, LARGE ROCKS, ETC. SHALL BE REMOVED.

WOOD CHIP FILTER BERM SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BERM SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BERM ALIGNMENT. WOOD CHIP BERMS SHALL NOT BE LOCATED IN AREAS OF CONCENTRATED FLOW OR USED TO CONSTRUCT SEDIMENT TRAPS OR OTHER IMPOUNDMENTS.

A 6" THICK LAYER OF COMPOST SHALL BE ADDED TO THE UPSLOPE SIDE OF ANY WOOD CHIP FILTER BERM LOCATED IN AN HQ WATERSHED. THIS BMP SHALL NOT BE ROUTINELY USED IN EV WATERSHEDS.

BERMS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH HALF THE HEIGHT OF THE BERM. DAMAGED OR DETERIORATED PORTIONS OF THE BERM SHALL BE REPLACED IMMEDIATELY UPON INSPECTION.

BERMS MAY BE LEVELED WHEN THE TRIBUTARY AREA HAS BEEN PERMANENTLY STABILIZED OR LEFT IN PLACE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

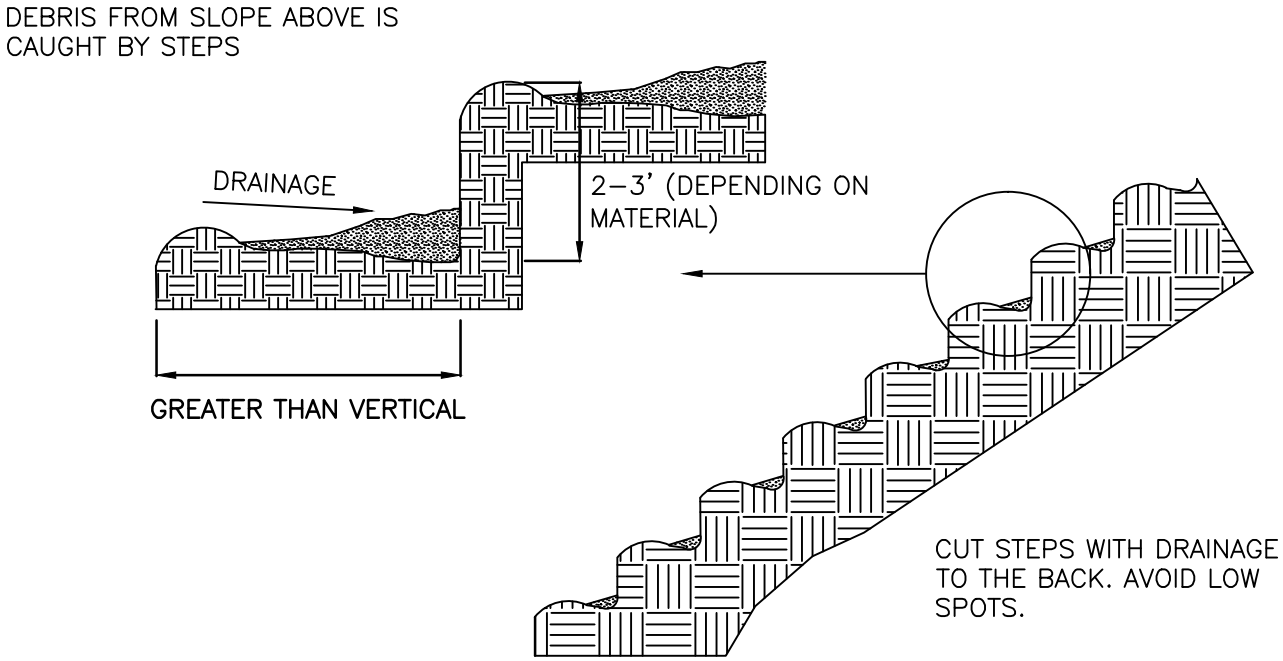
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
WOODCHIP
FILTER BERM

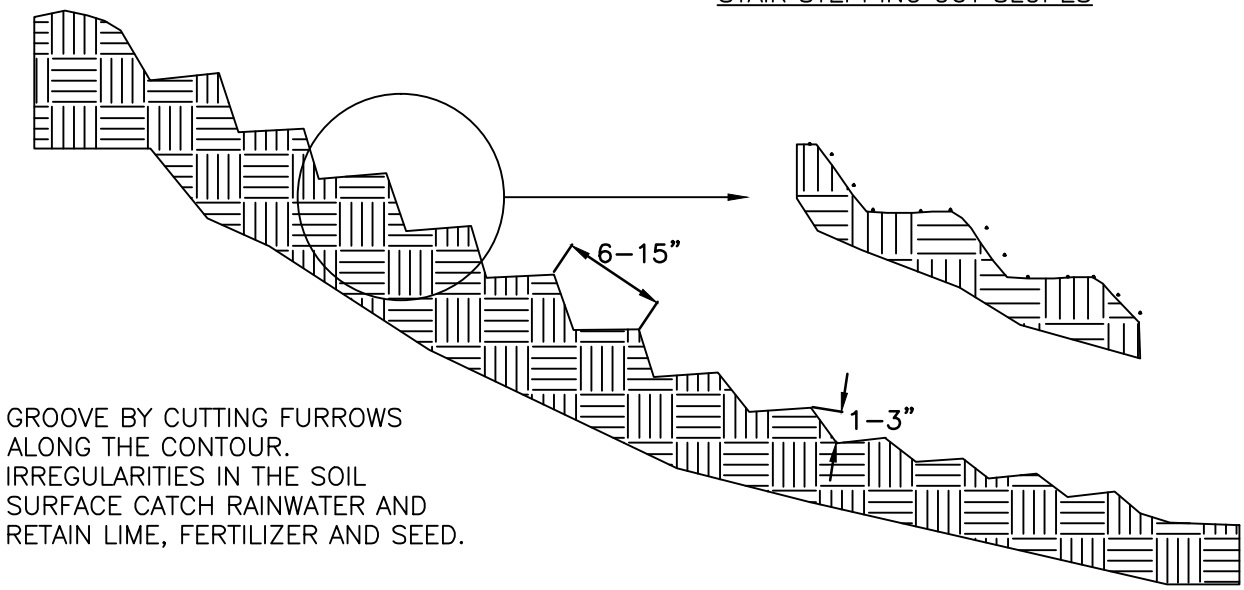
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 117

Sheet: 117 of 127
Type:



STAIR STEPPING CUT SLOPES



GROOVING SLOPES

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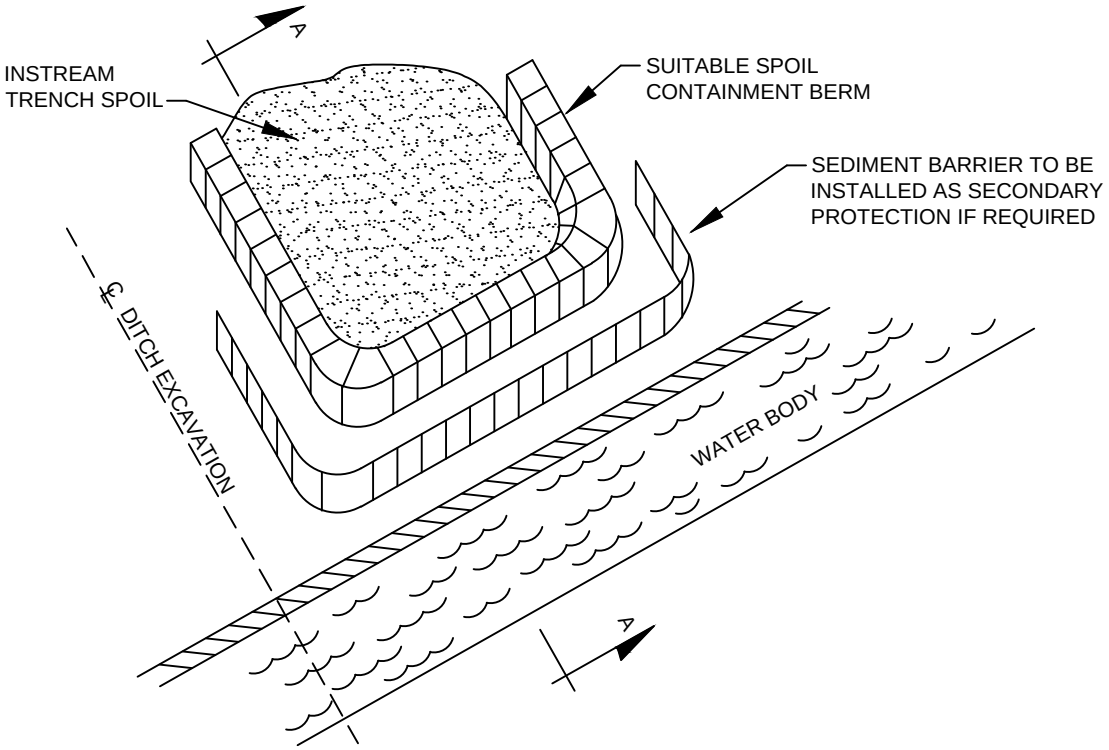
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

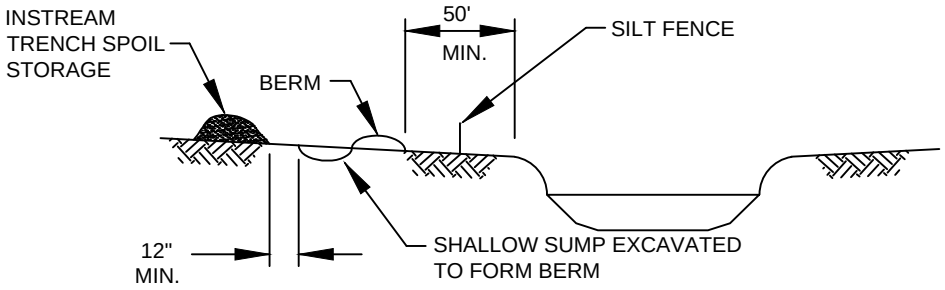
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SURFACE ROUGHENING

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 118

Sheet: 118 of 127
Type:





SECTION A-A
NOT TO SCALE

NOTES:

1. SOIL CONTAINMENT BERNS ARE TO BE USED WHERE INSTREAM TRENCH SPOIL COULD REENTER THE WATERCOURSE DIRECTLY OR INDIRECTLY AND WITH STIMULTANEOUS UTILIZATION OF SEDIMENT BARRIERS IF REQUIRED.
2. MATERIAL USED FOR THE CONTAINMENT BERM SHOULD BE A MINIMUM OF 50' FROM THE WATERS EDGE. IT SHOULD BE KEPT TO A HEIGHT WHICH REMAINS STABLE DURING THE CONSTRUCTION PERIOD.
3. CARE SHOULD BE TAKEN THAT THE SPOIL PILE DOES NOT OVERTOP THE CONTAINMENT BERM.
4. THE CONTAINMENT BERM SHOULD BE DISMANTLED AND THE SITE RESTORED TO THE ORIGINAL CONDITION UPON COMPLETION OF THE WATER CROSSING.
5. WHERE POSSIBLE, RIPARIAN VEGETATION SHALL BE LEFT IN PLACE.
6. STAGED MOVEMENT OF INSTREAM SPOIL MAY BE REQUIRED IF QUANTITIES ARE EXCESSIVE.
7. CARE AND ATTENTION MUST BE TAKEN TO ENSURE SPOIL CONTAINMENT BERMS ARE MAINTAINED.
8. FULL CONSIDERATION FOR OVERALL SLOPE STABILITY IS REQUIRED WHEN SELECTING A SPOIL CONTAINMENT LOCATION.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

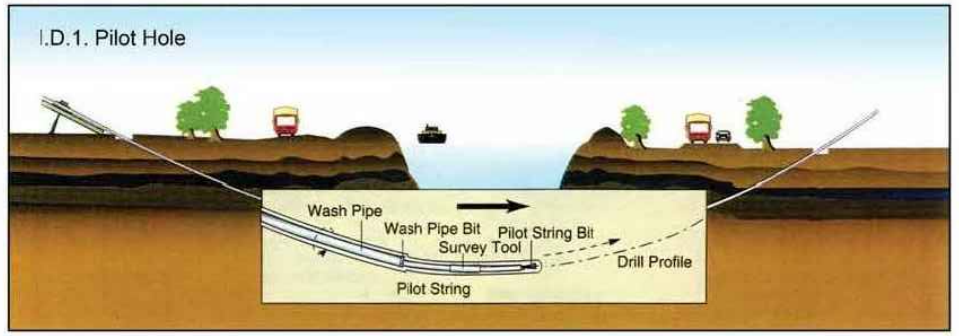
TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL TEMPORARY SOIL CONTAINMENT
BERM FOR WATERBODY TRENCH SPOIL

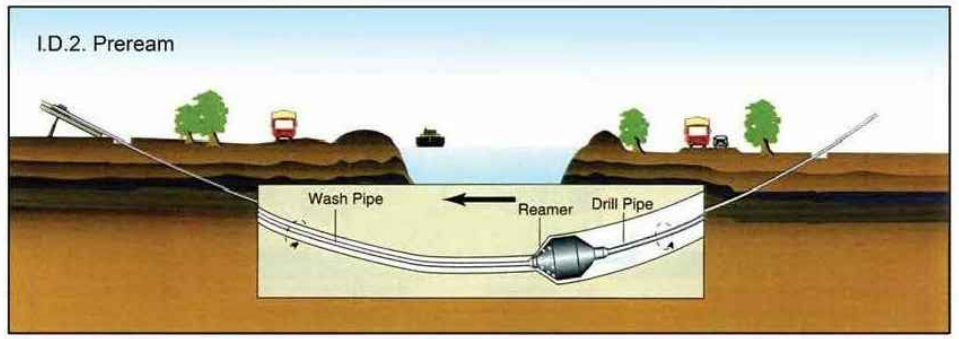
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

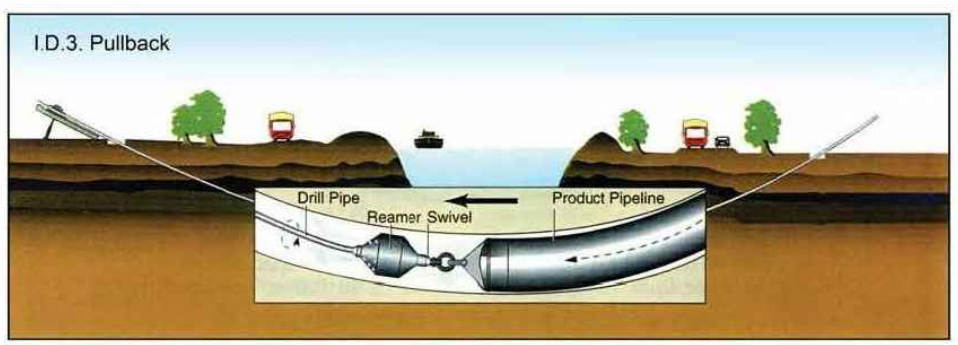
FIG. NO. 119

Sheet: 119 of 127
Type:

Figure 1. Technique







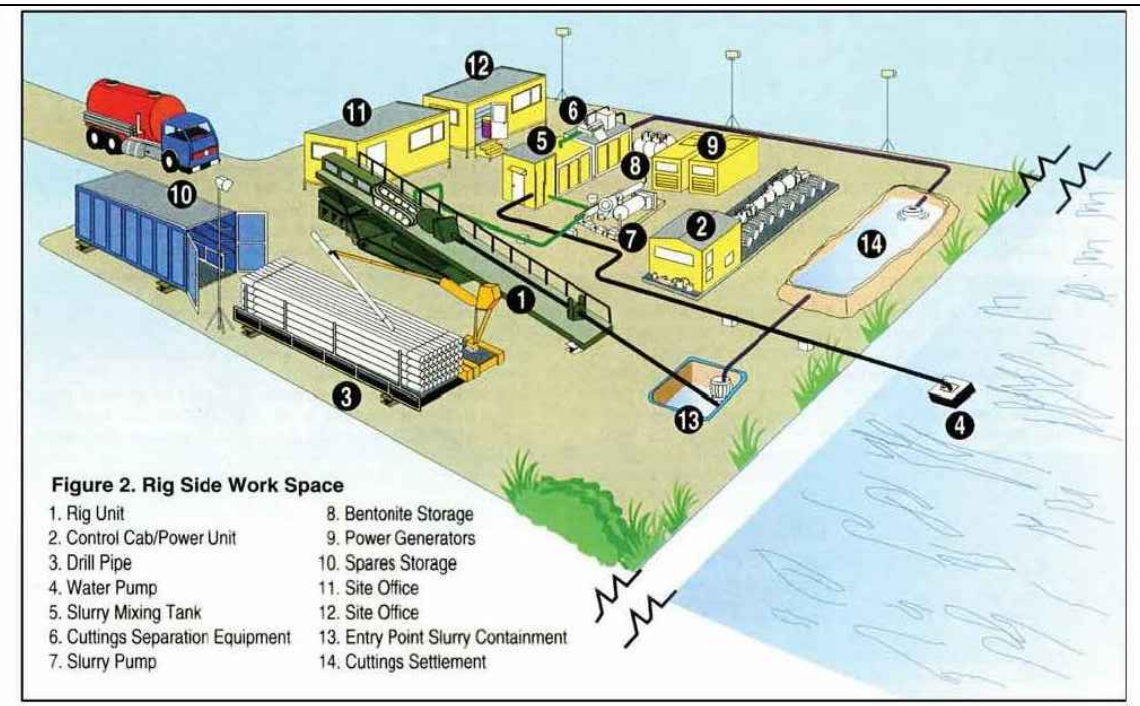


Figure 2. Rig Side Work Space

1. Rig Unit
2. Control Cab/Power Unit
3. Drill Pipe
4. Water Pump
5. Slurry Mixing Tank
6. Cuttings Separation Equipment
7. Slurry Pump
8. Bentonite Storage
9. Power Generators
10. Spares Storage
11. Site Office
12. Site Office
13. Entry Point Slurry Containment
14. Cuttings Settlement

DCCA4 PIPELINE DIGEST AUGUST 1995

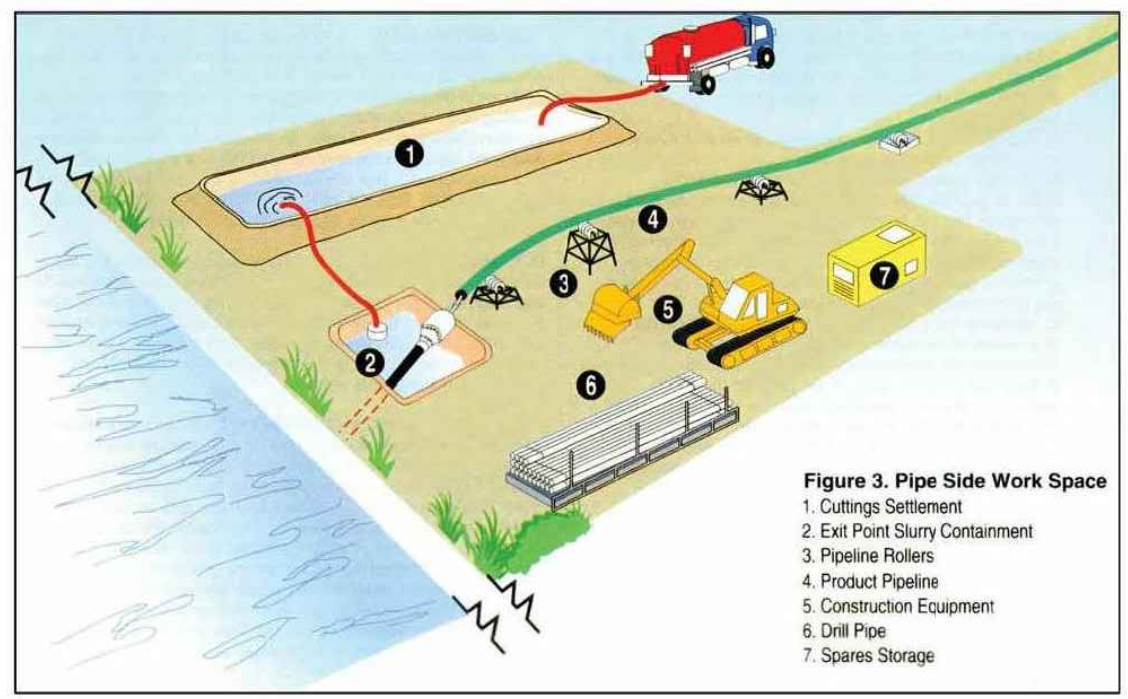


Figure 3. Pipe Side Work Space

1. Cuttings Settlement
2. Exit Point Slurry Containment
3. Pipeline Rollers
4. Product Pipeline
5. Construction Equipment
6. Drill Pipe
7. Spares Storage

AUGUST 1995 PIPELINE DIGEST DCCA5

*CONNECTICUT LOOP ONLY

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Section:	Township:	Range:
Dft:	Date:	Scale:
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TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
TYPICAL CONSTRUCTION HORIZONTAL DIRECTIONAL DRILL (HDD)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 120

Sheet: 120 of 127
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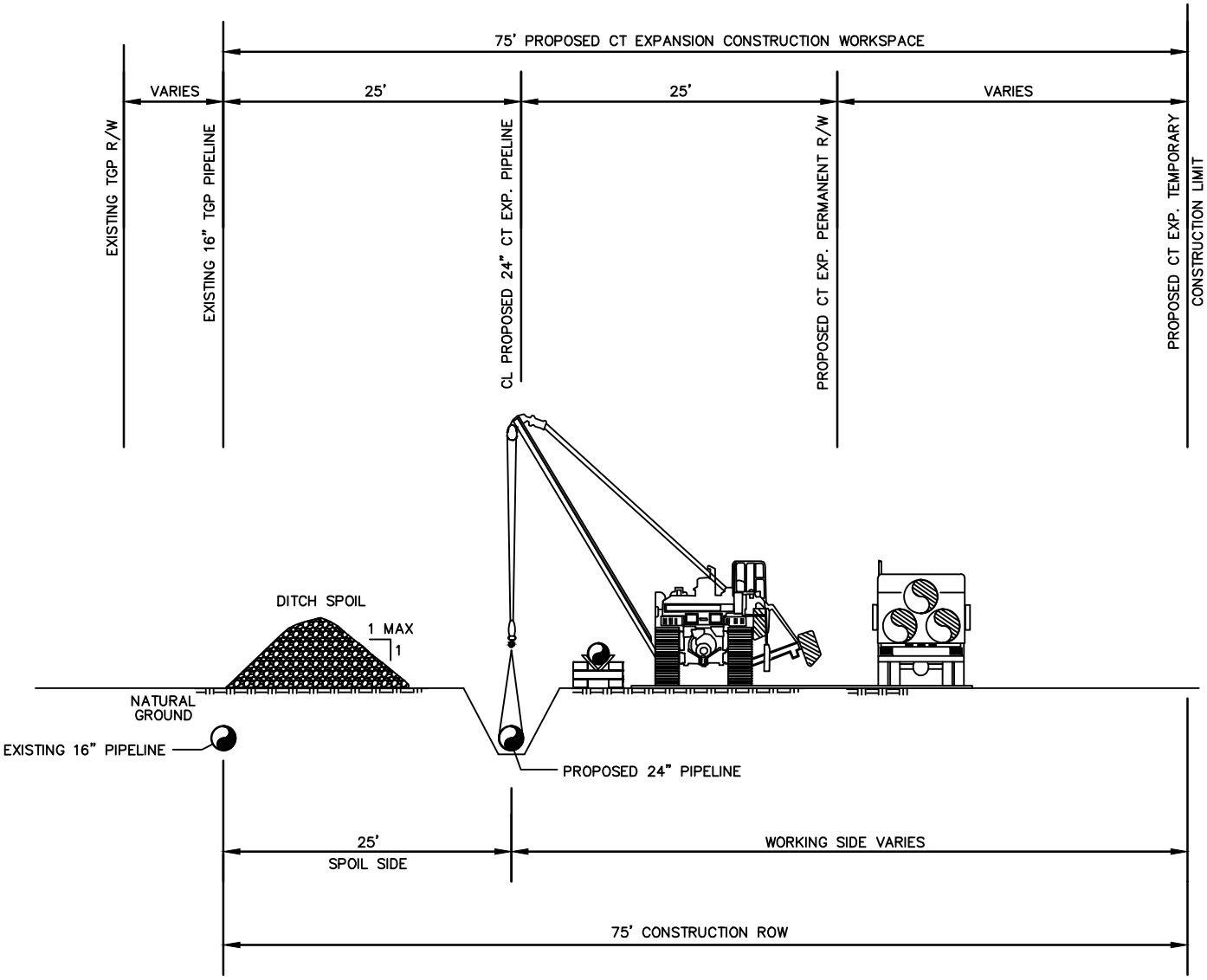
Sep 17, 2014 – 11:30AM



*CONNECTICUT LOOP ONLY

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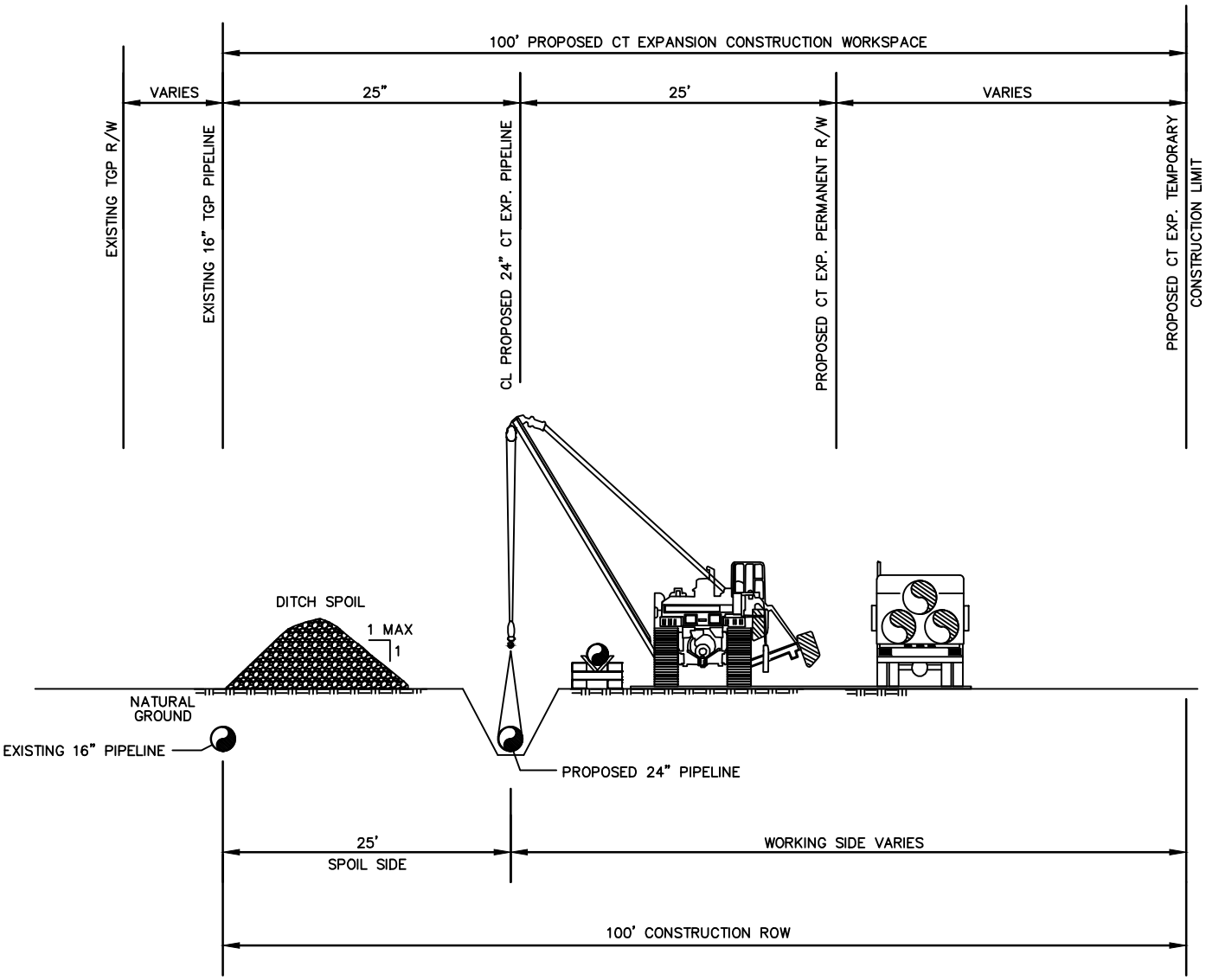
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
24" TYPICAL 75' CONSTRUCTION WORKSPACE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 121

Sheet: 121 of 127
Type:



*CONNECTICUT LOOP ONLY

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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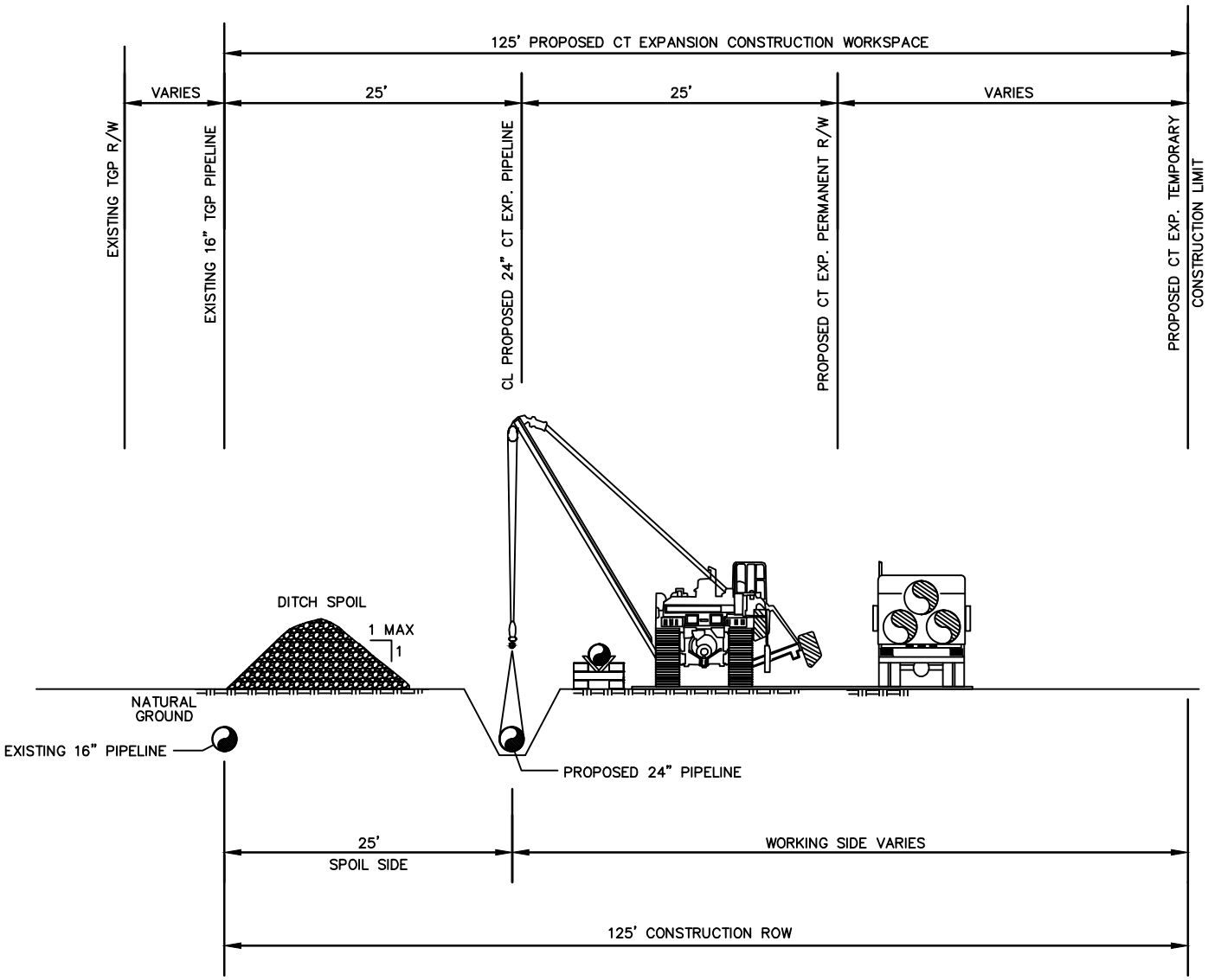
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
24" TYPICAL 100' CONSTRUCTION WORKSPACE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 122

Sheet: 122 of 127
Type:



*CONNECTICUT LOOP ONLY

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:	Op. Area:	
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Section:	Township:	Range:
Dft:	Date:	Project ID:
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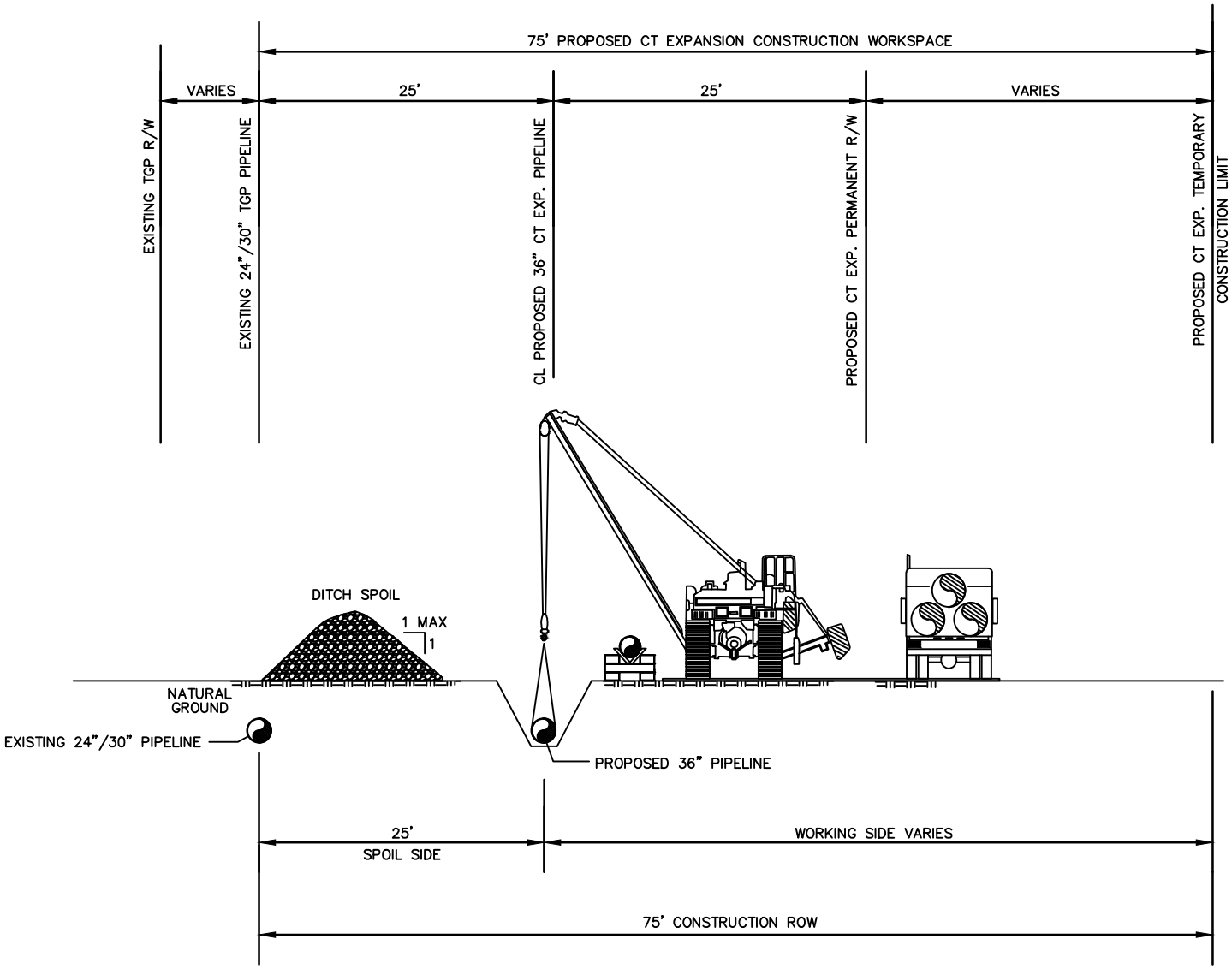
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
24" TYPICAL 125' CONSTRUCTION WORKSPACE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 123

Sheet: 123 of 127
Type:



*MASSACHUSETTS AND NEW YORK LOOP ONLY

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

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Division:	Op. Area:	
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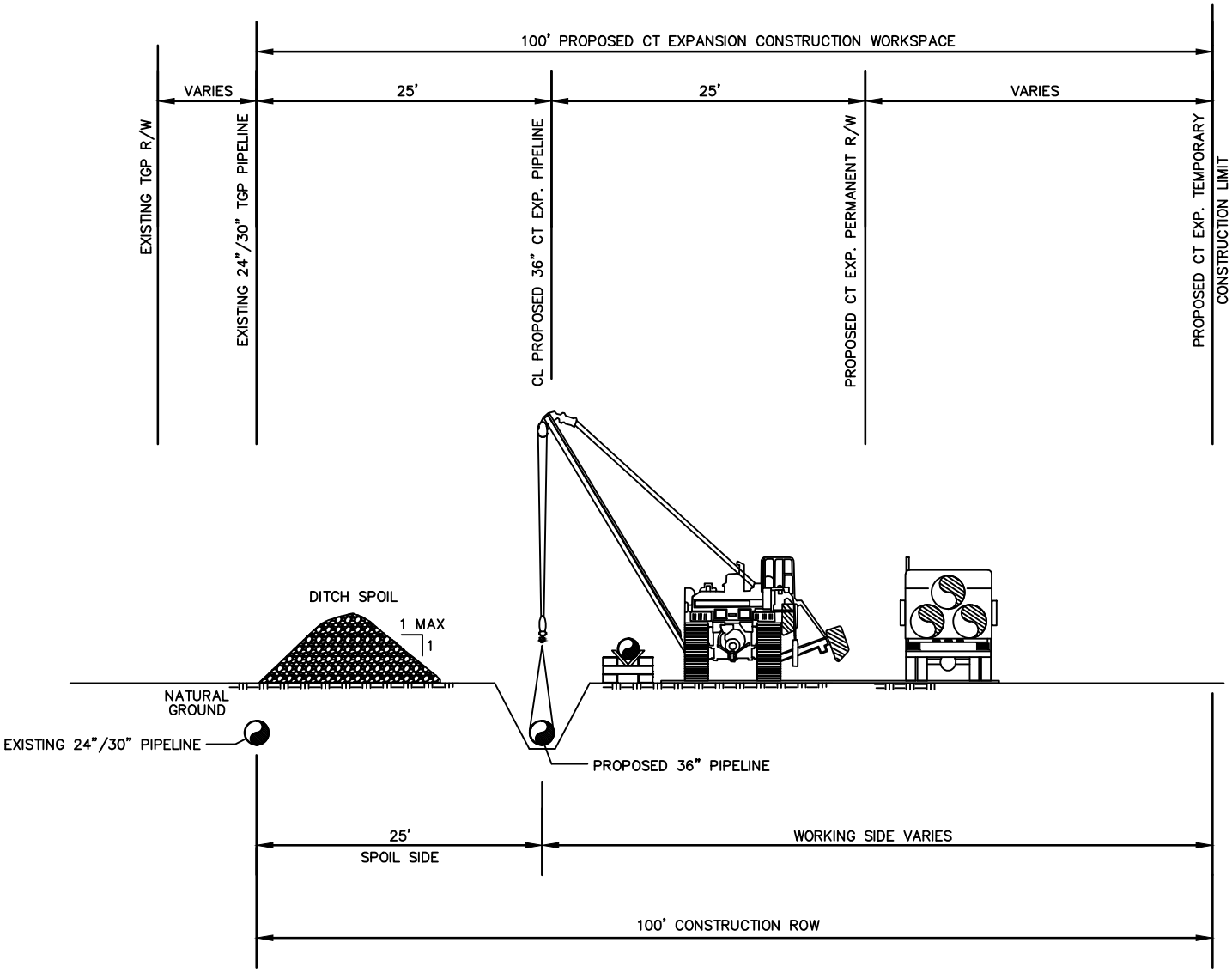
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
36" TYPICAL 75' CONSTRUCTION WORKSPACE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 124

Sheet: 124 of 127
Type:



*MASSACHUSETTS AND NEW YORK LOOP ONLY

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
36" TYPICAL 100' CONSTRUCTION WORKSPACE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 125

Sheet: 125 of 127
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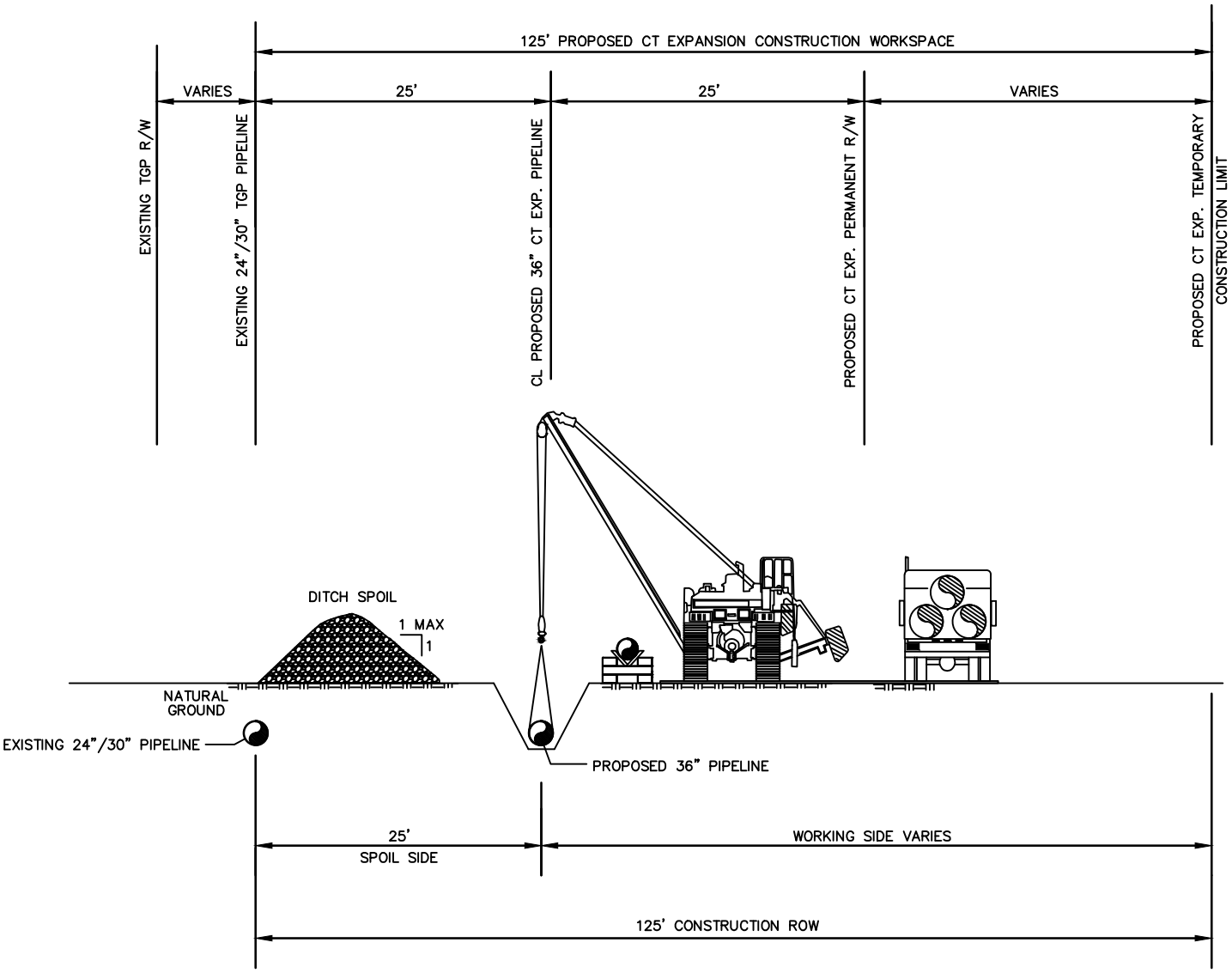


*MASSACHUSETTS AND NEW YORK LOOP ONLY

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

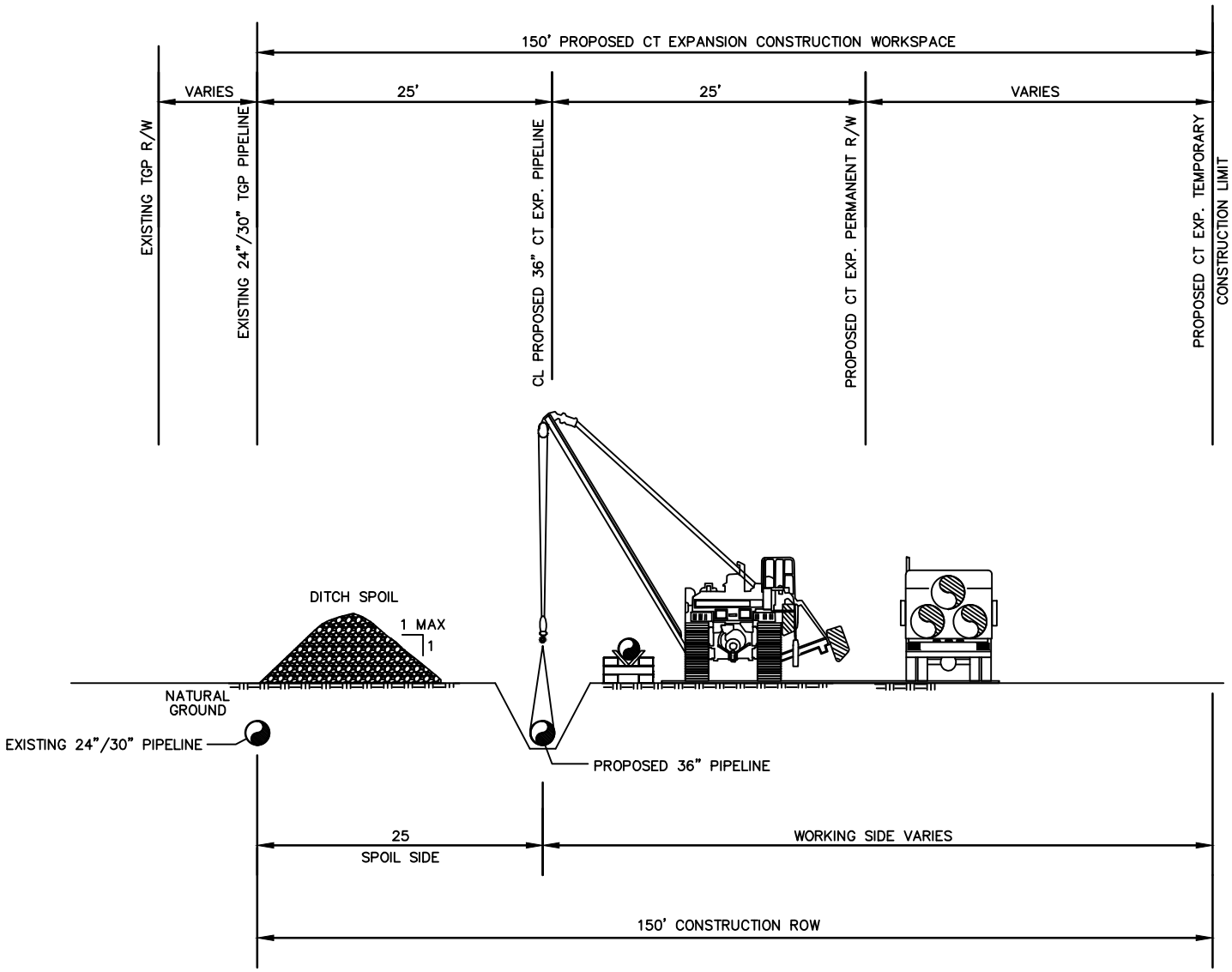
Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
36" TYPICAL 125' CONSTRUCTION WORKSPACE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 126

Sheet: 126 of 127
Type:



*MASSACHUSETTS AND NEW YORK LOOP ONLY

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE,LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
36" TYPICAL 150' CONSTRUCTION WORKSPACE

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 127

Sheet: 127 of 127
Type:

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

ATTACHMENT O

Hydrologic and Hydraulic Calculations

O1 - Access Roads Report
O2 – Diversion Swales Report
O3 - Access Road Silt Fence Reports
O4 – Silt Fence Design Summary Report

TENNESSEE GAS PIPELINE COMPANY, L.L.C.

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

HYDROLOGIC CALCULATIONS FOR PERMANENT ACCESS ROADS ALONG THE

CONNECTICUT PIPELINE EXPANSION PROJECT

CONNECTICUT LOOP

Submitted by:

Tennessee Gas Pipeline Company, L.L.C.
1001 Louisiana St, Suite 1000
Houston, TX 77002

NOVEMBER 2015

The attached hydrologic calculations were performed for all proposed permanent access roads field associated with the Connecticut Pipeline Extension (Project) Hartford County Connecticut. The Project would consist of installing approximately 13.3 miles of pipeline looping: 1.4 Miles of 36-inch Pipeline Loop in Albany County, New York (“NY Loop”) 3.8 Miles of 36-inch Pipeline Loop in Berkshire County, Massachusetts (“MA Loop”). 8.15 Miles of 24-inch Pipeline Loop in Hampden County, Massachusetts and Hartford County, Connecticut (“CT Loop)”.

The primary objective of the attached calculations is to analyze pre versus post development runoff associated with the construction of permanent access roadways to the pipeline.

DESIGN CRITERIA AND METHODOLOGY

The following design criteria and methodology was used to perform the calculations:

1. **Hydrologic Methodology**
   Hydrologic calculations were performed using the Rational Method with HydroCAD v.10.0.

   Rational Method: Q=CIA

- Q = flow (cubic feet per second - cfs)
  C = runoff coefficient
  A = drainage area (acres – ac)
  I = rainfall intensity (inches per hour – in/hr)
- This method was used for drainage areas up to 200 acres in size
- NOAA Technical Memorandum NWS Hydro-35 was used to determine "I" in Connecticut County of Hartford.
- The following Runoff Coefficients were used:

Cover Type	Slope Range (%)	Hydrologic Soil Group*	Runoff Coefficient
Pasture	0% - 6%	D	0.20
Impervious Surfaces	All	D	0.95
Forest	0% – 20 %	D	0.32
Forest	> 20 %	D	0.38
Gravel	0%-10%	D	0.80

*Hydrologic Soil Group D was used for a conservative approach.

- Time of Concentrations were calculated using the following:
  - **Sheet Flow:**
    Manning's Kinematic Solution
    Maximum (max) sheet flow length of 150ft

- **Shallow Concentrated Flow**
  The travel time for shallow concentrated flow was calculated by dividing the travel path length by a calculated velocity. The velocity for specific cover types were calculated using Manning's equation.

- **Channel Flow**
  Channel flow is calculated using Manning's equation assuming full flow depth.

Design Frequency:
The design frequency utilized in the design varied based on the U.S. Weather Bureau Technical Paper 40. A 2-year design, a 10-year, and a 100-year maximum design storm were utilized for all watershed classifications.

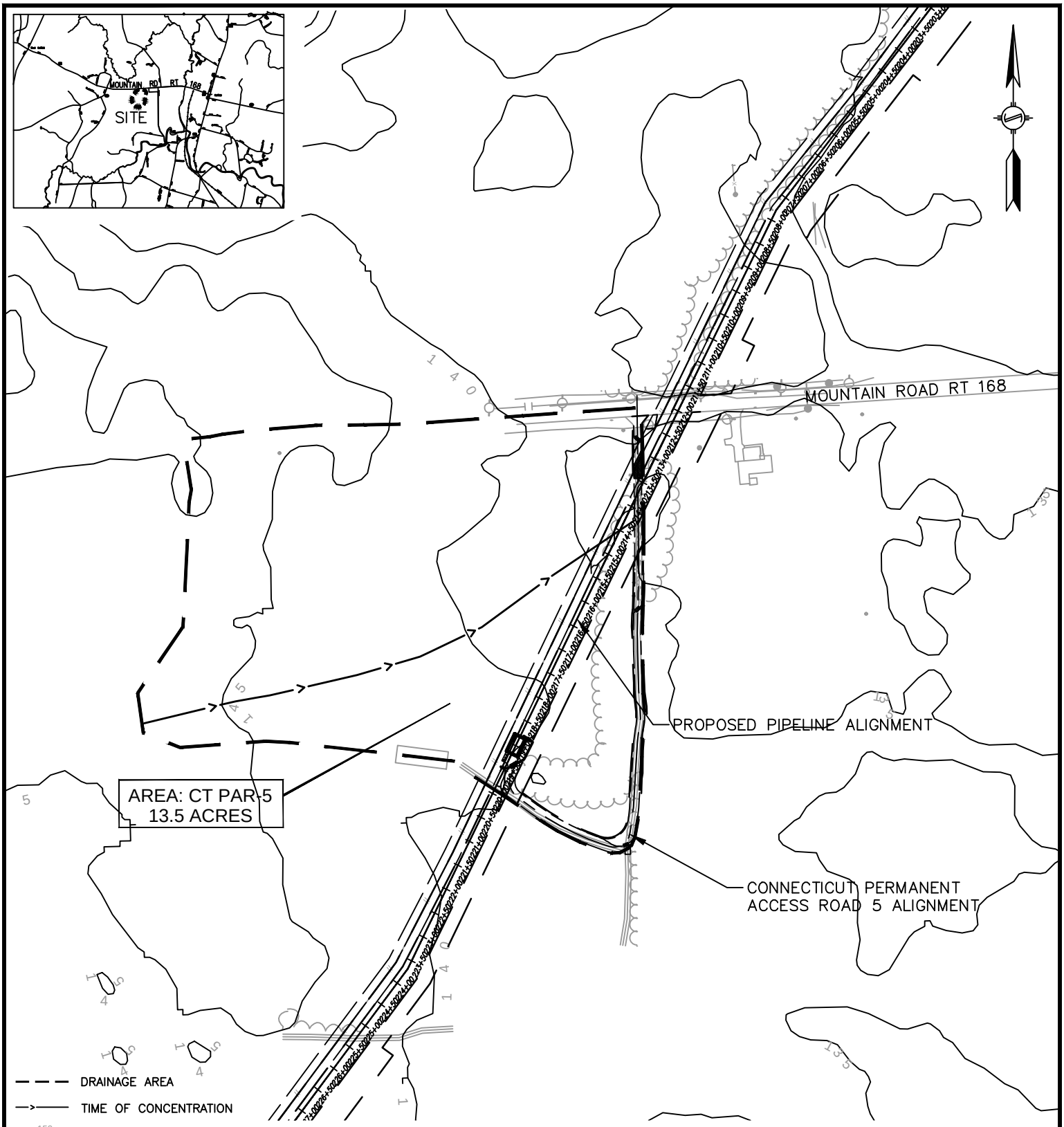
2. Summary and Results

The post construction hydrologic patterns of the access road areas are maintained. The post development flows, summarized in the table below, are not significantly higher than pre development flows due to the construction of the access roadways and will not negatively impact the surrounding areas. Overland sheet flow is promoted along the length of the access roads and a crushed stone surface is utilized to provide some permeability. The minimal increase in runoff is further mitigated by the immediate surrounding areas which provide flood and peak flow attenuation.

CT PAR-05

	Pre-Development Flow (cfs)	**Post-Development Flow** (cfs)	**Difference** (cfs)	**Difference** (%)
2-Year	7.5	7.7	0.2	2.7
10-Year	10.7	11.1	0.4	3.7
100-Year	18.6	18.8	0.2	1.1

Nov 19, 2015 – 10:24AM



NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

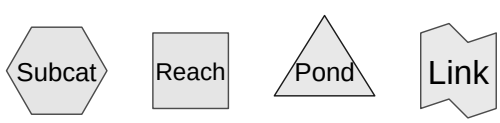
Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft: BWM	Date: 11/12/15	Project ID:
Chk: DAK	Date: 11/10/15	Scale:
Appr: AP	Date: 11/13/15	Filename:

CONNECTICUT EXPANSION
CONNECTICUT LOOP
PROPOSED NATURAL GAS PIPELINE
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

DRAINAGE AREA MAP

Sheet: 1 of 1
Type:



Routing Diagram for C-ENG-14C4781CT-PAR05
Prepared by BL Companies, Printed 11/17/2015
HydroCAD® 10.00 s/n 01334 © 2013 HydroCAD Software Solutions LLC

Summary for Subcatchment 3S: CT PAR-5 PRE

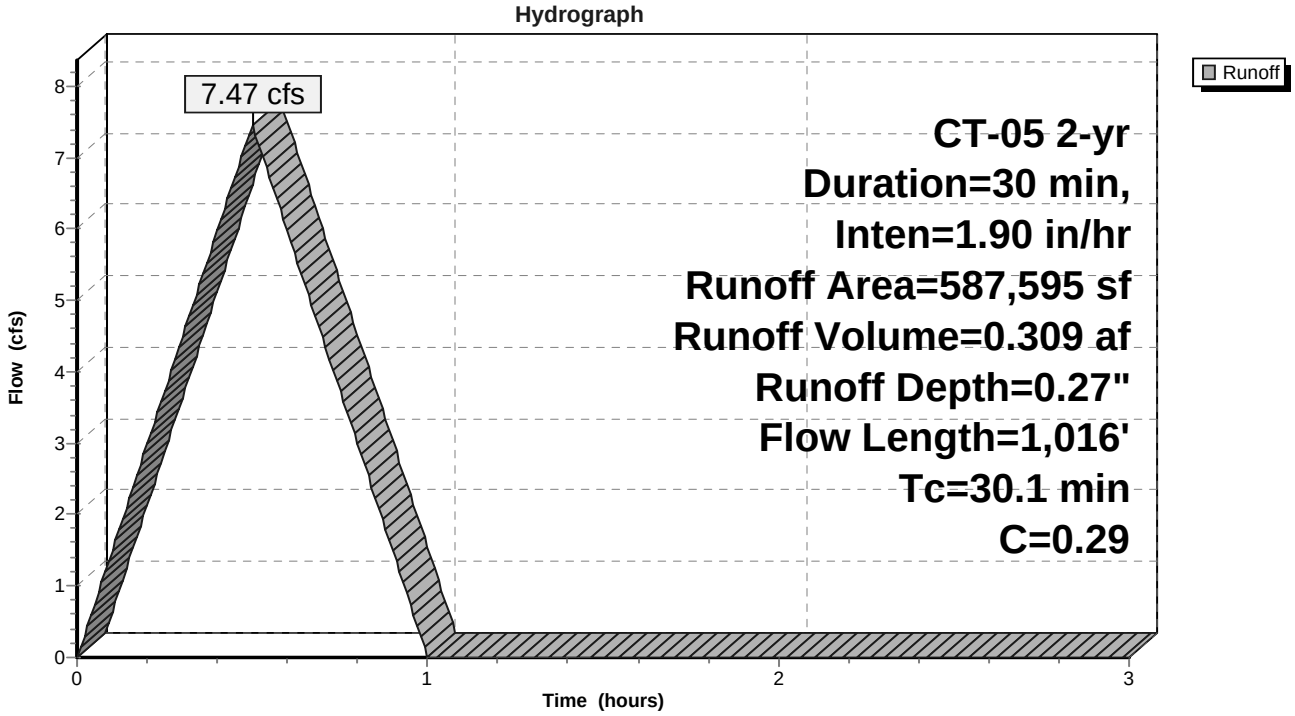
Runoff = 7.47 cfs @ 0.50 hrs, Volume= 0.309 af, Depth= 0.27"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 2-yr Duration=30 min, Inten=1.90 in/hr

Area (sf)	C	Description
473,303	0.20	Pasture/Crops
12,896	0.95	Existing Paved Road
27,236	0.95	Existing Roof
26,760	0.80	Existing Gravel Road
47,400	0.32	Forest
587,595	0.29	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0100	0.11		**Sheet Flow, 100** Cultivated: Residue>20% n= 0.170 P2= 2.88"
9.9	533	0.0100	0.90		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
5.1	383	0.0190	1.24		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
30.1	1,016	Total			

Subcatchment 3S: CT PAR-5 PRE



Summary for Subcatchment 7S: CT PAR-5 POST

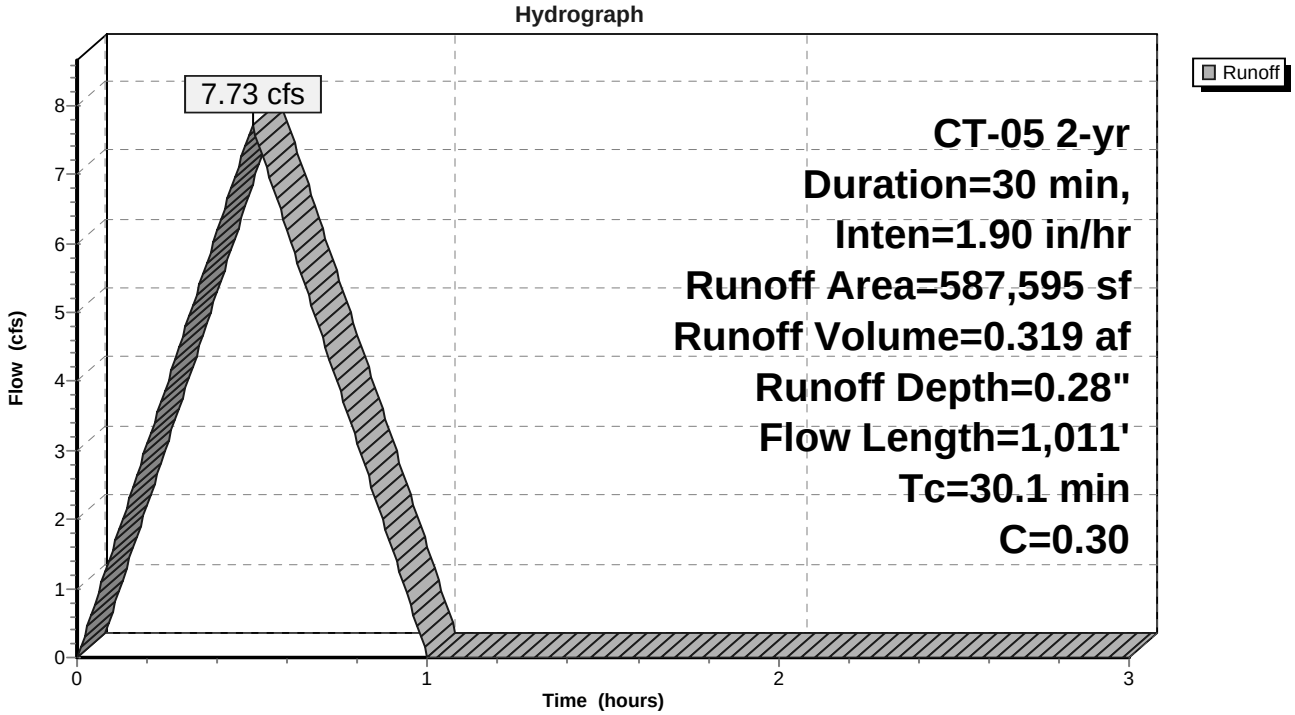
Runoff = 7.73 cfs @ 0.50 hrs, Volume= 0.319 af, Depth= 0.28"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 2-yr Duration=30 min, Inten=1.90 in/hr

Area (sf)	C	Description
467,503	0.20	Pasture/Crops
12,896	0.95	Existing Paved Road
27,236	0.95	Existing Roof
16,393	0.80	Existing Gravel Road
42,275	0.32	Forest
20,500	0.80	Proposed Gravel Road
792	0.80	Gravel Pad (Mainline Valve)
587,595	0.30	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0100	0.11		**Sheet Flow, 100** Cultivated: Residue>20% n= 0.170 P2= 2.88"
9.9	533	0.0100	0.90		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
5.1	378	0.0190	1.24		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
30.1	1,011	Total			

Subcatchment 7S: CT PAR-5 POST



Summary for Subcatchment 3S: CT PAR-5 PRE

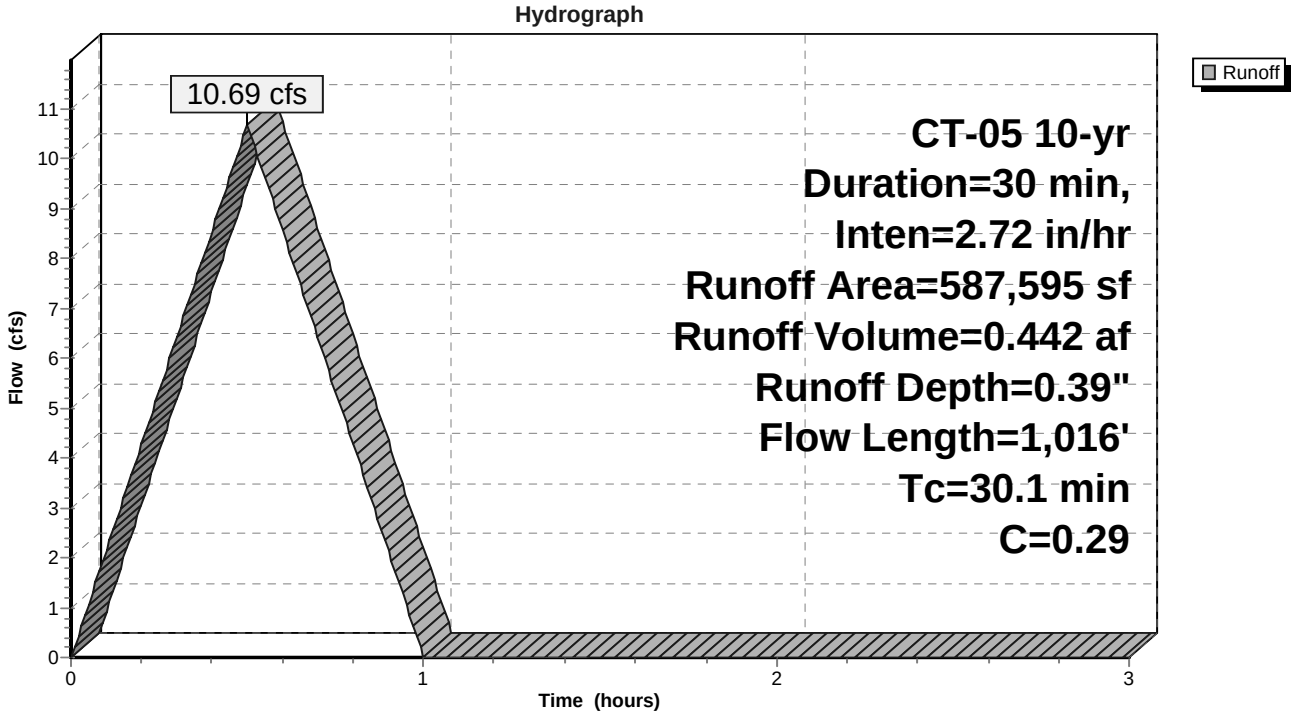
Runoff = 10.69 cfs @ 0.50 hrs, Volume= 0.442 af, Depth= 0.39"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 10-yr Duration=30 min, Inten=2.72 in/hr

Area (sf)	C	Description
473,303	0.20	Pasture/Crops
12,896	0.95	Existing Paved Road
27,236	0.95	Existing Roof
26,760	0.80	Existing Gravel Road
47,400	0.32	Forest
587,595	0.29	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0100	0.11		**Sheet Flow, 100** Cultivated: Residue>20% n= 0.170 P2= 2.88"
9.9	533	0.0100	0.90		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
5.1	383	0.0190	1.24		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
30.1	1,016	Total			

Subcatchment 3S: CT PAR-5 PRE



Summary for Subcatchment 7S: CT PAR-5 POST

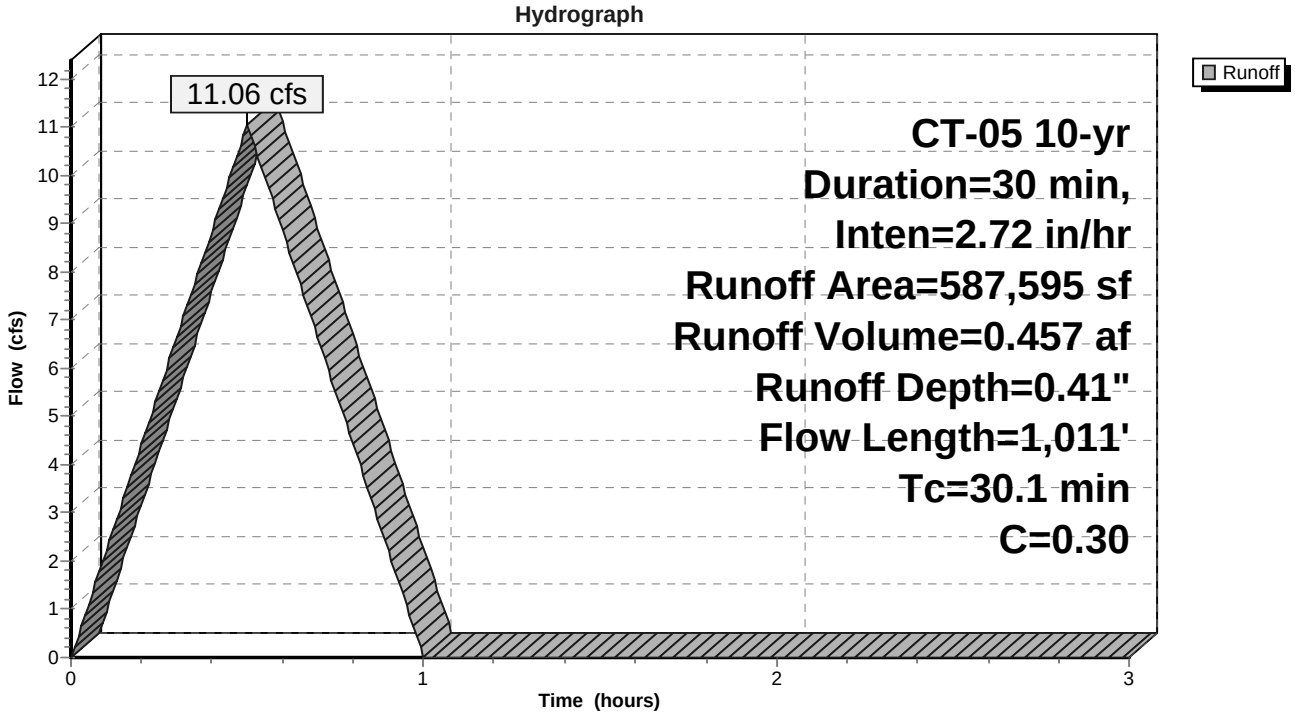
Runoff = 11.06 cfs @ 0.50 hrs, Volume= 0.457 af, Depth= 0.41"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 10-yr Duration=30 min, Inten=2.72 in/hr

Area (sf)	C	Description
467,503	0.20	Pasture/Crops
12,896	0.95	Existing Paved Road
27,236	0.95	Existing Roof
16,393	0.80	Existing Gravel Road
42,275	0.32	Forest
20,500	0.80	Proposed Gravel Road
792	0.80	Gravel Pad (Mainline Valve)
587,595	0.30	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0100	0.11		**Sheet Flow, 100** Cultivated: Residue>20% n= 0.170 P2= 2.88"
9.9	533	0.0100	0.90		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
5.1	378	0.0190	1.24		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
30.1	1,011	Total			

Subcatchment 7S: CT PAR-5 POST



Summary for Subcatchment 3S: CT PAR-5 PRE

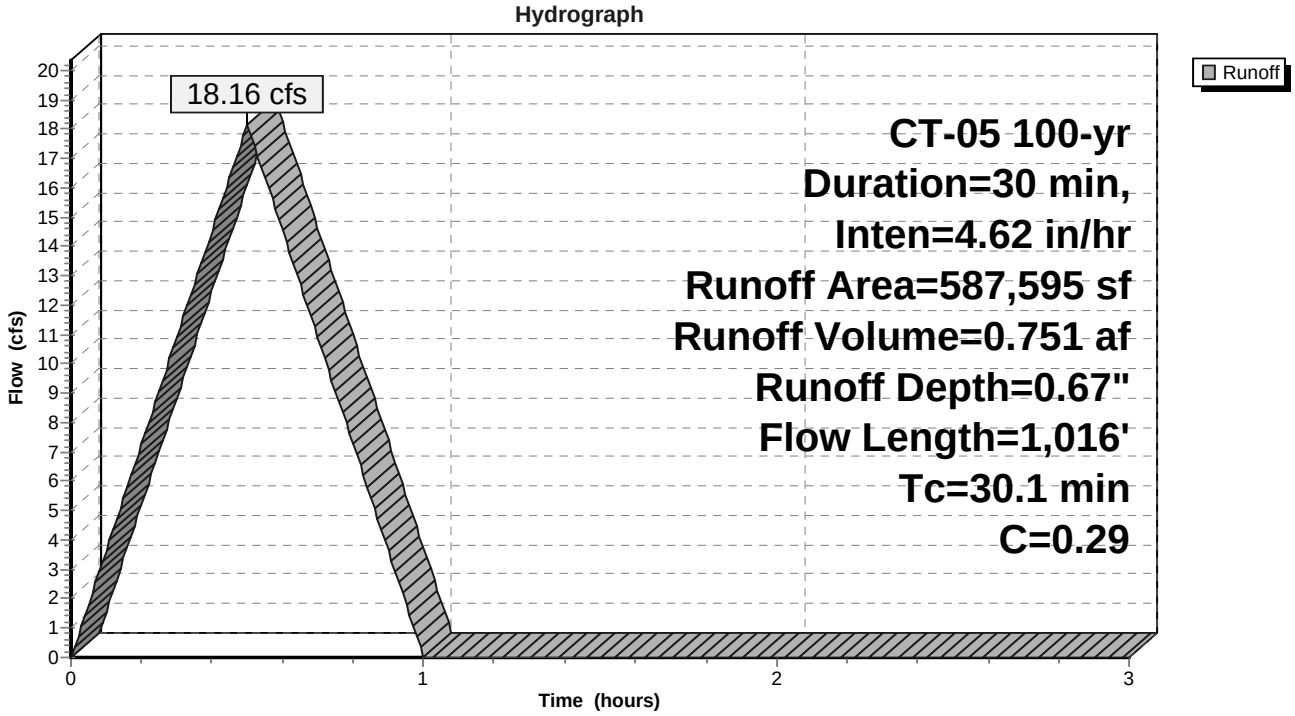
Runoff = 18.16 cfs @ 0.50 hrs, Volume= 0.751 af, Depth= 0.67"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 100-yr Duration=30 min, Inten=4.62 in/hr

Area (sf)	C	Description
473,303	0.20	Pasture/Crops
12,896	0.95	Existing Paved Road
27,236	0.95	Existing Roof
26,760	0.80	Existing Gravel Road
47,400	0.32	Forest
587,595	0.29	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0100	0.11		**Sheet Flow, 100** Cultivated: Residue>20% n= 0.170 P2= 2.88"
9.9	533	0.0100	0.90		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
5.1	383	0.0190	1.24		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
30.1	1,016	Total			

Subcatchment 3S: CT PAR-5 PRE



Summary for Subcatchment 7S: CT PAR-5 POST

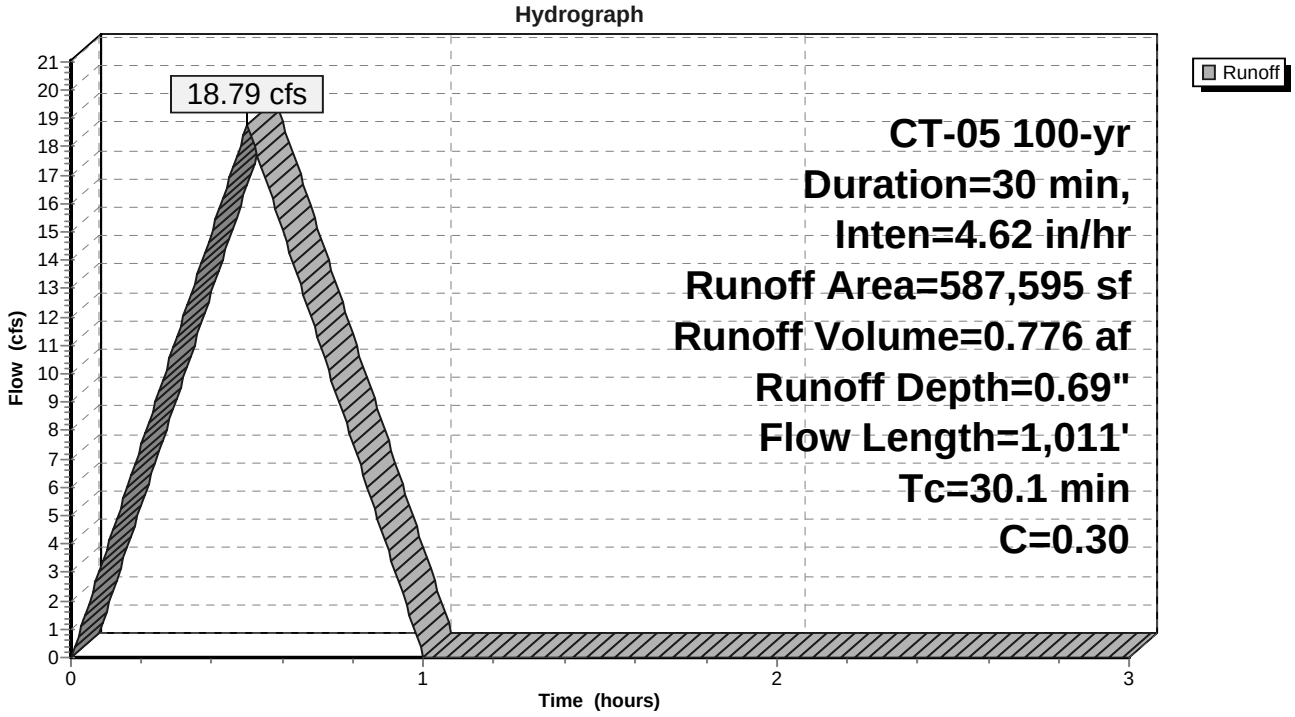
Runoff = 18.79 cfs @ 0.50 hrs, Volume= 0.776 af, Depth= 0.69"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 100-yr Duration=30 min, Inten=4.62 in/hr

Area (sf)	C	Description
467,503	0.20	Pasture/Crops
12,896	0.95	Existing Paved Road
27,236	0.95	Existing Roof
16,393	0.80	Existing Gravel Road
42,275	0.32	Forest
20,500	0.80	Proposed Gravel Road
792	0.80	Gravel Pad (Mainline Valve)
587,595	0.30	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0100	0.11		**Sheet Flow, 100** Cultivated: Residue>20% n= 0.170 P2= 2.88"
9.9	533	0.0100	0.90		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
5.1	378	0.0190	1.24		**Shallow Concentrated Flow, Shallow Conc.** Cultivated Straight Rows Kv= 9.0 fps
30.1	1,011	Total			

Subcatchment 7S: CT PAR-5 POST



TENNESSEE GAS PIPELINE COMPANY, L.L.C.

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

HYDROLOGIC AND HYDRAULIC CALCULATIONS FOR TEMPORARY DIVERSION SWALES ALONG THE

CONNECTICUT PIPELINE EXPANSION PROJECT

CONNECTICUT LOOP

STATE OF CONNECTICUT
DEREK A. KOHL
No. 21417
LICENSED
PROFESSIONAL ENGINEER

Submitted by:

Tennessee Gas Pipeline Company, L.L.C.
1001 Louisiana St, Suite 1000
Houston, TX 77002

MARCH 2016

The attached hydrologic and hydraulic calculations were performed for all temporary diversion swales proposed to be installed by the Connecticut Pipeline Extension (Project) Hartford County Connecticut. The Project would consist of installing approximately 13.3 miles of pipeline looping: 1.4 Miles of 36-inch Pipeline Loop in Albany County, New York ("NY Loop") 3.8 Miles of 36-inch Pipeline Loop in Berkshire County, Massachusetts ("MA Loop"). 8.15 Miles of 24-inch Pipeline Loop in Hampden County, Massachusetts and Hartford County, Connecticut ("CT Loop)".

The primary objective of the attached calculations is to evaluate the amount of stormwater runoff contributory to the proposed temporary diversion swales in order to confirm the diversion swale size and lining are adequate for the anticipated flow rates. A typical temporary diversion swale will consist of a graded trapezoidal channel with erosion control blankets installed to protect bare soils until permanent vegetation becomes established.

DESIGN CRITERIA AND METHODOLOGY

The following design criteria and methodology was used to perform the calculations:

1. **Hydrologic Calculation Methodology**
   Hydrologic calculations were performed using the Rational Method with HydroCAD v.10.0. The specific method used to calculate the design flows for each watershed varied based on parameters such as the watershed size and slope, and ground cover type (e.g. pasture, forest, urban).

   a. **Rational Method: Q=CIA**
   - Q = flow (cubic feet per second - cfs)
     C = runoff coefficient
     A = drainage area (acres – ac)
     I = rainfall intensity (inches per hour – in/hr)
   - This method was used for drainage areas up to 200 acres in size
   - NOAA Technical Memorandum NWS Hydro-35 was used to determine "I" in Connecticut County of Hartford.
   - The following Runoff Coefficients were used:

Cover Type	Slope Range (%)	Hydrologic Soil Group*	Runoff Coefficient
Pasture	0% - 6%	D	0.20
Forest	0% – 20 %	D	0.32
Forest	> 20 %	D	0.38

*Hydrologic Soil Group D was used for a conservative approach.

   - Time of Concentrations were calculated using the following:
     - **Sheet Flow:**
       Manning's Kinematic Solution
       Maximum (max) sheet flow length of 150ft

- **Shallow Concentrated Flow**
  The travel time for shallow concentrated flow was calculated by dividing the travel path length by a calculated velocity. The velocity for specific cover types were calculated using Manning's equation.

- **Channel Flow**
  As upstream channel morphology is not constant, the travel time for Channel flow was calculated by assuming a channel velocity of 15.00 ft/s and applying it to the shallow concentrated flow formula.

b. Design Frequency:
The design frequency utilized in the design varied based on the U.S. Weather Bureau Technical Paper 40. A 2-year, a 5-year, and a 10-year storm event were analyzed for each watershed.

2. Hydraulic Calculation Methodology
The temporary diversion swales were sized using Manning's equation. To simplify the construction documents, a consistent swale size was selected. The swale has a 2 foot bottom width, a 11 foot top width, and a 1.5 foot depth and 3:1 side slopes as required per the 2002 CT Guidelines for Soil Erosion and Sediment Control (Guidelines). Per the Guidelines, when contributing drainage areas are 5 acres or less the diversion swales shall be designed to convey the 2 year design storm. If the contributing drainage area is over 5 acres the swale must safely convey the 10 year storm event while maintaining 0.3' of free board. The proposed diversions for this project have been designed in conformance with the Guidelines. North American Green's Erosion Control Materials Design Software was utilized to perform hydraulic calculations for each swale. The swale design flow rate, geometry, slope, and lining are provided as inputs to the software. The software calculates the swale capacity and shear stress for the design flow with the unvegetated temporary erosion control blanket scenario, and the vegetated scenario. The software performs calculations in accordance with FHWA Hydraulic Engineering Circular #15 (HEC-15) and the USDA Agricultural Handbook No. 667.

3. Summary and Results
The temporary diversion swales are sized appropriately for the analyzed storm events. There are two diversions with contributing areas over 5 acres, the attached calculations demonstrate that they swales have the capacity to convey the 10 year storm while maintaining the required freeboard. The erosion control blankets selected will protect the bare soils from erosion while vegetation is being established, and once established the vegetation will protect the swales from erosion. The following table summarizes the results of the analysis and design.

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CONNECTICUT EXPANSION PROJECT - CONNECTICUT LOOP

SWALE I.D.	CHANNEL NO. STATIONING	BOTTOM WIDTH B (FT)	DEPTH D (FT)	TOP WIDTH W (FT)	Z1 (FT)	Z2 (FT)	TEMPORARY LINING*	PERMANENT LINING	Design Flow (CFS)	Cross Pipe Approx. Sta.	Cross Pipe Size (in.)	Number of Pipes	Pipe Length (FT)	Pipe Inv. (In)	Pipe Inv. (Out)	Level Spreader Length (FT.)**	Level Spreader Entrance Width (FT.)	Level Spreader End Width (FT.)	Level Spreader Depth (FT.)	Notes
1	92+00	2	1.5	11.0	3	3	SC150	UNREINFORCED VEGETATION	2.19	N/A						10	10	3	0.5	
2	102+50	2	1.5	11.0	3	3	SC150	UNREINFORCED VEGETATION	1.86	N/A						10	10	3	0.5	
3	128+00	2	1.5	11.0	3	3	SC150	UNREINFORCED VEGETATION	1.52	N/A						10	10	3	0.5	
4	295+50	2	1.5	11.0	3	3	SC150	UNREINFORCED VEGETATION	4.83	N/A						10	10	3	0.5	
6	297+50	2	1.5	11.0	3	3	SC150	UNREINFORCED VEGETATION	3.07	N/A						10	10	3	0.5	
7	306+00	2	1.5	11.0	3	3	SC150	UNREINFORCED VEGETATION	4.07	N/A						10	10	3	0.5	
8	390+00	2	1.5	11.0	3	3	SC150	UNREINFORCED VEGETATION	4.88	N/A						10	10	3	0.5	

* SEE DETAIL IN CALCULATIONS FOR PRODUCT INFORMATION
** LEVEL SPREADER TO BE DESIGNED TO CONSTRUCTION BEST MANAGEMENT PRACTICES FIGURE NUMBER 28

200 100 0 200

SCALE IN FEET

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

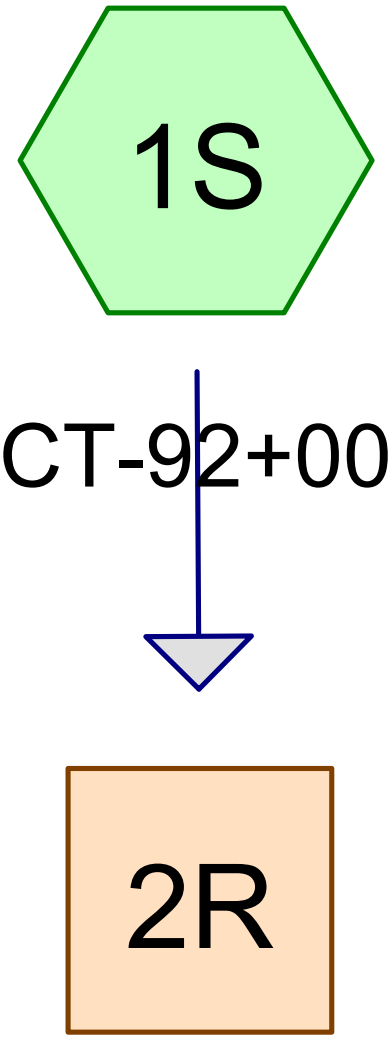
REVISIONS

Division:		Op. Area:	
St.: CT		Co./Par.: HARTFORD	
Section:	Township:	Range:	
Dft: JR	Date: 07/17/14	Project ID:	
Chk: JD	Date: 05/27/14	Scale: 1"=200'	
Appr: RE	Date: 05/27/14	Filename: SK14C4781CT04_swales.dwg	

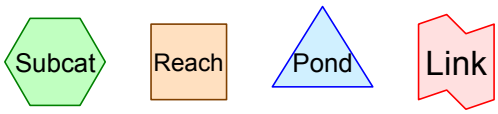
CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
DIVERSION SWALE AT STA. 92+00
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Sheet: 1 of 1
Type:



Diversion Swale



Routing Diagram for Main Line Diversion Swale_CT92+00
Prepared by BL Companies, Printed 3/23/2016
HydroCAD® 10.00 s/n 01334 © 2013 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: CT-92+00

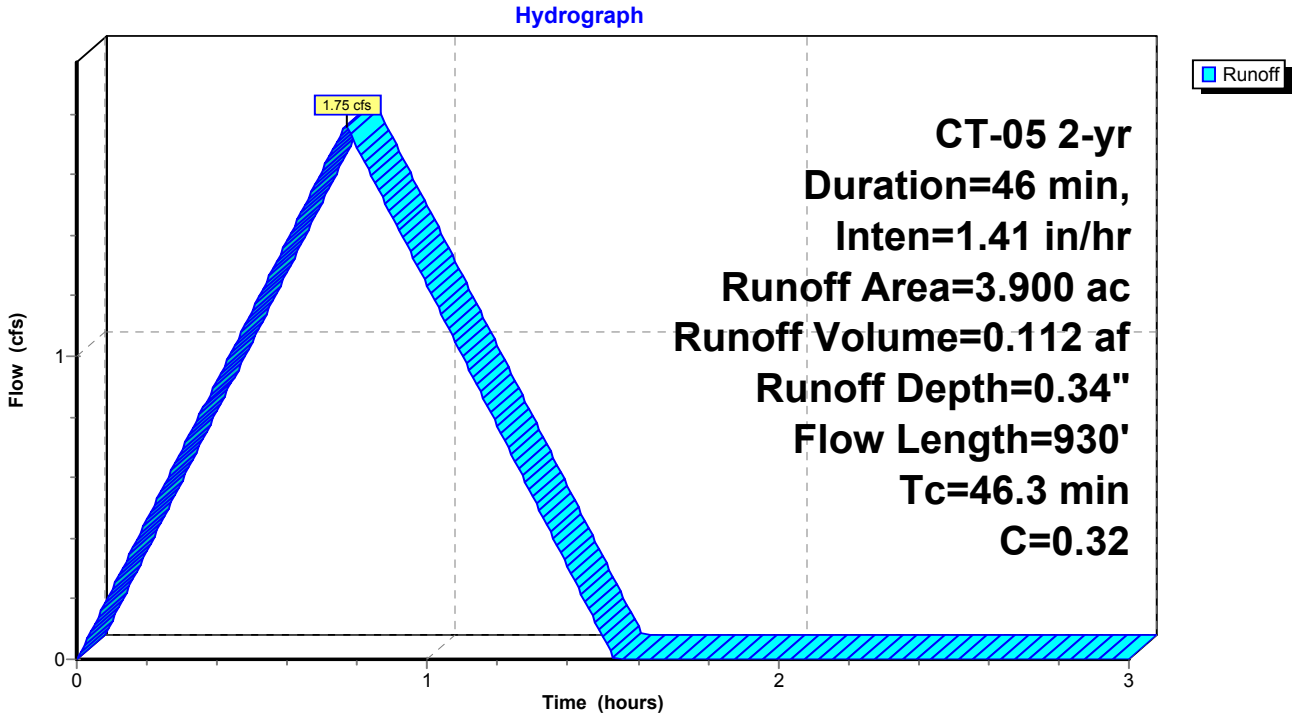
Runoff = 1.75 cfs @ 0.77 hrs, Volume= 0.112 af, Depth= 0.34"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 2-yr Duration=46 min, Inten=1.41 in/hr

Area (ac)	C	Description
3.900	0.32	Forest, 0-20%, D Soil
3.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	150	0.0667	0.07		**Sheet Flow, Sheet 1** Woods: Dense underbrush n= 0.800 P2= 2.88"
12.6	780	0.0423	1.03		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
46.3	930	Total			

Subcatchment 1S: CT-92+00



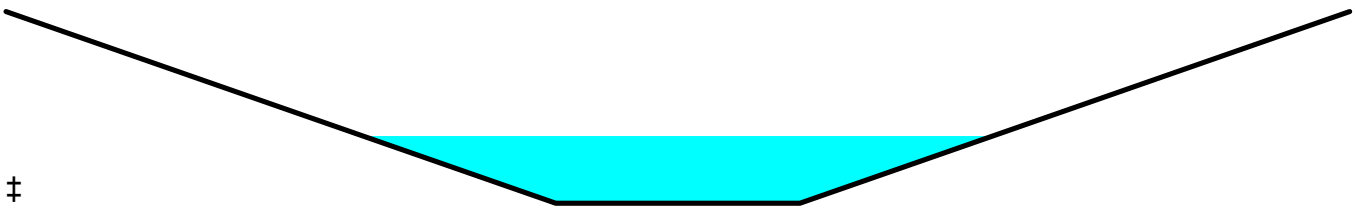
Summary for Reach 2R: Diversion Swale

Inflow Area = 3.900 ac, 0.00% Impervious, Inflow Depth = 0.34" for 2-yr event
Inflow = 1.75 cfs @ 0.77 hrs, Volume= 0.112 af
Outflow = 1.69 cfs @ 0.86 hrs, Volume= 0.112 af, Atten= 4%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.90 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.43 fps, Avg. Travel Time= 7.4 min

Peak Storage= 358 cf @ 0.80 hrs
Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 15.69 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 190.0' Slope= 0.0158 '/'
Inlet Invert= 170.00', Outlet Invert= 167.00'



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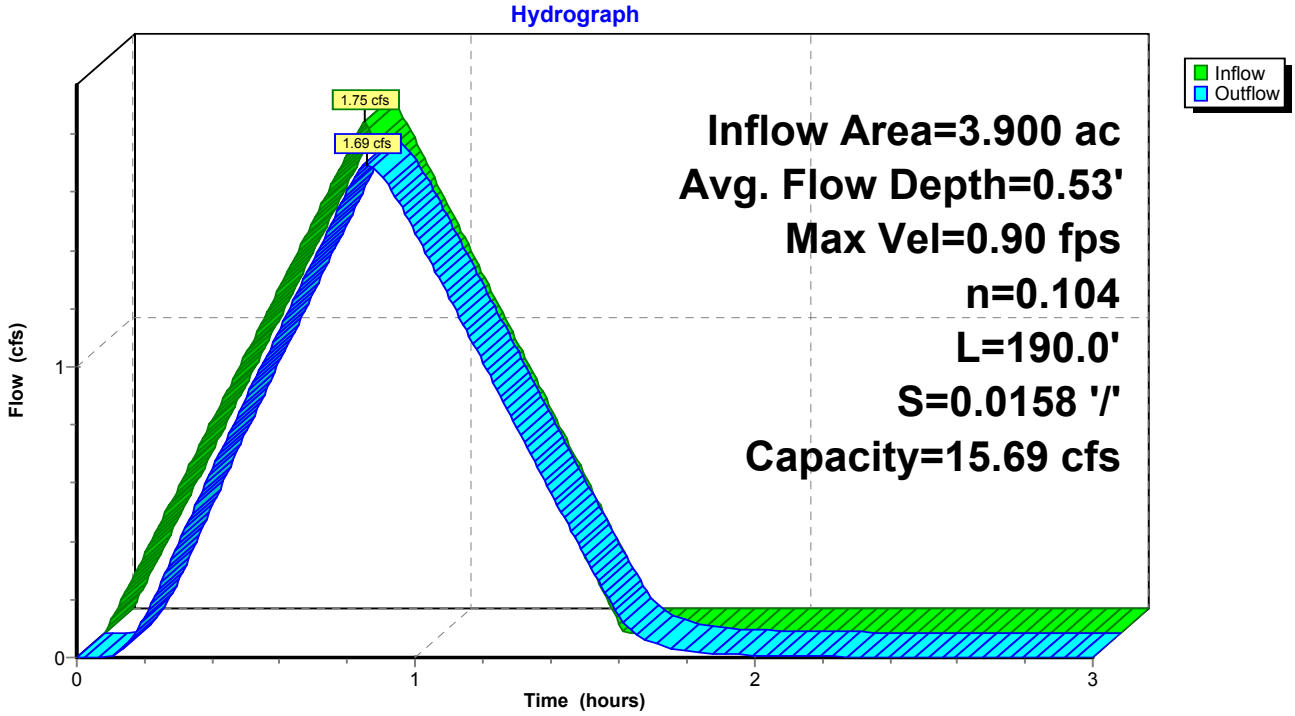
Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-92+00

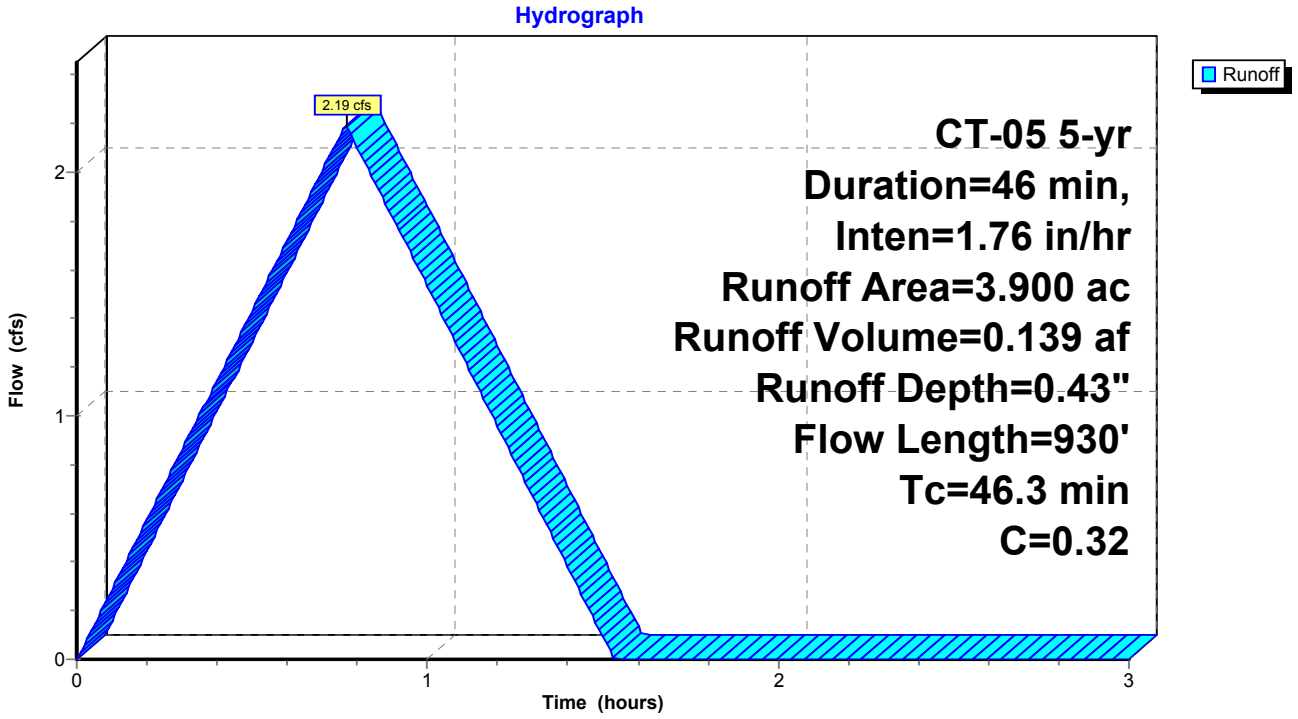
Runoff = 2.19 cfs @ 0.77 hrs, Volume= 0.139 af, Depth= 0.43"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 5-yr Duration=46 min, Inten=1.76 in/hr

Area (ac)	C	Description
3.900	0.32	Forest, 0-20%, D Soil
3.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	150	0.0667	0.07		**Sheet Flow, Sheet 1** Woods: Dense underbrush n= 0.800 P2= 2.88"
12.6	780	0.0423	1.03		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
46.3	930	Total			

Subcatchment 1S: CT-92+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 3.900 ac, 0.00% Impervious, Inflow Depth = 0.43" for 5-yr event
Inflow = 2.19 cfs @ 0.77 hrs, Volume= 0.139 af
Outflow = 2.12 cfs @ 0.85 hrs, Volume= 0.139 af, Atten= 3%, Lag= 5.0 min

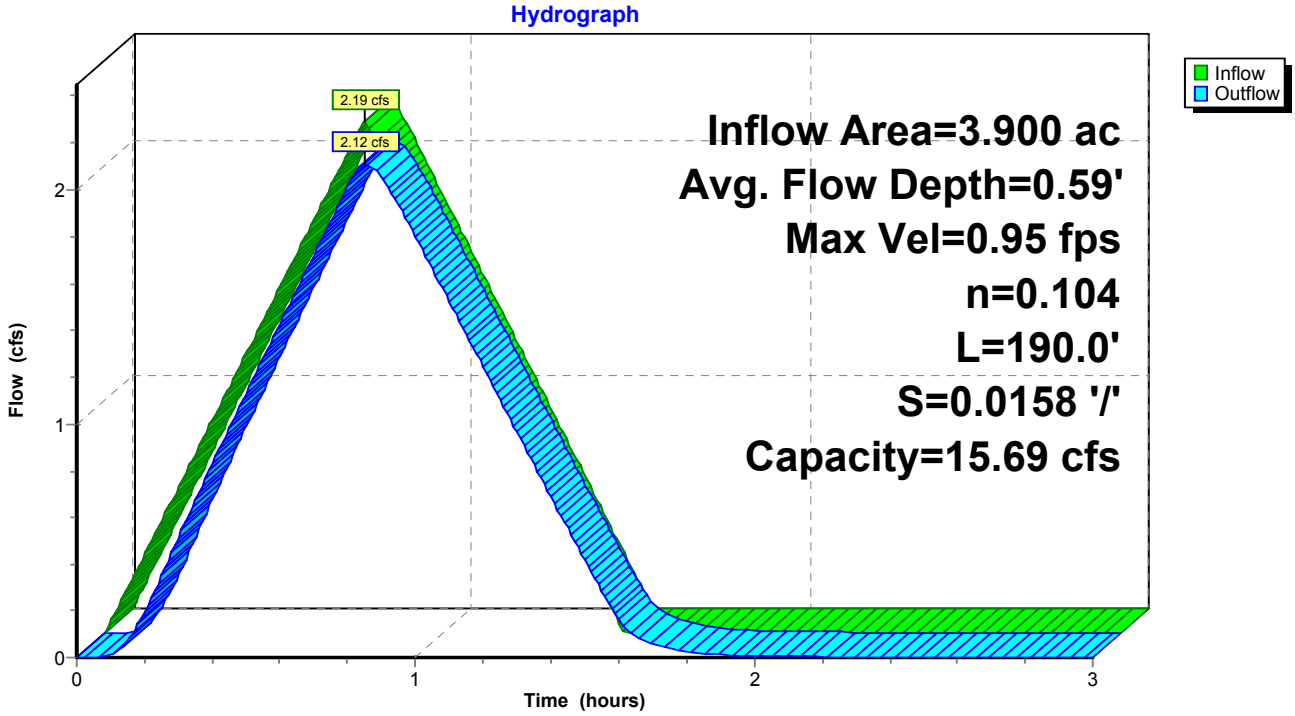
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.95 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.45 fps, Avg. Travel Time= 7.0 min

Peak Storage= 421 cf @ 0.80 hrs
Average Depth at Peak Storage= 0.59'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 15.69 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 190.0' Slope= 0.0158 '/'
Inlet Invert= 170.00', Outlet Invert= 167.00'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-92+00

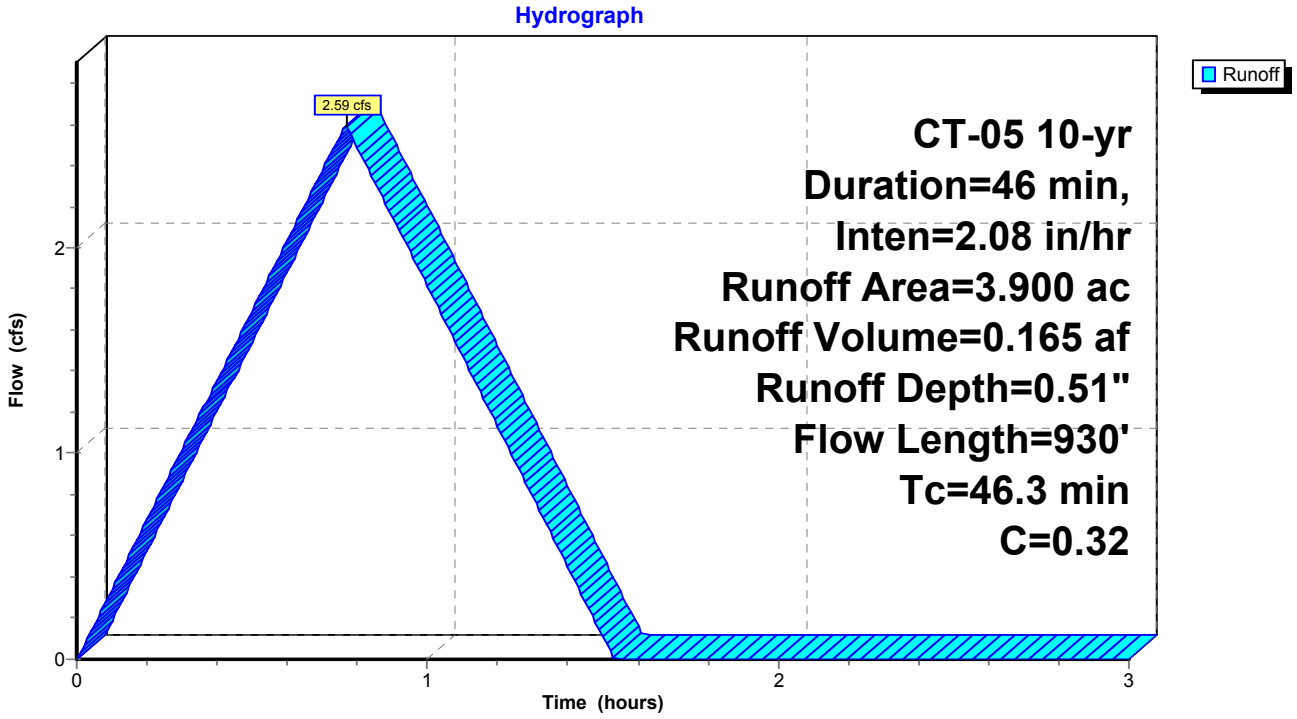
Runoff = 2.59 cfs @ 0.77 hrs, Volume= 0.165 af, Depth= 0.51"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 10-yr Duration=46 min, Inten=2.08 in/hr

Area (ac)	C	Description
3.900	0.32	Forest, 0-20%, D Soil
3.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.7	150	0.0667	0.07		**Sheet Flow, Sheet 1** Woods: Dense underbrush n= 0.800 P2= 2.88"
12.6	780	0.0423	1.03		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
46.3	930	Total			

Subcatchment 1S: CT-92+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 3.900 ac, 0.00% Impervious, Inflow Depth = 0.51" for 10-yr event
Inflow = 2.59 cfs @ 0.77 hrs, Volume= 0.165 af
Outflow = 2.51 cfs @ 0.85 hrs, Volume= 0.165 af, Atten= 3%, Lag= 4.8 min

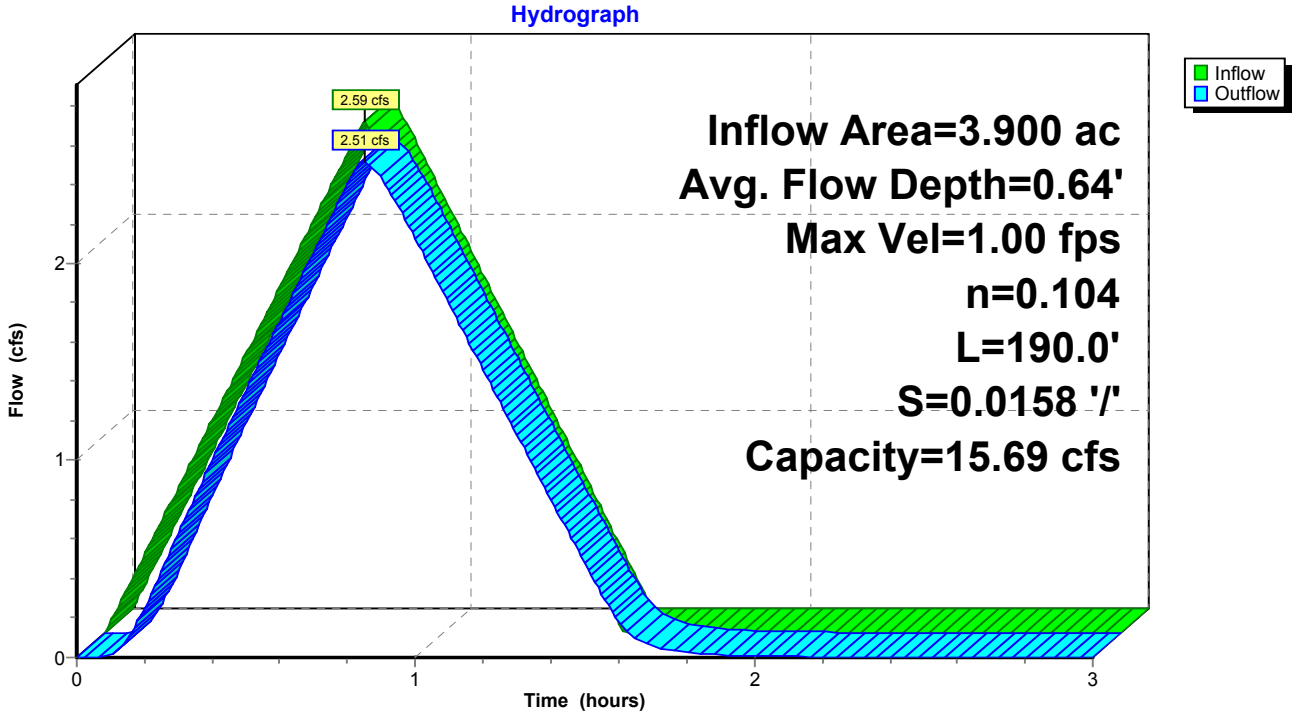
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.00 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 6.7 min

Peak Storage= 477 cf @ 0.79 hrs
Average Depth at Peak Storage= 0.64'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 15.69 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 190.0' Slope= 0.0158 '/'
Inlet Invert= 170.00', Outlet Invert= 167.00'

‡

Reach 2R: Diversion Swale



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Tel. 800.772.2040
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www.nagreen.com

Erosion Control Materials Design Software
Version 5.0

Project Name: Kinder Morgan-CT
Project Number: 49018
Channel Name: 92+00

Discharge	2.19
Peak Flow Period	2
Channel Slope	0.015789
Channel Bottom Width	2
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

SC150

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	2.19 cfs	1.64 ft/s	0.41 ft	0.05	2 lbs/ft2	0.41 lbs/ft2	4.91	STABLE	D

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	2.19 cfs	0.76 ft/s	0.7 ft	0.144	4.2 lbs/ft2	0.69 lbs/ft2	6.06	STABLE	--
Underlying Substrate	Straight	2.19 cfs	0.76 ft/s	0.7 ft	--	0.04 lbs/ft2	0.002 lbs/ft2	17.28	STABLE	--

100 50 0 100

SCALE IN FEET

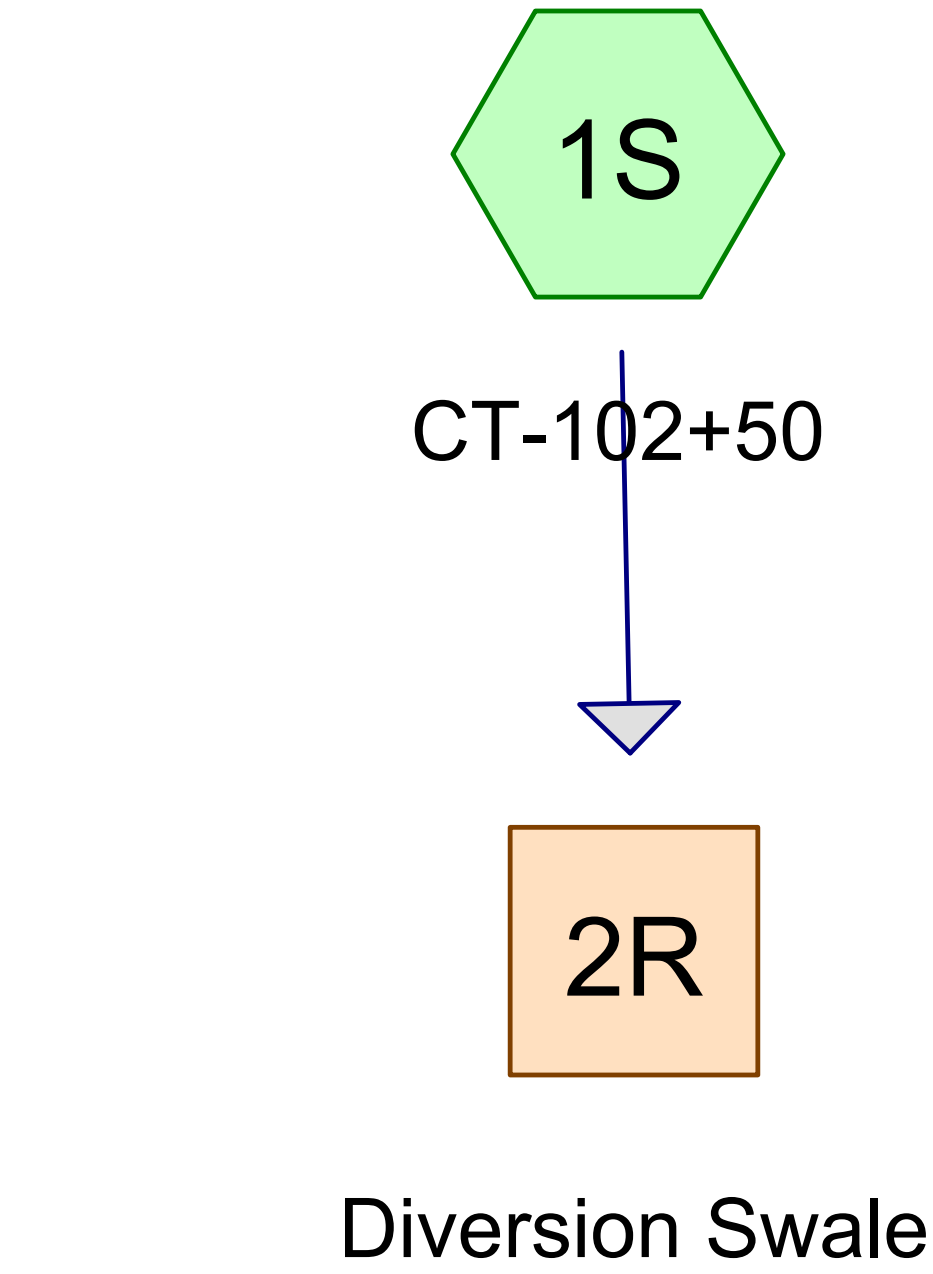
NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
			REVISIONS		

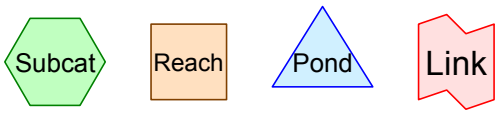
Division:		Op. Area:	
St.: CT		Co./Par.: HARTFORD	
Section:	Township:	Range:	
Dft: JR	Date: 07/17/14	Project ID:	
Chk: JD	Date: 05/27/14	Scale: 1"=100'	
Appr: RE	Date: 05/27/14	Filename: SK14C4781CT04_swales.dwg	

CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
DIVERSION SWALE AT STA. 102+50
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Sheet: 1 of 1
Type:





Routing Diagram for Main Line Diversion Swale_CT102+50
Prepared by BL Companies, Printed 3/23/2016
HydroCAD® 10.00 s/n 01334 © 2013 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: CT-102+50

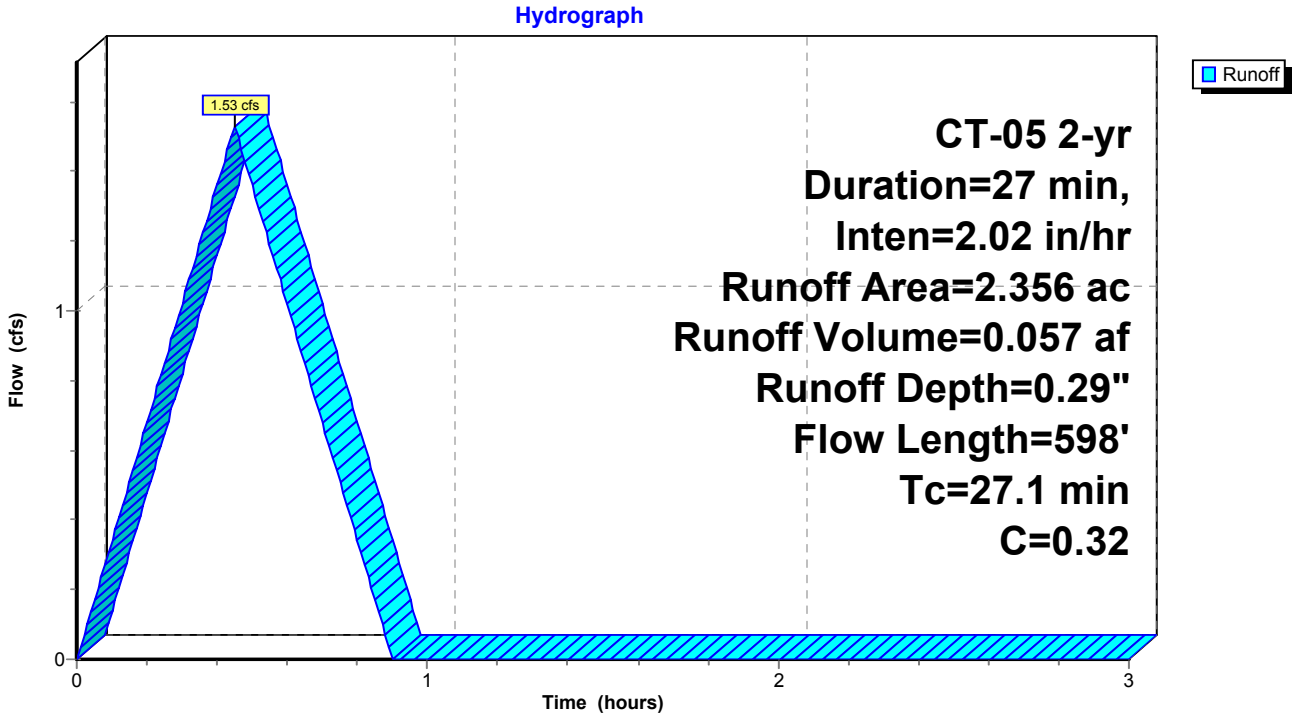
Runoff = 1.53 cfs @ 0.45 hrs, Volume= 0.057 af, Depth= 0.29"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 2-yr Duration=27 min, Inten=2.02 in/hr

Area (ac)	C	Description
2.356	0.32	Forest, 0-20%, D Soil
2.356		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	150	0.0733	0.13		**Sheet Flow, Sheet 1** Woods: Light underbrush n= 0.400 P2= 2.88"
8.5	448	0.0156	0.87		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
27.1	598	Total			

Subcatchment 1S: CT-102+50



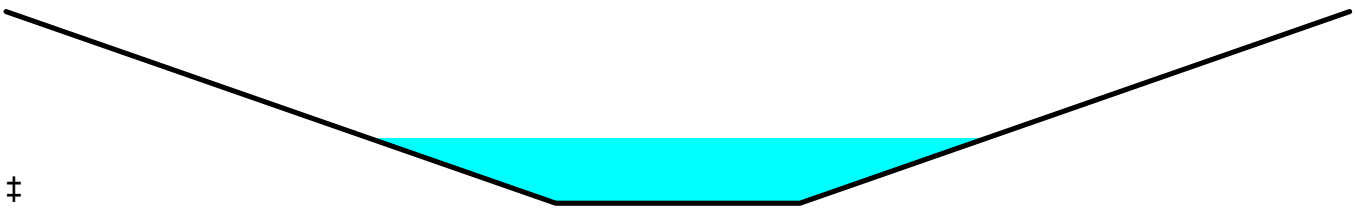
Summary for Reach 2R: Diversion Swale

Inflow Area = 2.356 ac, 0.00% Impervious, Inflow Depth = 0.29" for 2-yr event
Inflow = 1.53 cfs @ 0.45 hrs, Volume= 0.057 af
Outflow = 1.34 cfs @ 0.60 hrs, Volume= 0.057 af, Atten= 12%, Lag= 9.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.74 fps, Min. Travel Time= 6.0 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 16.2 min

Peak Storage= 484 cf @ 0.50 hrs
Average Depth at Peak Storage= 0.51'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 13.21 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 268.0' Slope= 0.0112 '/'
Inlet Invert= 160.00', Outlet Invert= 157.00'



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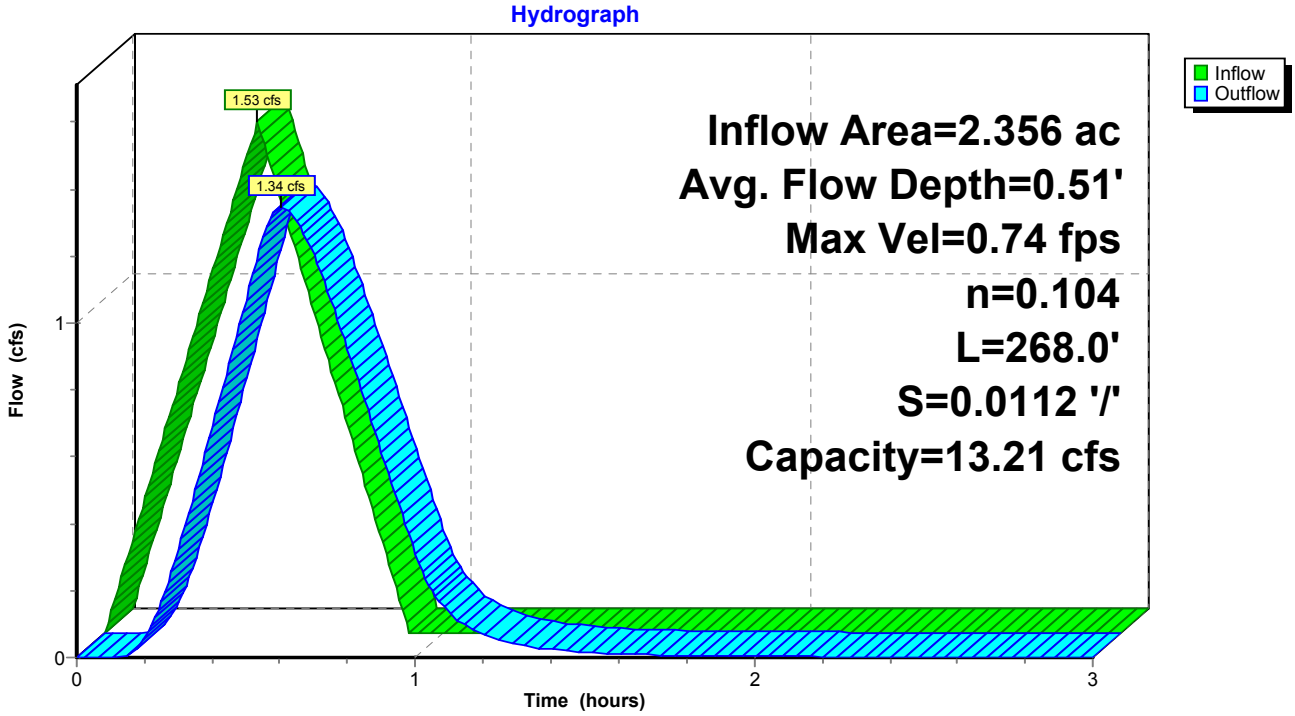
Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-102+50

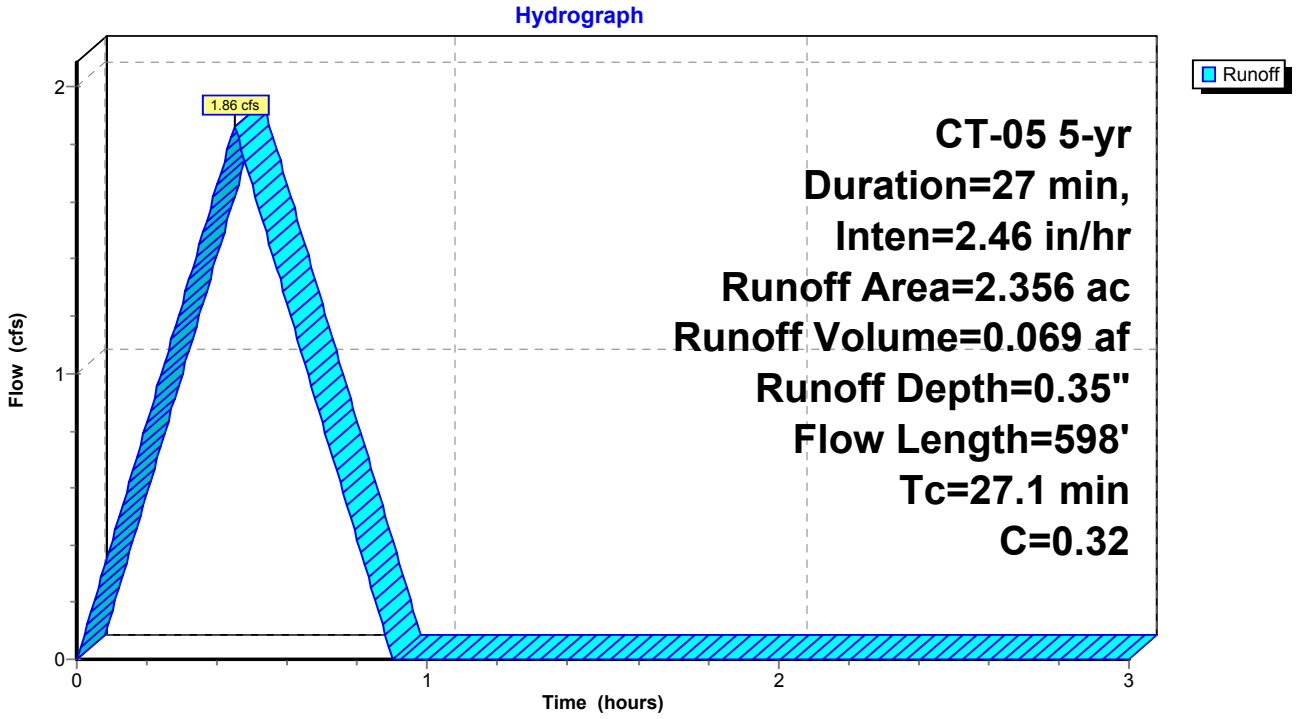
Runoff = 1.86 cfs @ 0.45 hrs, Volume= 0.069 af, Depth= 0.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 5-yr Duration=27 min, Inten=2.46 in/hr

Area (ac)	C	Description
2.356	0.32	Forest, 0-20%, D Soil
2.356		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	150	0.0733	0.13		**Sheet Flow, Sheet 1** Woods: Light underbrush n= 0.400 P2= 2.88"
8.5	448	0.0156	0.87		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
27.1	598	Total			

Subcatchment 1S: CT-102+50



Summary for Reach 2R: Diversion Swale

Inflow Area = 2.356 ac, 0.00% Impervious, Inflow Depth = 0.35" for 5-yr event
Inflow = 1.86 cfs @ 0.45 hrs, Volume= 0.069 af
Outflow = 1.65 cfs @ 0.60 hrs, Volume= 0.069 af, Atten= 11%, Lag= 8.8 min

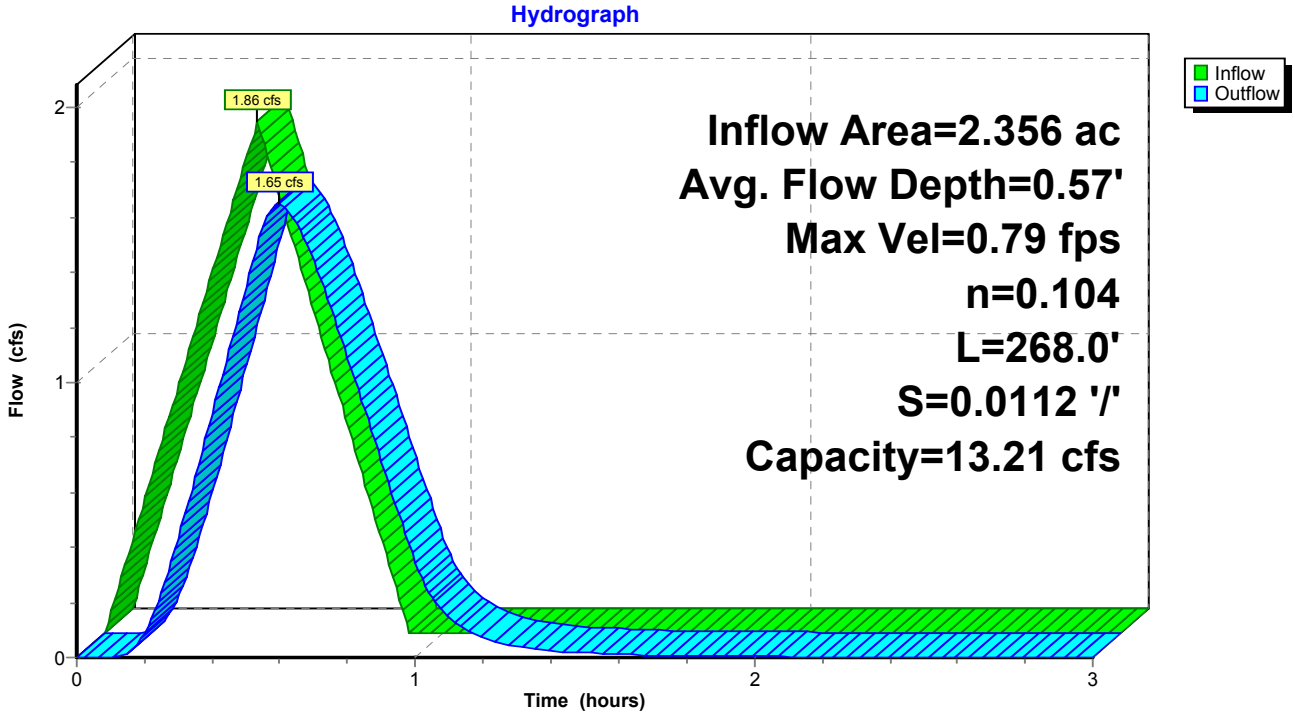
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.79 fps, Min. Travel Time= 5.7 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 15.5 min

Peak Storage= 562 cf @ 0.50 hrs
Average Depth at Peak Storage= 0.57'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 13.21 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 268.0' Slope= 0.0112 '/'
Inlet Invert= 160.00', Outlet Invert= 157.00'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-102+50

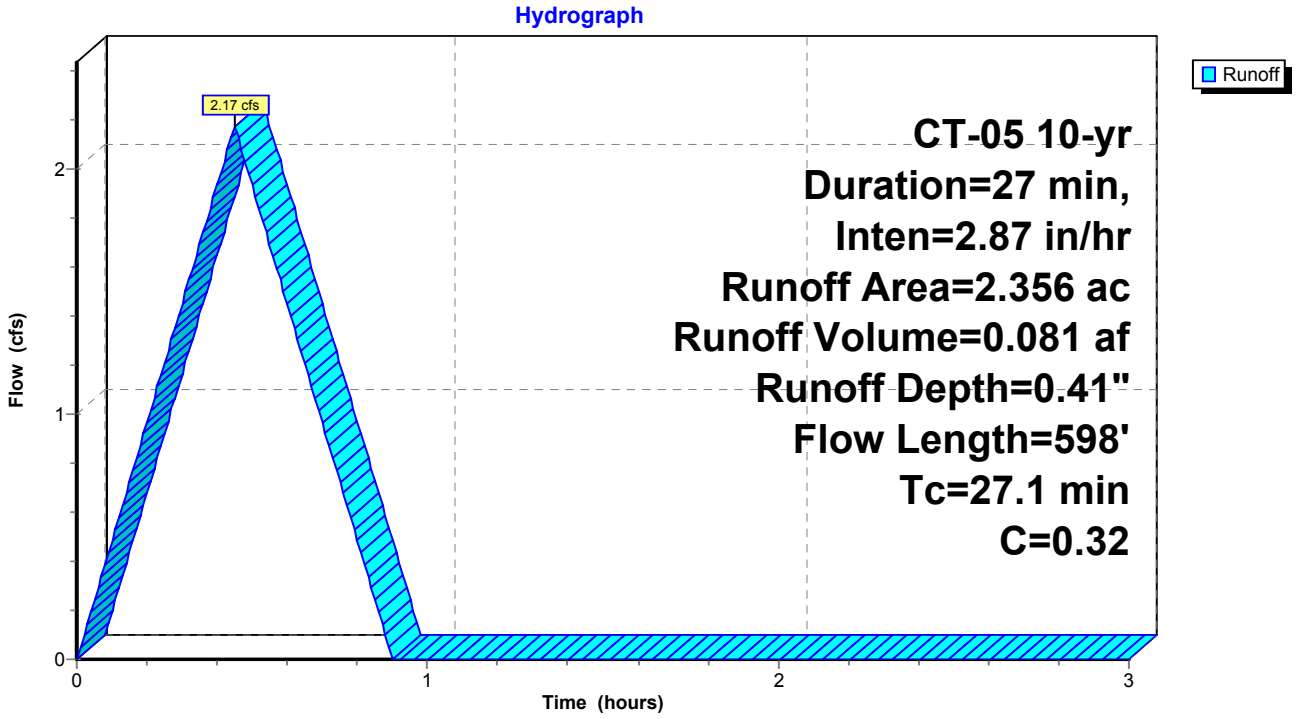
Runoff = 2.17 cfs @ 0.45 hrs, Volume= 0.081 af, Depth= 0.41"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 10-yr Duration=27 min, Inten=2.87 in/hr

Area (ac)	C	Description
2.356	0.32	Forest, 0-20%, D Soil
2.356		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.6	150	0.0733	0.13		**Sheet Flow, Sheet 1** Woods: Light underbrush n= 0.400 P2= 2.88"
8.5	448	0.0156	0.87		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
27.1	598	Total			

Subcatchment 1S: CT-102+50



Summary for Reach 2R: Diversion Swale

Inflow Area = 2.356 ac, 0.00% Impervious, Inflow Depth = 0.41" for 10-yr event
Inflow = 2.17 cfs @ 0.45 hrs, Volume= 0.081 af
Outflow = 1.94 cfs @ 0.59 hrs, Volume= 0.081 af, Atten= 11%, Lag= 8.4 min

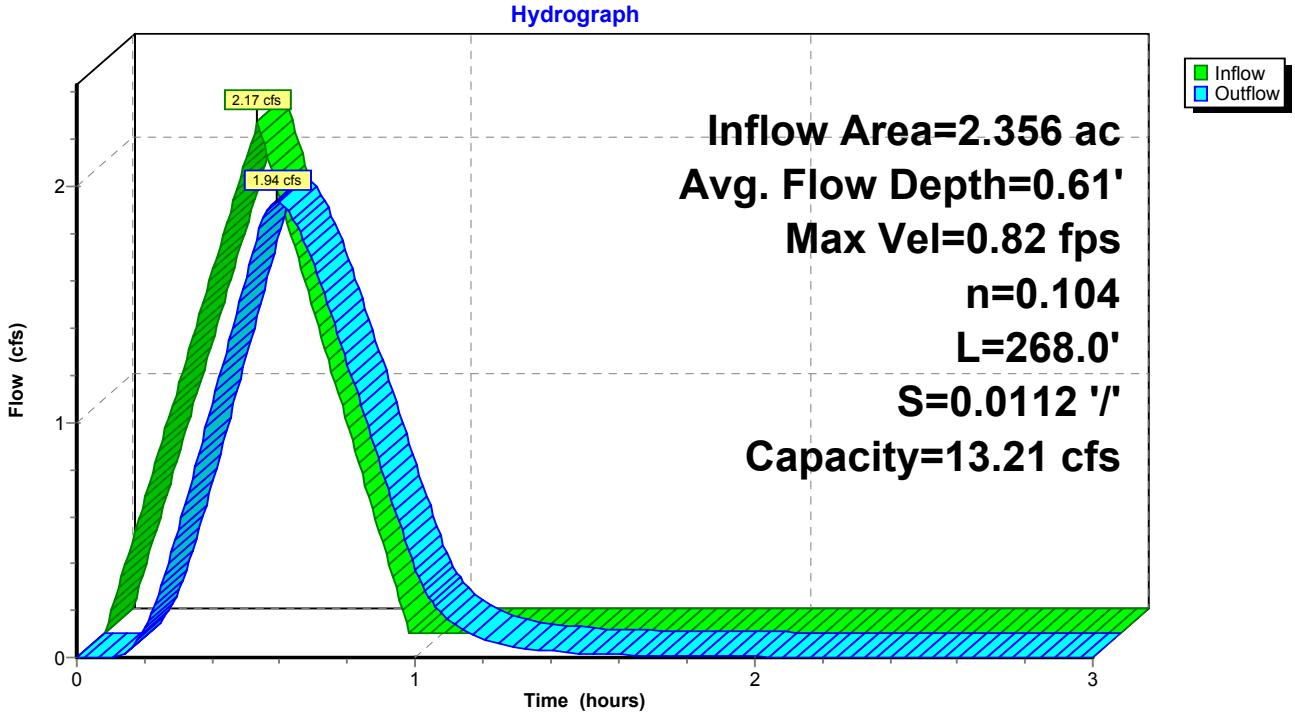
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.82 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.30 fps, Avg. Travel Time= 15.0 min

Peak Storage= 632 cf @ 0.50 hrs
Average Depth at Peak Storage= 0.61'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 13.21 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 268.0' Slope= 0.0112 '/'
Inlet Invert= 160.00', Outlet Invert= 157.00'

‡

Reach 2R: Diversion Swale



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Tel. 800.772.2040
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www.nagreen.com

Erosion Control Materials Design Software
Version 5.0

Project Name: Kinder Morgan-CT
Project Number: 49018
Channel Name: 102+50

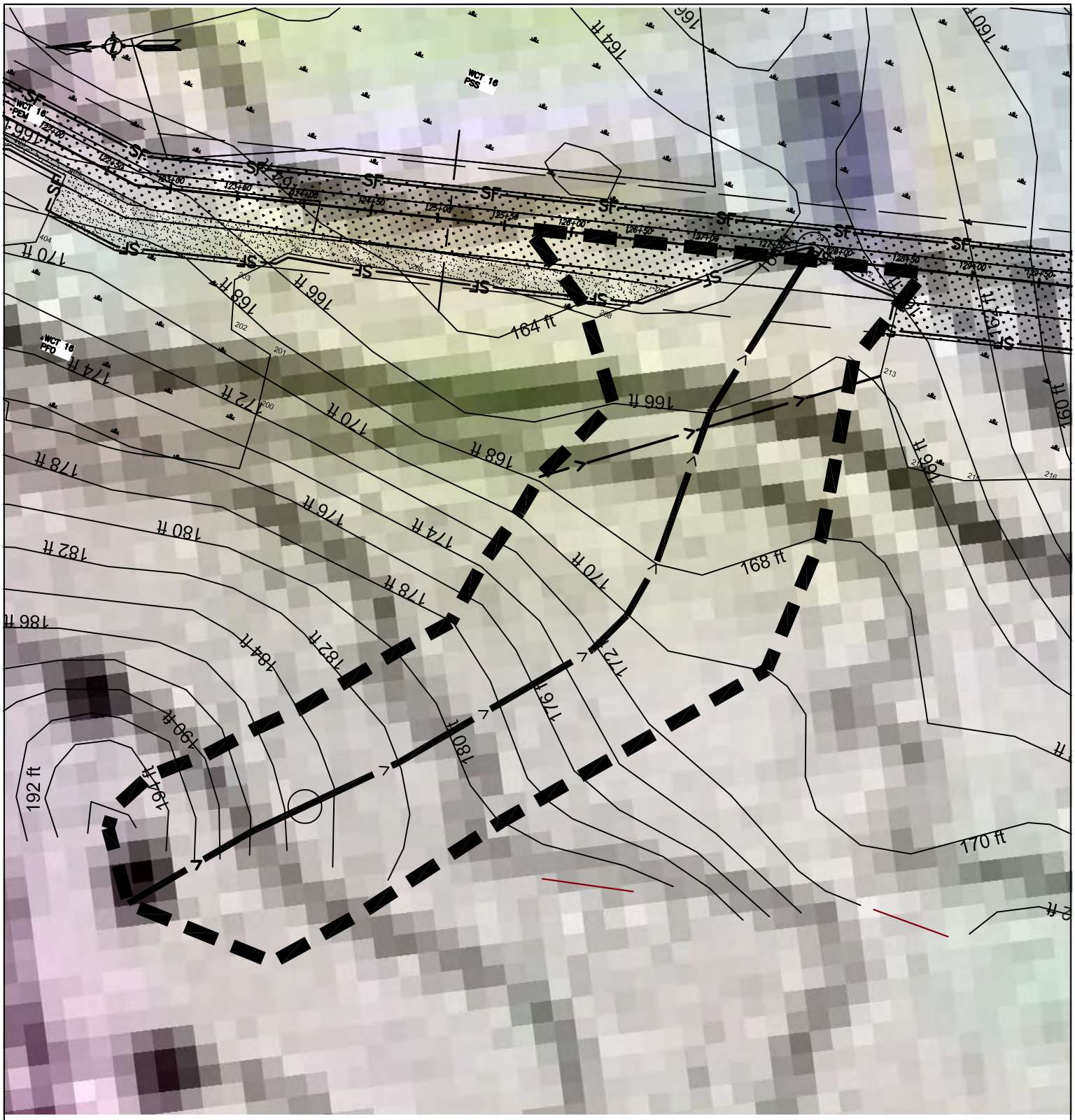
Discharge	1.86
Peak Flow Period	2
Channel Slope	0.0112
Channel Bottom Width	2
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

SC150

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	1.86 cfs	1.38 ft/s	0.42 ft	0.05	2 lbs/ft2	0.29 lbs/ft2	6.9	STABLE	D

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	1.86 cfs	0.59 ft/s	0.75 ft	0.162	4.2 lbs/ft2	0.52 lbs/ft2	8.06	STABLE	--
Underlying Substrate	Straight	1.86 cfs	0.59 ft/s	0.75 ft	--	0.04 lbs/ft2	0.001 lbs/ft2	28.8	STABLE	--



100 50 0 100

SCALE IN FEET

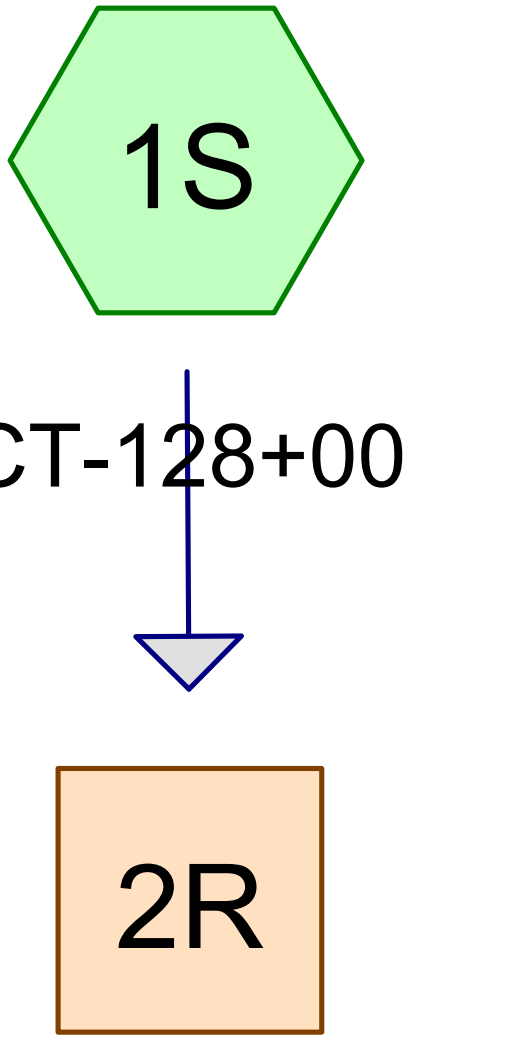
NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
			REVISIONS		

Division:		Op. Area:	
St.: CT		Co./Par.: HARTFORD	
Section:	Township:	Range:	
Dft: JR	Date: 07/17/14	Project ID:	
Chk: JD	Date: 05/27/14	Scale: 1"=100'	
Appr: RE	Date: 05/27/14	Filename: SK14C4781CT04_swales.dwg	

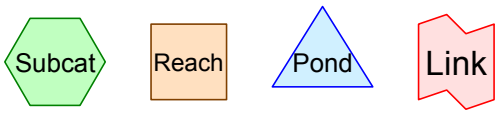
CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
DIVERSION SWALE AT STA. 128+00
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Sheet: 1 of 1
Type:



Diversion Swale



Routing Diagram for Main Line Diversion Swale_CT128+00
Prepared by BL Companies, Printed 3/23/2016
HydroCAD® 10.00 s/n 01334 © 2013 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: CT-128+00

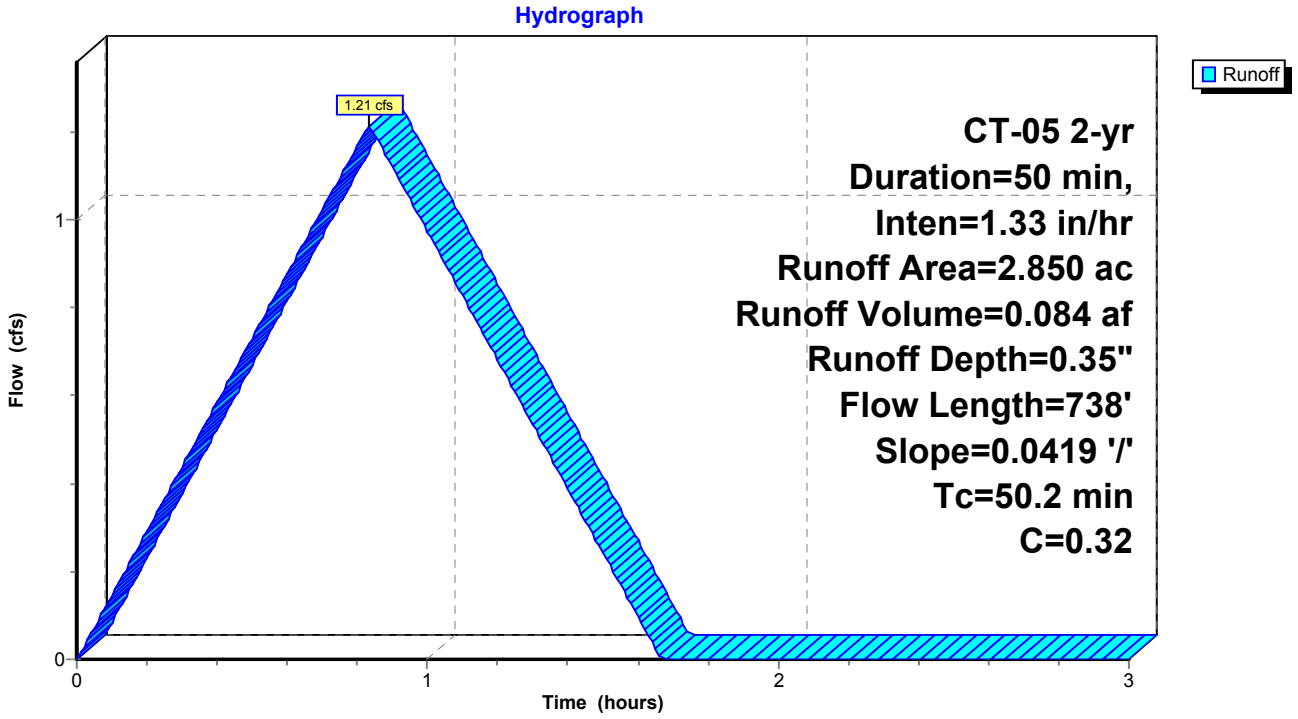
Runoff = 1.21 cfs @ 0.83 hrs, Volume= 0.084 af, Depth= 0.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 2-yr Duration=50 min, Inten=1.33 in/hr

Area (ac)	C	Description
2.850	0.32	Forest, 0-20%, D Soil
2.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.6	150	0.0419	0.06		**Sheet Flow, Sheet 1** Woods: Dense underbrush n= 0.800 P2= 2.88"
9.6	588	0.0419	1.02		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
50.2	738	Total			

Subcatchment 1S: CT-128+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 2.850 ac, 0.00% Impervious, Inflow Depth = 0.35" for 2-yr event
Inflow = 1.21 cfs @ 0.83 hrs, Volume= 0.084 af
Outflow = 1.14 cfs @ 0.99 hrs, Volume= 0.084 af, Atten= 6%, Lag= 9.2 min

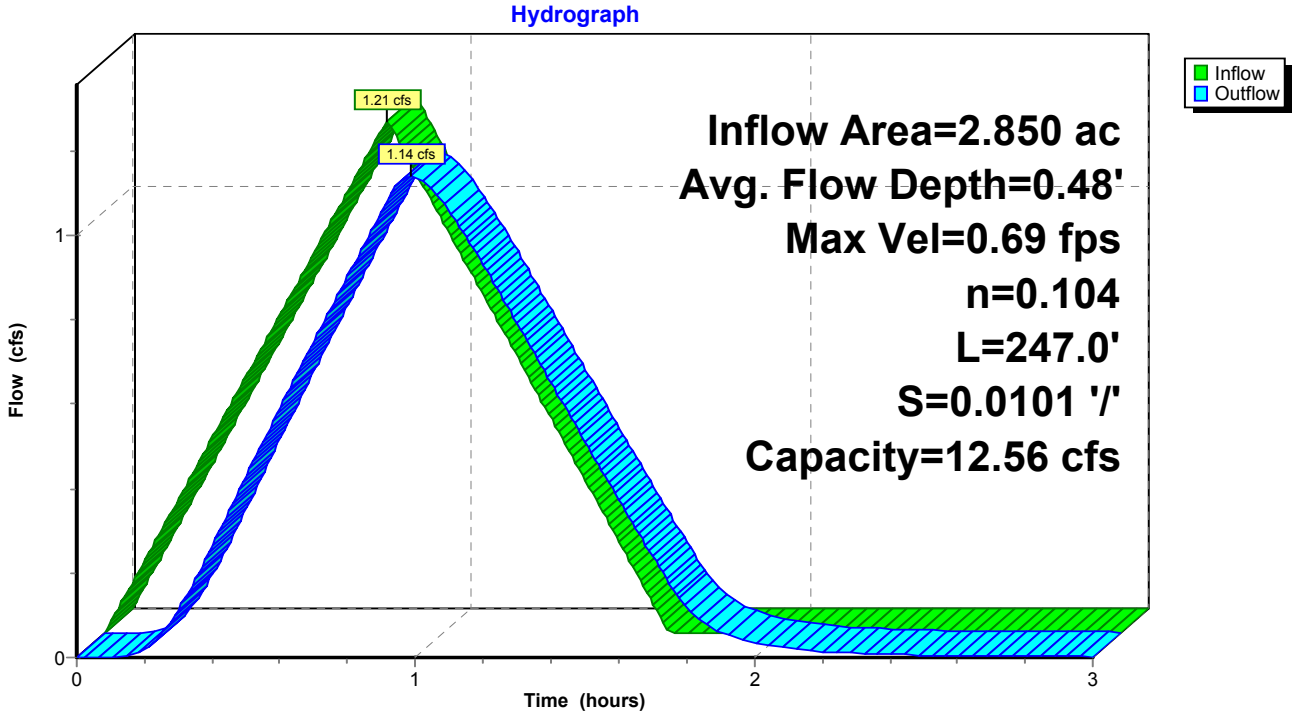
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.69 fps, Min. Travel Time= 6.0 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 11.4 min

Peak Storage= 411 cf @ 0.89 hrs
Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 12.56 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 247.0' Slope= 0.0101 '/'
Inlet Invert= 168.00', Outlet Invert= 165.50'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-128+00

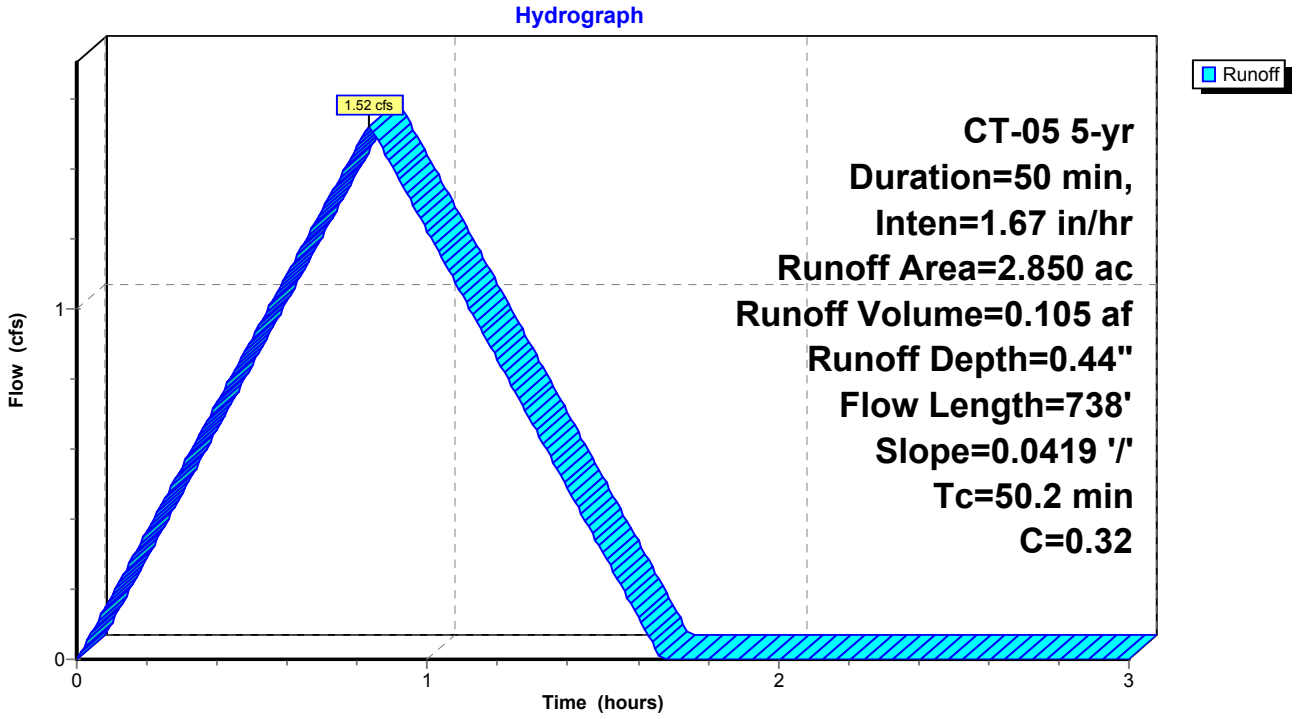
Runoff = 1.52 cfs @ 0.83 hrs, Volume= 0.105 af, Depth= 0.44"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 5-yr Duration=50 min, Inten=1.67 in/hr

Area (ac)	C	Description
2.850	0.32	Forest, 0-20%, D Soil
2.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.6	150	0.0419	0.06		**Sheet Flow, Sheet 1** Woods: Dense underbrush n= 0.800 P2= 2.88"
9.6	588	0.0419	1.02		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
50.2	738	Total			

Subcatchment 1S: CT-128+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 2.850 ac, 0.00% Impervious, Inflow Depth = 0.44" for 5-yr event
Inflow = 1.52 cfs @ 0.83 hrs, Volume= 0.105 af
Outflow = 1.44 cfs @ 0.98 hrs, Volume= 0.105 af, Atten= 6%, Lag= 8.6 min

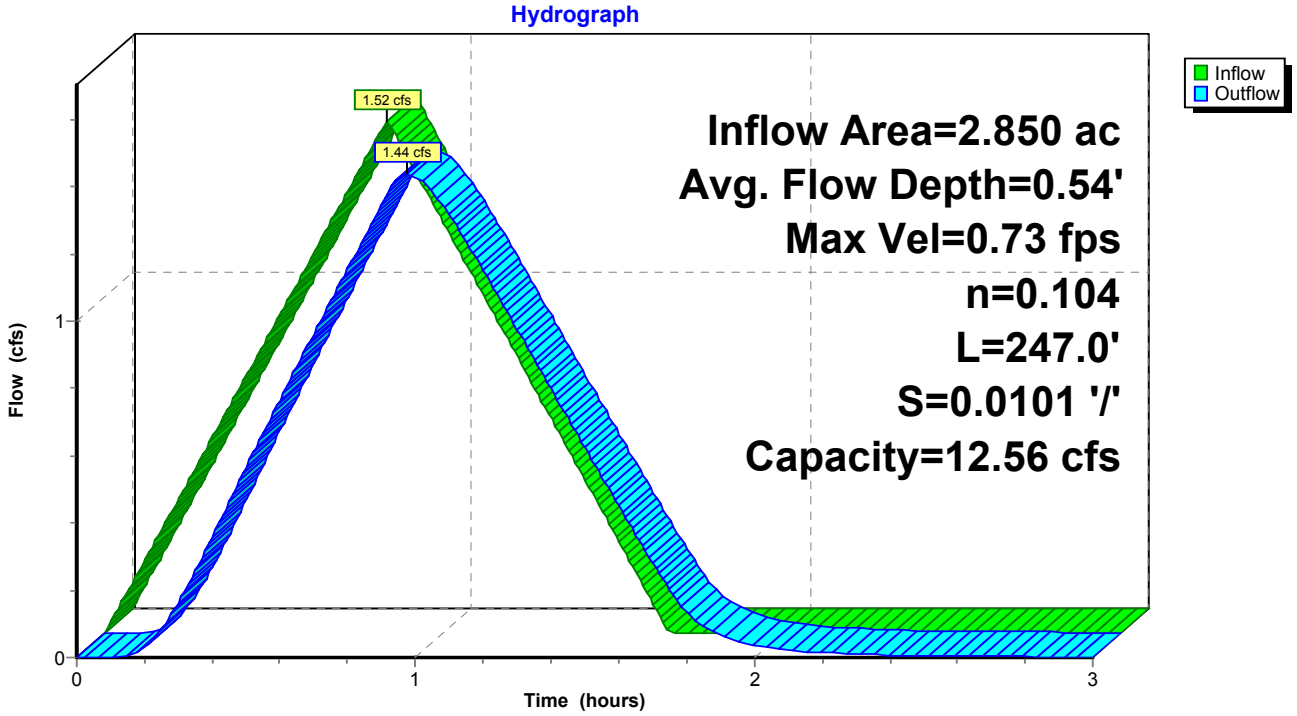
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.73 fps, Min. Travel Time= 5.6 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 10.8 min

Peak Storage= 486 cf @ 0.88 hrs
Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 12.56 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 247.0' Slope= 0.0101 '/'
Inlet Invert= 168.00', Outlet Invert= 165.50'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-128+00

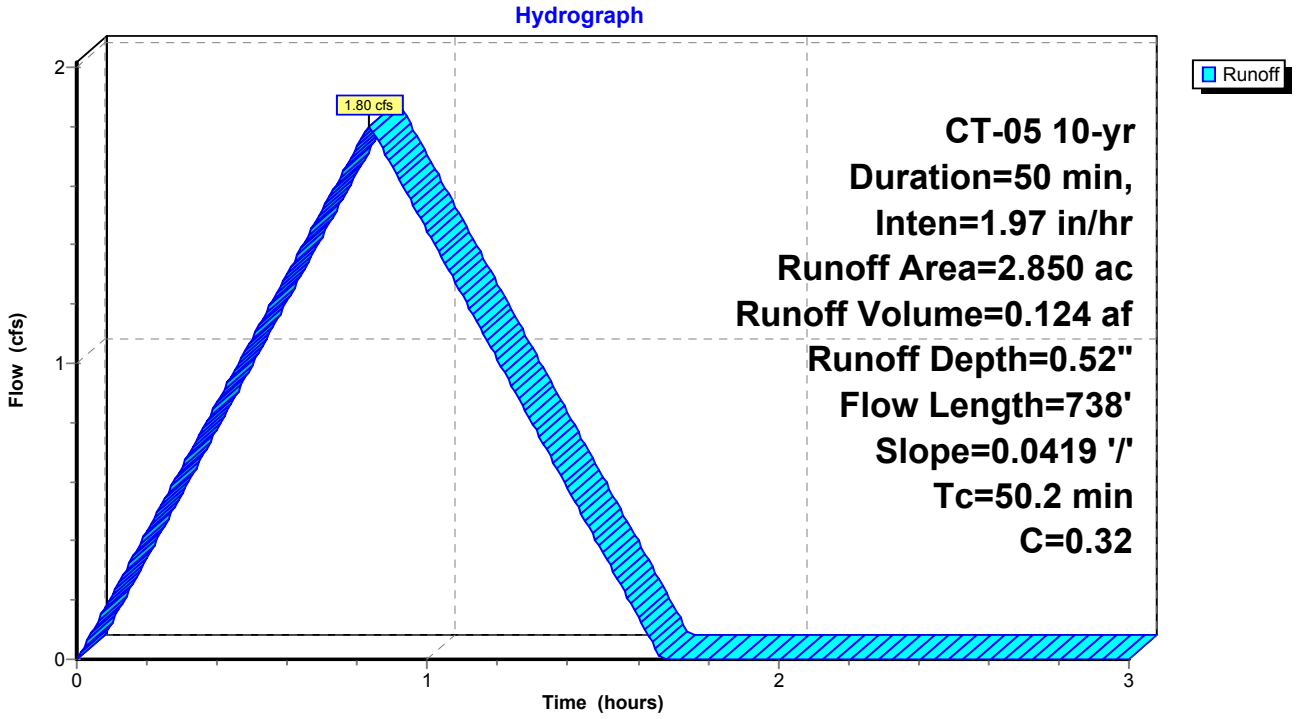
Runoff = 1.80 cfs @ 0.83 hrs, Volume= 0.124 af, Depth= 0.52"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 10-yr Duration=50 min, Inten=1.97 in/hr

Area (ac)	C	Description
2.850	0.32	Forest, 0-20%, D Soil
2.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.6	150	0.0419	0.06		**Sheet Flow, Sheet 1** Woods: Dense underbrush n= 0.800 P2= 2.88"
9.6	588	0.0419	1.02		**Shallow Concentrated Flow, SCF** Woodland Kv= 5.0 fps
50.2	738	Total			

Subcatchment 1S: CT-128+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 2.850 ac, 0.00% Impervious, Inflow Depth = 0.52" for 10-yr event
Inflow = 1.80 cfs @ 0.83 hrs, Volume= 0.124 af
Outflow = 1.71 cfs @ 0.97 hrs, Volume= 0.124 af, Atten= 5%, Lag= 8.2 min

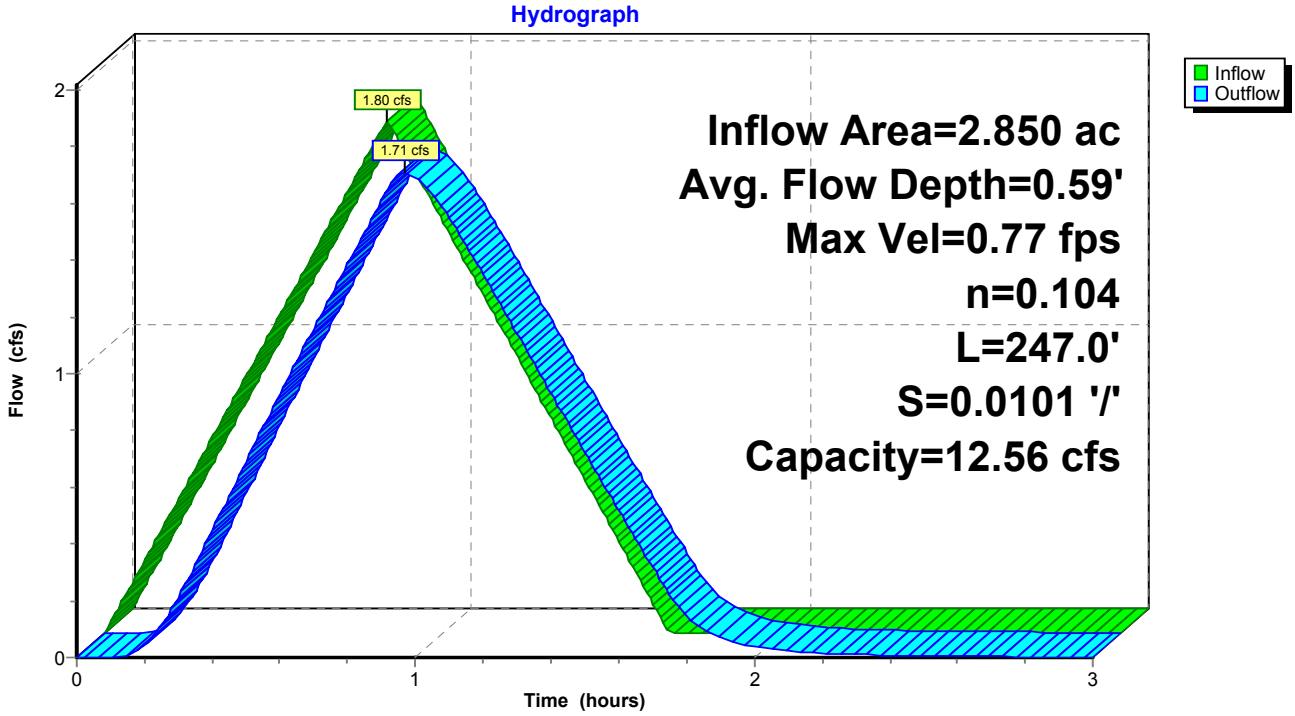
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.77 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.40 fps, Avg. Travel Time= 10.3 min

Peak Storage= 551 cf @ 0.88 hrs
Average Depth at Peak Storage= 0.59'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 12.56 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 247.0' Slope= 0.0101 '/'
Inlet Invert= 168.00', Outlet Invert= 165.50'

‡

Reach 2R: Diversion Swale



200 100 0 200

SCALE IN FEET

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.
			REVISIONS		

Division:		Op. Area:
St.: CT		Co./Par.: HARTFORD
Section:	Township:	Range:
Dft: JR	Date: 07/17/14	Project ID:
Chk: JD	Date: 05/27/14	Scale: 1"=200'
Appr: RE	Date: 05/27/14	Filename: SK14C4781CT04_swales.dwg

CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
DIV. SWALE AT STA. 295+50, 297+50& 306+00
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Sheet: 1 of 1
Type:

Tensar International Corporation
5401 St. Wendel-Cynthiana Road
Poseyville, Indiana 47633
Tel. 800.772.2040
Fax 812.867.0247
www.nagreen.com

Erosion Control Materials Design Software
Version 5.0

Project Name: Kinder Morgan-CT
Project Number: 49018
Channel Name: 128+00

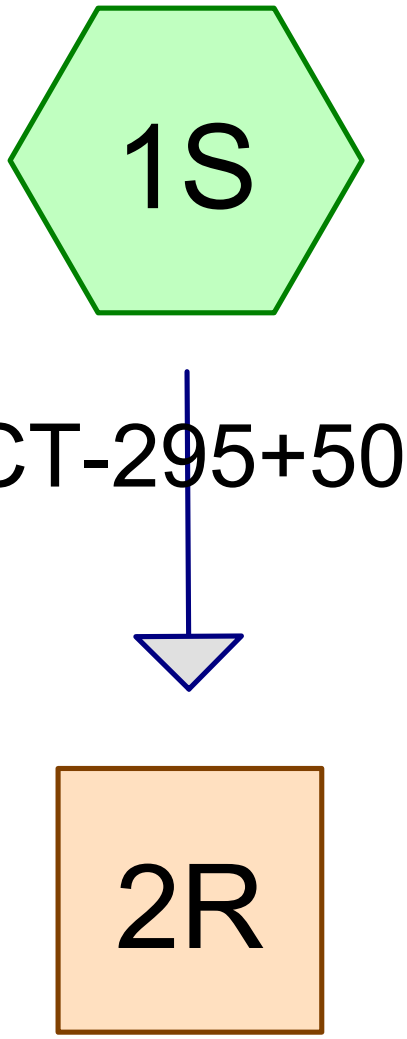
Discharge	1.52
Peak Flow Period	2
Channel Slope	0.0101
Channel Bottom Width	2
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

SC150

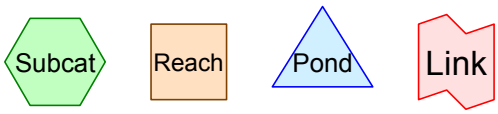
Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	1.52 cfs	1.26 ft/s	0.38 ft	0.05	2 lbs/ft2	0.24 lbs/ft2	8.27	STABLE	D

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	1.52 cfs	0.5 ft/s	0.73 ft	0.18	4.2 lbs/ft2	0.46 lbs/ft2	9.13	STABLE	--
Underlying Substrate	Straight	1.52 cfs	0.5 ft/s	0.73 ft	--	0.04 lbs/ft2	0.001 lbs/ft2	40.38	STABLE	--



Diversion Swale



Routing Diagram for Main Line Diversion Swale_CT295+50
Prepared by BL Companies, Printed 3/23/2016
HydroCAD® 10.00 s/n 01334 © 2013 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: CT-295+50

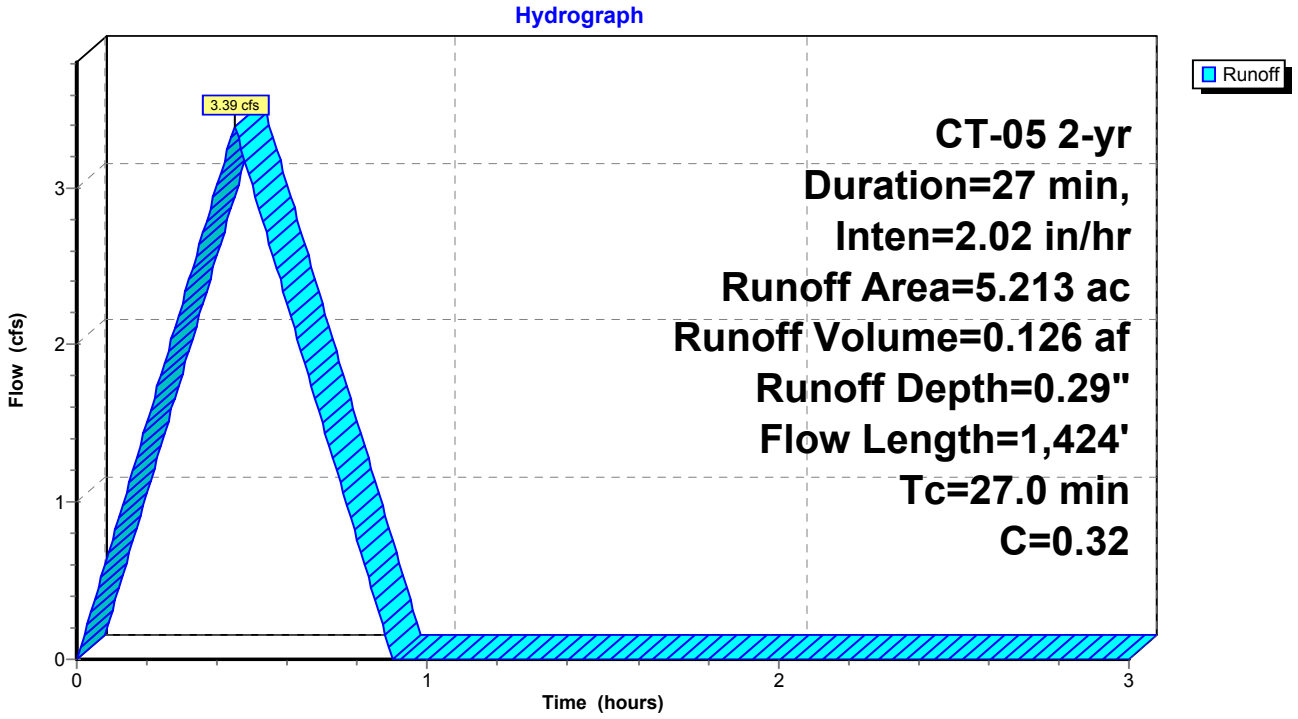
Runoff = 3.39 cfs @ 0.45 hrs, Volume= 0.126 af, Depth= 0.29"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 2-yr Duration=27 min, Inten=2.02 in/hr

Area (ac)	C	Description
5.213	0.32	Forest, 0-20%, D Soil
5.213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	150	0.0600	0.27		**Sheet Flow, Sheet 1** Grass: Short n= 0.150 P2= 2.88"
17.8	1,274	0.0290	1.19		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
27.0	1,424	Total			

Subcatchment 1S: CT-295+50



Summary for Reach 2R: Diversion Swale

Inflow Area = 5.213 ac, 0.00% Impervious, Inflow Depth = 0.29" for 2-yr event
Inflow = 3.39 cfs @ 0.45 hrs, Volume= 0.126 af
Outflow = 3.28 cfs @ 0.49 hrs, Volume= 0.126 af, Atten= 3%, Lag= 2.6 min

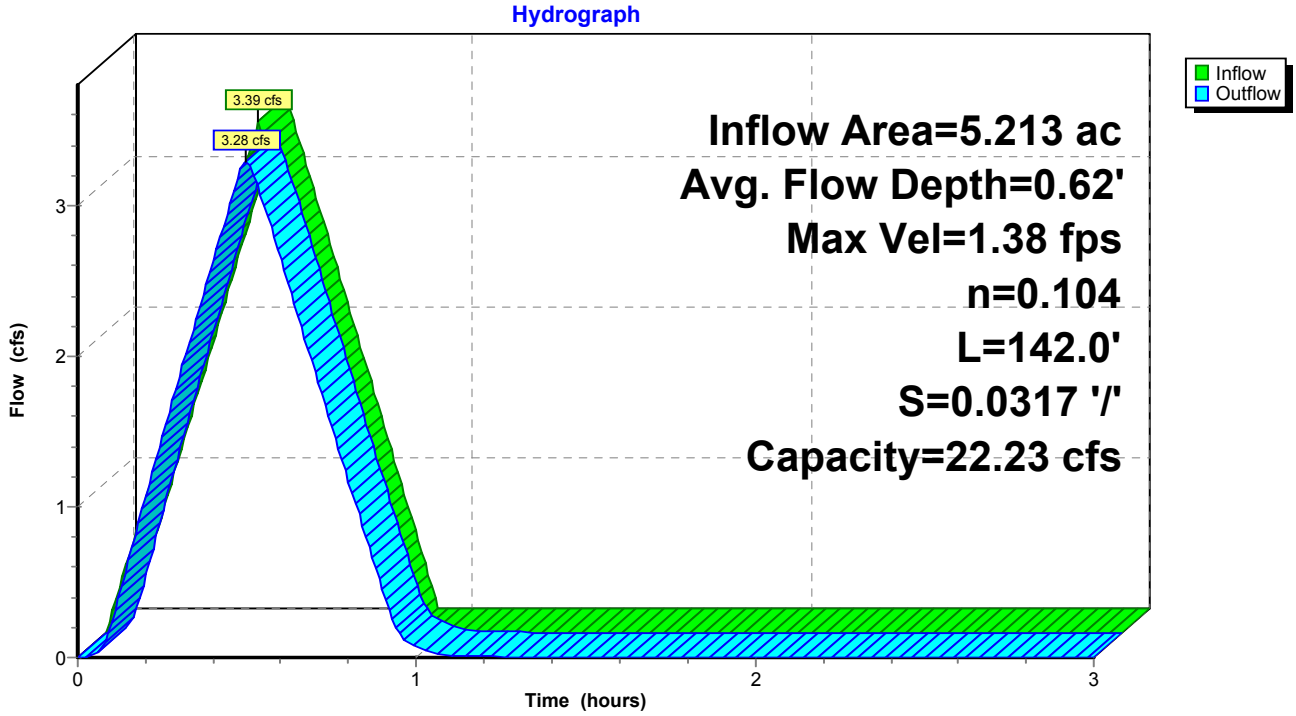
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.38 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 5.0 min

Peak Storage= 337 cf @ 0.46 hrs
Average Depth at Peak Storage= 0.62'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 22.23 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 142.0' Slope= 0.0317 '/'
Inlet Invert= 140.50', Outlet Invert= 136.00'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-295+50

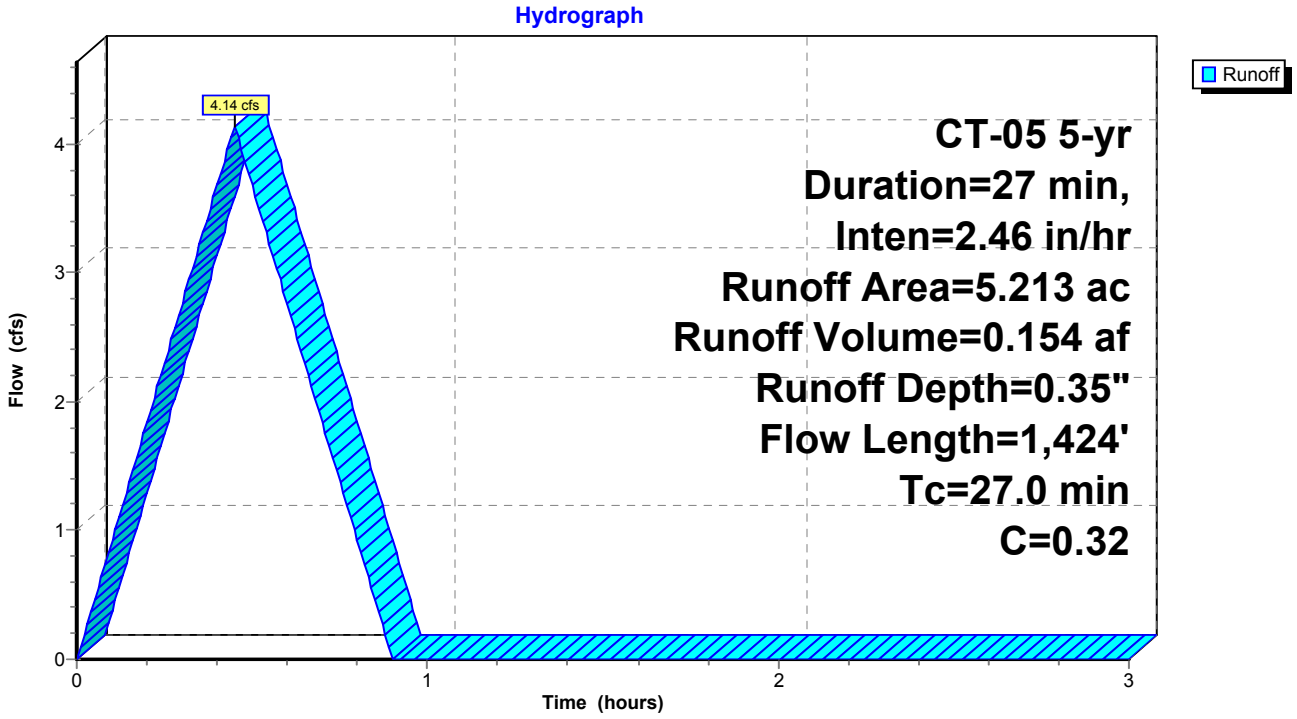
Runoff = 4.14 cfs @ 0.45 hrs, Volume= 0.154 af, Depth= 0.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 5-yr Duration=27 min, Inten=2.46 in/hr

Area (ac)	C	Description
5.213	0.32	Forest, 0-20%, D Soil
5.213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	150	0.0600	0.27		**Sheet Flow, Sheet 1** Grass: Short n= 0.150 P2= 2.88"
17.8	1,274	0.0290	1.19		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
27.0	1,424	Total			

Subcatchment 1S: CT-295+50



Summary for Reach 2R: Diversion Swale

Inflow Area = 5.213 ac, 0.00% Impervious, Inflow Depth = 0.35" for 5-yr event
Inflow = 4.14 cfs @ 0.45 hrs, Volume= 0.154 af
Outflow = 4.01 cfs @ 0.49 hrs, Volume= 0.154 af, Atten= 3%, Lag= 2.5 min

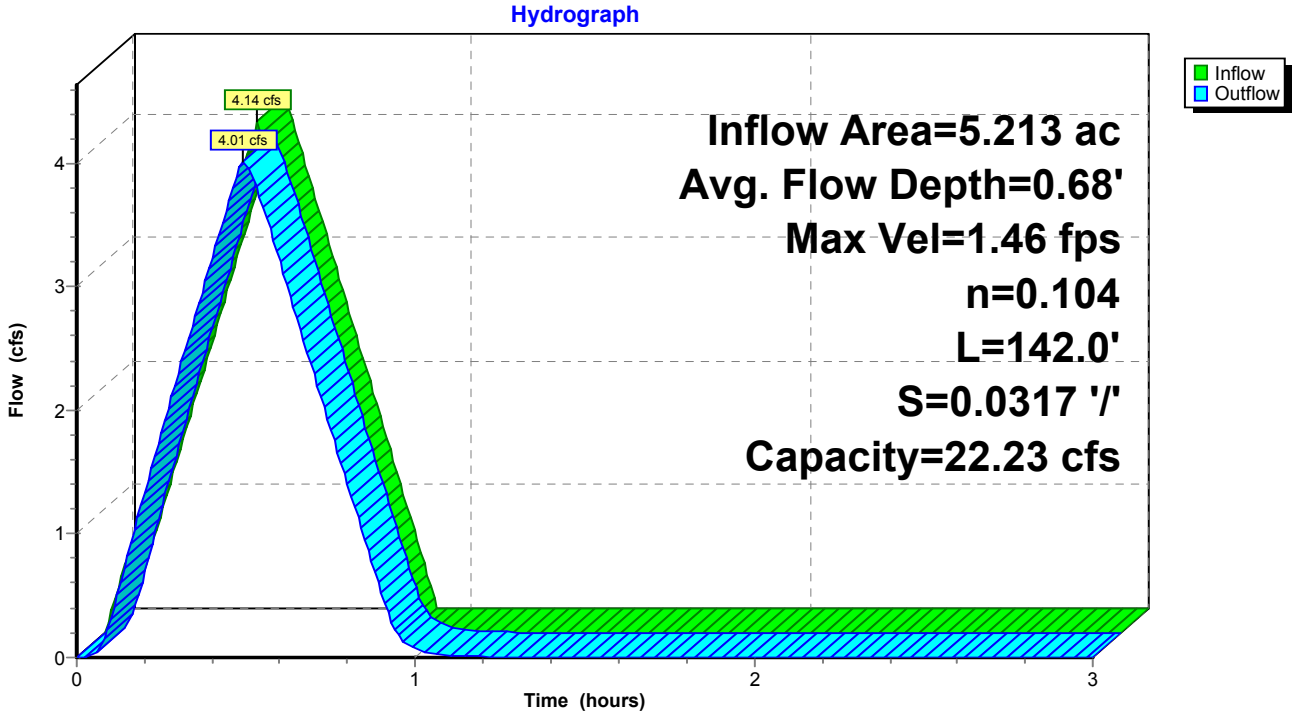
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.46 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 4.7 min

Peak Storage= 390 cf @ 0.46 hrs
Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 22.23 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 142.0' Slope= 0.0317 '/'
Inlet Invert= 140.50', Outlet Invert= 136.00'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-295+50

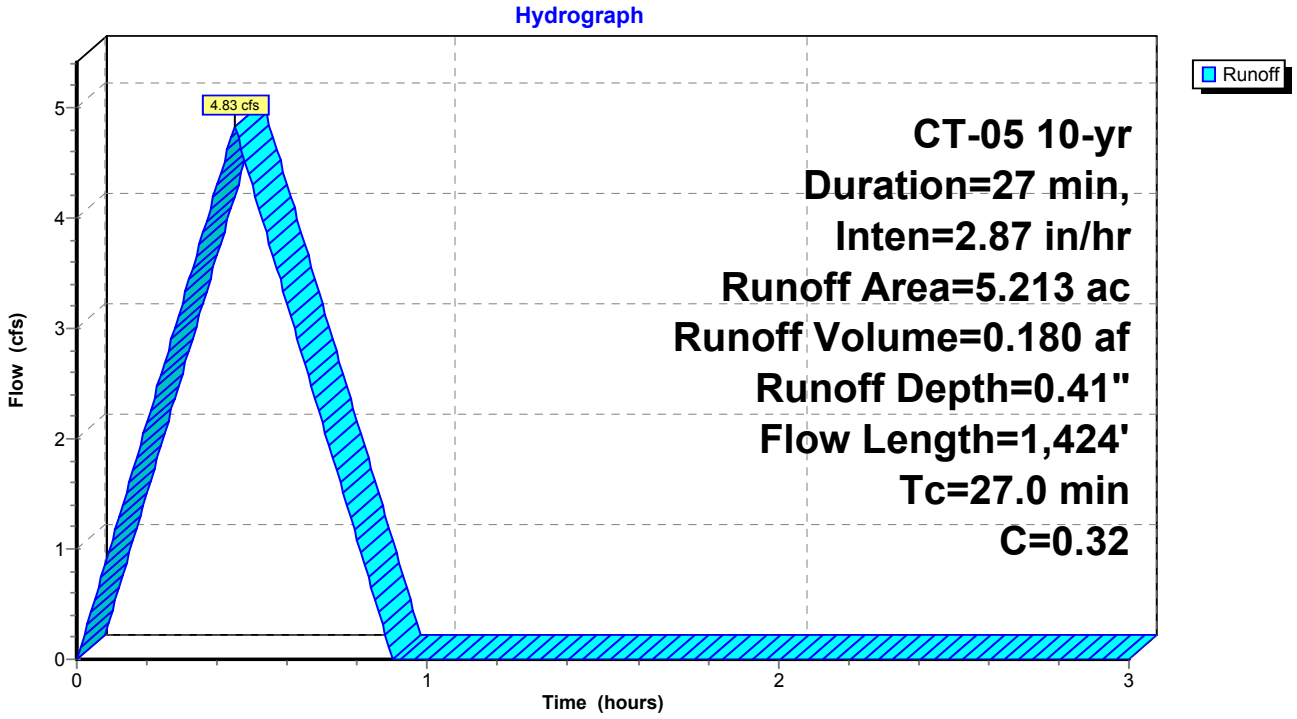
Runoff = 4.83 cfs @ 0.45 hrs, Volume= 0.180 af, Depth= 0.41"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 10-yr Duration=27 min, Inten=2.87 in/hr

Area (ac)	C	Description
5.213	0.32	Forest, 0-20%, D Soil
5.213		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	150	0.0600	0.27		**Sheet Flow, Sheet 1** Grass: Short n= 0.150 P2= 2.88"
17.8	1,274	0.0290	1.19		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
27.0	1,424	Total			

Subcatchment 1S: CT-295+50



Summary for Reach 2R: Diversion Swale

Inflow Area = 5.213 ac, 0.00% Impervious, Inflow Depth = 0.41" for 10-yr event
Inflow = 4.83 cfs @ 0.45 hrs, Volume= 0.180 af
Outflow = 4.68 cfs @ 0.49 hrs, Volume= 0.180 af, Atten= 3%, Lag= 2.5 min

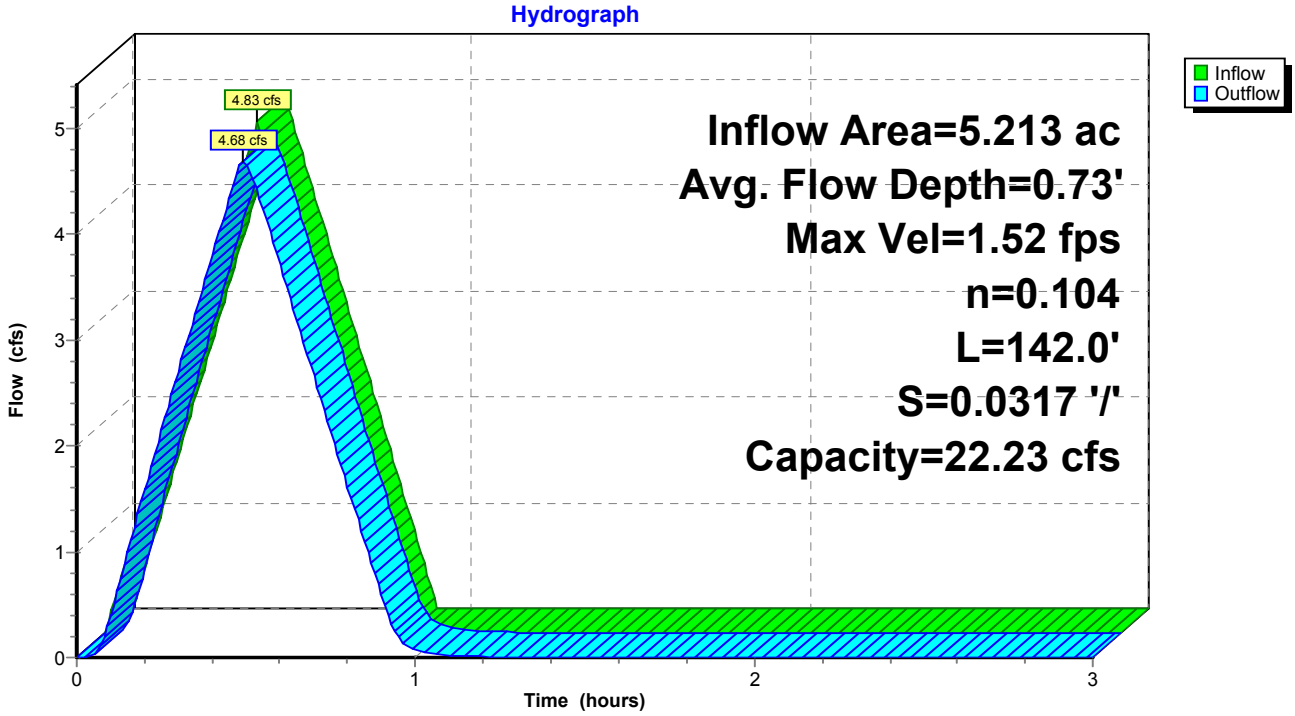
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.52 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 4.6 min

Peak Storage= 437 cf @ 0.46 hrs
Average Depth at Peak Storage= 0.73'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 22.23 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 142.0' Slope= 0.0317 '/'
Inlet Invert= 140.50', Outlet Invert= 136.00'

‡

Reach 2R: Diversion Swale



Tensar International Corporation
5401 St. Wendel-Cynthiana Road
Poseyville, Indiana 47633
Tel. 800.772.2040
Fax 812.867.0247
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Erosion Control Materials Design Software
Version 5.0

Project Name: Kinder Morgan-CT
Project Number: 49018
Channel Name: 295+50

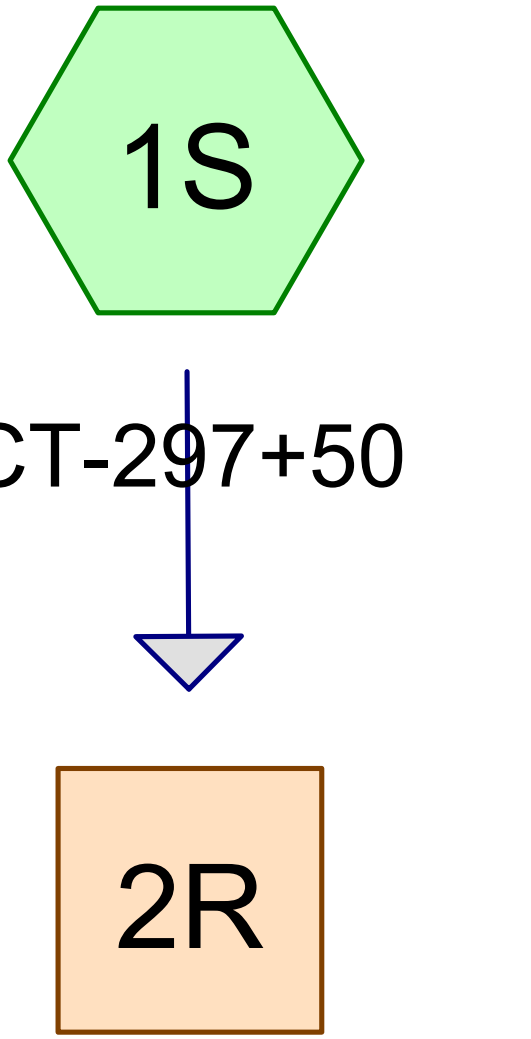
Discharge	4.83
Peak Flow Period	2
Channel Slope	0.0317
Channel Bottom Width	2
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

SC150

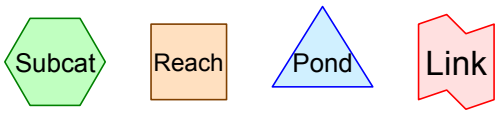
Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	4.83 cfs	2.64 ft/s	0.52 ft	0.05	2 lbs/ft2	1.02 lbs/ft2	1.96	STABLE	D

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	4.83 cfs	1.6 ft/s	0.72 ft	0.099	4.2 lbs/ft2	1.43 lbs/ft2	2.93	STABLE	--
Underlying Substrate	Straight	4.83 cfs	1.6 ft/s	0.72 ft	--	0.04 lbs/ft2	0.009 lbs/ft2	3.91	STABLE	--



Diversion Swale



Routing Diagram for Main Line Diversion Swale_CT297+50
Prepared by BL Companies, Printed 3/23/2016
HydroCAD® 10.00 s/n 01334 © 2013 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: CT-297+50

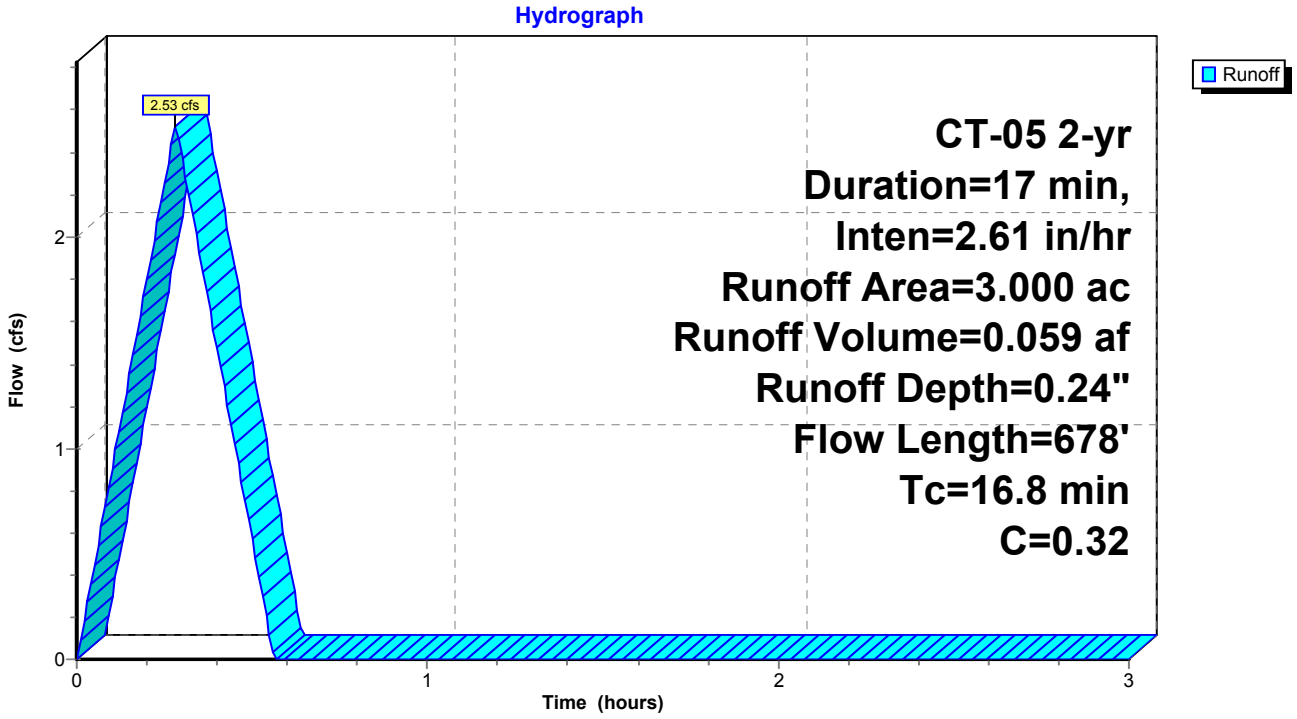
Runoff = 2.53 cfs @ 0.28 hrs, Volume= 0.059 af, Depth= 0.24"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 2-yr Duration=17 min, Inten=2.61 in/hr

Area (ac)	C	Description
3.000	0.32	Forest, 0-20%, D Soil
3.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	150	0.0467	0.25		**Sheet Flow, Sheet 1** Grass: Short n= 0.150 P2= 2.88"
6.6	528	0.0360	1.33		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
16.8	678	Total			

Subcatchment 1S: CT-297+50



Summary for Reach 2R: Diversion Swale

Inflow Area = 3.000 ac, 0.00% Impervious, Inflow Depth = 0.24" for 2-yr event
Inflow = 2.53 cfs @ 0.28 hrs, Volume= 0.059 af
Outflow = 2.03 cfs @ 0.44 hrs, Volume= 0.059 af, Atten= 20%, Lag= 9.6 min

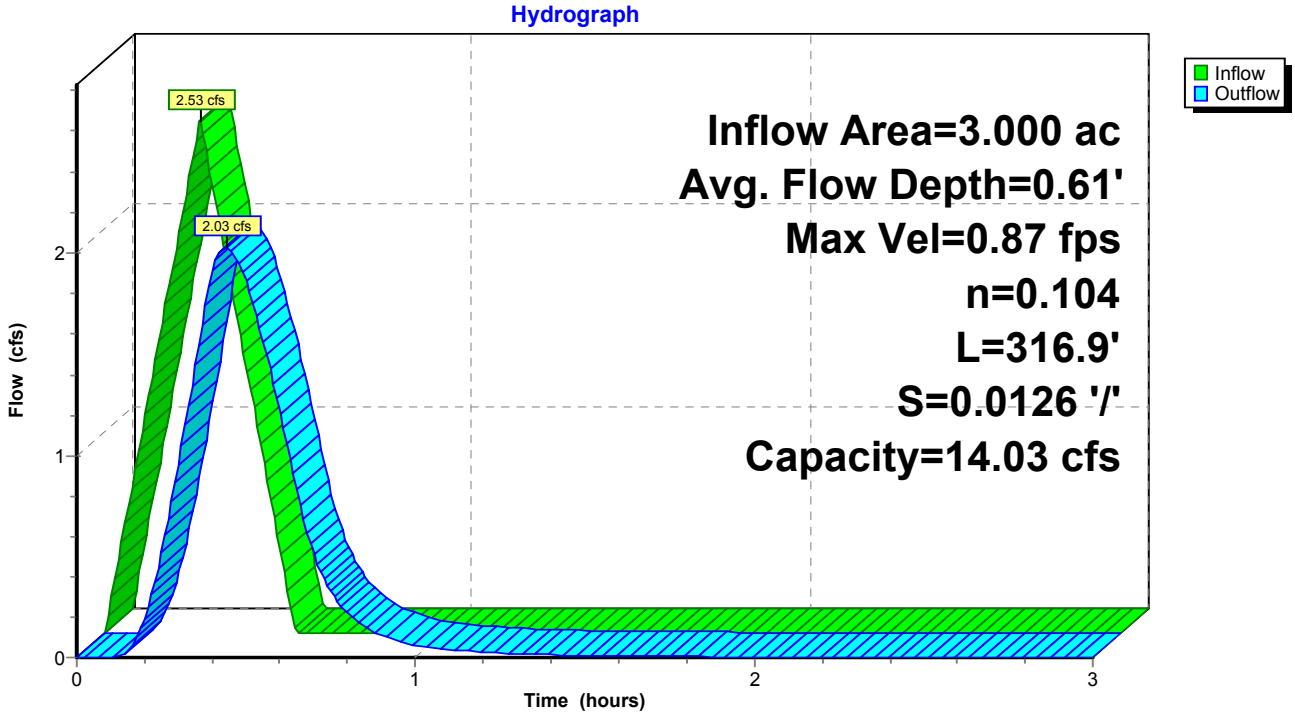
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.87 fps, Min. Travel Time= 6.1 min
Avg. Velocity = 0.26 fps, Avg. Travel Time= 20.0 min

Peak Storage= 739 cf @ 0.34 hrs
Average Depth at Peak Storage= 0.61'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 14.03 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 316.9' Slope= 0.0126 '/'
Inlet Invert= 142.00', Outlet Invert= 138.00'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-297+50

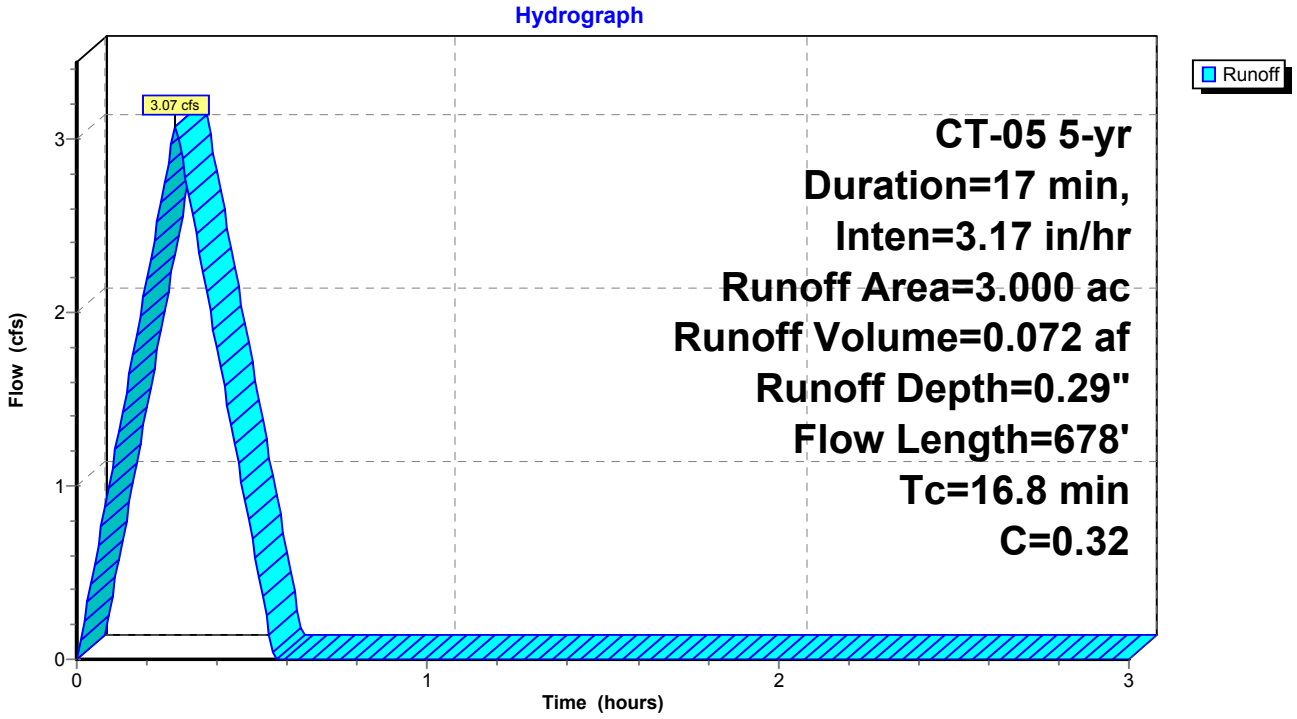
Runoff = 3.07 cfs @ 0.28 hrs, Volume= 0.072 af, Depth= 0.29"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 5-yr Duration=17 min, Inten=3.17 in/hr

Area (ac)	C	Description
3.000	0.32	Forest, 0-20%, D Soil
3.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	150	0.0467	0.25		**Sheet Flow, Sheet 1** Grass: Short n= 0.150 P2= 2.88"
6.6	528	0.0360	1.33		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
16.8	678	Total			

Subcatchment 1S: CT-297+50



Summary for Reach 2R: Diversion Swale

Inflow Area = 3.000 ac, 0.00% Impervious, Inflow Depth = 0.29" for 5-yr event
Inflow = 3.07 cfs @ 0.28 hrs, Volume= 0.072 af
Outflow = 2.50 cfs @ 0.43 hrs, Volume= 0.072 af, Atten= 19%, Lag= 9.1 min

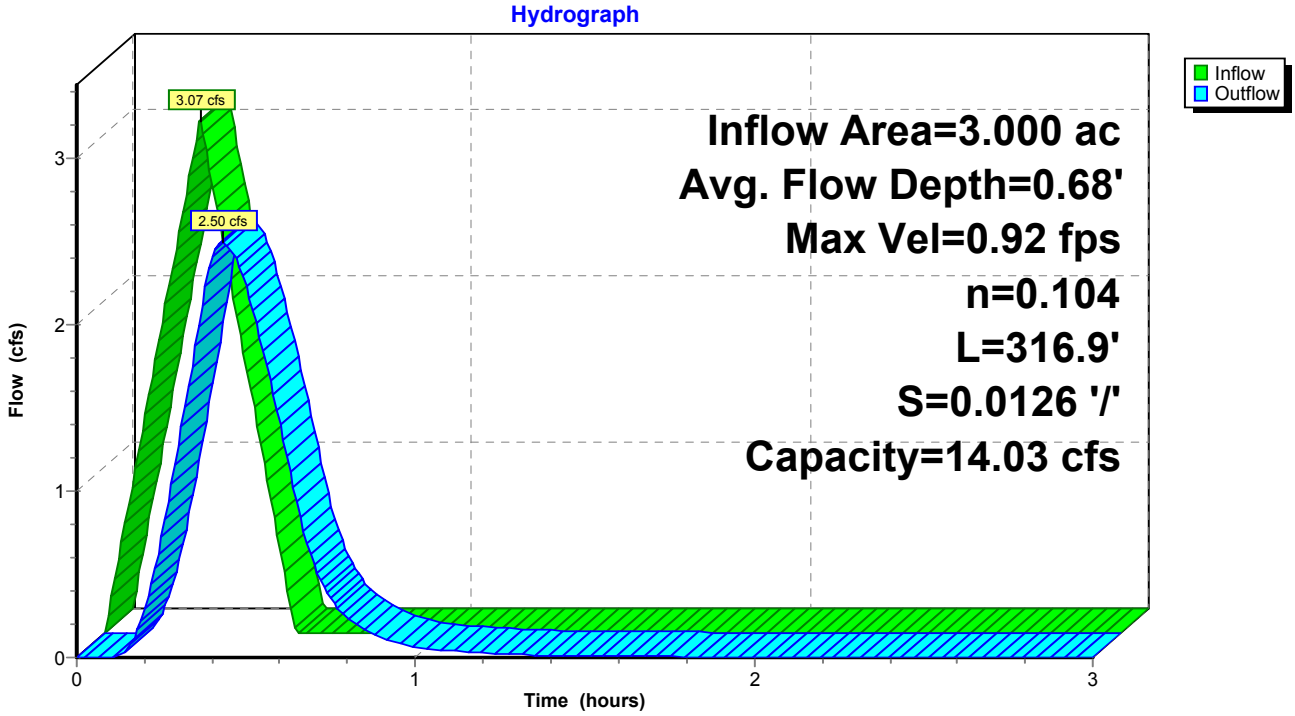
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.92 fps, Min. Travel Time= 5.7 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 19.2 min

Peak Storage= 861 cf @ 0.34 hrs
Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 14.03 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 316.9' Slope= 0.0126 '/'
Inlet Invert= 142.00', Outlet Invert= 138.00'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-297+50

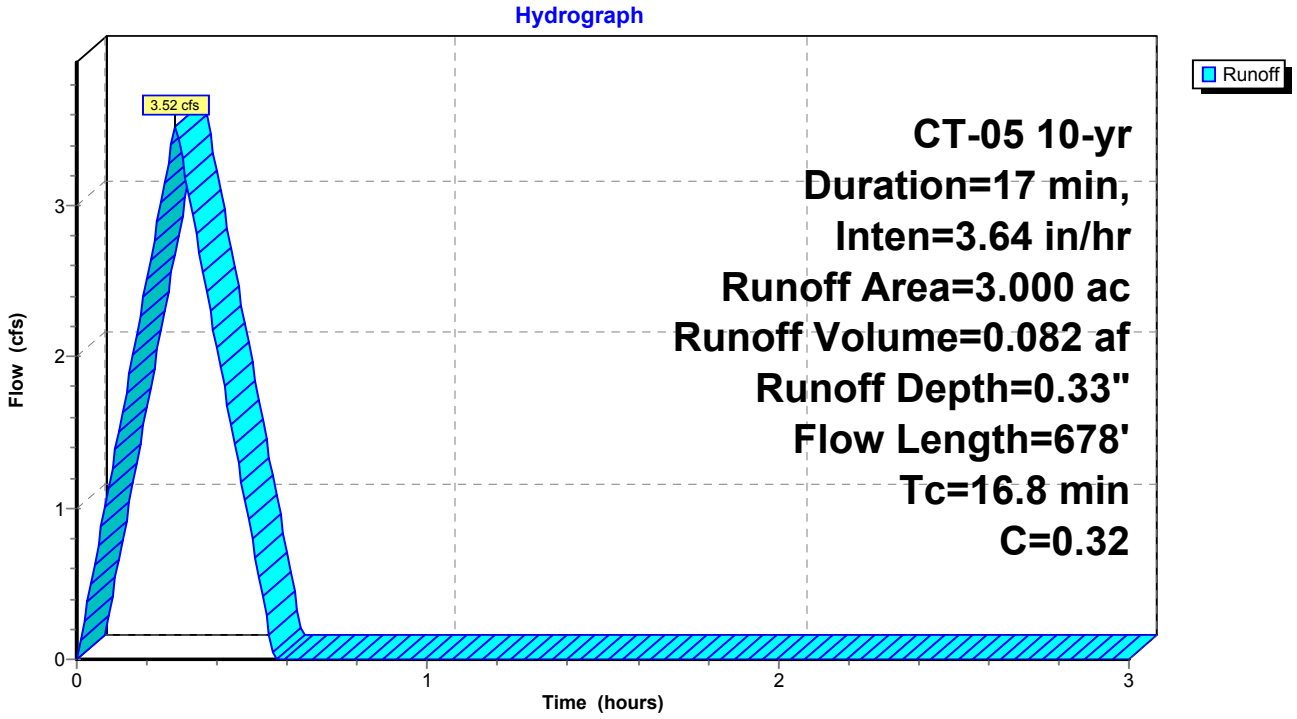
Runoff = 3.52 cfs @ 0.28 hrs, Volume= 0.082 af, Depth= 0.33"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 10-yr Duration=17 min, Inten=3.64 in/hr

Area (ac)	C	Description
3.000	0.32	Forest, 0-20%, D Soil
3.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	150	0.0467	0.25		**Sheet Flow, Sheet 1** Grass: Short n= 0.150 P2= 2.88"
6.6	528	0.0360	1.33		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
16.8	678	Total			

Subcatchment 1S: CT-297+50



Summary for Reach 2R: Diversion Swale

Inflow Area = 3.000 ac, 0.00% Impervious, Inflow Depth = 0.33" for 10-yr event
Inflow = 3.52 cfs @ 0.28 hrs, Volume= 0.082 af
Outflow = 2.89 cfs @ 0.43 hrs, Volume= 0.082 af, Atten= 18%, Lag= 8.7 min

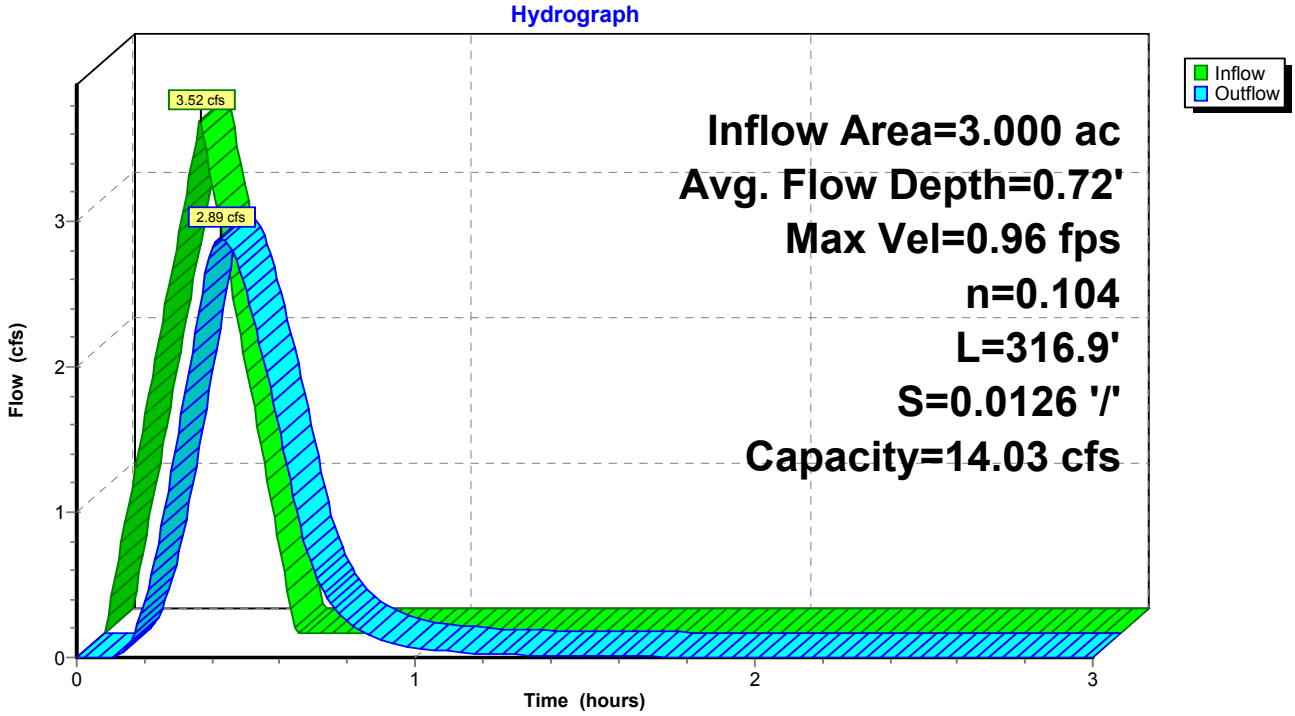
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.96 fps, Min. Travel Time= 5.5 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 18.7 min

Peak Storage= 958 cf @ 0.33 hrs
Average Depth at Peak Storage= 0.72'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 14.03 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 316.9' Slope= 0.0126 '/'
Inlet Invert= 142.00', Outlet Invert= 138.00'

‡

Reach 2R: Diversion Swale



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Erosion Control Materials Design Software
Version 5.0

Project Name: Kinder Morgan-CT
Project Number: 49018
Channel Name: 297+50

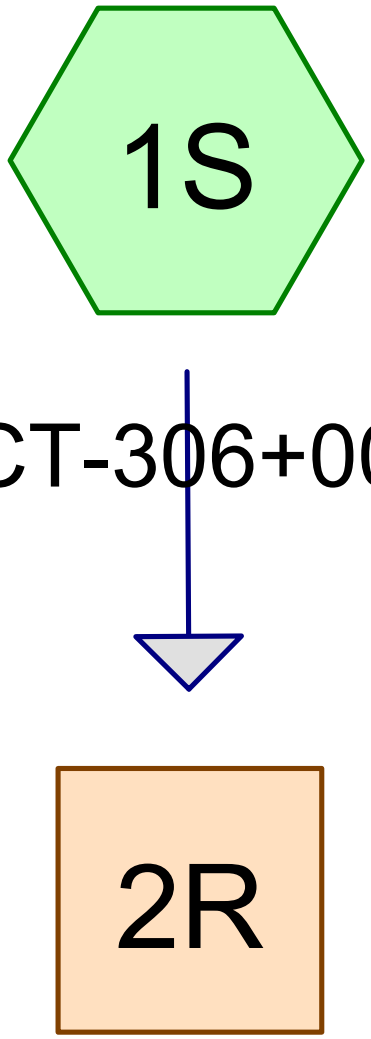
Discharge	3.07
Peak Flow Period	2
Channel Slope	0.0126
Channel Bottom Width	2
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

SC150

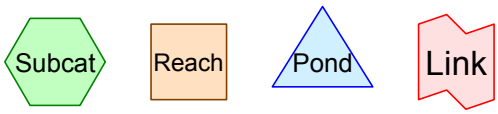
Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	3.07 cfs	1.67 ft/s	0.52 ft	0.05	2 lbs/ft2	0.41 lbs/ft2	4.91	STABLE	D

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	3.07 cfs	0.83 ft/s	0.83 ft	0.129	4.2 lbs/ft2	0.65 lbs/ft2	6.45	STABLE	--
Underlying Substrate	Straight	3.07 cfs	0.83 ft/s	0.83 ft	--	0.04 lbs/ft2	0.002 lbs/ft2	14.77	STABLE	--



Diversion Swale



Routing Diagram for Main Line Diversion Swale_CT306+00
Prepared by BL Companies, Printed 3/23/2016
HydroCAD® 10.00 s/n 01334 © 2013 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: CT-306+00

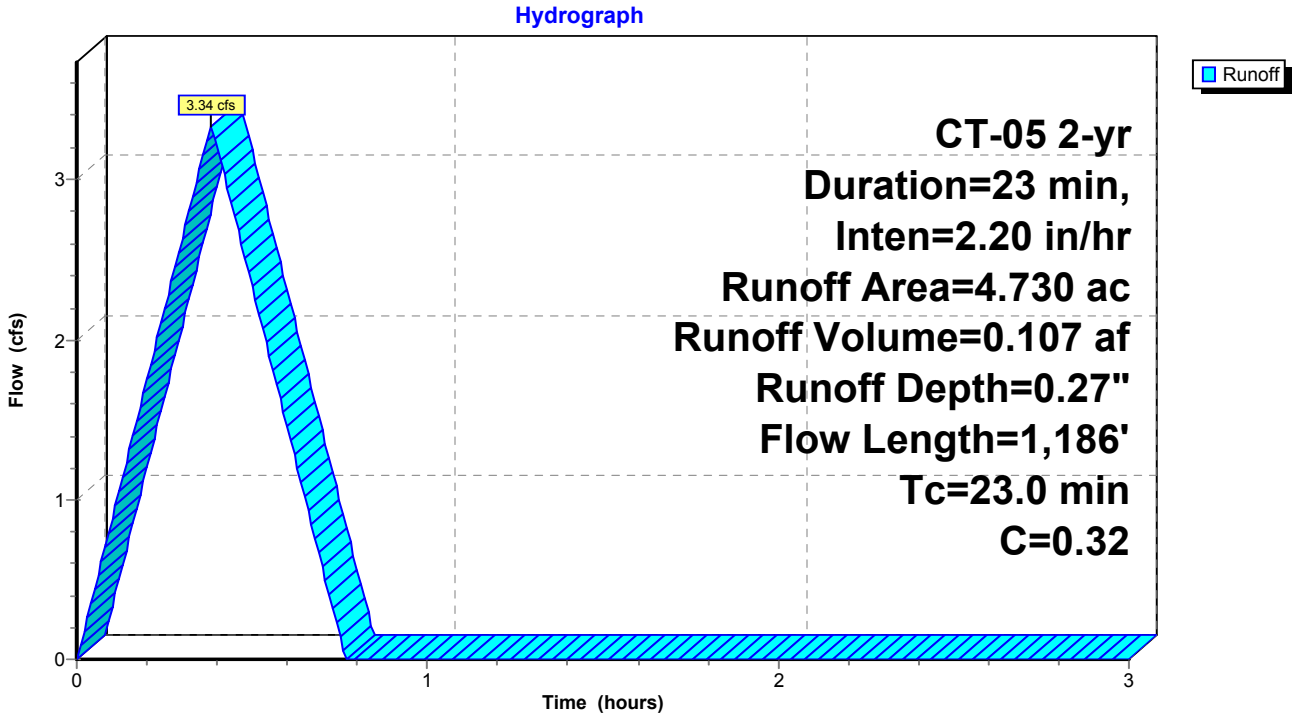
Runoff = 3.34 cfs @ 0.38 hrs, Volume= 0.107 af, Depth= 0.27"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 2-yr Duration=23 min, Inten=2.20 in/hr

Area (ac)	C	Description
4.730	0.32	Forest, 0-20%, D Soil
4.730		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	150	0.0733	0.29		**Sheet Flow, Sheet 1** Grass: Short n= 0.150 P2= 2.88"
14.5	1,036	0.0290	1.19		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
23.0	1,186	Total			

Subcatchment 1S: CT-306+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 4.730 ac, 0.00% Impervious, Inflow Depth = 0.27" for 2-yr event
Inflow = 3.34 cfs @ 0.38 hrs, Volume= 0.107 af
Outflow = 2.89 cfs @ 0.53 hrs, Volume= 0.106 af, Atten= 13%, Lag= 9.1 min

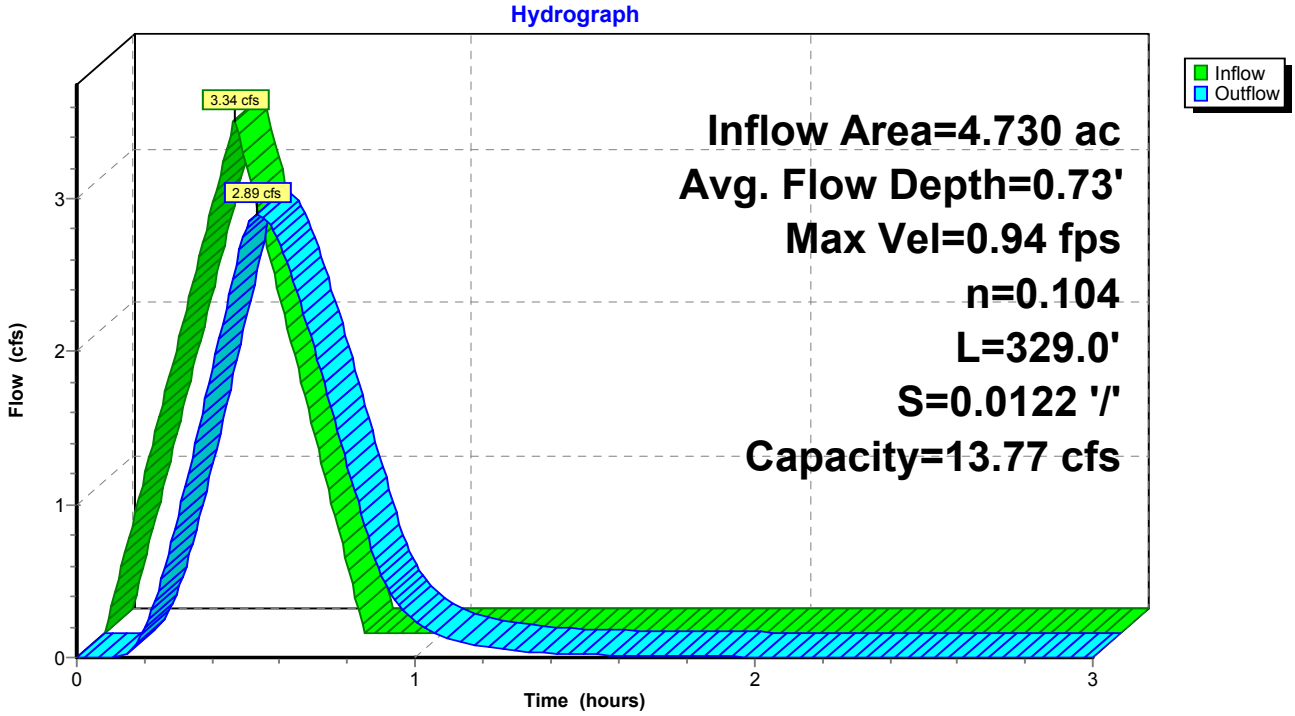
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.94 fps, Min. Travel Time= 5.8 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 17.0 min

Peak Storage= 1,009 cf @ 0.44 hrs
Average Depth at Peak Storage= 0.73'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 13.77 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 329.0' Slope= 0.0122 '/'
Inlet Invert= 148.00', Outlet Invert= 144.00'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-306+00

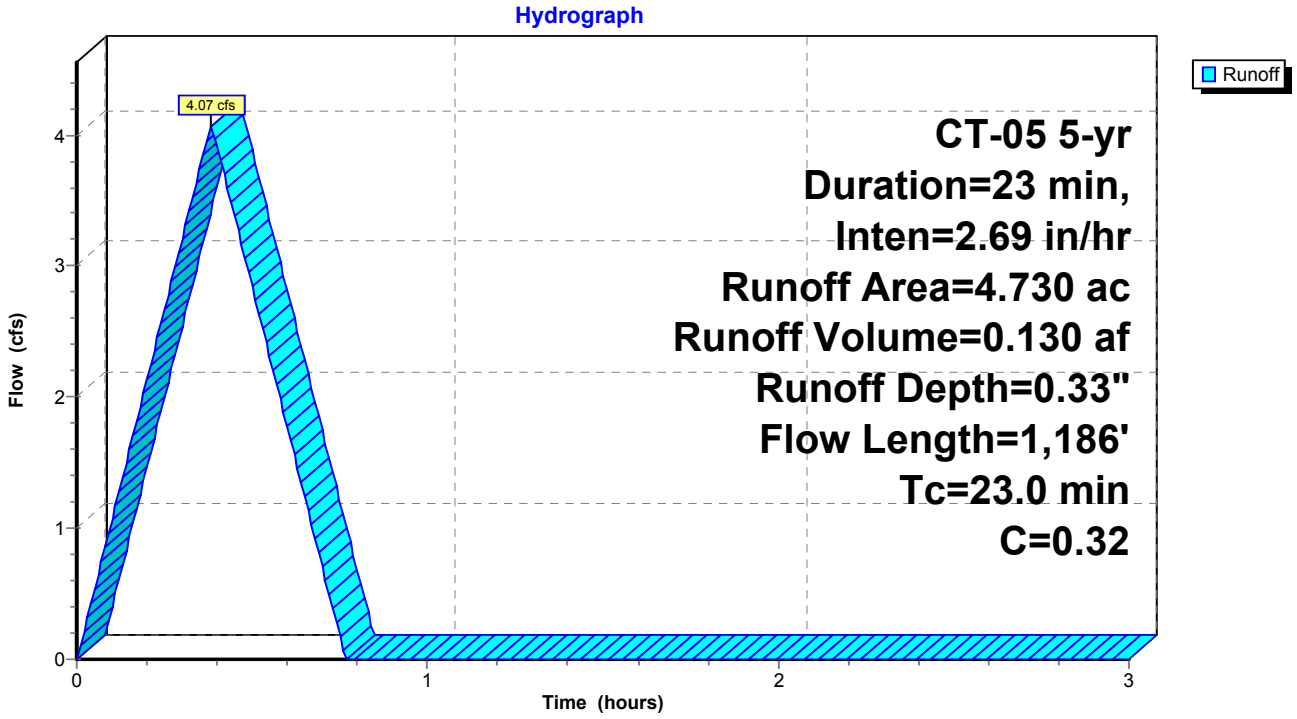
Runoff = 4.07 cfs @ 0.38 hrs, Volume= 0.130 af, Depth= 0.33"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 5-yr Duration=23 min, Inten=2.69 in/hr

Area (ac)	C	Description
4.730	0.32	Forest, 0-20%, D Soil
4.730		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	150	0.0733	0.29		**Sheet Flow, Sheet 1** Grass: Short n= 0.150 P2= 2.88"
14.5	1,036	0.0290	1.19		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
23.0	1,186	Total			

Subcatchment 1S: CT-306+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 4.730 ac, 0.00% Impervious, Inflow Depth = 0.33" for 5-yr event
Inflow = 4.07 cfs @ 0.38 hrs, Volume= 0.130 af
Outflow = 3.56 cfs @ 0.53 hrs, Volume= 0.130 af, Atten= 13%, Lag= 8.6 min

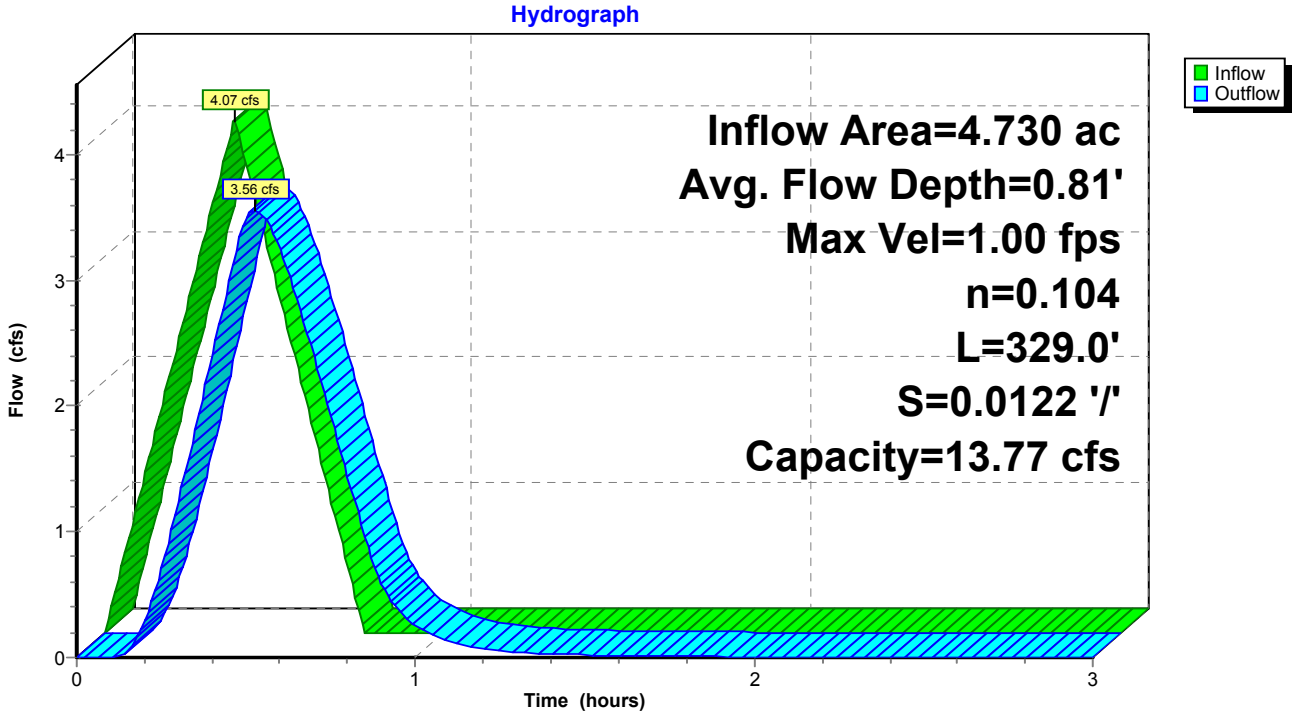
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.00 fps, Min. Travel Time= 5.5 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 16.3 min

Peak Storage= 1,175 cf @ 0.43 hrs
Average Depth at Peak Storage= 0.81'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 13.77 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 329.0' Slope= 0.0122 '/'
Inlet Invert= 148.00', Outlet Invert= 144.00'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-306+00

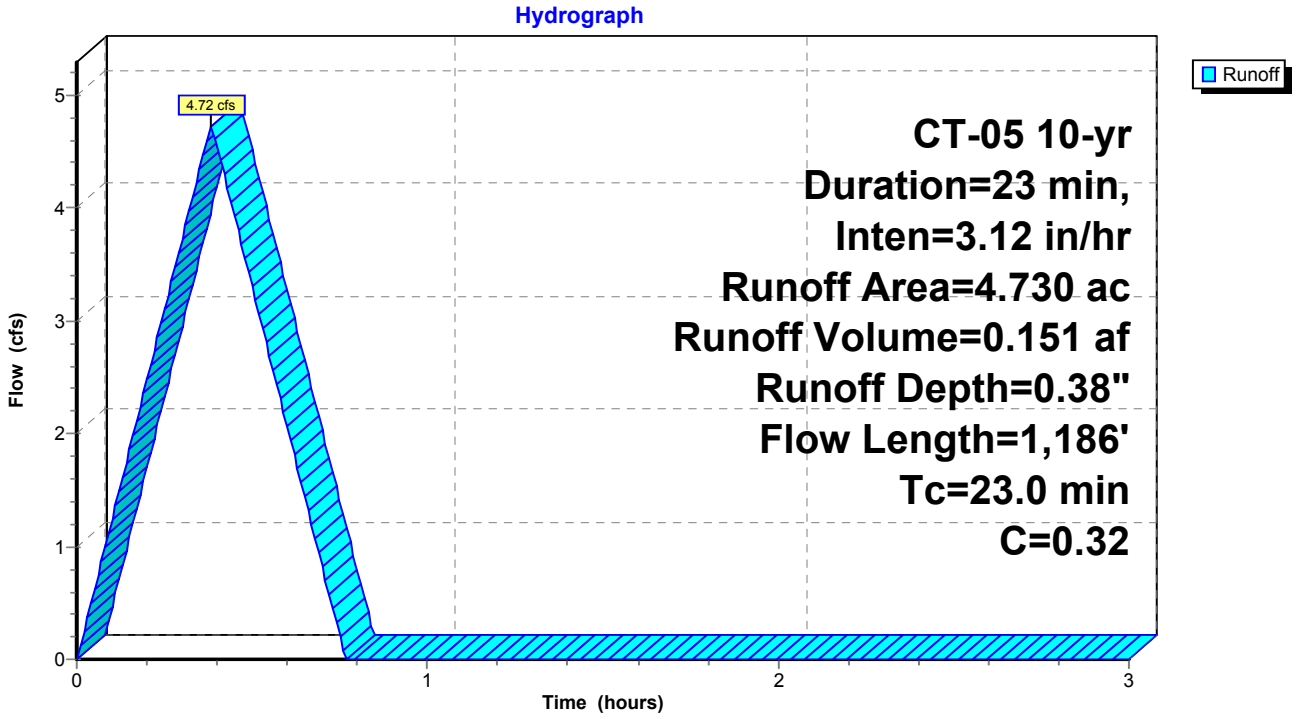
Runoff = 4.72 cfs @ 0.38 hrs, Volume= 0.151 af, Depth= 0.38"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 10-yr Duration=23 min, Inten=3.12 in/hr

Area (ac)	C	Description
4.730	0.32	Forest, 0-20%, D Soil
4.730		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	150	0.0733	0.29		**Sheet Flow, Sheet 1** Grass: Short n= 0.150 P2= 2.88"
14.5	1,036	0.0290	1.19		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
23.0	1,186	Total			

Subcatchment 1S: CT-306+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 4.730 ac, 0.00% Impervious, Inflow Depth = 0.38" for 10-yr event
Inflow = 4.72 cfs @ 0.38 hrs, Volume= 0.151 af
Outflow = 4.15 cfs @ 0.52 hrs, Volume= 0.151 af, Atten= 12%, Lag= 8.3 min

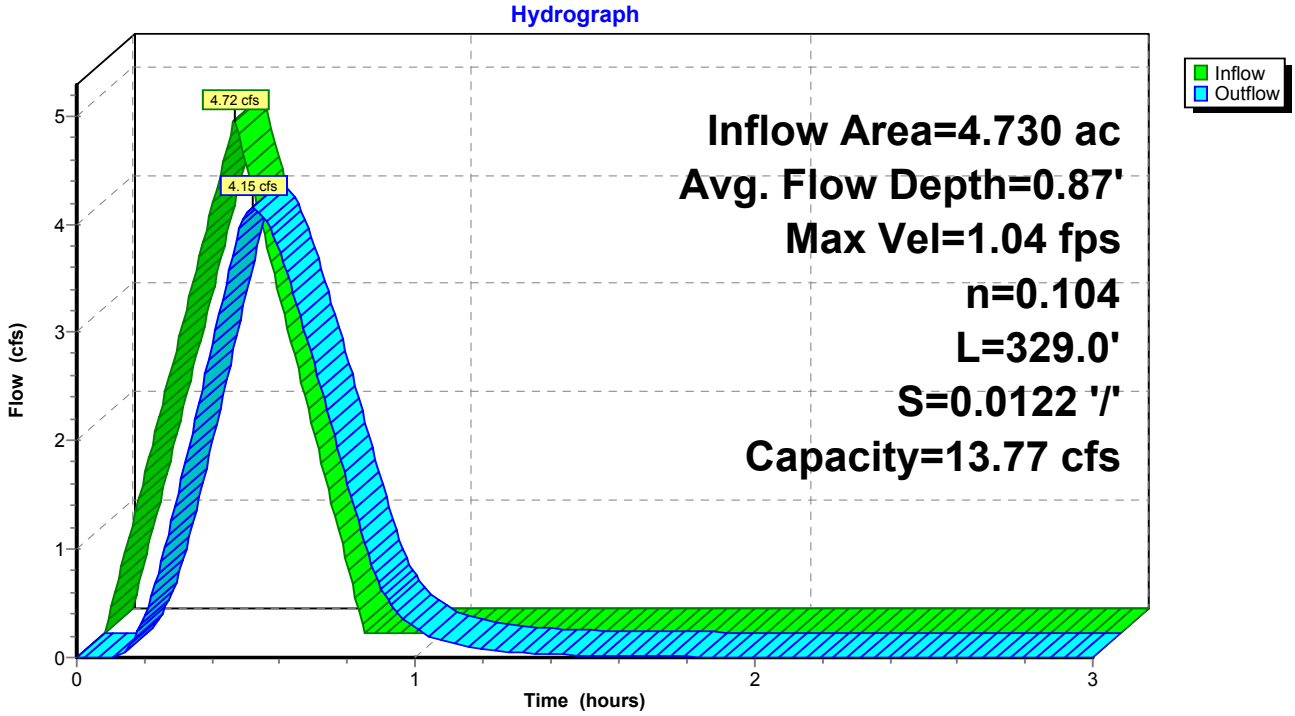
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.04 fps, Min. Travel Time= 5.3 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 15.8 min

Peak Storage= 1,317 cf @ 0.43 hrs
Average Depth at Peak Storage= 0.87'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 13.77 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 329.0' Slope= 0.0122 '/'
Inlet Invert= 148.00', Outlet Invert= 144.00'

‡

Reach 2R: Diversion Swale



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Erosion Control Materials Design Software
Version 5.0

Project Name: Kinder Morgan-CT
Project Number: 49018
Channel Name: 306+00

Discharge	4.07
Peak Flow Period	2
Channel Slope	0.0122
Channel Bottom Width	2
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

SC150

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	4.07 cfs	1.82 ft/s	0.59 ft	0.048	2 lbs/ft2	0.45 lbs/ft2	4.44	STABLE	D

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	4.07 cfs	0.95 ft/s	0.91 ft	0.117	4.2 lbs/ft2	0.69 lbs/ft2	6.07	STABLE	--
Underlying Substrate	Straight	4.07 cfs	0.95 ft/s	0.91 ft	--	0.04 lbs/ft2	0.003 lbs/ft2	11.37	STABLE	--

200 100 0 200

SCALE IN FEET

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

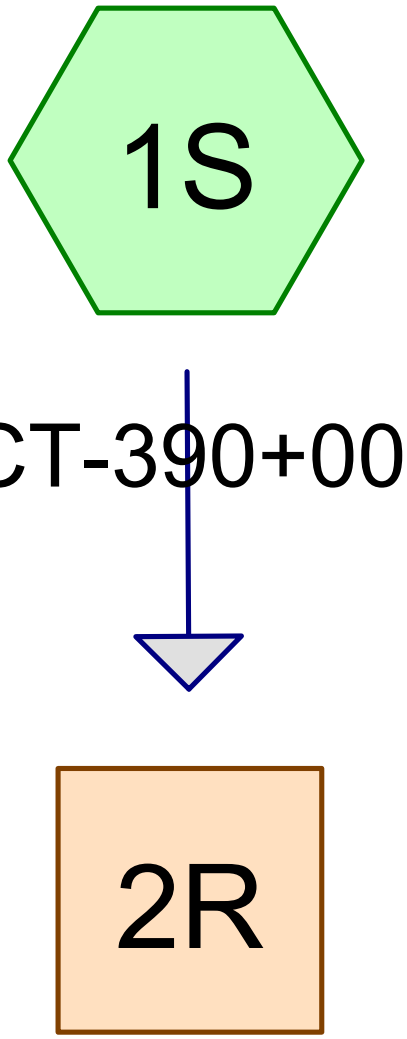
REVISIONS

Division:		Op. Area:
St.: CT		Co./Par.: HARTFORD
Section:	Township:	Range:
Dft: JR	Date: 07/17/14	Project ID:
Chk: JD	Date: 05/27/14	Scale: 1"=200'
Appr: RE	Date: 05/27/14	Filename: SK14C4781CT04_swales.dwg

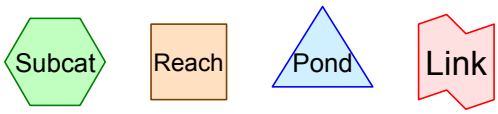
CONNECTICUT EXPANSION
CONNECTICUT LOOP 300
PROPOSED 24" NATURAL GAS PIPELINE
DIVERSION SWALE AT STA. 390+00
TOWN OF SUFFIELD
HARTFORD COUNTY, CONNECTICUT

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Sheet: 1 of 1
Type:



Diversion Swale



Routing Diagram for Main Line Diversion Swale_CT390+00
Prepared by BL Companies, Printed 3/23/2016
HydroCAD® 10.00 s/n 01334 © 2013 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: CT-390+00

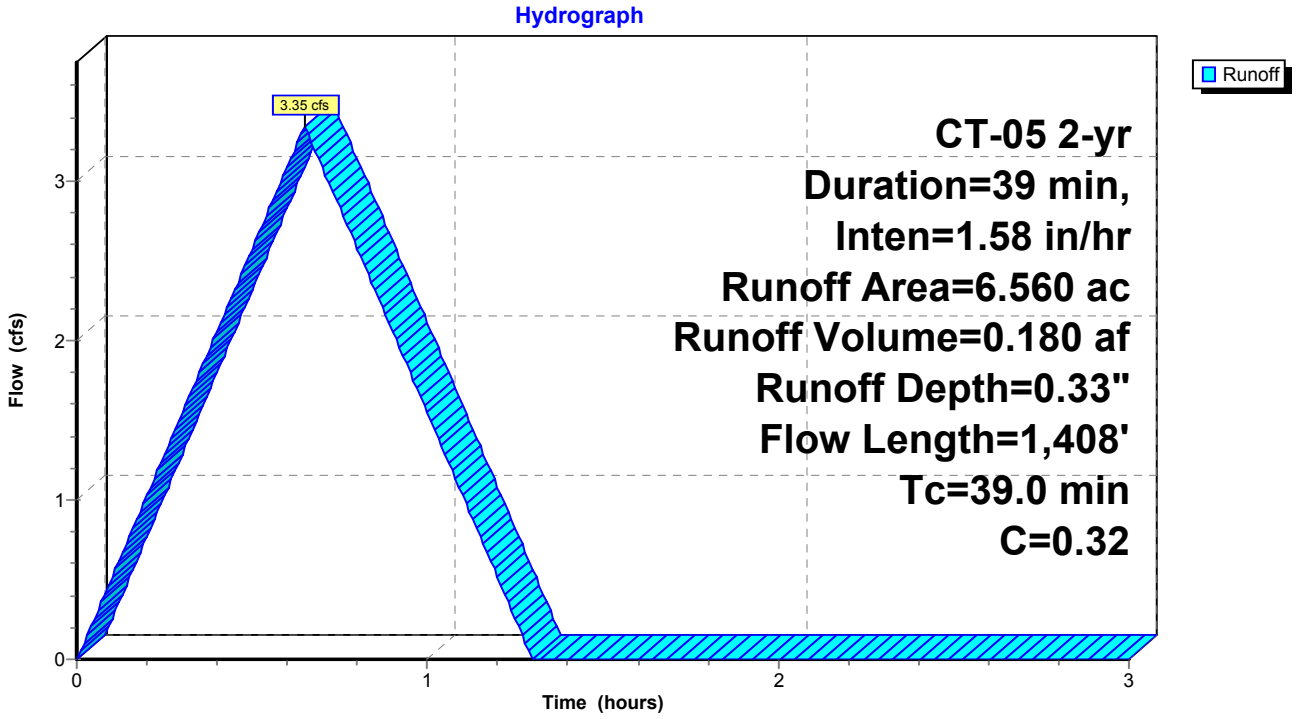
Runoff = 3.35 cfs @ 0.65 hrs, Volume= 0.180 af, Depth= 0.33"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 2-yr Duration=39 min, Inten=1.58 in/hr

Area (ac)	C	Description
6.560	0.32	Forest, 0-20%, D Soil
6.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.1000	0.15		**Sheet Flow, Sheet 1** Woods: Light underbrush n= 0.400 P2= 2.88"
22.6	1,258	0.0175	0.93		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
39.0	1,408	Total			

Subcatchment 1S: CT-390+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 6.560 ac, 0.00% Impervious, Inflow Depth = 0.33" for 2-yr event
Inflow = 3.35 cfs @ 0.65 hrs, Volume= 0.180 af
Outflow = 3.19 cfs @ 0.74 hrs, Volume= 0.180 af, Atten= 5%, Lag= 5.4 min

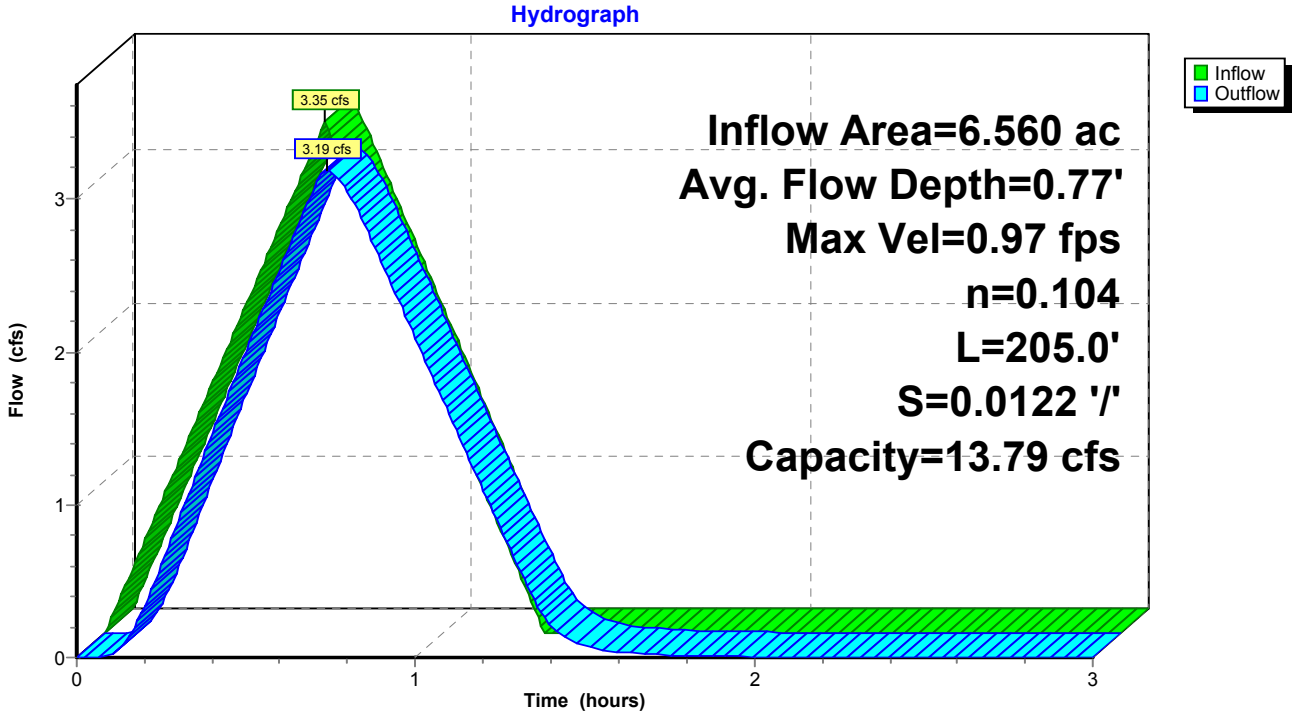
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.97 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 8.3 min

Peak Storage= 675 cf @ 0.68 hrs
Average Depth at Peak Storage= 0.77'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 13.79 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 205.0' Slope= 0.0122 '/'
Inlet Invert= 160.00', Outlet Invert= 157.50'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-390+00

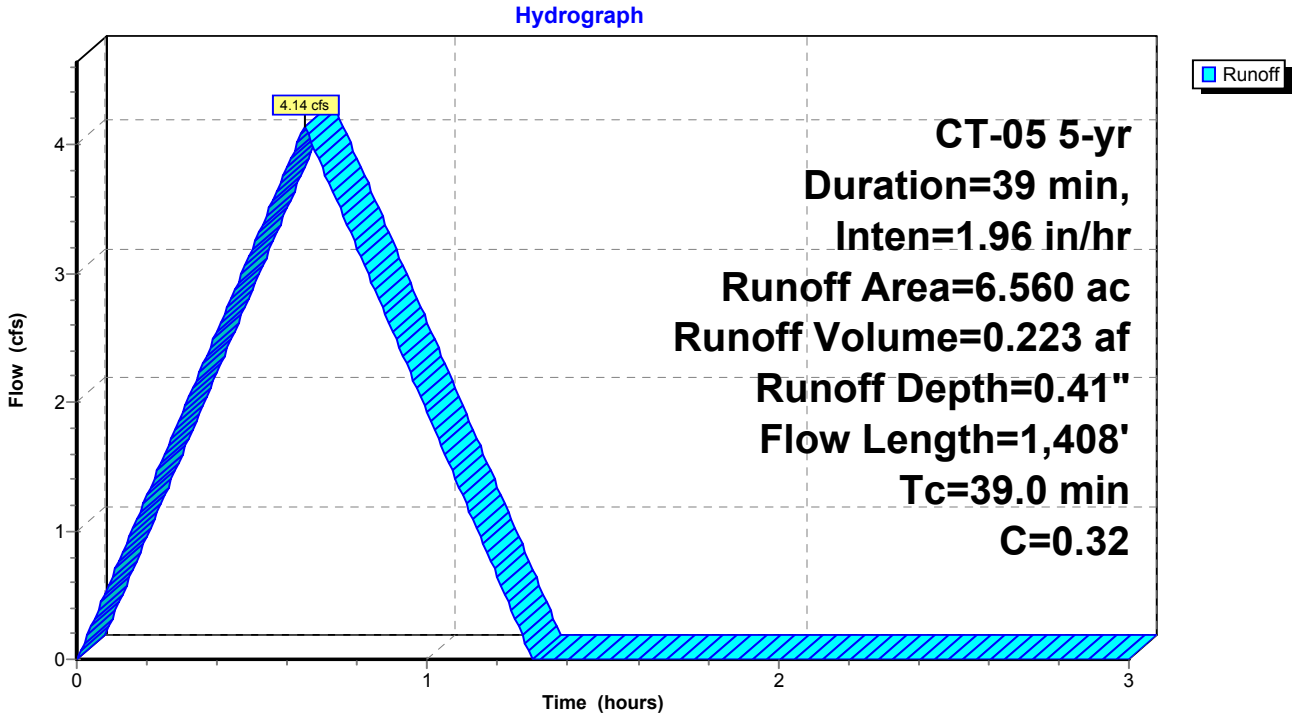
Runoff = 4.14 cfs @ 0.65 hrs, Volume= 0.223 af, Depth= 0.41"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 5-yr Duration=39 min, Inten=1.96 in/hr

Area (ac)	C	Description
6.560	0.32	Forest, 0-20%, D Soil
6.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.1000	0.15		**Sheet Flow, Sheet 1** Woods: Light underbrush n= 0.400 P2= 2.88"
22.6	1,258	0.0175	0.93		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
39.0	1,408	Total			

Subcatchment 1S: CT-390+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 6.560 ac, 0.00% Impervious, Inflow Depth = 0.41" for 5-yr event
Inflow = 4.14 cfs @ 0.65 hrs, Volume= 0.223 af
Outflow = 3.96 cfs @ 0.73 hrs, Volume= 0.222 af, Atten= 4%, Lag= 5.1 min

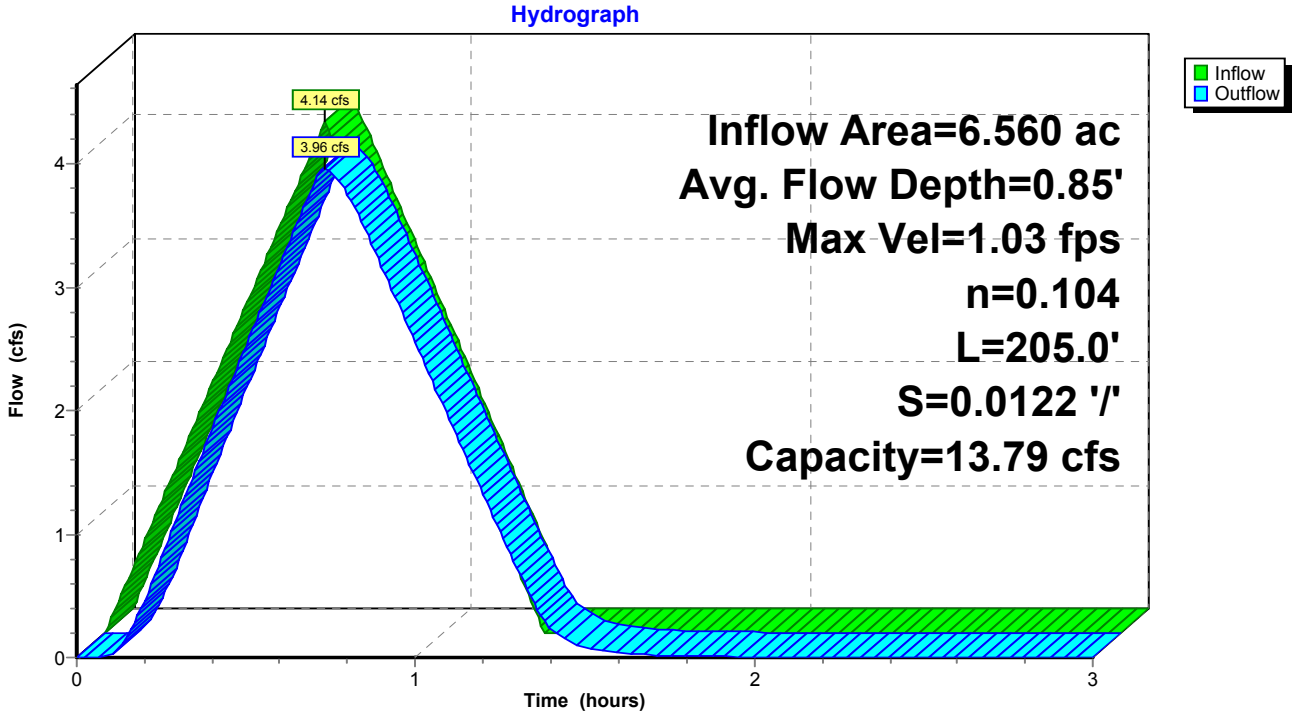
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.03 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.43 fps, Avg. Travel Time= 7.9 min

Peak Storage= 791 cf @ 0.68 hrs
Average Depth at Peak Storage= 0.85'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 13.79 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 205.0' Slope= 0.0122 '/'
Inlet Invert= 160.00', Outlet Invert= 157.50'

‡

Reach 2R: Diversion Swale



Summary for Subcatchment 1S: CT-390+00

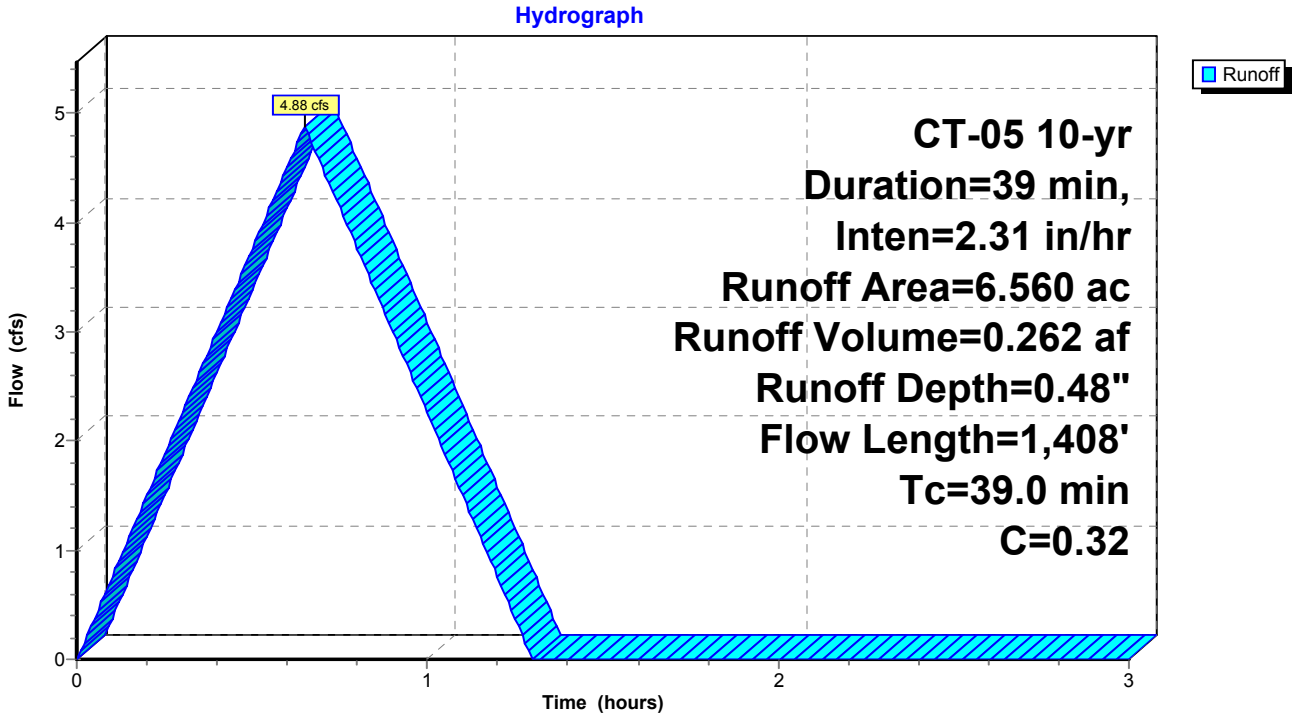
Runoff = 4.88 cfs @ 0.65 hrs, Volume= 0.262 af, Depth= 0.48"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT-05 10-yr Duration=39 min, Inten=2.31 in/hr

Area (ac)	C	Description
6.560	0.32	Forest, 0-20%, D Soil
6.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	150	0.1000	0.15		**Sheet Flow, Sheet 1** Woods: Light underbrush n= 0.400 P2= 2.88"
22.6	1,258	0.0175	0.93		**Shallow Concentrated Flow, SCF** Short Grass Pasture Kv= 7.0 fps
39.0	1,408	Total			

Subcatchment 1S: CT-390+00



Summary for Reach 2R: Diversion Swale

Inflow Area = 6.560 ac, 0.00% Impervious, Inflow Depth = 0.48" for 10-yr event
Inflow = 4.88 cfs @ 0.65 hrs, Volume= 0.262 af
Outflow = 4.67 cfs @ 0.73 hrs, Volume= 0.262 af, Atten= 4%, Lag= 4.9 min

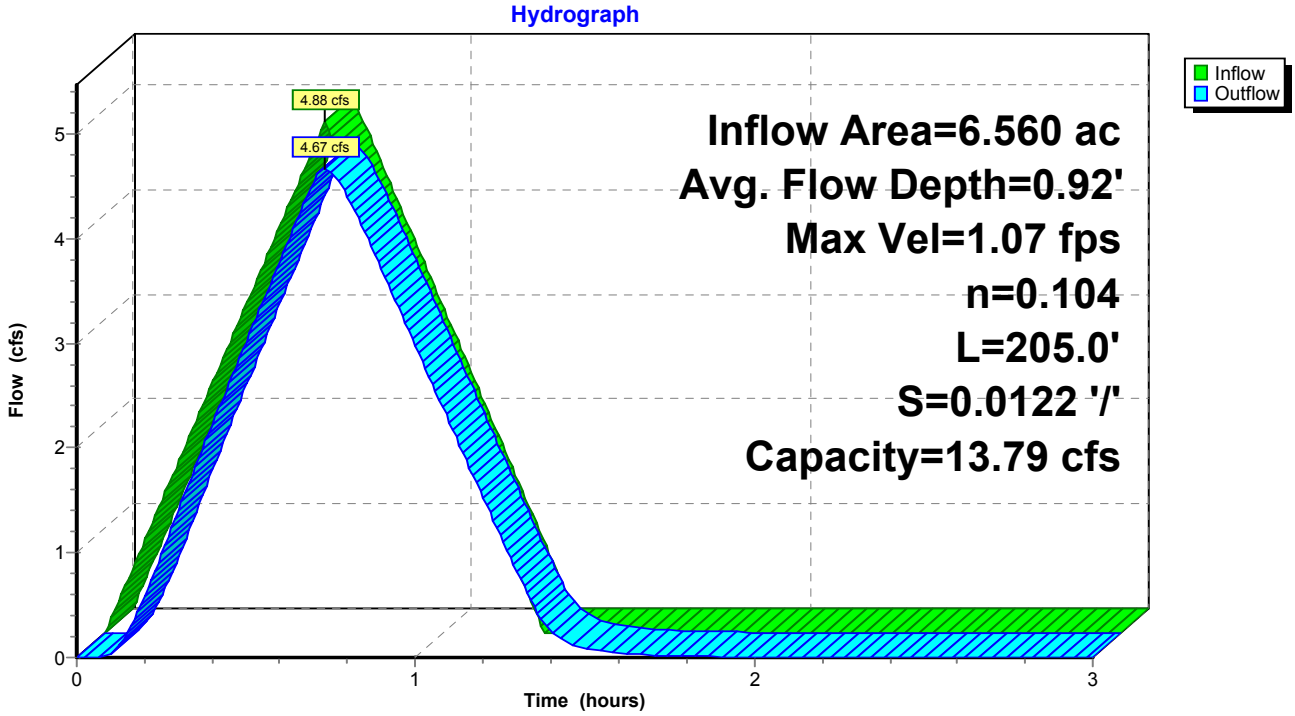
Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.07 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.45 fps, Avg. Travel Time= 7.6 min

Peak Storage= 895 cf @ 0.68 hrs
Average Depth at Peak Storage= 0.92'
Bank-Full Depth= 1.50' Flow Area= 9.8 sf, Capacity= 13.79 cfs

2.00' x 1.50' deep channel, n= 0.104
Side Slope Z-value= 3.0 '/' Top Width= 11.00'
Length= 205.0' Slope= 0.0122 '/'
Inlet Invert= 160.00', Outlet Invert= 157.50'

‡

Reach 2R: Diversion Swale



Tensar International Corporation
5401 St. Wendel-Cynthiana Road
Poseyville, Indiana 47633
Tel. 800.772.2040
Fax 812.867.0247
www.nagreen.com

Erosion Control Materials Design Software
Version 5.0

Project Name: Kinder Morgan-CT
Project Number: 49018
Channel Name: 390+00

Discharge	4.88
Peak Flow Period	2
Channel Slope	0.0122
Channel Bottom Width	2
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

SC150

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150 Unvegetated	Straight	4.88 cfs	1.94 ft/s	0.64 ft	0.047	2 lbs/ft2	0.49 lbs/ft2	4.1	STABLE	D

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	4.88 cfs	1.04 ft/s	0.96 ft	0.11	4.2 lbs/ft2	0.73 lbs/ft2	5.74	STABLE	--
Underlying Substrate	Straight	4.88 cfs	1.04 ft/s	0.96 ft	--	0.04 lbs/ft2	0.004 lbs/ft2	9.49	STABLE	--

TENNESSEE GAS PIPELINE COMPANY, L.L.C.

SILT FENCE DESIGN CRITERIA AND METHODOLOGY FOR THE ACCESS ROADWAYS

CONNECTICUT PIPELINE EXPANSION PROJECT

CONNECTICUT LOOP

Submitted by:

Tennessee Gas Pipeline Company, L.L.C.
1001 Louisiana St, Suite 1000
Houston, TX 77002

JULY 2014

INTRODUCTION

The following description of silt fence design criteria and methodology was performed as part of a comprehensive erosion and sedimentation control design of the Connecticut Expansion Pipeline (Project) within Connecticut. Tennessee Gas Pipeline Company ("Tennessee") is filing an application for a certificate of public convenience and necessity with the Federal Energy Regulatory Commission ("Commission" or "FERC") for the Project in Albany County, New York, Berkshire and Hampden Counties, Massachusetts and Hartford County, Connecticut. The proposed Project involves the construction of two sections of new 36-inch pipeline looping totaling 1.4 miles in New York and 3.8 miles in Massachusetts, and one section of new 24-inch pipeline looping totaling 8.1 miles in Massachusetts and Connecticut. To the extent that it is practicable, feasible, and in compliance with existing law, Tennessee proposes to locate the pipeline loops within or adjacent to the right-of-way ("ROW") associated with its existing pipelines designated as the 200 and 300 Lines. Tennessee proposes to begin construction of the Project facilities in 2015 and to place the facilities in-service by November 2016.

DESIGN CRITERIA AND METHODOLOGY

In order to reduce runoff velocity and effect deposition of transported sediment load, both standard and reinforced silt fencing has been specified for use in the Connecticut portion of the Tennessee Pipeline Construction areas.

As per the Connecticut Guidelines for Soil and Sediment Control (2002, section 5-11-35), silt fencing placement is applicable where small disturbed areas where the contributing drainage area is less than 1 acre. The maximum slope length for 20" reinforced silt fence is:

Slope Steepness	Slope Steepness (%)	Maximum Slope Length (ft)
2:1 to 3:1	50 to 33	50
3:1 to 5:1	33 to 20	75
5:1 or flatter	20 or less	100

As there are no Connecticut State standards for silt fence specification where either maximum slope steepness or slope length is exceeded (as in noted in the above table), Tennessee specifies the use of reinforced silt fence and super silt fence with the following maximum allowable slope length (see standard environmental details at the end of this document):

Maximum Slope Length (ft) Above Fence [1]		
Slope Steepness	**Slope Percent (%)**	**Super Silt Fence**
2:1	50	50
-	45	60
-	40	75
-	35	85
-	30	100
4:1	25	135
5:1	20	275
-	15	215
10:1	10	325
20:1	5	500
50:1	2	1000

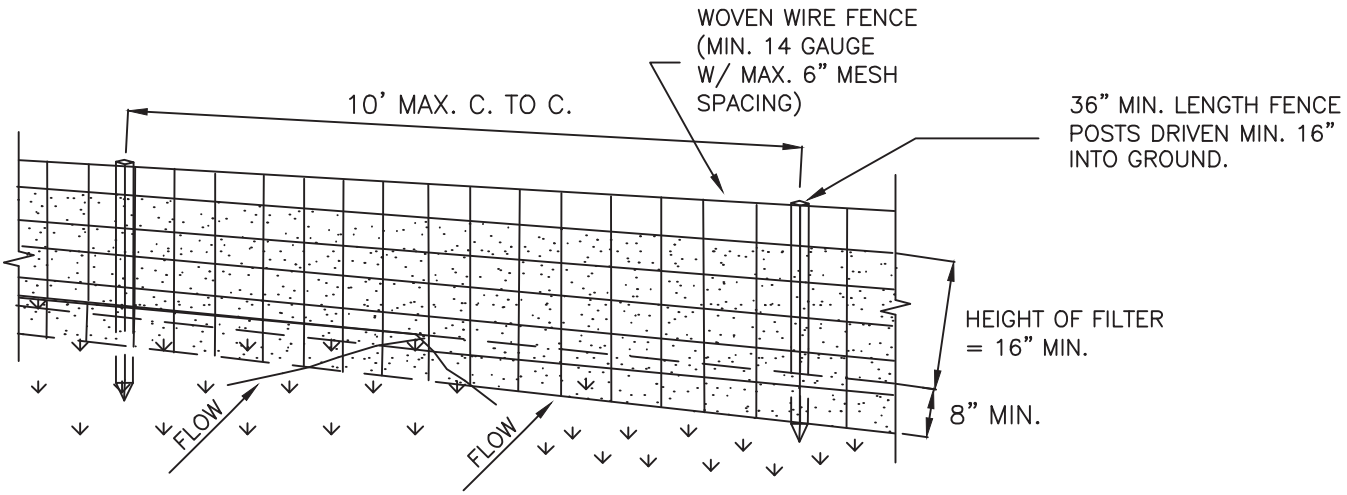
[1]This table is based on the table 4.4 Maximum Slope Length for Silt Fence of the PA DEP Erosion and Sediment Pollution Control Manual, 2012, page 76.

Locations where reinforced silt barrier slope steepness or slope length are exceeded (as noted in the above table), Tennessee will be utilizing a swale to intercept runoff up gradient of the construction areas, sized appropriately to either transfer flow to a nearby waterbody, if appropriate or directed via storm drainage pipe through the construction area and outletting in a preferred down gradient location.

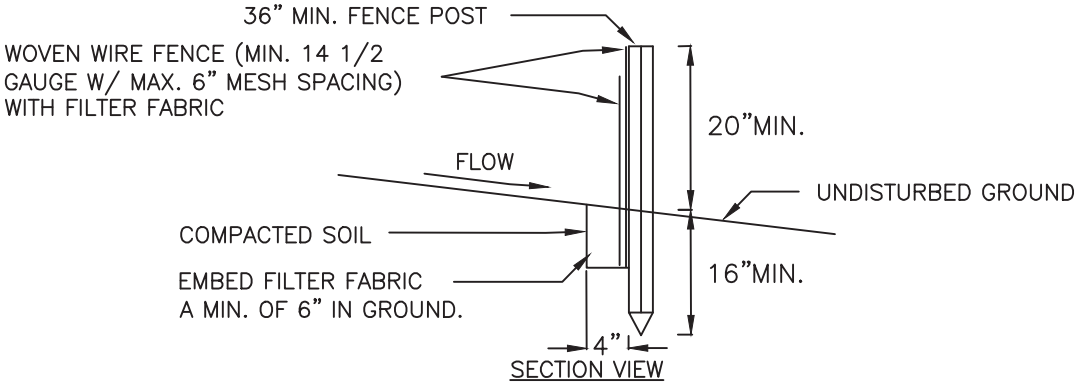
Finally, Silt fence materials will be according to specifications as noted in the Best Management Practices (BMPs) for Construction Activities in Connecticut.

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

SEDIMENT BARRIER TYPE AND LOCATION - CONNECTICUT ACCESS ROADS										
ACCESS ROAD TYPE AND NAME	SEDIEMNT BARRIER LOCATION (STA. TO STA.)	Length of Barrier (FT)	SEDIMENT BARRIER TYPE	ACTUAL SLOPE PERCENT ABOVE BARRIER (%)	ACTUAL SLOPE LENGTH ABOVE BARRIER (FT)	ALLOWABLE SLOPE LENGTH ABOVE BARRIER (FT)	REMAINING SLOPE LENGTH (FT)	PERCENTAGE OF SLOPE LENGTH REMAINING	RESULT	Comments
			-	0	0				-	
CT-1	100+00-101+50	150	20 INCH SILT FENCE	6.6	75	100	25	25%	OK	
CT-2	100+00-103+00	300	20 INCH SILT FENCE	7.2	99	100	1	1%	OK	
CT-3	100+00-106+11	611	20 INCH SILT FENCE	2	10	100	90	90%	OK	
CT-4	100+00-102+75	175	20 INCH SILT FENCE	2	10	100	90	90%	OK	
	102+75-105+00	225	SUPER SILT FENCE	3.3	135	500	365	73%	OK	
	105+00-111+57	500	20 INCH SILT FENCE	2	10	100	90	90%	OK	
CT-4a	200+00-210+00	1000	20 INCH SILT FENCE	2	10	100	90	90%	OK	
	210+00-216+19	519	SUPER SILT FENCE	2.8	352	500	148	30%	OK	
CT-5	1+00-5+50	450	20 INCH SILT FENCE	1.8	40	100	60	60%	OK	
	5+50-10+00	450	SUPER SILT FENCE	2	251	1000	749	75%	OK	
	10+00-18+00	800	20 INCH SILT FENCE	5	30	100	70	70%	OK	
	18+00-21+91	391	SUPER SILT FENCE	2	180	1000	820	82%	OK	
CT-5a	50+00-54+91	491	20 INCH SILT FENCE	2	20	100	80	80%	OK	
CT-6	1+00-14+14	1314	20 INCH SILT FENCE	1	20	100	80	80%	OK	
CT-7	100+00-108+00	800	20 INCH SILT FENCE	0.37	89	100	11	11%	OK	
	108+00-112+00	300	20 INCH SILT FENCE	2	20	100	80	80%	OK	
	112+00-118+00	600	20 INCH SILT FENCE	2	55	100	45	45%	OK	
	118+00-119+47	147	20 INCH SILT FENCE	2	56	100	44	44%	OK	
CT-7a	111+00-113+58	258	20 INCH SILT FENCE	10	50	100	50	50%	OK	
	100+00-111+00	1100	20 INCH SILT FENCE	2	20	100	80	80%	OK	
CT-8	100+00-101+76	176	20 INCH SILT FENCE	2.9	35	100	65	65%	OK	
CT-8A		65	20 INCH SILT FENCE	2	20	100	80	80%	OK	AT ENTRANCE TO EXIST PAVED LOT
Pipe Yard 1										
NE corner to SE corner	0' - 475'	475	SUPER SILT FENCE	0.0667	150	1000	850	85%	OK	
	475' - 1035'	560	20 INCH SILT FENCE	0.25	30	100	70	70%	OK	
	1035' - 1987	952	20 INCH SILT FENCE	0.121	95	100	5	5%	OK	
SW corner to NW corner	0'-1540'	1540	SUPER SILT FENCE	0.102	343	1000	657	66%	OK	
	1540' - 2148'	608	SUPER SILT FENCE	0.0565	177	1000	823	82%	OK	
N edge		268	SUPER SILT FENCE	0.0298	336	1000	664	66%	OK	
			SUPER SILT FENCE			0	0	0%	-	
Pipe Yard 2			SUPER SILT FENCE			0	0	0%	-	
SW corner to NW corner	0' - 637'	637	SUPER SILT FENCE	0.023	214	1000	786	79%	OK	
N edge		482	SUPER SILT FENCE	0.001	105	1000	895	90%	OK	
NE corner to SE corner	0' - 460'	857	SUPER SILT FENCE	0.0009	333	1000	667	67%	OK	



PERSPECTIVE VIEW



SECTION VIEW

CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 14 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER THEY SHALL BE OVER–LAPPED BY SIX INCHES AND FOLDED. FILTER FABRIC SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
6. MAXIMUM DRAINAGE AREA FOR OVERLAND FLOW TO A SILT FENCE SHALL NOT EXCEED 1/4 ACRE PER 100 FEET OF FENCE.
7. MAXIMUM ALLOWABLE SLOPE LENGTHS CONTRIBUTING RUNOFF TO SILT FENCE PLACED ON A SLOPE ARE AS FOLLOWS:

SLOPE STEEPNESS	MAXIMUM LENGTH (FT)
2:1	25
3:1	50
4:1	75
5:1 OR GREATER	100

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
REINFORCED SILT FENCE

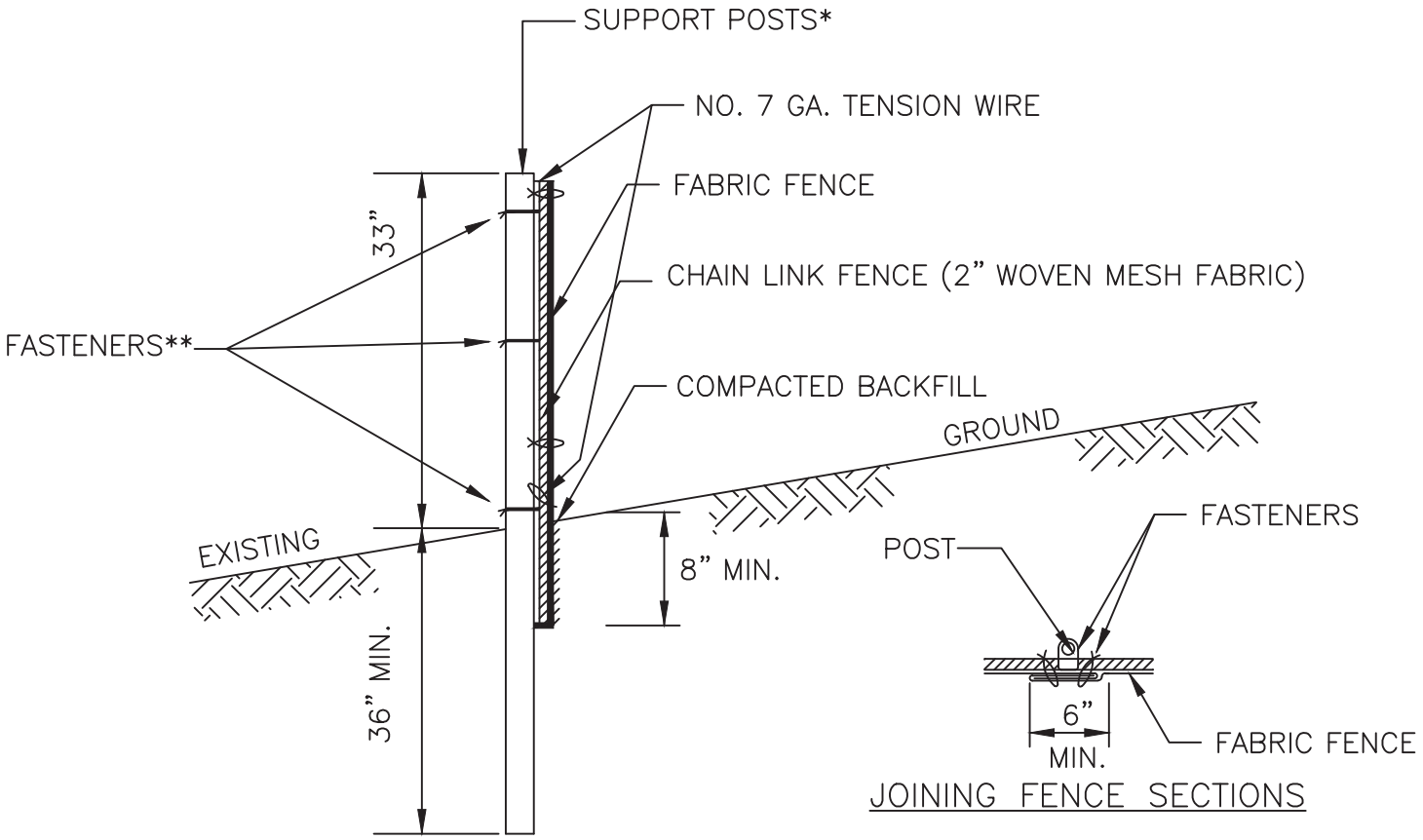
Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 31

Sheet: 31 of 127

Type:

STANDARD CONSTRUCTION DETAIL #22
Super Filter Fabric Fence



* POSTS SPACED @ 10' MAX. USE 2 1/2" DIA. GALVANIZED OR ALUMINUM POSTS.

** CHAIN LINK TO POST FASTENERS SPACED @ 14" MAX. USE NO. 6 GA. ALUMINUM WIRE OR NO. 9 GALVANIZED STEEL PRE-FORMED CLIPS. CHAIN LINK TO TENSION WIRE FASTENERS SPACED @ 60" MAX. USE NO. 10 GA. GALVANIZED STEEL WIRE. FABRIC TO CHAIN FASTENERS SPACED @ 24" MAX. C TO C.

NO. 7 GA. TENSION WIRE INSTALLED HORIZONTALLY AT TOP AND BOTTOM OF CHAIN-LINK FENCE.

FILTER FABRIC FENCE MUST BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER MUST BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT.

SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SUPER SILT FENCE (1)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 32

Sheet: 32 of 127
Type:

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

CT EXPANSION PROJECT

SILT FENCE DESIGN CRITERIA AND METHODOLOGY

CONNECTICUT LOOP

Submitted by:

••

Tennessee Gas Company L.L.C.
1001 Louisiana St, Suite 1000
Houston, TX 77002

July 2014

Revised March 2015

INTRODUCTION

The following description of silt fence design criteria and methodology was performed as part of a comprehensive erosion and sedimentation control design of the Connecticut Expansion Pipeline (Project) within Connecticut. Tennessee Gas Pipeline Company ("Tennessee") is filing an application for a certificate of public convenience and necessity with the Federal Energy Regulatory Commission ("Commission" or "FERC") for the Project in Albany County, New York, Berkshire and Hampden Counties, Massachusetts and Hartford County, Connecticut. The proposed Project involves the construction of two sections of new 36-inch pipeline looping totaling 1.4 miles in New York and 3.8 miles in Massachusetts, and one section of new 24-inch pipeline looping totaling 8.1 miles in Massachusetts and Connecticut. To the extent that it is practicable, feasible, and in compliance with existing law, Tennessee proposes to locate the pipeline loops within or adjacent to the right-of-way ("ROW") associated with its existing pipelines designated as the 200 and 300 Lines. Tennessee proposes to begin construction of the Project facilities in 2015 and to place the facilities in-service by November 2016.

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In order to reduce runoff velocity and effect deposition of transported sediment load, both standard and reinforced silt fencing has been specified for use in the Connecticut portion of the Tennessee Pipeline Construction areas.

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Slope Steepness	Slope Steepness (%)	Maximum Slope Length (ft)
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3:1 to 5:1	33 to 20	75
5:1 or flatter	20 or less	100

As there are no Connecticut State standards for silt fence specification where either maximum slope steepness or slope length is exceeded (as in noted in the above table), Tennessee specifies the use of reinforced silt fence and super silt fence with the following maximum allowable slope length (see standard environmental details at the end of this document):

Maximum Slope Length (ft) Above Fence [1]		
Slope Steepness	**Slope Percent (%)**	**Super Silt Fence**
2:1	50	50
-	45	60
-	40	75
-	35	85
-	30	100
4:1	25	135
5:1	20	275
-	15	215
10:1	10	325
20:1	5	500
50:1	2	1000

[1]This table is based on the table 4.4 Maximum Slope Length for Silt Fence of the PA DEP Erosion and Sediment Pollution Control Manual, 2012, page 76.

Locations where reinforced silt barrier slope steepness or slope length are exceeded (as noted in the above table), Tennessee will be utilizing a swale to intercept runoff up gradient of the construction areas, sized appropriately to either transfer flow to a nearby waterbody, if appropriate or directed via storm drainage pipe through the construction area and outletting in a preferred down gradient location.

Finally, Silt fence materials will be according to specifications as noted in the Best Management Practices (BMPs) for Construction Activities in Connecticut.

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

Tennessee Gas Pipeline Comapany, L.L.C.
Connecticut Expansion Project
Sediment Barrier Backup Calculations
Connecticut Loop - Table 1

Left or Right of Baseline		SEDIMENT BARRIER LOCATION NEW (STA to STA)		Length of Barrier (FT)	SEDIMENT BARRIER TYPE	ACTUAL SLOPE PERCENT ABOVE BARRIER (%)	ACTUAL SLOPE LENGTH ABOVE BARRIER (FT)	ALLOWABLE SLOPE LENGTH ABOVE BARRIER (FT)	REMAINING SLOPE LENGTH (FT)	PERCENTAGE OF SLOPE LENGTH REMAINING	RESULT	Comments
RIGHT		0	180	159	20 INCH SILT FENCE	1	50	100	50	50%	OK	SIDESLOPE
		180	550	872	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
	LEFT	460	780	367	20 INCH SILT FENCE	8	50	100	50	50%	OK	SIDESLOPE WITH WATERBAR
		790	860	292	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
	LEFT	850	1130	290	SUPER SILT FENCE	4	250	500	250	50%	OK	SIDESLOPE
		1125	1600	982	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		1950	1980	385	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		2025	3950	4828	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		4050	4060	93	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		4250	4325	100	20 INCH SILT FENCE	2	50	100	50	50%	OK	ROAD CROSSING
		4310	4480	100	20 INCH SILT FENCE	2	50	100	50	50%	OK	ROAD CROSSING
		4425	4480	178	20 INCH SILT FENCE	2	50	100	50	50%	OK	ROAD CROSSING
RIGHT		4825	5050	205	20 INCH SILT FENCE	1	50	100	50	50%	OK	SIDESLOPE
		5050	6425	2860	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		6425	6560	382	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		6650	7000	875	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		7000	7080	164	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		7180	7380	532	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		7250	7300	121	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		7450	7630	530	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		7670	7750	330	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		7760	7790	102	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		7840	8440	1526	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		8480	8590	398	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
RIGHT		8600	8780	168	20 INCH SILT FENCE	2	50	100	50	50%	OK	SIDESLOPE
		8780	9050	653	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		8850	9630	1679	SUPER SILT FENCE	4	930	500	0	0%	NO GOOD	WETLAND, SWALE REQ'D
	LEFT	9580	9700	61	20 INCH SILT FENCE	4	100	100	0	0%	OK	SIDESLOPE
		9700	10350	1459	SUPER SILT FENCE	3	598	500	0	0%	NO GOOD	WETLAND, SWALE REQ'D
		10450	10500	200	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		10500	10600	158	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND
RIGHT		10500	10640	114	20 INCH SILT FENCE	1	50	100	50	50%	OK	SIDESLOPE
		10650	11000	804	SUPER SILT FENCE	3	432	500	68	14%	OK	WETLAND
		11050	13680	5682	SUPER SILT FENCE	16	200	175	0	0%	NO GOOD	WETLAND, SWALE REQ'D
		13650	13720	165	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND
		13760		100	20 INCH SILT FENCE	1	50	100	50	50%	OK	ROAD CROSSING
		13810		100	20 INCH SILT FENCE	1	50	100	50	50%	OK	ROAD CROSSING
		13825	14780	1707	SUPER SILT FENCE	1	150	1000	850	85%	OK	WETLAND WITH WATERBAR
		14800	15400	1447	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		15400	15950	912	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR

Left or Right of Baseline		SEDIMENT BARRIER LOCATION NEW (STA to STA)		Length of Barrier (FT)	SEDIMENT BARRIER TYPE	ACTUAL SLOPE PERCENT ABOVE BARRIER (%)	ACTUAL SLOPE LENGTH ABOVE BARRIER (FT)	ALLOWABLE SLOPE LENGTH ABOVE BARRIER (FT)	REMAINING SLOPE LENGTH (FT)	PERCENTAGE OF SLOPE LENGTH REMAINING	RESULT	Comments
		17000	17700	1475	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		17800	18250	1062	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		19300	19250	2263	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		19250	19390	100	20 INCH SILT FENCE	1	50	100	50	50%	OK	ROAD CROSSING
		19350	19380	100	20 INCH SILT FENCE	1	50	100	50	50%	OK	ROAD CROSSING
		19430	20030	1323	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		20400	21150	1721	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		21200	21250	567	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		21350	21730	864	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
LEFT		21700	21900	177	SUPER SILT FENCE	3	330	500	170	34%	OK	SIDESLOPE
		21900	21950	205	SUPER SILT FENCE	3	340	500	160	32%	OK	WETLAND WITH WATERBAR
		22000	22480	1072	SUPER SILT FENCE	6	130	325	195	60%	OK	WETLAND WITH WATERBAR
		23250	23250	555	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		24150	24550	967	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		25080	25400	774	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		25400	25500	216	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		25700	27400	3839	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		27430	27540	416	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		27650	28630	2044	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		29050	29650	1458	SUPER SILT FENCE	3	1424	500	0	0%	NO GOOD	WETLAND, SWALE REQ'D
LEFT		29700	29850	180	SUPER SILT FENCE	4	678	500	0	0%	NO GOOD	SIDESLOPE, SWALE REQ'D
		29900	30000	307	SUPER SILT FENCE	5	306	500	194	39%	OK	WETLAND
			30050	100	20 INCH SILT FENCE	1	50	100	50	50%	OK	ROAD CROSSING
			30030	100	20 INCH SILT FENCE	1	50	100	50	50%	OK	ROAD CROSSING
		30050	30150	295	20 INCH SILT FENCE	4	100	100	0	0%	OK	WETLAND
		30230	30700	1191	SUPER SILT FENCE	4	1186	500	0	0%	NO GOOD	WETLAND, SWALE REQ'D
		30700	31000	670	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		31280	31400	394	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		31500	31680	545	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		31750	33450	3505	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		33500	33000	298	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		33800	33950	455	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		34080	34150	361	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		34200	34730	1146	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		34930	36950	4280	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		37150	37350	675	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		37550	37630	298	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		37800	38050	618	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		38150	38225	302	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		38360	38450	280	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR

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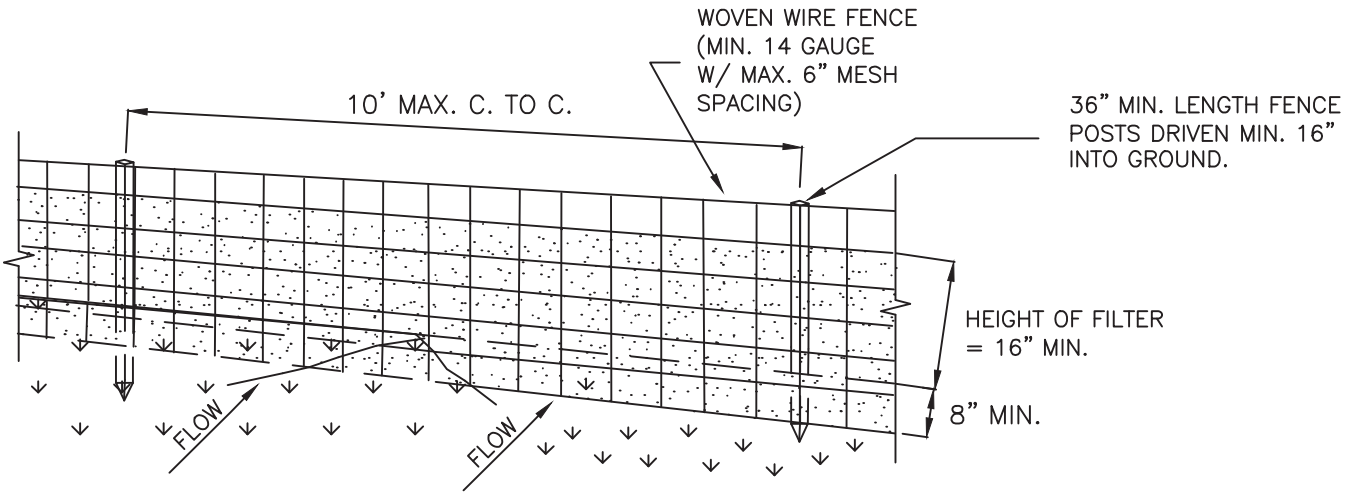
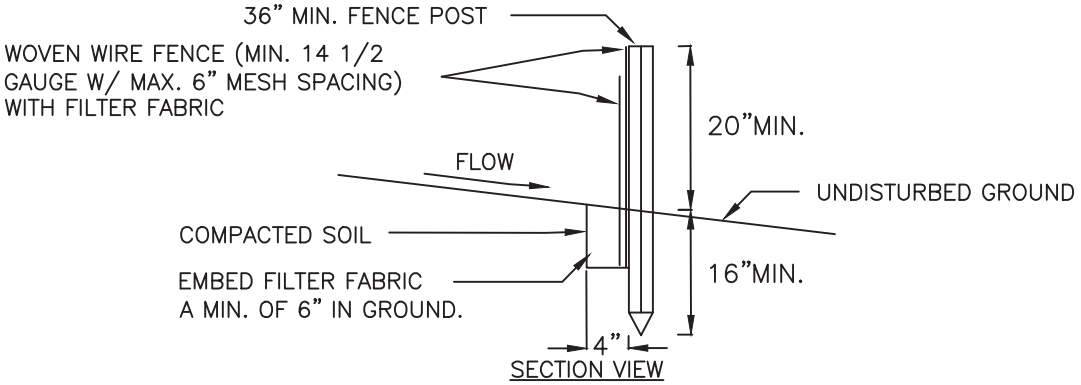
Tennessee Gas Pipeline Comapny, L.L.C.
Connecticut Expansion Project
Sediment Barrier Backup Calculations
Connecticut Loop - Table 3

Left or Right of Baseline		SEDIMENT BARRIER LOCATION NEW (STA to STA)		Length of Barrier (FT)	SEDIMENT BARRIER TYPE	ACTUAL SLOPE PERCENT ABOVE BARRIER (%)	ACTUAL SLOPE LENGTH ABOVE BARRIER (FT)	ALLOWABLE SLOPE LENGTH ABOVE BARRIER (FT)	REMAINING SLOPE LENGTH (FT)	PERCENTAGE OF SLOPE LENGTH REMAINING	RESULT	Comments
		38350	**38440**	**280**	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		38450	**38580**	**363**	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		38650	**38900**	**661**	20 INCH SILT FENCE	1	50	100	50	50%	OK	WETLAND WITH WATERBAR
		38900	**39000**	**126**	SUPER SILT FENCE	3	1408	500	0	0%	NO GOOD	SIDESLOPE, SWALE REQ'D
			39040	**100**	20 INCH SILT FENCE	1	50	100	50	50%	OK	ROAD CROSSING
			39060	**100**	20 INCH SILT FENCE	1	50	100	50	50%	OK	ROAD CROSSING
		39100	**39280**	**455**	SUPER SILT FENCE	4	450	500	50	10%	OK	WETLAND WITH WATERBAR
		39250	**39380**	**90**	20 INCH SILT FENCE	1	50	100	50	50%	OK	SIDESLOPE WITH WATERBAR
		39380	**40510**	**2740**	SUPER SILT FENCE	1	500	1000	500	50%	OK	WETLAND WITH WATERBAR
		40550	**40575**	**235**	SUPER SILT FENCE	6	225	325	100	31%	OK	WETLAND WITH WATERBAR
	Left	**40575**	**41500**	**1210**	SUPER SILT FENCE	2	660	1000	340	34%	OK	WETLAND WITH WATERBAR
		42600	**42650**	**110**	20 INCH SILT FENCE	25	25	75	50	67%	OK	WETLAND WITH WATERBAR



PERSPECTIVE VIEW



SECTION VIEW

CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 14 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER THEY SHALL BE OVER–LAPPED BY SIX INCHES AND FOLDED. FILTER FABRIC SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
6. MAXIMUM DRAINAGE AREA FOR OVERLAND FLOW TO A SILT FENCE SHALL NOT EXCEED 1/4 ACRE PER 100 FEET OF FENCE.
7. MAXIMUM ALLOWABLE SLOPE LENGTHS CONTRIBUTING RUNOFF TO SILT FENCE PLACED ON A SLOPE ARE AS FOLLOWS:

SLOPE STEEPNESS	MAXIMUM LENGTH (FT)
2:1	25
3:1	50
4:1	75
5:1 OR GREATER	100

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:	Op. Area:	
St.:	Co./Par.:	
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
REINFORCED SILT FENCE

Tennessee Gas Pipeline Company, L.L.C.
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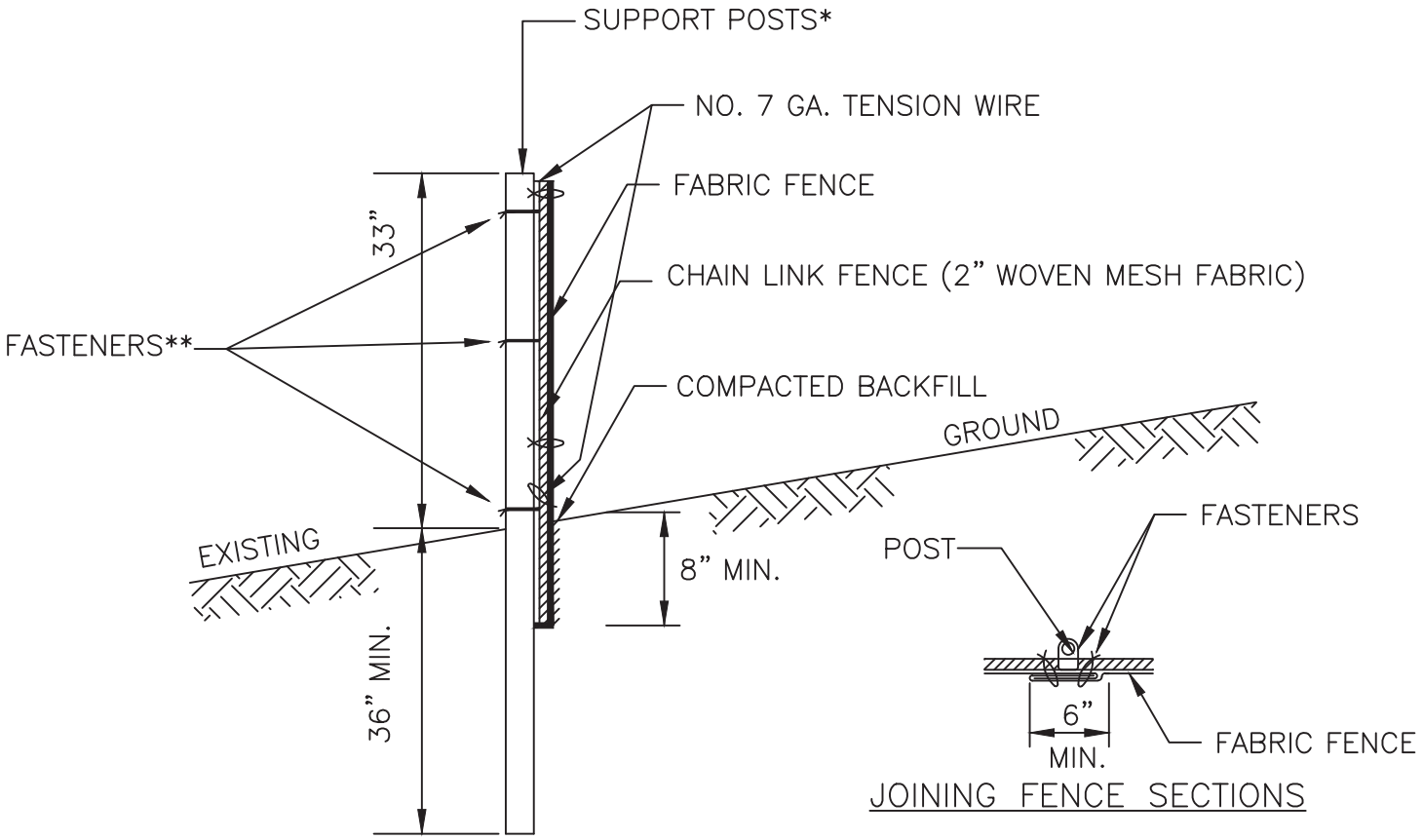
FIG. NO. 31

Sheet: 31 of 127

Type:

STANDARD CONSTRUCTION DETAIL #22
Super Filter Fabric Fence



* POSTS SPACED @ 10' MAX. USE 2 1/2" DIA. GALVANIZED OR ALUMINUM POSTS.

** CHAIN LINK TO POST FASTENERS SPACED @ 14" MAX. USE NO. 6 GA. ALUMINUM WIRE OR NO. 9 GALVANIZED STEEL PRE-FORMED CLIPS. CHAIN LINK TO TENSION WIRE FASTENERS SPACED @ 60" MAX. USE NO. 10 GA. GALVANIZED STEEL WIRE. FABRIC TO CHAIN FASTENERS SPACED @ 24" MAX. C TO C.

NO. 7 GA. TENSION WIRE INSTALLED HORIZONTALLY AT TOP AND BOTTOM OF CHAIN-LINK FENCE.

FILTER FABRIC FENCE MUST BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER MUST BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT.

SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.

NO.	DATE	BY	DESCRIPTION	PROJ. ID	APPR.

REVISIONS

Division:		Op. Area:
St.:		Co./Par.:
Section:	Township:	Range:
Dft:	Date:	Project ID:
Chk:	Date:	Scale:
Appr:	Date:	Filename:

TENNESSEE GAS PIPELINE, LLC.
STANDARD ENVIRONMENTAL DETAIL
CONNECTICUT EXPANSION PROJECT
SUPER SILT FENCE (1)

Tennessee Gas Pipeline Company, L.L.C.
a Kinder Morgan company

FIG. NO. 32

Sheet: 32 of 127
Type: