merjent

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February 10, 2023

Tennessee Department of Environment and Conservation
Division of Water Resources
Attention: ARAP Processing
3711 Middlebrook Pike
Knoxville, TN 37921

Re: Enbridge
WART TOPS Replacement Project – Roane County, TN
Request for Notice of Coverage, *General Aquatic Resource Alteration Permit for* Minor Alterations to Wetlands

Dear Mr. Joshua Frazier,

East Tennessee Natural Gas (ETNG), a subsidiary of Enbridge, owns and operates natural gas transmission pipeline systems and associated appurtenances in the State of Tennessee. ETNG is proposing to replace approximately 240 feet of its existing 22-inch diameter natural gas pipeline where the pipeline crosses the Heritage Railroad. The WART TOPS Replacement project (Project) is located at approximate latitude/longitude 35.942761, -84.389456 within unincorporated Roane County, TN. The Project is regulated by the Federal Energy Regulatory Commission (FERC) under ETNG's blanket certificate. Construction activities are scheduled to begin in April 2023, or upon issuance of all applicable permits, and take approximately 35 days.

To accomplish the Project, ETNG will replace a portion of the carrier pipeline located within a casing pipe as it crosses underneath the Heritage Railroad. The new replacement pipe will be installed by exposing the existing ends of the casing pipe on each side of the railroad crossing. Each excavation will measure approximately 50 feet by 50 feet and will occur within the existing easement. The carrier pipe will be cut at each exposure and removed from the casing pipe. The new replacement pipe will be pulled through the existing casing pipe and tie-in welds will connect each end to the remaining existing carrier pipe.

Although the Project is located adjacent to the East Fork of Poplar Creek, no in-stream work is proposed as a part of the Project. Sheet piling placed at the Ordinary High-Water Mark (OHWM) and large sandbags placed to level the ground surface will be used to stabilize the streambank and support the construction activity. The sheet piling and large sandbags will be removed upon completion of the Project. All areas impacted by the Project will be returned to preconstruction contours and revegetated upon Project completion.

Access to the Project will utilize existing public roads and access routes along the existing Right-of-Way into the workspace.

Wetland and Waterbody Survey

A survey for wetlands and waterbodies was conducted in December 2022. The wetland and waterbody survey identified one wetland consisting of a palustrine forested (PFO) area within the proposed pipe

replacement workspace east of the railroad bridge and north of the East Fork of Poplar Creek. Two wet weather conveyances were identified within the Project area.

Regulatory Authority

All identified wetlands within the Project workspace are assumed to be under the jurisdiction of the U.S. Army Corps of Engineers (USACE) as a Water of the United States and of the Tennessee Department of Environment and Conservation as Waters of the State. Replacement of the existing pipelines is assumed to be authorized under a non-reporting category of Nationwide Permit 3 for Maintenance activities. Therefore, a pre-construction notification (PCN) to the USACE is not required. ETNG is seeking authorization for temporary wetland impacts, including temporary conversion of PFO to PEM under the General Aquatic Resources Alteration Permit and a 401 Water Quality Certification from the Tennessee Department of Environment and Conservation.

If you have any questions or require additional information, please contact me at 713-562-5028 or by email at Ernie.Ladkani@merjent.com; or contact Kimberly Janusaitis of Enbridge at 713-989-8406 or by email at **Kimberly.Janusaitis@enbridge.com** .

Sincerely,

Ernie Ladkani
Environmental Consultant

Cc: Kimberly Janusaitis - Enbridge

Enclosures:

- Aquatic Resource Alteration Permit Application for Minor Wetland Alteration
- ARAP Supplemental Information
- Project Site Plan
- ETNG WART TOPS Project Wetland Delineation Report
- ETNG Erosion & Sedimentation Control Plan
- Wetland Impact Mapping

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Resources
William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 11th Floor,
Nashville, Tennessee, 37243
1-888-891-8332 (TDEC)

Application for Aquatic Resource Alteration Permit (ARAP) & State §401 Water Quality Certification

OFFICIAL STATE USE ONLY	Site #:		Permit #:	

Section 1. Applicant Information (individual responsible for site, signs certification below)

Applicant Name (company or individual): East Tennessee Natural Gas		SOS #:	Status: N/A
Primary Contact/Signatory: Kimberly Janusaitus		Signatory's Title or Position: Environmental Advisor	
Mailing Address: 915 N. Eldridge Parkway, Suite 1100		City: Houston	State: TX Zip: 77079
Phone: 713-989-8406	Fax:	E-mail: kimberly.janusaitis@enbridge.com	

Section 2. Alternate Contact/Consultant Information (a consultant is not required)

Alternate Contact Name: Ernie Ladkani			
Company: Merjent, Inc.		Title or Position: Senior Environmental Consultant	
Mailing Address: 1 Main Street SE, Suite 300		City: Minneapolis	State: MN Zip: 55414
Phone: 713-562-5028	Fax:	E-mail: ernie.ladkani@merjent.com	

Section 3. Fee (application will be incomplete until fee is received)

☐ No Fee ☒ Fee Submitted with Application Amount Submitted: $ 500

Current application fee schedules can be found at the Division of Water Resources webpage at:
https://www.tn.gov/environment/permit-permits/water-permits1/aquatic-resource-alteration-permit--arap-.html
or by calling (615) 532-0625. Please make checks payable to "Treasurer, State of Tennessee".

Billing Contact (if different from Applicant): Name: Email:

Address: Phone:

Section 4. Project Details (fill in information and check appropriate boxes)

Site or Project Name: WART TOPS Replacement Project	Nearest City, Town or Major Landmark: Blair, TN	
Street Address or Location (include zip): N/A		
County(ies): Roane	MS4 Jurisdiction: N/A	Latitude (dd.dddd): 35.9427
		Longitude (dd.dddd): -84.3894

Resources Proposed for Alteration: ☐ Stream / River ☑ Wetland ☐ Reservoir

Name of Water Resource (for more information, access *http://tdeconline.tn.gov/dwr*):

Brief Project Description (a more detailed description is required under Section 8):
Replace approximately 240 feet of existing natural gas pipeline

Does the proposed activity require approval from the U.S. Army Corps of Engineers, the Tennessee Valley Authority, or any other federal, state, or local government agency? ☒ Yes ☐ No

If Yes, provide the permit reference numbers: USACE NWP 3 - non-reporting coverage

Will the activity require a 401 Water Quality Certification: ☒ Yes ☐ No

If Yes, attach any 401 WQC pre-filing meeting request documentation

Is the proposed activity associated with a larger common plan of development: ☐ Yes ☑ No

If Yes, submit site plans and identify the location and overall scope of the common plan of development.

Plans attached? ☐ Yes ☒ No

If applicable, indicate any other federal, state, or local permits that are associated with the overall project site (common plan of development) that have been obtained in the past (e.g., construction general permit and/or other ARAP):

Application for Aquatic Resource Alteration Permit (ARAP) & State §401 Water Quality Certification

Section 5. Project Schedule (fill in information and check appropriate boxes)		
Proposed start date: March 2023	Estimated end date: May 2023	
Is any portion of the activity complete now?	☐ Yes	☒ No
If yes, describe the extent of the completed portion:		

The required information in Sections 6-11 must be submitted on a separate sheet(s) and submitted in the same numbered format as presented below. If any question in not applicable, state the reason why it is not applicable.

Section 6. Description		**Attached** Yes	No
6.1	A narrative description of the scope of the project	☒	☐
6.2	USGS topographic map indicating the exact location of the project (can be a photographic copy)	☒	☐
6.3	Photographs of the resource(s) proposed for alteration with location description (photo locations should be noted on map)	☒	☐
6.4	A narrative description of the **existing** stream and/or wetland characteristics including, but not limited to, dimensions (e.g., depth, length, average width), substrate and riparian vegetation	☒	☐
6.5	A narrative description of the **proposed** stream and/or wetland characteristics including, but not limited to, dimensions (e.g., depth, length, average width), substrate and riparian vegetation	☒	☐
6.6	In the case of wetlands, include a wetland delineation with delineation forms and site map denoting location of data points	☒	☐
6.7	A copy of all hydrologic or jurisdictional determination documents issued for water resources on the project site	☒	☐

Section 7. Project Rationale	**Attached** Yes	No
Describe the need for the proposed activity, including, but not limited to the purpose, alternatives considered and rationale for selection of least impactful alternative, and what will be done to avoid or minimize impacts to water resources	☒	☐

Section 8. Technical Information		**Attached** Yes	No
8.1	Detailed plans, specifications, blueprints, or legible sketches of present site conditions and the proposed activity. Plans must be 8.5.x 11 inches. Additional larger plans may also be submitted to aid in application review. The detailed plans should be superimposed on existing and new conditions (e.g., stream cross sections where road crossings are proposed)	☒	☐
8.2	For the proposed activity and compensatory mitigation, provide a discussion regarding the sequencing of events and construction methods and any proposed monitoring	☒	☐
8.3	Depiction and narrative on the location and type of erosion prevention and sediment control (EPSC) measures for the proposed alterations and any other measures to treat, control, or manage impacts to waters	☒	☐

Section 9. Water Resources Degradation (degree of proposed impact)

Note that in most cases, activities that exceed the scope of the General Permit limitations are considered greater than *de minimis* degradation to water quality.

Please provide your basis for concluding the proposed activity will cause one of the following levels of water quality degradation:

☒ a. *De minimis* degradation, no appreciable permanent loss of resource values
☐ b. Greater than *de minimis* degradation (if greater than *de minimis* complete Sections 10-11)

For information and guidance on the definition of de minimis and degradation, refer to the Antidegradation Statement in Chapter 0400-40-03-.06 of the Tennessee Water Quality Criteria Rule:
https://publications.tnsosfiles.com/rules/0400/0400-40/0400-40.htm
For more information on specifics on what General Permits can cover, refer to the Natural Resources Unit webpage at:
https://www.tn.gov/environment/permit-permits/water-permits1/aquatic-resource-alteration-permit--arap-.html

Application for Aquatic Resource Alteration Permit (ARAP) & State §401 Water Quality Certification

Section 10. Detailed Alternatives Analysis		Attached Yes	Attached No
10.1	Analyze all reasonable alternatives and describe the level of degradation and permanent loss of resource value caused by each alternative. Assessment must consider options other than the "Preferred" and "No Action" alternatives. Provide associated rationale for selecting or rejecting all alternatives considered and demonstration that the least impactful practicable alternative was selected.	☐	■
10.2	Discuss the social and economic consequences of each alternative	☐	■
10.3	Demonstrate that the degradation associated with the preferred alternative will not violate water quality criteria for uses designated in the receiving waters, and is necessary to accommodate important economic and social development in the area	☐	■

Section 11. Compensatory Mitigation		Attached Yes	Attached No
11.1	A detailed discussion of the proposed compensatory mitigation. Provide evidence of credit reservation if proposing to utilize a third-party provider.	☐	■
11.2	Analysis of any proposed appreciable loss of resource value using the TN Stream Mitigation Guidelines. Provide Stream Quantification Tool (SQT) results if applicable. Include Existing Condition Score (ECS) and debit/credit calculations.	☐	■
11.3	Describe how the compensatory mitigation would result in no net loss of resource value	☐	■
11.4	Provide a detailed monitoring plan for the compensatory mitigation site if permittee-responsible project is proposed	☐	■
11.5	Describe the long-term protection measures for the compensatory mitigation site if permittee-responsible project is proposed (e.g., deed restrictions, conservation easement)	☐	■

Certification and Signature

An application submitted by a corporation must be signed by a principal executive officer; from a partnership or proprietorship, by the partner or proprietor respectively; from a municipal, state, federal or other public agency or facility, the application must be signed by either a principal executive officer, ranking elected official, or other duly authorized employee. ***I certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision. The submitted information is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury. The project proponent hereby requests that the certifying authority review and take action on this CWA 401 certification request within the applicable reasonable period of time.***

Kimberly Janusaitis	Environmental Advisor		
Printed Name	Official Title	Signature	Date

Note that this form must be signed by the principal executive officer, partner or proprietor, or a ranking elected official in the case of a municipality; for details see **Certification and Signature** statement above. For more information, contact your local EFO at the toll-free number 1-888-891-8332 (TDEC). Submit the completed ARAP Application form (keep a copy for your records) to the appropriate EFO for the county(ies) where the proposed activity is located, addressed to **Attention: ARAP Processing**. You may also electronically submit the complete application and all associated attachments to water.permits@tn.gov.

EFO	Street Address	Zip Code	EFO	Street Address	Zip Code
Memphis	8383 Wolf Lake Drive, Bartlett	38133-4119	Cookeville	1221 South Willow Ave.	38506
Jackson	1625 Hollywood Drive	38305-4316	Chattanooga	1301 Riverfront Pkwy., Ste. 206	37402
Nashville	711 R S Gass Boulevard	37243	Knoxville	3711 Middlebrook Pike	37921
Columbia	1421 Hampshire Pike	38401	Johnson City	2305 Silverdale Road	37601

Enbridge – East Tennessee Natural Gas
WART TOPS Replacement Project
General Aquatic Resource Alteration Permit for Minor Alterations to Wetland
Supplemental Information

Section 6 – Description

6.1 – Narrative description of the scope of the project

East Tennessee Natural Gas (ETNG), a subsidiary of Enbridge, owns and operates natural gas transmission pipeline systems and associated appurtenances in the State of Tennessee. ETNG is proposing to replace approximately 240 feet of its existing 22-inch diameter natural gas pipeline where the pipeline crosses the Heritage Railroad due to a failure of the cathodic protection. The WART TOPS Replacement project (Project) is located at approximate latitude/longitude 35.942761, -84.389456 within unincorporated Roane County, TN. The Project is regulated by the Federal Energy Regulatory Commission (FERC) under ETNG's blanket certificate. Construction activities are scheduled to begin in April 2023, or upon issuance of all applicable permits, and take approximately 35 days.

To accomplish the Project, ETNG will replace a portion of the carrier pipeline located within a casing pipe as it crosses underneath the Heritage Railroad. The new replacement pipe will be installed by exposing the existing ends of the casing pipe on each side of the railroad crossing. Each excavation will measure approximately 50 feet by 50 feet and will occur within the existing easement. The carrier pipe will be cut at each exposure and removed from the casing pipe. The new replacement pipe will be pulled through the existing casing pipe and tie-in welds will connect each end to the remaining existing carrier pipe.

Although the Project is located adjacent to the East Fork of Poplar Creek, no in-stream work is proposed as a part of the Project. Sheet piling placed at the Ordinary High-Water Mark (OHWM) and large sandbags placed to level the ground surface will be used to stabilize the streambank and support the construction activity. The sheet piling and large sandbags will be removed upon completion of the Project. All areas impacted by the Project will be returned to preconstruction contours and revegetated upon Project completion.

Access to the Project will utilize existing public roads and access routes along the existing Right-of-Way into the workspace.

6.2 – USGS topographic map with project location.

A Project location map is included as Figure 1 in the attached Wetland Delineation Report (Attachment A). A USGS topographic map with the site location is included as Figure 2 in the Wetland Delineation Report.

6.3 – Photographs of the resource proposed for alteration.

Photographs of all resources identified within the Project's Construction Work Area (CWA) are included in Appendix A of the attached Wetland Delineation Report (Attachment A).

6.4 – Narrative description of the existing stream and wetland characteristics.

Based on a field investigation conducted by Merjent on December 9, 2022, and review of desktop resources, it was determined that two wetlands (w01 and w02) totaling 0.26 acre occur within the survey area (Figure 5 in Attachment A).

Enbridge – East Tennessee Natural Gas
WART TOPS Replacement Project
General Aquatic Resource Alteration Permit for Minor Alterations to Wetland
Supplemental Information

Summary of Delineated Wetlands				
Wetland ID	Cowardin Classification[1]	Hydromorphic (HGM) Classification	TRAM Category (Score)	Size (acres) Within Survey Area
w01	PFO	Riverine	Moderate Resource Value (59.4)	0.11
w02	PFO	Riverine	Moderate Resource Value (62.0)	0.15
			Total	0.26
PFO = Palustrine Forest				
[1]Source: Cowardin, et al 1979				

Wetland w01 (0.11 acre)
Wetland w01 (0.11 acre) is a palustrine forested (PFO) wetland located in a depression adjacent to stream s04 (Poplar Creek). The tree and sapling/shrub strata are dominated by American elm (Ulmus americana). The herb stratum is dominated by northern sea oats and farewell-summer (Symphyotrichum lateriflorum). Soils meet the characteristics for the hydric soil indicators Depleted Matrix (F3) and Redox Depressions (F8). Hydrology indicators observed include Surface Water (A1), High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9), Geomorphic Position (D2), and a positive FAC-Neutral Test (D5).

Wetland w02 (0.15 acre)

Wetland w02 (0.15 acre) is a PFO wetland located in a depression abutting stream s04 (Poplar Creek). The tree stratum is dominated by American elm and American sycamore (Platanus occidentalis). The sapling/shrub strata is dominated by silky dogwood (Cornus amomum), American elm, and common privet (Ligustrum sinense). The herb stratum is dominated by northern sea oats. Soils meet the characteristics for the hydric soil indicator Depleted Matrix (F3). Hydrology indicators observed include Surface Water (A1), High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9), Geomorphic Position (D2), and a positive FAC-Neutral Test (D5).

Four streams were determined to exist within the survey area (Figure 5 in Attachment A). Completed Hydrological Determination Field Data Sheets for the streams are provided in Appendix D of Attachment A.

Summary of Delineated Streams						
Stream ID	Name	OHWM Width (feet)	OHWM Depth (feet)	Flow Regime	Hydrologic Determination Score (Narrative Rating)	Size (acres) Within Survey Area[1]
s01	Unnamed Tributary to Poplar Creek	1.5	0.3	Ephemeral	10.5 (Wet Weather Conveyance)	0.004

Enbridge – East Tennessee Natural Gas
WART TOPS Replacement Project
General Aquatic Resource Alteration Permit for Minor Alterations to Wetland
Supplemental Information

Summary of Delineated Streams						
Stream ID	Name	OHWM Width (feet)	OHWM Depth (feet)	Flow Regime	Hydrologic Determination Score (Narrative Rating)	Size (acres) Within Survey Area[1]
s02	Unnamed Tributary to Poplar Creek	2.0	0.5	Intermittent	21.5 (Stream)	0.003
s03	Unnamed Tributary to Poplar Creek	1.0	0.2	Ephemeral	15.25 (Wet Weather Conveyance)	0.003
s04	Poplar Creek	150.0	6.0	Perennial	56.0 (Stream)	2.47
					Total	2.48
[1]Note: Delineated streams may extend outside of survey area						

Stream s01 (0.004 acre)

Stream s01 (0.004 acre) is an ephemeral waterway that flows from the north towards the south within the south-central portion of the survey area. The OHWM width of the stream is approximately 1.5 feet and the OHWM depth is approximately 4 inches. The OHWM was determined by the observation of defined bed and bank; sediment sorting; leaf litter disturbed or washed away; and vegetation matted down, bent, or absent. The substrate consists primarily of cobble and gravel. Although it is located within the project study area, Stream s01 will not be impacted by the proposed project.

Stream s02 (0.003 acre)

Stream s02 (0.003 acre) is an intermittent waterway that flows from the north towards the south within the south-central portion of the survey area. Stream s02 flows from a culvert outlet pipe that is likely tied into the stormwater detention pond located near the electrical substation to the east of the survey area. The OHWM width of the stream is approximately 2 feet and the OHWM depth is approximately 6 inches. The OHWM was determined by the observation of defined bed and bank; sediment sorting; leaf litter disturbed or washed away; and vegetation matted down, bent, or absent. The substrate consists of silt, clay, and mud. Although it is located within the project study area, Stream s02 will not be impacted by the proposed project.

Stream s03 (0.003 acre)

Stream s03 (0.003 acre) is an ephemeral waterway that flows from the north towards the south within the south-central portion of the survey area. The OHWM width of the stream is approximately 1 –foot and the OHWM depth is approximately 2 inches. The OHWM was determined by the observation of defined bed and bank; sediment sorting; leaf litter disturbed or washed away; and vegetation matted

down, bent, or absent. The substrate consists of silt, clay, and mud. Stream s03 will be impacted by the proposed project.

Stream s04 (2.47 acre)

Stream s04 (2.47 acre) is a named perennial waterway (Poplar Creek) that flows from the east towards the west in the south-central portion of the survey area. The OHWM width of the stream is approximately 150 feet at the centerline of the survey area and the OHWM depth is approximately 6 feet. The OHWM was determined by the observation of defined bed and bank; sediment sorting; leaf litter disturbed or washed away; vegetation matted down, bent, or absent, and shelving. The substrate consists primarily of sand and gravel. Although it is located within the project study area, Stream s04 will not be impacted by the proposed project.

6.5 – Narrative description of the proposed stream characteristics.

The proposed project will include temporary clearing and conversion of approximately 0.06 acres of wetland w02. Once the project is complete, the affected area of w02 will be restored to its preconstruction contours and allowed to revert to its original vegetated condition (See Attachment D).

The proposed project will include temporary clearing of approximately 121 square feet of stream s03. Once the project is complete, the affected area of s03 will be restored to its preconstruction contours and allowed to revert to its original flow regime (See Attachment D).

6.6 – Wetland delineation

A Wetland Delineation Report is included as Attachment A.

6.7 – Jurisdictional determination documents.

The intermittent waterbody designated as abutting or adjacent within the Project area are assumed to be under the jurisdiction of the U.S. Army Corps of Engineers' Pre-Jurisdictional Determination and of the Tennessee Department of Environment and Conservation as waters of the state.

Section 7 – Project Rationale

The purpose of the Projects is to remediate a segment of pipeline by replacement due to the failure of cathodic protection. The need for the Project is to replace potentially damaged pipe with new pipe and new cathodic protection to increase the longevity of the existing pipeline.

The only alternative for this Project would be a No Action alternative. In this instance, a No Action alternative is not feasible, as it would create integrity issues for the pipeline.

Section 8 – Technical Information

8.1 – Detailed plans, specifications, blueprints, or legible sketches of present site conditions and the proposed activity

Project Site Plans are included in Attachment B of this application package.

8.2 – Mitigation and sequencing of events and construction methods

Prior to initiating construction, erosion control measures will be installed as necessary to prevent off-site transport of sediment to adjacent resources. The new replacement pipe will be installed by exposing the existing ends of the casing pipe on each side of the railroad crossing. The carrier pipe will be cut at each exposure and removed from the casing pipe. The new replacement pipe will be pulled through the existing casing pipe and tie-in welds will connect each end to the remaining existing carrier pipe. All disturbed areas will be backfilled, compacted, and returned to original contours. The disturbed areas will be seeded with a native seed mix and covered with straw mulch and/or erosion control matting. Erosion control measures will remain in place until the site is stable and revegetated.

8.3 – Erosion prevention and sediment control

Where practicable, construction activities will be completed under dry conditions to mitigate any potential effects to water quality. Erosion and sediment control measures will be in place and functional to prevent sedimentation to adjacent resources. Upon completion of the work, the areas will be seeded with native species and covered with straw and/or erosion control matting. National Pollutant Discharge Elimination System Stormwater Permit coverage is not required for the Project; however, the Project will be conducted in compliance with the FERC *Upland Erosion Control, Revegetation, and Maintenance Plan* and *Wetland and Waterbody Construction and Mitigation Procedures.* Additionally, industry standard best management practices outlined in ETNG's Erosion & Sedimentation Control Plan will be utilized throughout the Project (Attachment C).

Section 9 – Water Resources Degradation

The proposed Project will cause *de minimis* degradation of water quality. The proposed Project crosses one wet weather conveyance and a portion of one wetland. Erosion control devices will be installed to prevent sedimentation. Construction and equipment will avoid wetlands and waters that are not within the direct Project right of way by avoiding staging or parking in these areas. Following the installation of the replacement pipeline segment, the area will be backfilled and restored to pre-existing grade and contours. Construction matting will be removed, and all disturbed areas will be seeded with an appropriate native seed mixture. All phases of construction will be completed with appropriate soil and erosion control measures. All impacts within waterbodies will be temporary.

Attachment A: Wetland Delineation Report

WART-TOPS Replacement and Abandonment Project

Roane County, Tennessee

Texas Eastern Transmission, LP

Wetland Delineation Report

Prepared by:

merjent

January 2023

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1.0 INTRODUCTION

Merjent, Inc. (Merjent) delineated wetlands and other waters within a 29.6-acre survey area in Roane County, Tennessee for the Texas Eastern Transmission, LP (Texas Eastern) WART-TOPS Replacement and Abandonment Project (Project). Other waters can include, but are not limited to, streams, ponds, and lakes. Texas Eastern, a subsidiary of Enbridge, provided Merjent a 29.6-acre survey area to complete wetland and other water delineations (Figure 1). Field surveys were conducted on December 9, 2022, within the survey area. This wetland delineation report will be used to support future maintenance activity, planning, and permitting.

ETNG is proposing to replace approximately 240 feet of its existing 22-inch diameter natural gas pipeline where the pipeline crosses the Heritage Railroad. The Project will be accessed from County Road 327 (Blair Road) along an existing permanent access road (PAR) from the north within the Construction Work Area (CWA) and from and an existing temporary access road (TAR) to the south. The CWA consists of one PAR, one TAR and temporary workspaces (TWS) located within and adjacent to ETNG's easement.

This report outlines the wetland delineation investigation, methodology, and findings as completed by Merjent. This report has been compiled by the following staff that are trained and experienced in wetland delineation methodologies and applicable regulations:

- **Ashley Guell; Field Manager, Report Author**

Mrs. Ashley Guell is a consultant specializing in environmental field surveys, permitting, and project management in the Upper Midwest and east coast. Mrs. Guell has over 10 years of experience serving oil & gas, transmission, and development sectors. On behalf of her clients, Mrs. Guell works with environmental permitting agencies to streamline the permitting process and ensure an appropriate timeline is maintained. Mrs. Guell coordinates and conducts field surveys and desktop reviews of threatened and endangered species surveys, habitat assessments, wetland delineations, cultural resources, and contaminated land investigations.

- **Tanner Morris; Field Lead, Report Author**

Tanner Morris, MS, PWS, CE is a Senior Analyst and skilled field botanist with over 11 years of technical experience managing and completing routine to complex projects for a variety of clients across the Midwest. His expertise includes performing botanical surveys, rare plant surveys, floristic quality assessments, plant community classifications, invasive species mapping, wetland delineations, and habitat assessments. Mr. Morris has worked across a variety of market sectors including oil and gas, transmission lines, private developers, departments of transportation, universities, non-profits, and state agencies. His expertise includes preparation of environmental permit applications, coordination with regulatory agencies, and biological studies.

- **James Heideman; GIS Analyst**

Mr. James Heideman is a GIS Specialist with 11 years of experience in environmental consulting, focusing on cultural resource management and environmental permitting. His expertise includes the use of various GIS products for the purposes of field data collection, spatial data post-processing and analysis, and technical report figure production. Mr. Heideman has worked on projects across the Midwest supporting a variety of sectors that include renewables, electrical transmission, oil and gas, transportation, mining, and water and sewage.

2.0 METHODS

2.1 DESKTOP REVIEW

Desktop resources were used to identify potential wetlands and other waters within the survey area. The following sources of information were consulted to identify potential wetlands within the survey area prior to field investigation:

- U.S. Geological Survey (USGS) Topographical Map (Figure 2; USGS, 2021)
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Roane County, Tennessee (Figure 3; Soil Survey Staff, NRCS, USDA, 2019)
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) (Figure 4; USFWS, 2021)
- USGS National Hydrography Dataset (NHD) (Figure 4; USGS, 2021)
- Environmental Systems Research Institute (ESRI) Basemap Aerial Imagery (Figures 3-5)
- Google Earth™ Aerial Imagery (multiple years)

2.2 FIELD INVESTIGATION METHODOLOGY

The delineation of wetlands and other waters were based on the methodology described in the U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual (Environmental Laboratory, 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (USACE, 2010). Other waters were identified in accordance with the USACE Jurisdictional Determination Form Instructional Guidebook (USACE-U.S. Environmental Protection Agency, 2007).

Prior to the field work, background information was reviewed to establish the potential location of wetlands and other waters within the survey area. On December 9, 2022, the survey area was walked with the intent of determining wetland and stream boundaries. Data points were sampled at locations within or near the wetland areas to document soil characteristics, evidence of hydrology, and dominant vegetation. Vegetative community boundaries were identified according to the Cowardin Classification System (Cowardin et al., 1979).

During the field review, the Tennessee Department of Environment and Conservation's (TDEC) Tennessee Rapid Assessment Method for Wetlands (TRAM) was used to evaluate the wetlands and Hydraulic Determination Field Data Sheets were used to evaluate the streams identified within the survey area.

2.2.1 Naming Protocol

Features identified in associated figures and appendices are named in the following manner:

- Wetlands (w01, w02, etc.)
- Streams (s01, s02, etc.)
- Data points (dp01, dp02, etc.)
- Photo points (pp01, pp02, etc.)

2.2.2 Site Photographs

Photos (Appendix A) were taken to provide a visual representation of wetland communities and boundaries, as well as general site conditions, at the time of inspection. Photos were geospatially referenced by their associated photo point location and presented with direction taken (e.g., “pp01 view West,” “pp02 view Northeast”). Photo point locations are depicted in the wetland delineation figure (Figure 5).

2.2.3 Delineation Data Sheets

The wetland determination data forms (Appendix B) were completed to document if representative data points meet or do not meet each of the wetland criteria. Plant species nomenclature follows the Regional Wetland Plant List (USACE, 2020). Hydric soils were identified using the methods outlined in Field Indicators of Hydric Soils in the United States, Version 8.2 (USDA-NRCS, 2018).

2.2.4 Survey of Wetlands and Other Waters Boundaries

Merjent surveyed all data point locations, wetland boundaries, and Ordinary High-Water Mark (OHWM) of streams using Global Positioning System (GPS) technology capable of sub-meter accuracy. While these surveys provide reasonably accurate spatial data, they do not provide the same level of accuracy as a professional land survey. Wetland and stream boundaries were not flagged during the field survey.

2.2.5 Previous Site Review

Merjent is unaware of previous wetland delineation mapping at this site or associated regulatory review.

3.0 RESULTS AND DISCUSSION

3.1 DESKTOP REVIEW

3.1.1 Topography

The USGS topographic map (Figure 2) shows generally low relief with the landscape sloping gently towards Poplar Creek. Elevations within the 29.6-acre survey area range from 797 feet above mean sea level to 746 feet above mean sea level (USGS, 2021).

3.1.2 Soil Survey

No digital data are available on the NRCS soil map (Figure 3; Soil Survey Staff, NRCS, USDA, 2019).

3.1.3 Mapped Wetlands and Other Waters

A background investigation of NWI and NHD data identified one 2.43-acre wetland/waterway complex within the south-central portion of the survey area (Figure 4). The named stream is Poplar Creek and is characterized as a perennial waterway.

3.1.4 Current, Historic, and High-Resolution Aerial Imagery

Multiple sources of historic aerial imagery were reviewed to evaluate the survey area for wetland signatures. Based on this review, potential wetland signatures were found in riparian areas, field drainage ways, and localized depressions expressing saturated soils along Poplar Creek.

3.1.5 Recent Climatic Conditions and Precipitation Data

The NRCS Climate Analysis for Wetlands (WETS) Tables define the normal range for monthly precipitation over a representative period (USDA, 2022). Recent precipitation data were compared with historic precipitation data from a 30-year dataset (1992-2022) from a nearby WETS weather station (Kingston, TN) to determine if normal hydrologic and climatic conditions were present on-site during field delineations. When compared, the observed precipitation data from three months prior to the field delineations indicate normal precipitation conditions in the region at the time of survey (Table 3-1).

TABLE 3-1

WETS Analysis – December 2022

	Long-term rainfall records (1992-2022)								
WETS Station Kingston, TN	**Month**	**<30%**	**Mean**	**>30%**	**Actual**	**Condition**	**Condition Value**	**Weight**	**Value X Weight**
3rd Prior Month	September	2.61	4.45	5.41	3.79	Normal	2	1	2
2nd Prior Month	October	1.55	3.31	4.05	1.17	Dry	1	2	2
1st Prior Month	November	3.11	4.48	5.32	4.37	Normal	2	3	6
								Sum:	**10**

If sum is:		**Condition Values:**
6 to 9	then prior period has been drier than normal	(1) Dry
10 to 14	then prior period has been normal	(2) Normal
15 to 18	then prior period has been wetter than normal	(3) Wet

Conditions on Site:	**Normal**

3.2 FIELD INVESTIGATION

Land use within the survey area consists of maintained right-of-way (ROW), upland riparian forest, and old field habitat. An electric substation is located to the north and east of the Project. The survey area abuts a maintained railroad ROW that runs north and along the eastern portion of the survey area Project. An existing gravel access road to the substation is present within the utility ROW and crosses the north-central portion of the survey area.

The survey area is in the Southern Limestone/Dolomite Valleys and Low Rolling Hills subregion of the Interior Plateau ecoregion. This region is dominated by limestone and cherty dolomite, with soils that vary in their productivity. Most of the region landcover varies between agriculture, urban and industrial, and areas of thick forest. The natural vegetation consisted of white oak forest, sycamore-ash-elm floodplain forest and grassland barrens intermixed with cedar-pine glades. (Omernik, 1987).

3.2.1 Uplands

The upland areas within the survey area consist of primarily utility ROWs, old fields, and riparian forest areas. Dominant vegetation in the survey area within the upland forest areas includes scarlet oak (*Quercus coccinea*), eastern red-cedar (*Juniperus virginiana*), American sycamore (*Platanus occidentalis*), American elm (*Ulmus americana*), and honey locust (*Gleditsia triacanothos*) in the tree stratum. The shrub areas are dominated by coralberry (*Symphoricarpos orbiculatus*), Amur honeysuckle (*Lonicera maackii*), and Chinese privet (*Ligustrum sinense*). The herb stratum is dominated by Japanese stilt grass (*Microstegium vimineum*), Chinese bush-clover (*Lespedeza cuneata*), and northern wood-oats (*Chasmanthium latifolium*).

The old field habitat is dominated by broom-sedge (*Andropogon virginicus*), white oldfield American-aster (*Symphyotrichum pilosum*), tall goldenrod (*Solidago altissima*), Chinese bush-clover, and tall ironweed (*Vernonia gigantea*).

The mowed herbaceous ROW is dominated by tall false rye grass (*Schedonorus arundinaceus*), Kentucky bluegrass (*Poa pratensis*), tall redtop (*Tridens flavus*), broom-sedge, and beaked cut-throat grass (*Coleataenia anceps*).

3.2.2 Wetlands

Based on a field investigation conducted by Merjent on December 9, 2022, and review of desktop resources, it is our professional opinion that two wetlands totaling 0.26 acre occur within the survey area (Figure 5; Table 3-2).

Representative photographs of the wetlands are provided in Appendix A. More detailed information for associated data points may be found in the wetland determination forms (Appendix B). A summary of the wetland is provided below. Completed TRAM forms for the wetlands are provided in Appendix C.

TABLE 3-2
Summary of Delineated Wetlands

Wetland ID	Cowardin Classification[1]	Hydrogeomorphic (HGM) Classification	TRAM Category (Score)	Size (acres) within Survey Area[2]
w01	PFO	Riverine	Moderate Resource Value (59.4)	0.11
w02	PFO	Riverine	Moderate Resource Value (62.0)	0.15
			Total:	**0.26**

PFO = palustrine forested

[1] Source: Cowardin et al., 1979

[2] Note: delineated wetlands may extend outside of survey area.

3.2.2.1 Wetland w01 (0.11 acre)

Wetland w01 (0.11 acre) is a palustrine forested (PFO) wetland located in a depression adjacent to stream s04 (Poplar Creek). The tree and sapling/shrub strata are dominated by American elm (*Ulmus americana*). The herb stratum is dominated by northern sea oats and farewell-summer (*Symphyotrichum lateriflorum*). Soils meet the characteristics for the hydric soil indicators Depleted Matrix (F3) and Redox Depressions (F8). Hydrology indicators observed include Surface Water (A1), High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9), Geomorphic Position (D2), and a positive FAC-Neutral Test (D5).

3.2.2.2 Wetland w02 (0.15 acre)

Wetland w02 (0.15 acre) is a PFO wetland located in a depression abutting stream s04 (Poplar Creek). The tree stratum is dominated by American elm and American sycamore (*Platanus occidentalis*). The sapling/shrub strata is dominated by silky dogwood (*Cornus amomum*), American elm, and common privet (*Ligustrum sinense*). The herb stratum is dominated by northern sea oats. Soils meet the characteristics for the hydric soil indicator Depleted Matrix (F3). Hydrology indicators observed include Surface Water (A1), High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9), Geomorphic Position (D2), and a positive FAC-Neutral Test (D5).

3.2.3 Streams

Merjent determined that four streams exist within the survey area (Figure 5; Table 3-3). Representative photographs of the streams are provided in Appendix A. Completed Hydrological Determination Field Data Sheets for the streams are provided in Appendix D.

TABLE 3-3
Summary of Delineated Streams

Stream ID	Name	OHWM Width (feet)	OHWM Depth (feet)	Flow Regime	Hydrologic Determination Score (Narrative Rating)	Size (acres) within Survey Area[1]
s01	Unnamed Tributary to Poplar Creek	1.5	0.3	Ephemeral	10.5 (Wet Weather Conveyance)	0.004
s02	Unnamed Tributary to Poplar Creek	2.0	0.5	Intermittent	21.5 (Stream)	0.003
s03	Unnamed Tributary to Poplar Creek	1.0	0.2	Ephemeral	15.25 (Wet Weather Conveyance)	0.003
s04	Poplar Creek	150.0	6.0	Perennial	56.0 (Stream)	2.47
					Total:	2.48

[1] Note: Delineated streams may extend outside of survey area

3.2.3.1 Stream s01 (0.004 acre)

Stream s01 (0.004 acre) is an ephemeral waterway that flows from the north towards the south within the south-central portion of the survey area. The OHWM width of the stream is approximately 1.5 feet and the OHWM depth is approximately 4 inches. The OHWM was determined by the observation of defined bed and bank; sediment sorting; leaf litter disturbed or washed away; and vegetation matted down, bent, or absent. The substrate consists primarily of cobble and gravel.

3.2.3.2 Stream s02 (0.003 acre)

Stream s02 (0.003 acre) is an intermittent waterway that that flows from the north towards the south within the south-central portion of the survey area. Stream s02 flows from a culvert outlet pipe that is likely tied into the stormwater detention pond located near the electrical substation to the east of the survey area. The OHWM width of the stream is approximately 2 feet and the OHWM depth is approximately 6 inches. The OHWM was determined by the observation of defined bed and bank; sediment sorting; leaf litter disturbed or washed away; and vegetation matted down, bent, or absent. The substrate consists of silt, clay, and mud.

3.2.3.3 Stream s03 (0.003 acre)

Stream s03 (0.003 acre) is an ephemeral waterway that flows from the north towards the south within the south-central portion of the survey area. The OHWM width of the stream is approximately 1 –foot and the OHWM depth is approximately 2 inches. The OHWM was determined by the observation of defined bed and bank; sediment sorting; leaf litter disturbed or washed away; and vegetation matted down, bent, or absent. The substrate consists of silt, clay, and mud.

3.2.3.4 Stream s04 (2.47 acre)

Stream s04 (2.47 acre) is a named perennial waterway (Poplar Creek) that flows from the east towards the west in the south-central portion of the survey area. The OHWM width of the stream is approximately 150 feet at the centerline of the survey area and the OHWM depth is approximately 6 feet. The OHWM was determined by the observation of defined bed and bank; sediment sorting; leaf litter disturbed or washed away; vegetation matted down, bent, or absent, and shelving. The substrate consists primarily of sand and gravel.

3.2.4 Other Surface Water Resources

Two upland drainages are observed within the central portion of the survey area. While top soils are absent along portions of these features, neither are continuous across the landscape or have a continuous bed or bank.

4.0 SUMMARY AND CONCLUSION

Based on a field investigation conducted by Merjent on December 9, 2022, and review of desktop resources, it is our professional opinion that two wetlands totaling 0.26 acre and four streams totaling 2.48 acre exist within the survey area. No other water resources were identified within the survey area. This report represents our best professional judgment based on our local knowledge and experience.

5.0 DISCLAIMER

Resources identified in this report may be subject to regulation by federal, state, and/or local jurisdiction. These authorities may require a professional land survey of the delineated boundaries to verify impacts for regulatory purposes.

The field survey results presented herein apply to the existing and reasonably foreseeable site conditions at the time of the assessment. They cannot apply to site changes of which Merjent is unaware and has not had the opportunity to review. Changes in the condition of a property may occur with time due to the natural processes or human impacts at the Project site or on adjacent properties. Changes in applicable standards may also occur as a result of legislation or the expansion of knowledge over time. Accordingly, the findings of this report may be invalidated, wholly or in part, by changes beyond the control of Merjent.

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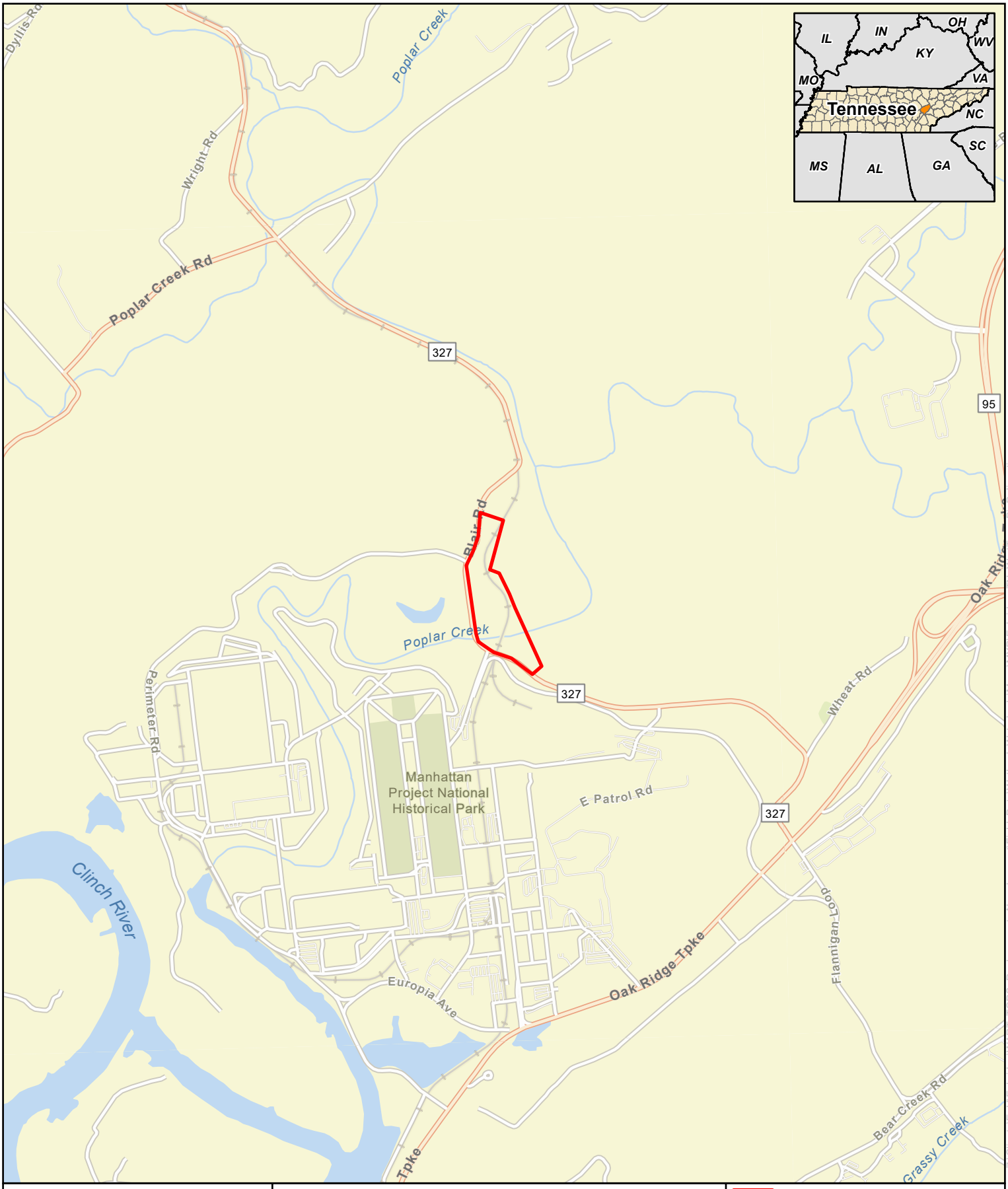
Figure 1
Project Location



0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

merjent

For Environmental Review Purposes Only

Figure 1: Project Location

Enbridge

WART-TOPS Replacement and Abandonment

Roane County, Tennessee

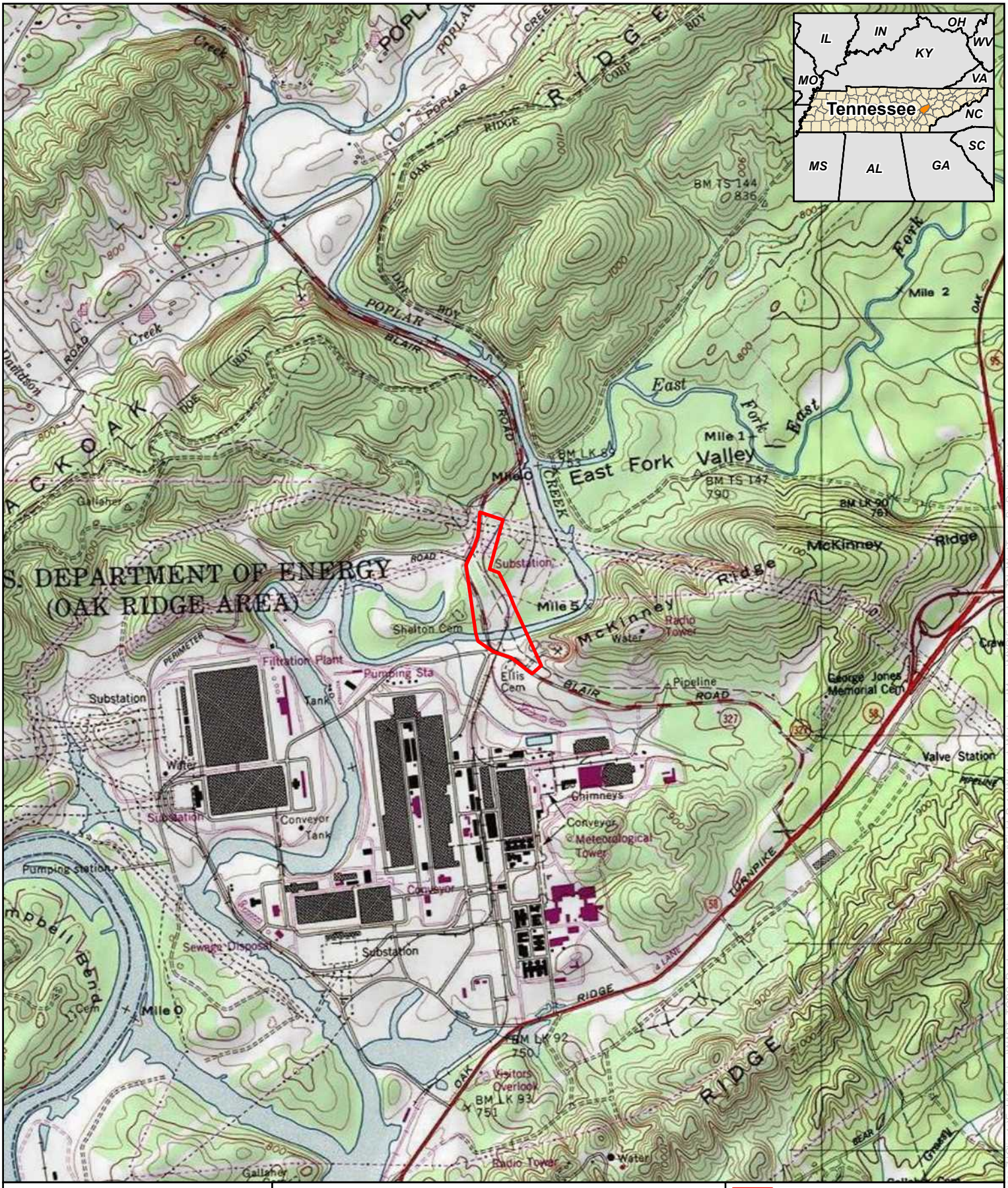
Survey Area

Source: Z:\Clients\E_H\Enbridge\WART_TOPS_Replacement_Abandonment\Field_Data\Wetland_Waterbody\Maps\MXD\Enbridge_TN_WartTops_BioDelineation.aprx

Date: (12/27/2022)

Figure 2

Topography



0 1,000 2,000 Feet

1 inch = 2,000 feet

N W E S

merjent

For Environmental Review Purposes Only

Figure 2: Project Location and Topography

Enbridge

WART-TOPS Replacement and Abandonment

Roane County, Tennessee

Survey Area

Source: Z:\Client\E_H\Enbridge\WART_TOPS_Replacement_Abandonment\Field_Data\Wetland_Waterbody\Maps\MXD\Enbridge_TN_WartTops_BioBellneation.aprx

Date: (12/27/2022)

Figure 3
SSURGO Soil Type

0 150 300 Feet

1 inch = 300 feet

N W E S

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Figure 4: SSURGO Soil Type

Enbridge

WART-TOPS Replacement and Abandonment

Roane County, Tennessee

Survey Area

Hydric Soil*

Non-Hydric Soil*

*No features within data frame

Source: Z:\Clients\E_H\Enbridge\WART_TOPS_Replacement_Abandonment\Field_Data\Wetland_WaterbodyMaps\MXD\Enbridge_TN_WartTops_BioDelineation.aprx

Date: (1/13/2023)

Figure 4

Hydrology

0 150 300 Feet

1 inch = 300 feet

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Figure 4: Hydrology

Enbridge

WART-TOPS Replacement and Abandonment

Roane County, Tennessee

Survey Area

NHD Waterway

NHD Waterbody

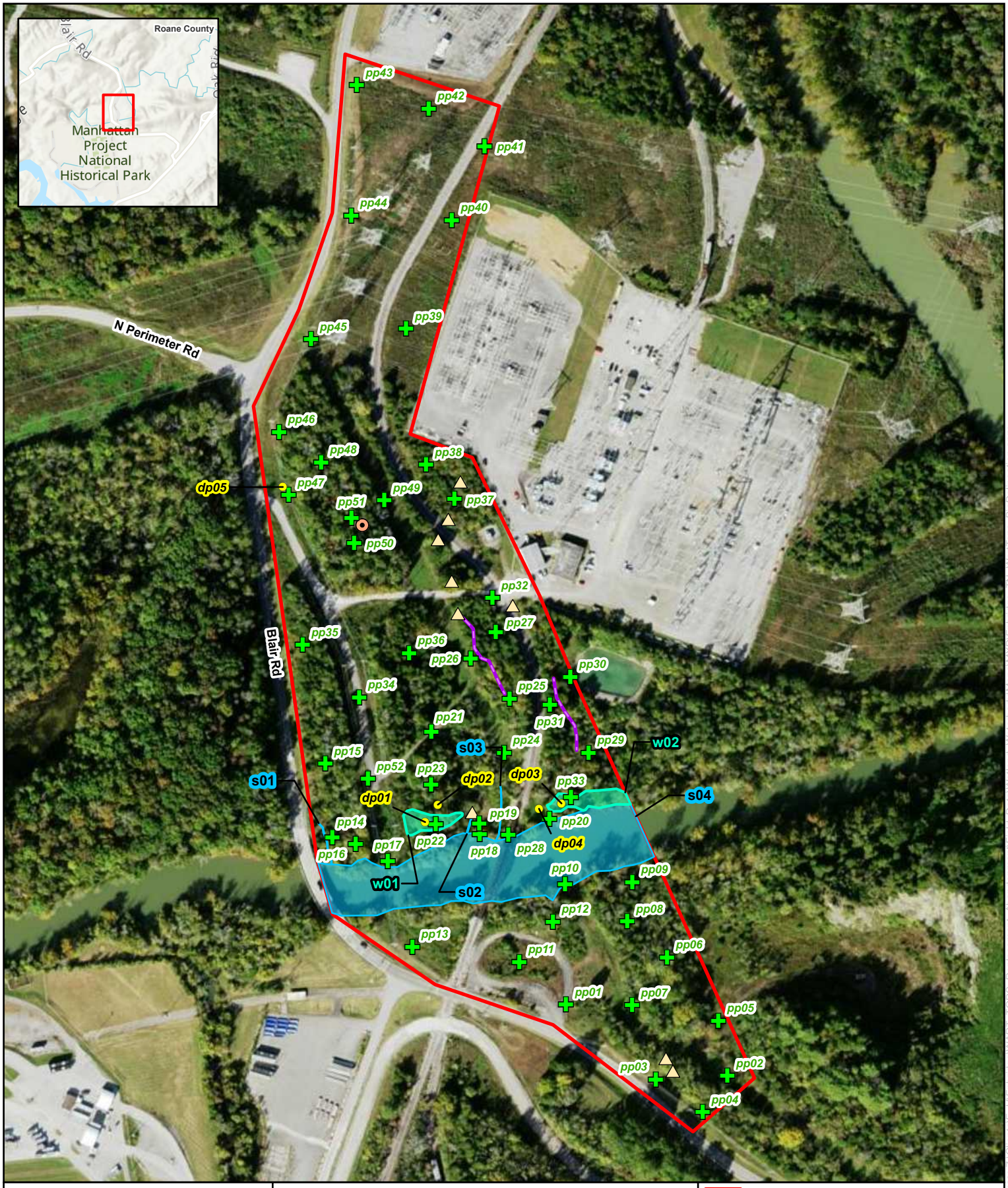
NWI Wetland

Source: Z:\Clients\E_H\Enbridge\WART_TOPS_Replacement_Abandonment\Field_Data\Wetland_Waterbody\Maps\MXD\Enbridge_TN_WarTops_BioDelineation.aprx

Date: (1/13/2023)

Figure 5

Wetland Delineation



0 150 300 Feet

1 inch = 300 feet

N W E S

merjent

For Environmental Review Purposes Only

Figure 5: Wetland and Waterbody Delineation Map

Enbridge

WART-TOPS Replacement and Abandonment

Roane County, Tennessee

- Survey Area
- Photo Point
- Existing Culvert
- Existing Well
- Wetland Data Point
- Isolated Drainage Swale
- Delineated Waterway
- Community Type
- PFO

Source: Z:\Clients\E_H\Enbridge\WART_TOPS_Replacement_Abandonment\Field_Data\Wetland_Waterbody\Maps\MXD\Enbridge_TN_WartTops_BioDelineation.aprx

Date: (12/27/2022)

Appendix A
Survey Photographs

Photograph pp01 view East

Photograph pp01 view North

Photograph pp01 view South

Photograph pp01 view West

Photograph pp02 view Northeast

Photograph pp02 view Northwest

Photograph pp02 view Southeast

Photograph pp02 view Southwest

Photograph pp03 view Northeast

Photograph pp03 view Northwest

Photograph pp03 view Southeast

Photograph pp04 view Northeast

Photograph pp04 view Northwest

Photograph pp05 view Northwest

Photograph pp05 view Southeast

Photograph pp06 view North

Photograph pp06 view South

Photograph pp07 view North

Photograph pp07 view South

Photograph pp08 view East

Photograph pp08 view North

Photograph pp08 view South

Photograph pp08 view West

Photograph pp09 view North

Photograph pp09 view South

Photograph pp10 view East

Photograph pp10 view North

Photograph pp10 view South

Photograph pp10 view West

Photograph pp11 view East

Photograph pp11 view North

Photograph pp11 view South

Photograph pp11 view West

Photograph pp12 view North

Photograph pp12 view South

Photograph pp13 view East

Photograph pp13 view North

Photograph pp13 view South

Photograph pp13 view West

Photograph pp14 view East

Photograph pp14 view North

Photograph pp14 view South

Photograph pp14 view West

Photograph pp15 view North

Photograph pp15 view South

Photograph pp16 view North

Photograph pp16 view South

Photograph pp17 view East

Photograph pp17 view North

Photograph pp17 view South

Photograph pp17 view West

Photograph pp18 view Southeast

Photograph pp19 view East

Photograph pp19 view North

Photograph pp19 view South

Photograph pp19 view West

Photograph pp20 view East

Photograph pp20 view North

Photograph pp20 view South

Photograph pp20 view West

Photograph pp21 view Northeast

Photograph pp21 view Northwest

Photograph pp21 view Southeast

Photograph pp21 view Southwest

Photograph pp22 view East

Photograph pp22 view North

Photograph pp22 view South

Photograph pp22 view West

Photograph pp23 view North

Photograph pp23 view South

Photograph pp24 view Northeast

Photograph pp24 view Northwest

Photograph pp24 view Southeast

Photograph pp24 view Southwest

Photograph pp25 view East

Photograph pp25 view North

Photograph pp25 view South

Photograph pp25 view West

Photograph pp26 view North

Photograph pp26 view South

Photograph pp27 view North

Photograph pp27 view South

Photograph pp28 view East

Photograph pp28 view North

Photograph pp28 view South

Photograph pp28 view West

Photograph pp29 view East

Photograph pp29 view North

Photograph pp29 view South

Photograph pp29 view West

Photograph pp30 view North

Photograph pp30 view Southeast

Photograph pp31 view North

Photograph pp31 view South

Photograph pp32 view East

Photograph pp32 view West

Photograph pp33 view East

Photograph pp33 view North

Photograph pp33 view South

Photograph pp33 view West

Photograph pp34 view North

Photograph pp34 view South

Photograph pp35 view North

Photograph pp35 view South

Photograph pp36 view East

Photograph pp36 view West

Photograph pp37 view Northeast

Photograph pp37 view Northwest

Photograph pp37 view Southeast

Photograph pp37 view Southwest

Photograph pp38 view North

Photograph pp38 view South

Photograph pp39 view North

Photograph pp39 view South

Photograph pp40 view North

Photograph pp40 view South

Photograph pp41 view East

Photograph pp41 view North

Photograph pp41 view South

Photograph pp41 view West

Photograph pp42 view North

Photograph pp42 view South

Photograph pp43 view North

Photograph pp43 view South

Photograph pp44 view North

Photograph pp44 view South

Photograph pp45 view North

Photograph pp45 view Southeast

Photograph pp46 view North

Photograph pp46 view South

Photograph pp47 view East

Photograph pp47 view North

Photograph pp48 view North

Photograph pp48 view South

Photograph pp49 view Northwest

Photograph pp49 view Southeast

Photograph pp50 view North

Photograph pp50 view South

Photograph pp51 view South

Photograph pp52 view North

Photograph pp52 view South

Appendix B

Wetland Determination Data Forms – Eastern Mountains and Piedmont Region

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: WART-TOPS Replacement and Abandonment City/County: Roane County Sampling Date: 2022-12-09

Applicant/Owner: Enbridge State: Tennessee Sampling Point: dp01

Investigator(s): TM Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR N, MLRA 128 Lat: 35.942568 Long: -84.390261 Datum: WGS84

Soil Map Unit Name: No Digital Data Available NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓ No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:
PFO wetland located in depression in floodplain. Antecedent precipitation conditions at time of survey indicate normal conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 12
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: dp01

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ulmus americana*	75	Y	FACW
2. *Platanus occidentalis*	15	N	FACW
3. *Celtis occidentalis*	10	N	FACU
4.			
5.			
6.			
7.			
	100.0 = Total Cover		
50% of total cover: 50.0	20% of total cover: 20.0		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Ulmus americana*	20	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	20.0 = Total Cover		
50% of total cover: 10.0	20% of total cover: 4.0		
Herb Stratum (Plot size: 5)			
1. *Chasmanthium latifolium*	65	Y	FACU
2. *Symphyotrichum lateriflorum*	35	Y	FACW
3. *Lonicera japonica*	5	N	FACU
4. *Carex blanda*	5	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	110.0 = Total Cover		
50% of total cover: 55.0	20% of total cover: 22.0		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0.0	20% of total cover: 0.0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	145.00	x 2 =	290.00
FAC species	5.00	x 3 =	15.00
FACU species	80.00	x 4 =	320.00
UPL species	0.00	x 5 =	0.00
Column Totals:	230.00 (A)		625.00 (B)

Prevalence Index = B/A = 2.72

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: dp01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/2	92	7.5YR 4/4	8	C	M	SICL	
6-24	10YR 5/2	90	10YR 3/6	10	C	M	SICL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: WART-TOPS Replacement and Abandonment City/County: Roane County Sampling Date: 2022-12-09

Applicant/Owner: Enbridge State: Tennessee Sampling Point: dp02

Investigator(s): TM Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): None Slope (%): 0-2

Subregion (LRR or MLRA): LRR N, MLRA 128 Lat: 35.942657 Long: -84.390091 Datum: WGS84

Soil Map Unit Name: No Digital Data Available NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:
Upland data point located in floodplain. Antecedent precipitation conditions at time of survey indicate normal conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ____	No ✓	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ✓	Depth (inches): ____

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: dp02

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Liquidambar styraciflua*	45	Y	FAC
2. *Juniperus virginiana*	35	Y	FACU
3. *Ulmus americana*	15	N	FACW
4.			
5.			
6.			
7.			
	95.0 = Total Cover		
50% of total cover: 47.5	20% of total cover: 19.0		

Sapling/Shrub Stratum (Plot size: 15)			
1. *Lonicera morrowii*	65	Y	FACU
2. *Ligustrum sinense*	20	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	85.0 = Total Cover		
50% of total cover: 42.5	20% of total cover: 17.0		

Herb Stratum (Plot size: 5)			
1. *Chasmanthium latifolium*	10	Y	FACU
2. *Allium vineale*	3	Y	FACU
3. *Polystichum acrostichoides*	2	N	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	15.0 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3.0		

Woody Vine Stratum (Plot size: 30)			
1. *Lonicera japonica*	5	Y	FACU
2.			
3.			
4.			
5.			
	5.0 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1.0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 14.29 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	15.00	x 2 =	30.00
FAC species	45.00	x 3 =	135.00
FACU species	140.00	x 4 =	560.00
UPL species	0.00	x 5 =	0.00
Column Totals:	200.00 (A)		725.00 (B)

Prevalence Index = B/A = 3.62

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: dp02

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 3/3	95	10YR 4/3	5	C	M	SIL	
11-24	10YR 4/3	100					L	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: WART-TOPS Replacement and Abandonment City/County: Roane County Sampling Date: 2022-12-09

Applicant/Owner: Enbridge State: Tennessee Sampling Point: dp03

Investigator(s): TM Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR N, MLRA 128 Lat: 35.942634 Long: -84.389117 Datum: WGS84

Soil Map Unit Name: No Digital Data Available NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes ✓** **No _____**
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:
PFO wetland located in depression in floodplain. Antecedent precipitation conditions at time of survey indicate normal conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 8	
Water Table Present?	Yes ✓	No _____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0	**Wetland Hydrology Present? Yes ✓ No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: dp03

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Platanus occidentalis*	45	Y	FACW
2. *Ulmus americana*	25	Y	FACW
3. *Salix nigra*	10	N	OBL
4.			
5.			
6.			
7.			
	80.0 = Total Cover		
50% of total cover: 40.0	20% of total cover: 16.0		

Sapling/Shrub Stratum (Plot size: 15)			
1. *Cornus amomum*	25	Y	FACW
2. *Ulmus americana*	15	Y	FACW
3. *Ligustrum sinense*	10	Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			
	50.0 = Total Cover		
50% of total cover: 25.0	20% of total cover: 10.0		

Herb Stratum (Plot size: 5)			
1. *Chasmanthium latifolium*	60	Y	FACU
2. *Lysimachia nummularia*	20	N	FACW
3. *Symphyotrichum lateriflorum*	15	N	FACW
4. *Carex frankii*	8	N	OBL
5. *Andropogon virginicus*	3	N	FACU
6.			
7.			
8.			
9.			
10.			
11.			
	106.0 = Total Cover		
50% of total cover: 53.0	20% of total cover: 21.2		

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0.0	20% of total cover: 0.0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	18.00	x 1 =	18.00
FACW species	145.00	x 2 =	290.00
FAC species	0.00	x 3 =	0.00
FACU species	73.00	x 4 =	292.00
UPL species	0.00	x 5 =	0.00
Column Totals:	236.00 (A)		600.00 (B)

Prevalence Index = B/A = 2.54

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: dp03

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/2	94	7.5YR 4/6	6	C	M	SICL	
8-24	10YR 5/2	92	10YR 4/4	8	C	M	SICL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: WART-TOPS Replacement and Abandonment City/County: Roane County Sampling Date: 2022-12-09

Applicant/Owner: Enbridge State: Tennessee Sampling Point: dp04

Investigator(s): TM Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR or MLRA): LRR N, MLRA 128 Lat: 35.942632 Long: -84.389364 Datum: WGS84

Soil Map Unit Name: No Digital Data Available NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:
Upland data point located in floodplain. Antecedent precipitation conditions at time of survey indicate normal conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: dp04

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
50% of total cover: 0.0	20% of total cover: 0.0		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	0 = Total Cover		
50% of total cover: 0.0	20% of total cover: 0.0		
Herb Stratum (Plot size: 5)			
1. *Vernonia gigantea*	25	Y	FAC
2. *Tridens flavus*	15	Y	FACU
3. *Poa pratensis*	15	Y	FACU
4. *Lonicera japonica*	12	N	FACU
5. *Schedonorus arundinaceus*	10	N	FACU
6. *Allium vineale*	8	N	FACU
7. *Rubus allegheniensis*	6	N	FACU
8. *Glechoma hederacea*	5	N	FACU
9.			
10.			
11.			
	96.0 = Total Cover		
50% of total cover: 48.0	20% of total cover: 19.2		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0.0	20% of total cover: 0.0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	25.00	x 3 =	75.00
FACU species	71.00	x 4 =	284.00
UPL species	0.00	x 5 =	0.00
Column Totals:	96.00 (A)		359.00 (B)

Prevalence Index = B/A = 3.74

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: dp04

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/4	92	10YR 4/3	8	C	M	SIL	
4-14	10YR 4/3	98	10YR 4/2	2	D	M	L	
14-24	10YR 4/4	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: WART-TOPS Replacement and Abandonment City/County: Roane County Sampling Date: 2022-12-09

Applicant/Owner: Enbridge State: Tennessee Sampling Point: dp05

Investigator(s): TM Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR or MLRA): LRR N, MLRA 128 Lat: 35.944863 Long: -84.391134 Datum: WGS84

Soil Map Unit Name: No Digital Data Available NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:
Upland data point located in depression along paved access road. Standing water present from recent rain. No hydrophytic vegetation or hydric soils present. Antecedent precipitation conditions at time of survey indicate normal conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 4
Water Table Present?	Yes ✓	No _____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: dp05

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0 = Total Cover		
50% of total cover: 0.0	20% of total cover: 0.0		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	0 = Total Cover		
50% of total cover: 0.0	20% of total cover: 0.0		
Herb Stratum (Plot size: 5)			
1. *Solidago altissima*	25	Y	FACU
2. *Poa pratensis*	25	Y	FACU
3. *Rubus allegheniensis*	15	Y	FACU
4. *Carex blanda*	12	N	FAC
5. *Ligustrum sinense*	12	N	FACU
6. *Allium vineale*	10	N	FACU
7. *Melilotus officinalis*	2	N	FACU
8. *Fragaria virginiana*	1	N	FACU
9.			
10.			
11.			
	102.0 = Total Cover		
50% of total cover: 51.0	20% of total cover: 20.4		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
50% of total cover: 0.0	20% of total cover: 0.0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	12.00	x 3 =	36.00
FACU species	90.00	x 4 =	360.00
UPL species	0.00	x 5 =	0.00
Column Totals:	102.00 (A)		396.00 (B)

Prevalence Index = B/A = 3.88

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: dp05

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/4	100					SI	
6-18	10YR 4/3	95	10YR 4/2	5	D	PL	SIL	
18-24	10YR 4/3	92	10YR 5/2	8	D	M	SIL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

Appendix C

TRAM Forms

Tennessee Rapid Assessment Method for Wetlands

(TRAM)

2017

State of Tennessee
Department of Environment and Conservation
Division of Water Resources
Natural Resources Unit
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243

Exceptional Status Wetlands

INSTRUCTIONS: Affirmative answers to the categories on the following page determine if the wetland has or may have special status within the state. **Numbers 1-6** in the following table should be answered based on information obtained through the TDEC. Waters designated as **Outstanding National Resource Waters (ONRW)** are defined in Rule 0400-40-03-.06(5)(a) of the TDEC General Water Quality Criteria. The designation of **Exceptional Tennessee Waters (ETW)** is defined as waters that have the characteristics outlined in Rule 0400-40-03-.06(4)(a) of the TDEC General Water Quality Criteria. **All ETW wetlands should be submitted to TDEC for official documentation.** The remaining **numbers (7-13)** in the following table are designed to indicate potentially outstanding ecological or recreational resource values as intended in Rule 0400-40-03-.06(4)(a)7. Wetlands that fall into these remaining categories or are determined by a professional to have potential for characteristics not specifically listed are considered strong candidates for ETW status pending final determination by TDEC.

The term "**documented**" as it relates to rare species occurrences (number 4) means locations discovered, verified and reported by an environmental scientist in the field, or are listed and verified to be extant in databases maintained by governmental and other organizations such as the Tennessee Division of Natural Areas, Tennessee Wildlife Resources Agency, Tennessee Ornithological Society, U.S. Fish and Wildlife Service, NatureServe, and others. Wetland plant community concepts and current NatureServe Association-level natural community conservation status ranks (number 8) can be retrieved at http://explorer.natureserve.org/servlet/NatureServe?init=Ecol or by request to TDEC's Division of Natural Areas.

An affirmative response to any of numbers 1-6 of the Decision Table identifies the wetland per rule as an Outstanding National Resource Water or Exceptional Tennessee Water. A positive response to 7-13 requires a final determination by the Department.

#	Wetland Feature Decision Table	Yes/No	Affirmative Result
1	The wetland has been designated as an **Outstanding National Resource Water (ONRW)** by the Department under 0400-40-03-.06(5)(a)**.**	No	**ORNW**
2	The wetland has previously been designated and documented as an Exceptional Tennessee Water (ETW) by the Department under 0400-40-03-.06(4)(a)	No	**ETW**
3	The wetland is within a state or national park, wildlife refuge, forest, wilderness area, or natural area.	No	**ETW**
4	The wetland is known to contain a documented non-experimental population of a state or federally listed threatened or endangered aquatic or semi-aquatic plant(s), or aquatic animal(s).	No	**ETW**
5	The wetland or the area it is in has been designated by the U.S. Fish and Wildlife Service as "**Critical Habitat**" for any threatened or endangered aquatic or semi-aquatic plant or aquatic animal.	No	**ETW**
6	The wetland falls within an area designated as Lands Unsuitable for Mining pursuant to the federal Surface Mining Control and Reclamation Act where such designation is based in whole or in part on impacts to water resource values	No	**ETW**
7	**The wetland exhibits outstanding ecological or recreational values such as, but not limited to, those as outlined in 8-12**	No	Determination Required by TDEC
8	The wetland fits within the species composition concept for any plant community found in the state of Tennessee **ranked G2, G1, or more imperiled** at the "Association" classification level according to the NatureServe and Natural Heritage Ranking system (e.g., "bog", "fen", and "wet prairie/barren" communities).	No	Determination Required by TDEC
9	The wetland is **an inherently valuable resource** (e.g., vernal pools, headwater wetlands, sinks, spring/seeps, glades, newly described communities, high recreational or socioeconomic value) in the region and/or is deemed such by concurrence of qualified scientists.	No	Determination Required by TDEC
10	The wetland is an **older aged forested wetland** comprised of overstory trees with an average diameter at breast height (dbh) being **greater than or equal to 30 in** within the WAA.	No	Determination Required by TDEC
11	The wetland is observed and documented to be a **significant fish and wildlife habitat area**. These may include rookeries, migratory congregations, nesting sites, breeding areas, etc.	No	Determination Required by TDEC
12	The wetland is **hydrologically connected** to and/or has significant ecological contribution to an **ETW**	No	Determination Required by TDEC
13	The wetland has High Resource Value as determined by a **score of 75 or above** using the TRAM or non-HGM TRAM (to be determined after completing the quantitative portion of this manual)	No	Determination Required by TDEC

End of Narrative Rating. Begin Quantitative Rating on Next Page.

Quantitative Rating

Value Added Section

Wetland Size – Wetland size is correlated with some wetland functions and can provide greater habitat value to wildlife. In some regions within the state, large wetlands or wetlands of certain types may be rare and may play a vital and significant local and/or regional ecological role. Use Tables 1 through 3 below to determine if and how many points should be added to the overall HGM model scores.

Critical Sizes for Tennessee Wetlands by HGM Class and Region of State

Table 1. Depression wetland size throughout Tennessee (max 5 pts). Determine the area of wetland. Select the appropriate size class and assign points.	**Points**
≥5 acres	5
3 - <5 acres	3

Table 2. Slope and Flat wetland size throughout Tennessee (max 5 pts). Determine the area of wetland. Select the appropriate size class and assign points.	**Points**
≥50 acres	5
25 - <50 acres	3
10 - <25 acres	2
5 - <10 acres	1

Table 3. Riverine wetland size in central and eastern Tennessee (max 5 pts). Determine the area of wetland. Select the appropriate size class and assign points.	**Points**
≥50acres	5
25 - <50 acres	3
10 - <25 acres	2
5 - <10 acres	1

Wetland Background Information

Name(s) of Field Personnel: Tanner Morris, PWS, CE

Assessment Date: 12/09/2022

Agency/Organization: Merjent, Inc.

Office Address: 1 Main Street SE, Suite 300 Minneapolis, MN 55414

Phone Number: 612.746.3660

E-mail Address: tanner.morris@merjent.com

Wetland Name(s): w01

Wetland Location:

Include drawing or map of project area limits or attach map showing location and project area limits, county, nearest street address, and narrative description of location, etc.

See Delineation Report.

Watershed (12-Digit HUC): 060102070001

Lat/Long (dd.dddd, -dd.dddd) or UTM Coordinates (m easting, m northing): 35.942567, -84.390233

Circle coordinate system used: NAD83 (WGS84) UTM NAD27

USGS Quad Name: Elverton

Depicted on National Wetland Inventory Map: (Y/N) No

Soil Survey Map Units, Hydric Rating: N/A

Cowardin Wetland Type(s): PFO

HGM Classification: Riverine

Final Score: 59.4

TRAM Summary Worksheet

EXCEPTIONAL STATUS WETLANDS	Check if applicable
1. ONRW	N/A
2. ETW	N/A
3. Further Review Requested: Attach Wetland Background and Exceptional Status Wetlands Worksheet	
COMMENTS/NOTES:	

WETLAND FUNCTION (FCI)	SCORE
Maintain Hydrologic Regime	0.75
Maintain Biogeochemical Processes	0.63
Retain Particulates (Riverine Only)	0.67
Maintain Characteristic Plant Community	0.40
Maintain Characteristic Wildlife Community	0.52
Quantitative Score (Average of FCIsX100)	59.4
Value Added Total	0
TOTAL SCORE	59.4

APPENDIX A

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/9/2022 Project Name WART-TOPS Replacement and Abandonement

Field Personnel Tanner Morris, PWS, CE Wetland Name/Location Wetland w01

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions - no lateral cutting and no bank failure - local knowledge
   - no channelization; channel is naturally meandering - stream connected to floodplain - gauge data
   - no channel downcutting
2. Overbank flooding slightly impacted (SI = 0.75)
   -levee(s) etc. present but most overbank flooding occurs - slight lateral cutting and bank failure - local knowledge
   - channelization - stream connected to floodplain - gauge data
   - slight channel downcutting
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs - moderate lateral cutting and bank failure - local knowledge
   - channelization - gauge data
   - moderate channel downcutting
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs - significant lateral cutting and bank failure - local knowledge
   - channelization - gauge data
   - significant channel downcutting
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding - severe lateral cutting and bank failure - local knowledge
   - channelization - natural flood regime no longer occurs - gauge data
   - severe channel downcutting

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment - no land leveling
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site - land leveling of portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment - land leveling of portion of site
   -widely spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment - land leveling of portion of site
   -moderately spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling - land leveling of entire site
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH
   _X_ > 16 in (SI = 1.0) __ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)
   __ < 3 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot
   __ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) _X_ 5 – 7 (SI = 0.75) __ 3 – 4 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

__ ≥ 20 (SI = 1.0)) _X_ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

_X_ ≥ 70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)

__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added to Group 1 or 2 species based on the scientific literature or professional judgement. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum. *

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	_X_ American elm	__ River birch	__ European/Chinese privet
__ Willow oak	__ Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	__ Black willow	__ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	__ Sweetgum	_X_ Chasmanthium latifolium	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	_X_ Symphyotrichum lateriflorum	__ _____
__ Swamp white oak	__ _____	_1_ Number native shrub spp.		
__ _____	__ _____	_3_ Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = ____0.66_____

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0 _____

b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75 __0.495_____

c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50 _____

d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25 _____

e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0 _____

4. Calculate the square root of the value from Step 3 above.This value is the SI for V7 _____

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

_X_ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This value is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state. This value is the SI for V9

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)

__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) _X_ In eastern or central Tennessee (SI=1.0)

VALUES USED TO CALCULATE FUNCTIONAL CAPACITY INDICES (FCIs)

SUBINDEX VALUES:

V1__**0.75**__ (RIVCON) V3__**1.0**__ (TSIZE) V5__**0.0**__ (SCOV) V7__**0.495**__ (COMP) V9__**1.0**__ (TRACT)

V2__**0.75**__ (HYDRO) V4__**0.75**__ (TDEN) V6__**1.0**__ (GCV) V8__**1.0**__ (ORGANIC)

WETLAND FUNCTIONS

FUNCITION 1: MAINTAIN HYDROLOGIC REGIME

FCI 1: $(V1 \times V2)^{1/2} \Rightarrow$ (_0.75___ x _0.75___)$^{1/2}$ = __0.75_____

FUNCTION 2: RETAIN PARTICULATES

FCI 2: (trees present) = $\frac{(V1 \times V2)^{1/2} + V4}{2} \Rightarrow \frac{(FCI\ 1) + \_0.75\_\_\_}{2}$ = _0.75_____

FCI 2: (shrubs present) = $\frac{(V1 \times V2)^{1/2} + V5}{2} \Rightarrow \frac{(FCI\ 1) + \_\_0.0\_\_\_}{2}$ = __0.375_____

FCI 2: (ground cover) = $\frac{(V1 \times V2)^{1/2} + V6}{3} \Rightarrow \frac{(FCI\ 1) + \_\_1.0\_\_\_}{3}$ = __0.875_____

FUNCTION 3: MAINTAIN BIOGEOCHEMICAL PROCESSES

FCI 3: (trees present)= $\left((V1 \times V2)^{1/2} \times \left(\frac{\frac{V3+V4}{2} + V8}{2}\right)\right)^{1/2} \Rightarrow \left((FCI\ 1) \times \left(\frac{\frac{\_1.0\_\_\_ + \_\_0.75\_\_\_}{2} + \_1.0\_\_\_}{2}\right)\right)^{1/2}$ = _0.839_____

FCI 3: (shrubs present)= $\left((V1 \times V2)^{1/2} \times \frac{V5+V8}{3}\right)^{1/2} \Rightarrow \left((FCI\ 1) \times \frac{\_0.0\_\_\_ + \_\_1.0\_\_\_}{3}\right)^{1/2}$ = __0.5_____

FCI 3: (ground cover)= $\left((V1 \times V2)^{1/2} \times \frac{V6+V8}{5}\right)^{1/2} \Rightarrow \left((FCI\ 1) \times \frac{\_\_1.0\_\_\_ + \_1.0\_\_\_}{5}\right)^{1/2}$ = _0.548_____

FUNCTION 4: MAINTAIN CHARACTERISTIC PLANT COMMUNITY

FCI 4: (trees present) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V3+V4+V7}{3}\right)}{3} \Rightarrow \frac{(FCI\ 1) + 2\left(\frac{\_1.0\_\_\_ + \_0.75\_\_\_ + \_0.495\_\_\_}{3}\right)}{3}$ = __0.749_____

FCI 4: (shrubs present) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V5+V7}{2}\right)}{6} \Rightarrow \frac{(FCI\ 1) + 2\left(\frac{\_0.0\_\_\_ + \_0.495\_\_\_}{2}\right)}{6}$ = __0.208_____

FCI 4: (groundcover) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V6+V7}{2}\right)}{9} \Rightarrow \frac{(FCI\ 1) + 2\left(\frac{\_1.0\_\_\_ + \_0.495\_\_\_}{2}\right)}{9}$ = __0.249_____

FUNCTION 5: MAINTAIN CHARACTERISTIC WILDILFE COMMUNITY

FCI 5: (trees) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V3+V4+V7}{3}\right) + V9}{4} \Rightarrow \frac{(FCI\ 1) + 2\left(\frac{\_1.0\_\_ + \_0.75\_\_\_ + \_0.495\_\_\_}{3}\right) + \_1.0\_\_}{4}$ = __0.812_____

FCI 5: (shrubs present) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V5+V7}{2}\right)+V9}{6} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\_0.0\_\_+\_0.495\_\_}{2}\right)+\_1.0\_}{6}$

= 0.374

FCI 5: (groundcover) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V6+V7}{2}\right)+V9}{9} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\_1.0\_\_+\_0.495\_\_}{2}\right)+\_1.0\_}{9}$ =

0.361

Tennessee Rapid Assessment Method for Wetlands

(TRAM)

2017

State of Tennessee
Department of Environment and Conservation
Division of Water Resources
Natural Resources Unit
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243

Exceptional Status Wetlands

INSTRUCTIONS: Affirmative answers to the categories on the following page determine if the wetland has or may have special status within the state. **Numbers 1-6** in the following table should be answered based on information obtained through the TDEC. Waters designated as **Outstanding National Resource Waters (ONRW)** are defined in Rule 0400-40-03-.06(5)(a) of the TDEC General Water Quality Criteria. The designation of **Exceptional Tennessee Waters (ETW)** is defined as waters that have the characteristics outlined in Rule 0400-40-03-.06(4)(a) of the TDEC General Water Quality Criteria. **All ETW wetlands should be submitted to TDEC for official documentation.** The remaining **numbers (7-13)** in the following table are designed to indicate potentially outstanding ecological or recreational resource values as intended in Rule 0400-40-03-.06(4)(a)7. Wetlands that fall into these remaining categories or are determined by a professional to have potential for characteristics not specifically listed are considered strong candidates for ETW status pending final determination by TDEC.

The term "**documented**" as it relates to rare species occurrences (number 4) means locations discovered, verified and reported by an environmental scientist in the field, or are listed and verified to be extant in databases maintained by governmental and other organizations such as the Tennessee Division of Natural Areas, Tennessee Wildlife Resources Agency, Tennessee Ornithological Society, U.S. Fish and Wildlife Service, NatureServe, and others. Wetland plant community concepts and current NatureServe Association-level natural community conservation status ranks (number 8) can be retrieved at http://explorer.natureserve.org/servlet/NatureServe?init=Ecol or by request to TDEC's Division of Natural Areas.

An affirmative response to any of numbers 1-6 of the Decision Table identifies the wetland per rule as an Outstanding National Resource Water or Exceptional Tennessee Water. A positive response to 7-13 requires a final determination by the Department.

#	Wetland Feature Decision Table	Yes/No	Affirmative Result
1	The wetland has been designated as an **Outstanding National Resource Water (ONRW)** by the Department under 0400-40-03-.06(5)(a)**.**	No	**ORNW**
2	The wetland has previously been designated and documented as an Exceptional Tennessee Water (ETW) by the Department under 0400-40-03-.06(4)(a)	No	**ETW**
3	The wetland is within a state or national park, wildlife refuge, forest, wilderness area, or natural area.	No	**ETW**
4	The wetland is known to contain a documented non-experimental population of a state or federally listed threatened or endangered aquatic or semi-aquatic plant(s), or aquatic animal(s).	No	**ETW**
5	The wetland or the area it is in has been designated by the U.S. Fish and Wildlife Service as "**Critical Habitat**" for any threatened or endangered aquatic or semi-aquatic plant or aquatic animal.	No	**ETW**
6	The wetland falls within an area designated as Lands Unsuitable for Mining pursuant to the federal Surface Mining Control and Reclamation Act where such designation is based in whole or in part on impacts to water resource values	No	**ETW**
7	**The wetland exhibits outstanding ecological or recreational values such as, but not limited to, those as outlined in 8-12**	No	Determination Required by TDEC
8	The wetland fits within the species composition concept for any plant community found in the state of Tennessee **ranked G2, G1, or more imperiled** at the "Association" classification level according to the NatureServe and Natural Heritage Ranking system (e.g., "bog", "fen", and "wet prairie/barren" communities).	No	Determination Required by TDEC
9	The wetland is **an inherently valuable resource** (e.g., vernal pools, headwater wetlands, sinks, spring/seeps, glades, newly described communities, high recreational or socioeconomic value) in the region and/or is deemed such by concurrence of qualified scientists.	No	Determination Required by TDEC
10	The wetland is an **older aged forested wetland** comprised of overstory trees with an average diameter at breast height (dbh) being **greater than or equal to 30 in** within the WAA.	No	Determination Required by TDEC
11	The wetland is observed and documented to be a **significant fish and wildlife habitat area**. These may include rookeries, migratory congregations, nesting sites, breeding areas, etc.	No	Determination Required by TDEC
12	The wetland is **hydrologically connected** to and/or has significant ecological contribution to an **ETW**	No	Determination Required by TDEC
13	The wetland has High Resource Value as determined by a **score of 75 or above** using the TRAM or non-HGM TRAM (to be determined after completing the quantitative portion of this manual)	No	Determination Required by TDEC

End of Narrative Rating. Begin Quantitative Rating on Next Page.

Quantitative Rating

Value Added Section

Wetland Size – Wetland size is correlated with some wetland functions and can provide greater habitat value to wildlife. In some regions within the state, large wetlands or wetlands of certain types may be rare and may play a vital and significant local and/or regional ecological role. Use Tables 1 through 3 below to determine if and how many points should be added to the overall HGM model scores.

Critical Sizes for Tennessee Wetlands by HGM Class and Region of State

Table 1. Depression wetland size throughout Tennessee (max 5 pts). Determine the area of wetland. Select the appropriate size class and assign points.	**Points**
≥5 acres	5
3 - <5 acres	3

Table 2. Slope and Flat wetland size throughout Tennessee (max 5 pts). Determine the area of wetland. Select the appropriate size class and assign points.	**Points**
≥50 acres	5
25 - <50 acres	3
10 - <25 acres	2
5 - <10 acres	1

Table 3. Riverine wetland size in central and eastern Tennessee (max 5 pts). Determine the area of wetland. Select the appropriate size class and assign points.	**Points**
≥50acres	5
25 - <50 acres	3
10 - <25 acres	2
5 - <10 acres	1

Wetland Background Information

Name(s) of Field Personnel: Tanner Morris, PWS, CE

Assessment Date: 12/09/2022

Agency/Organization: Merjent, Inc.

Office Address: 1 Main Street SE, Suite 300 Minneapolis, MN 55414

Phone Number: 612.746.3660

E-mail Address: tanner.morris@merjent.com

Wetland Name(s): w02

Wetland Location:

Include drawing or map of project area limits or attach map showing location and project area limits, county, nearest street address, and narrative description of location, etc.

See Delineation Report.

Watershed (12-Digit HUC): 060102070001

Lat/Long (dd.dddd, -dd.dddd) or UTM Coordinates (m easting, m northing): 35.942683, -84.388896

Circle coordinate system used: NAD83 (WGS84) UTM NAD27

USGS Quad Name: Elverton

Depicted on National Wetland Inventory Map: (Y/N) No

Soil Survey Map Units, Hydric Rating: N/A

Cowardin Wetland Type(s): PFO

HGM Classification: Riverine

Final Score: 62.0

TRAM Summary Worksheet

EXCEPTIONAL STATUS WETLANDS	Check if applicable
1. ONRW	N/A
2. ETW	N/A
3. Further Review Requested: Attach Wetland Background and Exceptional Status Wetlands Worksheet	
COMMENTS/NOTES:	

WETLAND FUNCTION (FCI)	SCORE
Maintain Hydrologic Regime	0.75
Maintain Biogeochemical Processes	0.68
Retain Particulates (Riverine Only)	0.69
Maintain Characteristic Plant Community	0.43
Maintain Characteristic Wildlife Community	0.55
Quantitative Score (Average of FCIsX100)	62.0
Value Added Total	0
TOTAL SCORE	62.0

APPENDIX A

HGM FUNCTIONAL ASSESSMENT
RIVERINE WETLANDS

Date: 12/9/2022 Project Name WART-TOPS Replacement and Abandonement

Field Personnel Tanner Morris, PWS, CE Wetland Name/Location Wetland w01

Read instructions prior to conducting assessments. If project area is large or highly heterogeneous requiring the designation of several WAAs, a separate assessment should be performed for each WAA. CHECK THE APPROPRIATE BLANK(S) BELOW.

V1: River Connection (RIVCON)

1. Overbank flooding has not been impacted (SI = 1.0)
   - no artificial levee(s), spoil piles, roads, or other obstructions — - no lateral cutting and no bank failure — - local knowledge
   - no channelization; channel is naturally meandering — - stream connected to floodplain — - gauge data
   - no channel downcutting
2. Overbank flooding slightly impacted (SI = 0.75)
   -levee(s) etc. present but most overbank flooding occurs — - slight lateral cutting and bank failure — - local knowledge
   - channelization — - stream connected to floodplain — - gauge data
   - slight channel downcutting
3. Overbank flooding moderately impacted (SI = 0.5)
   - levee (s) etc. present but some overbank flow occurs — - moderate lateral cutting and bank failure — - local knowledge
   - channelization — - gauge data
   - moderate channel downcutting
4. Overbank flooding significantly impacted (SI = 0.25)
   - levee (s) etc. present but some overbank flow occurs — - significant lateral cutting and bank failure — - local knowledge
   - channelization — - gauge data
   - significant channel downcutting
5. Overbank flooding severely impacted (SI = 0.1)
   - levee(s) etc. have eliminated overbank flooding — - severe lateral cutting and bank failure — - local knowledge
   - channelization — - natural flood regime no longer occurs — - gauge data
   - severe channel downcutting

V2: Hydroperiod (HYDRO)

1. Hydrologic storage not altered (SI = 1.0)
   - no fill material or excessive sediment — - no land leveling
   - no ditches/drainage tiles
   - no artificial levees or other structures that cause prolonged ponding
2. Hydrologic storage slightly impacted (SI = 0.75)
   - portion of site impacted by fill or excessive sediment
   - ditches/drainage tiles present over portion of site — - land leveling of portion of site
   - portion of the site impacted by dikes or other structures that cause prolonged ponding
3. Hydrologic storage moderately impacted (SI = 0.50)
   - portion of site impacted by fill or excessive sediment — - land leveling of portion of site
   -widely spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
4. Hydrologic storage significantly impacted (SI = 0.25)
   - portion of site impacted by fill or excessive sediment — - land leveling of portion of site
   -moderately spaced ditches/drainage tiles present over entire site
   -portion of the site impacted by dikes or other structures that cause prolonged ponding
5. Hydrologic storage severely impacted (SI = 0.1)
   - entire site impacted by fill, excessive sediment, or leveling — - land leveling of entire site
   - closely spaced ditches/tiles present over entire site
   - entire site impacted by dikes or other structures that cause prolonged ponding

V3: Canopy Tree Size Class (TSIZE)

1. Average size of canopy trees > 3 in. DBH
   __ > 16 in. (SI = 1.0) _X_ 10 – 16 in. (SI = 0.75) __ 5 – 9 in. (SI = 0.5) __ 3 – 4 in. (SI = 0.25)
   __ < 3 in. or no trees present, go to V5

V4: Canopy Tree Density (TDEN)

1. Average number of canopy trees (> 3 in. DBH) per 30-ft. radius plot
   __ 8 – 16 (SI = 1.0) __ 17 – 50 (SI = 0.75) __ > 50 (SI = 0.5) __ 5 – 7 (SI = 0.75) _X_ 3 – 4 (SI = 0.5) __ 1– 2 (SI = 0.25)

V5: Shrub Cover (SCOV)

1. Average percent cover of shrubs (woody stems < 3 in. DBH and taller than 3 ft.) per 30-ft. radius plot

_X_ ≥ 20 (SI = 1.0)) __ < 20, go to V6

V6: Ground Vegetation Cover (GVC)

1. Average percent cover of ground vegetation per 30-ft. radius plot

_X_ ≥ 70 (SI = 1.0) __ 55 – 69 (SI = 0.75) __ 45 – 54 (SI = 0.5) __ 30 – 44 (SI = 0.25) __ 20 – 29 (SI = 0.1)
__ < 20 (SI=0.0)

V7: Vegetation Composition and Diversity (COMP)

1. Check the dominant species from Groups 1, 2, and 3 below using the 50/20 rule. If tree cover is < 20%, check the dominants in the next tallest stratum. If a dominant does not appear in lists below, but is a native species, it can be added to Group 1 or 2 species based on the scientific literature or professional judgement. Native shrub and herbaceous species are assigned to Group 2. When using shrub or herbaceous write in the number of dominant species. Dominant invasive species are checked regardless of stratum. *

GROUP 1 (Reference Standard)		GROUP 2 (Native Ubiquitous)		GROUP 3 (Invasive)
__ Water oak	__ Shumard oak	_X_ American elm	__ River birch	_X_ European/Chinese privet
__ Willow oak	__ Overcup oak	__ Slippery elm	__ Boxelder	__ Japanese honeysuckle
__ Cherrybark oak	__ Water hickory	__ Silver maple	__ Deciduous holly	__ Japanese stiltgrass
__ Pin oak	__ Honey locust	__ Red maple	__ Sugarberry	__ Giant reed
__ Swamp chestnut oak	__ Water tupelo	__ Black willow	_X_ Silky dogwood	__ Tall fescue
__ Bur oak	__ Bald cypress	__ Sweetgum	_X_ Platanus occidentalis	__ Purple loosestrife
__ Nuttall oak	__ Am. hornbeam	__ Green ash	_X_ Chasmanthium latifolium	__ _____
__ Swamp white oak	__ _____	_2_ Number native shrub spp.		
__ _____	__ _____	_4_ Number native herbaceous spp.		

2. Using the checked dominants in Groups 1, 2, and 3 above, calculate a quality index (Q) using the following formula: [(1.0 x # of checked dominants in Group 1) + (0.66 x # of checked dominants in Group 2) + (0.0 x # of checked dominants in Group 3)]/ total # of checked dominants in all groups = ____0.528_____

3. Multiply Q above by one of the following constants that reflects species richness:[1]

a) if ≥ 4 species from Groups 1 and/or 2 occur as dominants, multiply Q by 1.0	___0.528___
b) if 3 species from Groups 1 and/or 2 occur as dominant, multiply Q by 0.75	_____
c) if 2 species from Groups 1 and/or 2 occur as dominants, multiply Q by 0.50	_____
d) if 1 species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.25	_____
e) if no species from Groups 1 and/or 2 occurs as dominant, multiply Q by 0.0	_____
4. Calculate the square root of the value from Step 3 above.This value is the SI for V7	_____

* In some Riverine wetlands and in some small WAAs (e.g., <0.5 acres), relatively few species (e.g., overcup oak) may be present. In cases where this is the normal condition, Q can be multiplied by 1.0 if only 1 or 2 species are dominant.

V8: Soil Organic Matter (ORGANIC)

1. Surface horizons unaltered

_X_ 100 percent cover of O and/or A horizon present (SI = 1.0)

2. Surface horizons altered. Estimate the percent of the WAA in which neither an O or A horizon is present.

3. Subtract the sum of the values from Step 2 from 100. Convert this value to a decimal. This value is the SI for V8 (e.g., if 75 % of the WAA does not have an O or A horizon due to a significant disturbance, it will have an SI of 0.25).

V9: Tract Size (TRACT)

1. Area (acres) of adjacent wetland and upland forest that is contiguous with the WAA. These values are for western Tennessee are negligible unless greater than the value added section limits for the remainder of the state. This value is the SI for V9

__ > 7,000 (SI = 1.0) __ >200 – 1,000 (SI = 0.5) __ < 1(SI = 0.00)
__ >1,000 – 7,000 (SI = 0.75) __ 1 – 200 (SI = 0.25) _X_ In eastern or central Tennessee (SI=1.0)

VALUES USED TO CALCULATE FUNCTIONAL CAPACITY INDICES (FCIs)

SUBINDEX VALUES:

V1__**0.75**__ (RIVCON) V3___**0.75**_ (TSIZE) V5__**1.0**___ (SCOV) V7__**0.528**_ (COMP) V9__**1.0**__ (TRACT)

V2__**0.75**__ (HYDRO) V4___**0.50**_ (TDEN) V6__**1.0**___ (GCV) V8__**1.0**___ (ORGANIC)

WETLAND FUNCTIONS

FUNCITION 1: MAINTAIN HYDROLOGIC REGIME

FCI 1: $(V1 \times V2)^{1/2} \Rightarrow$ (_0.75___ x _0.75___)$^{1/2}$ = __0.75_____

FUNCTION 2: RETAIN PARTICULATES

FCI 2: (trees present) = $\frac{(V1 \times V2)^{1/2} + V4}{2} \Rightarrow \frac{(FCI\ 1) + \_0.50\_\_\_}{2}$ = __0.625_____

FCI 2: (shrubs present) = $\frac{(V1 \times V2)^{1/2} + V5}{2} \Rightarrow \frac{(FCI\ 1) + \_1.0\_\_\_}{2}$ = _0.875_____

FCI 2: (ground cover) = $\frac{(V1 \times V2)^{1/2} + V6}{3} \Rightarrow \frac{(FCI\ 1) + \_1.0\_\_\_}{3}$ = _0.583_____

FUNCTION 3: MAINTAIN BIOGEOCHEMICAL PROCESSES

FCI 3: (trees present)= $\left((V1 \times V2)^{1/2} \times \left(\frac{\frac{V3+V4}{2} + V8}{2}\right)\right)^{1/2} \Rightarrow \left((FCI\ 1) \times \left(\frac{\frac{\_0.75\_\_\_ + \_0.50\_\_\_}{2} + \_1.0\_\_\_}{2}\right)\right)^{1/2}$ = __0.781_____

FCI 3: (shrubs present)= $\left((V1 \times V2)^{1/2} \times \frac{V5+V8}{3}\right)^{1/2} \Rightarrow \left((FCI\ 1) \times \frac{\_1.0\_\_\_ + \_1.0\_\_\_}{3}\right)^{1/2}$ = __0.707_____

FCI 3: (ground cover)= $\left((V1 \times V2)^{1/2} \times \frac{V6+V8}{5}\right)^{1/2} \Rightarrow \left((FCI\ 1) \times \frac{\_1.0\_\_\_ + \_1.0\_\_\_}{5}\right)^{1/2}$ = __0.548_____

FUNCTION 4: MAINTAIN CHARACTERISTIC PLANT COMMUNITY

FCI 4: (trees present) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V3+V4+V7}{3}\right)}{3} \Rightarrow \frac{(FCI\ 1) + 2\left(\frac{\_0.75\_\_\_ + \_0.50\_\_\_ + \_0.528\_\_\_}{3}\right)}{3}$ = _0.645_____

FCI 4: (shrubs present) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V5+V7}{2}\right)}{6} \Rightarrow \frac{(FCI\ 1) + 2\left(\frac{\_1.0\_\_\_ + \_0.528\_\_\_}{2}\right)}{6}$ = __0.380_____

FCI 4: (groundcover) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V6+V7}{2}\right)}{9} \Rightarrow \frac{(FCI\ 1) + 2\left(\frac{\_1.0\_\_\_ + \_0.528\_\_\_}{2}\right)}{9}$ = __0.253_____

FUNCTION 5: MAINTAIN CHARACTERISTIC WILDILFE COMMUNITY

FCI 5: (trees) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V3+V4+V7}{3}\right) + V9}{4} \Rightarrow \frac{(FCI\ 1) + 2\left(\frac{\_0.75\_\_ + \_0.50\_\_\_ + \_0.528\_\_\_}{3}\right) + \_1.0\_\_}{4}$ = _0.734_____

FCI 5: (shrubs present) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V5+V7}{2}\right)+V9}{6} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\_1.0\_\_+\_0.528\_\_}{2}\right)+\_1.0\_}{6}$

= 0.546

FCI 5: (groundcover) = $\frac{(V1 \times V2)^{1/2} + 2\left(\frac{V6+V7}{2}\right)+V9}{9} \Rightarrow \frac{(FCI\ 1)+2\left(\frac{\_1.0\_\_+\_0.528\_\_}{2}\right)+\_1.0\_}{9}$ =

0.364

Appendix D
Hydrologic Determination Field Data Sheets

Tennessee Department of Environment and Conservation - Division of Water Resources
312 Rosa L. Parks Ave. 11th Floor. Nashville, TN 37243

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Resources, Version 1.5 (Fillable Form)

Named Waterbody: Unnamed Tributary to Poplar Creek	Date/Time: 12/09/22
Assessors/Affiliation: Tanner Morris/ Merjent Inc.	Project ID : s01
Site Name/Description: WART-TOPS Replacement and Abandonment	
Site Location: Oak Ridge, Tennessee	
HUC (12 digit): 060102070001	Latitude: 35.942389
Previous Rainfall (7-days) : 1.49 inches	Longitude: -84.391039
Precipitation this Season vs. Normal : Source of recent & seasonal precip. data : average	
Watershed Size : <0.01 square miles	County: Roane
Soil Type(s) / Geology : N/A	Source:
Surrounding Land Use : Forested; Industrial Activity (mining & electrical substation)	
Degree of historical alteration to natural channel morphology & hydrology (select one & describe fully in Notes) : Moderate	

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC
2. Defined bed and bank absent, vegetation composed of upland and FACU species	☑	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions N/A	☐	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☑	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream
6. Presence of fish (except *Gambusia*)	☑	Stream
7. Presence of naturally occurring ground water table connection	☑	Stream
8. Flowing water in channel and 7 days since last precip >0.1" in local watershed	☑	Stream
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream

NOTE: If any Primary Indicators 1-9 = "Yes", then no further investigation is necessary. However, assessors may choose to score secondary indicators as supporting evidence.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-DWR Guidance For Making Hydrologic Determinations, Version 1.5*

Overall Hydrologic Determination = WET WEATHER CONVEYANCE

Secondary Indicator Score (if applicable) = 10.50

Justification / Notes :

Ephemeral channel. Secondary indicator score 10.50. Watercourse is a wet weather conveyance if secondary indicator score is <19.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 6.25)	Absent	Weak	Moderate	Strong	
1. Continuous bed and bank	0	1	2	3	1
2. Sinuous channel	0	1	2	3	1
3. In-channel structure: riffle-pool sequences	0	1	2	3	0
4. Sorting of soil textures or other substrate	0	1	2	3	2
5. Active/relic floodplain	0	0.5	1	1.5	0
6. Depositional bars or benches	0	1	2	3	0
7. Braided channel	0	1	2	3	0
8. Recent alluvial deposits	0	0.5	1	1.5	0
9. Natural levees	0	1	2	3	0
10. Headcuts	0	1	2	3	1
11. Grade controls	0	0.5	1	1.5	1
12. Natural valley or drainageway	0	0.5	1	1.5	0.25
13. At least second order channel on existing USGS or NRCS map	0	1	2	3	0

B. Hydrology (Subtotal = 2.75)	Absent	Weak	Moderate	Strong	
14. Subsurface flow/discharge into channel	0	1	2	3	0.5
15. Water in channel and >48 hours since sig. rain	0	1	2	3	0.5
16. Leaf litter in channel	1.5	1	0.5	0	0.5
17. Sediment on plants or on debris	0	0.5	1	1.5	0
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5	0.5
19. Hydric soils in channel bed or sides of channel	No = 0		Yes = 1.5		0.75

C. Biology (Subtotal = 1.50)	Absent	Weak	Moderate	Strong	
20. Fibrous roots in channel bed [1]	3	2	1	0	0.5
21. Rooted plants in the thalweg [1]	3	2	1	0	1
22. Crayfish in stream (exclude in floodplain)	0	1	2	3	0
23. Bivalves/mussels	0	1	2	3	0
24. Amphibians	0	0.5	1	1.5	0
25. Macrobenthos (record type & abundance)	0	1	2	3	0
26. Filamentous algae; periphyton	0	1	2	3	0
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5	0
28. Wetland plants in channel bed [2]	0	0.5	1	1.5	0

[1] Focus is on the presence of terrestrial plants.

[2] Focus is on the presence of aquatic or wetland plants.

Total Points = 10.50

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

No macrobenthos present. Ephemeral channel.

Tennessee Department of Environment and Conservation - Division of Water Resources
312 Rosa L. Parks Ave. 11th Floor. Nashville, TN 37243

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Resources, Version 1.5 (Fillable Form)

Named Waterbody: Unnamed Tributary to Poplar Creek	Date/Time: 12/09/22
Assessors/Affiliation: Tanner Morris/ Merjent Inc.	Project ID : s02
Site Name/Description: WART-TOPS Replacement and Abandonment	
Site Location: Oak Ridge, Tennessee	
HUC (12 digit): 060102070001	Latitude: 35.942552
Previous Rainfall (7-days) : 1.49 inches	Longitude: -84.389889
Precipitation this Season vs. Normal : Source of recent & seasonal precip. data : average	
Watershed Size : <0.01 square miles	County: Roane
Soil Type(s) / Geology : N/A	Source:
Surrounding Land Use : Forested; Industrial Activity (mining & electrical substation)	
Degree of historical alteration to natural channel morphology & hydrology (select one & describe fully in Notes) : Severe	

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC
2. Defined bed and bank absent, vegetation composed of upland and FACU species	✓	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions N/A		WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✓	Stream
6. Presence of fish (except *Gambusia*)	✓	Stream
7. Presence of naturally occurring ground water table connection	✓	Stream
8. Flowing water in channel and 7 days since last precip >0.1" in local watershed	✓	Stream
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream

NOTE: If any Primary Indicators 1-9 = "Yes", then no further investigation is necessary. However, assessors may choose to score secondary indicators as supporting evidence.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-DWR Guidance For Making Hydrologic Determinations, Version 1.5*

Overall Hydrologic Determination = STREAM

Secondary Indicator Score (if applicable) = 21.50

Justification / Notes :

Intermittent channel.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 8.00)	Absent	Weak	Moderate	Strong	
1. Continuous bed and bank	0	1	2	3	2.5
2. Sinuous channel	0	1	2	3	0
3. In-channel structure: riffle-pool sequences	0	1	2	3	0.5
4. Sorting of soil textures or other substrate	0	1	2	3	3
5. Active/relic floodplain	0	0.5	1	1.5	0.5
6. Depositional bars or benches	0	1	2	3	0
7. Braided channel	0	1	2	3	0
8. Recent alluvial deposits	0	0.5	1	1.5	0
9. Natural levees	0	1	2	3	0
10. Headcuts	0	1	2	3	0
11. Grade controls	0	0.5	1	1.5	0.5
12. Natural valley or drainageway	0	0.5	1	1.5	1
13. At least second order channel on existing USGS or NRCS map	0	1	2	3	0

B. Hydrology (Subtotal = 6.50)	Absent	Weak	Moderate	Strong	
14. Subsurface flow/discharge into channel	0	1	2	3	1
15. Water in channel and >48 hours since sig. rain	0	1	2	3	2
16. Leaf litter in channel	1.5	1	0.5	0	1
17. Sediment on plants or on debris	0	0.5	1	1.5	0.5
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5	0.5
19. Hydric soils in channel bed or sides of channel	No = 0		Yes = 1.5		1.5

C. Biology (Subtotal = 7.00)	Absent	Weak	Moderate	Strong	
20. Fibrous roots in channel bed [1]	3	2	1	0	2.5
21. Rooted plants in the thalweg [1]	3	2	1	0	3
22. Crayfish in stream (exclude in floodplain)	0	1	2	3	1.5
23. Bivalves/mussels	0	1	2	3	0
24. Amphibians	0	0.5	1	1.5	0
25. Macrobenthos (record type & abundance)	0	1	2	3	0
26. Filamentous algae; periphyton	0	1	2	3	0
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5	0
28. Wetland plants in channel bed [2]	0	0.5	1	1.5	0

[1] Focus is on the presence of terrestrial plants.

[2] Focus is on the presence of aquatic or wetland plants.

Total Points = 21.50

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Intermittent channel.

Tennessee Department of Environment and Conservation - Division of Water Resources
312 Rosa L. Parks Ave. 11th Floor. Nashville, TN 37243

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Resources, Version 1.5 (Fillable Form)

Named Waterbody: Unnamed Tributary to Poplar Creek		Date/Time: 12/09/22
Assessors/Affiliation: Tanner Morris/ Merjent Inc.		Project ID : s03
Site Name/Description: WART-TOPS Replacement and Abandonment		
Site Location: Oak Ridge, Tennessee		
HUC (12 digit): 060102070001	Latitude: 35.942543	
Previous Rainfall (7-days) : 1.49 inches	Longitude: -84.389651	
Precipitation this Season vs. Normal : Source of recent & seasonal precip. data : average		
Watershed Size : <0.1 square miles	County: Roane	
Soil Type(s) / Geology : N/A	Source:	
Surrounding Land Use : Forested; Industrial Activity (mining & electrical substation)		
Degree of historical alteration to natural channel morphology & hydrology (select one & describe fully in Notes) : Severe		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC
2. Defined bed and bank absent, vegetation composed of upland and FACU species	✓	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions N/A		WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✓	Stream
6. Presence of fish (except *Gambusia*)	✓	Stream
7. Presence of naturally occurring ground water table connection	✓	Stream
8. Flowing water in channel and 7 days since last precip >0.1" in local watershed	✓	Stream
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream

NOTE: If any Primary Indicators 1-9 = "Yes", then no further investigation is necessary. However, assessors may choose to score secondary indicators as supporting evidence.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-DWR Guidance For Making Hydrologic Determinations, Version 1.5*

Overall Hydrologic Determination = WET WEATHER CONVEYANCE

Secondary Indicator Score (if applicable) = 15.25

Justification / Notes :

Ephemeral channel, has been altered/ditched previously.

Secondary indicator score 15.25. Watercourse is a wet weather conveyance if secondary indicator score is <19.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 6.50)	Absent	Weak	Moderate	Strong	
1. Continuous bed and bank	0	1	2	3	2
2. Sinuous channel	0	1	2	3	0
3. In-channel structure: riffle-pool sequences	0	1	2	3	0.5
4. Sorting of soil textures or other substrate	0	1	2	3	2.5
5. Active/relic floodplain	0	0.5	1	1.5	0.5
6. Depositional bars or benches	0	1	2	3	0
7. Braided channel	0	1	2	3	0
8. Recent alluvial deposits	0	0.5	1	1.5	0
9. Natural levees	0	1	2	3	0
10. Headcuts	0	1	2	3	0
11. Grade controls	0	0.5	1	1.5	0.5
12. Natural valley or drainageway	0	0.5	1	1.5	0.5
13. At least second order channel on existing USGS or NRCS map	0	1	2	3	0

B. Hydrology (Subtotal = 4.75)	Absent	Weak	Moderate	Strong	
14. Subsurface flow/discharge into channel	0	1	2	3	1
15. Water in channel and >48 hours since sig. rain	0	1	2	3	1.5
16. Leaf litter in channel	1.5	1	0.5	0	0.5
17. Sediment on plants or on debris	0	0.5	1	1.5	0
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5	0.25
19. Hydric soils in channel bed or sides of channel	No = 0		Yes = 1.5		1.5

C. Biology (Subtotal = 4.00)	Absent	Weak	Moderate	Strong	
20. Fibrous roots in channel bed [1]	3	2	1	0	2
21. Rooted plants in the thalweg [1]	3	2	1	0	2
22. Crayfish in stream (exclude in floodplain)	0	1	2	3	0
23. Bivalves/mussels	0	1	2	3	0
24. Amphibians	0	0.5	1	1.5	0
25. Macrobenthos (record type & abundance)	0	1	2	3	0
26. Filamentous algae; periphyton	0	1	2	3	0
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5	0
28. Wetland plants in channel bed [2]	0	0.5	1	1.5	0

[1] Focus is on the presence of terrestrial plants.

[2] Focus is on the presence of aquatic or wetland plants.

Total Points = 15.25

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Ephemeral channel.

Tennessee Department of Environment and Conservation - Division of Water Resources
312 Rosa L. Parks Ave. 11th Floor. Nashville, TN 37243

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Resources, Version 1.5 (Fillable Form)

Named Waterbody: Poplar Creek	Date/Time: 12/09/22
Assessors/Affiliation: Tanner Morris/ Merjent Inc.	Project ID : s04
Site Name/Description: WART-TOPS Replacement and Abandonment	
Site Location: Oak Ridge, Tennessee	
HUC (12 digit): 060102070001	Latitude: 35.942217
Previous Rainfall (7-days) : 1.49 inches	Longitude: -84.389537
Precipitation this Season vs. Normal : Source of recent & seasonal precip. data : average	
Watershed Size : 131.34 square miles	County: Roane
Soil Type(s) / Geology : N/A	Source:
Surrounding Land Use : Forested; Industrial Activity (mining & electrical substation)	
Degree of historical alteration to natural channel morphology & hydrology (select one & describe fully in Notes) : Absent	

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC
2. Defined bed and bank absent, vegetation composed of upland and FACU species	☑	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions N/A	☐	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☑	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream
6. Presence of fish (except *Gambusia*)	☐	Stream
7. Presence of naturally occurring ground water table connection	☐	Stream
8. Flowing water in channel and 7 days since last precip >0.1" in local watershed	☐	Stream
9. Evidence watercourse has been used as a supply of drinking water	☐	Stream

NOTE: If any Primary Indicators 1-9 = "Yes", then no further investigation is necessary. However, assessors may choose to score secondary indicators as supporting evidence.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-DWR Guidance For Making Hydrologic Determinations, Version 1.5*

Overall Hydrologic Determination = STREAM

Secondary Indicator Score (if applicable) = 56.50

Justification / Notes :

Poplar Creek, large river approximately 150 feet wide and 5-6 feet deep.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 25.00)	Absent	Weak	Moderate	Strong	
1. Continuous bed and bank	0	1	2	3	3
2. Sinuous channel	0	1	2	3	2.5
3. In-channel structure: riffle-pool sequences	0	1	2	3	2
4. Sorting of soil textures or other substrate	0	1	2	3	3
5. Active/relic floodplain	0	0.5	1	1.5	1.5
6. Depositional bars or benches	0	1	2	3	3
7. Braided channel	0	1	2	3	0
8. Recent alluvial deposits	0	0.5	1	1.5	1.5
9. Natural levees	0	1	2	3	3
10. Headcuts	0	1	2	3	0
11. Grade controls	0	0.5	1	1.5	1
12. Natural valley or drainageway	0	0.5	1	1.5	1.5
13. At least second order channel on existing USGS or NRCS map	0	1	2	3	3

B. Hydrology (Subtotal = 10.50)	Absent	Weak	Moderate	Strong	
14. Subsurface flow/discharge into channel	0	1	2	3	3
15. Water in channel and >48 hours since sig. rain	0	1	2	3	3
16. Leaf litter in channel	1.5	1	0.5	0	0
17. Sediment on plants or on debris	0	0.5	1	1.5	1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5	1.5
19. Hydric soils in channel bed or sides of channel	No = 0		Yes = 1.5		1.5

C. Biology (Subtotal = 21.00)	Absent	Weak	Moderate	Strong	
20. Fibrous roots in channel bed [1]	3	2	1	0	3
21. Rooted plants in the thalweg [1]	3	2	1	0	3
22. Crayfish in stream (exclude in floodplain)	0	1	2	3	3
23. Bivalves/mussels	0	1	2	3	3
24. Amphibians	0	0.5	1	1.5	1
25. Macrobenthos (record type & abundance)	0	1	2	3	3
26. Filamentous algae; periphyton	0	1	2	3	3
27. Iron oxidizing bacteria/fungus	0	0.5	1	1.5	1.5
28. Wetland plants in channel bed [2]	0	0.5	1	1.5	0.5

[1] Focus is on the presence of terrestrial plants.

[2] Focus is on the presence of aquatic or wetland plants.

Total Points = 56.50

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

High water level from recent rains, water turbid with low visibility.

Presence of fish, mussels, macrobenthos, algae, bacteria/fungus is assumed to be present due to visible habitat characteristics.

Attachment B: Site Plans

ROANE COUNTY, TENNESSEE

WART-TOPS PIPE REPLACEMENT
LAT: N035.942928
LONG: W084.389528

PLAN

REV:	PROJECT TITLE:	SEQ #:
0.A	9255 RR, WART-TOPS 3100-1 PIPE REPLACEMENT	
AFE: 30001299	PROJ NO:	
WP NO:		

REV	SUBSEQUENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR 60%	2023-02-07 MS	CAG

0 3000 6000 9000
1" = 3000'

REFERENCE DRAWINGS

REV NO.	REVISION DESCRIPTION	DATE BY	CHK	APPR.

ENBRIDGE

MP 1.76
9255 WART-TOPS
HERITAGE RAILROAD
OVERVIEW MAP

BY: MHP	CHK: JLM	ENG. : CAG	ENB APPR: JLM
DATE: 2023-01-30		SCALE: AS SHOWN	STATUS: DESIGN
DWG. NO.: WART-L-1001			REV. NO.: 0.A

ROW

71+40
(843) Atomic Energy Commission Reservation (351 Rods)
80+25 (844) Highway 2609 (3 Rods) 80+75
(845) Atomic Energy Commission Reservation (460 Rods)
111+62

FIELD NOTE

71+97 OH Power Line
74+38 PI 46° 6' 0" Right
74+88 OH Power Line
75+84 OH Power Line
76+78 OH Power Line
79+06 OH Power Line
79+40 OH Power Line
80+11 OH Power Line
St. Highway327 ROW
80+26 Begin 26" Casing
80+42 OH Power Line
80+50 CL St. Highway 327
St. Highway 327 ROW
80+78 End 26" Casing
81+17 OH Power Line
81+45 OH Power Line
88+00 CL Private Road
~~CL Recoat Pipe Trenton (Hot Wax/Guard Wrap)~~
92+55 Begin 30" Casing
92+71.5 30" Casing Transition to 26" Casing
93+12 CL A.E.C. Railroad Spur
93+45 End 26" Casing
CL Cathodic Unit MP 3111-1+1.77
Edge of Water
94+84 CL Poplar Creek
Edge of Water
98+90 PI 15° 25' 0" Left
99+43 PI 15° 25' 0" Left
100+63 CL Private Road
106+63 PI 12° 7' 0" Left
107+07 PI 12° 7' 0" Left

SCHEMATIC

MAP WINDOW

CROSSOVER

WART-TOPS/3100-1 WART-TOPS/3100-1

DOT CLASS

71+40 DOT Class 1 111+62

HCA

DATA CONFIRMED

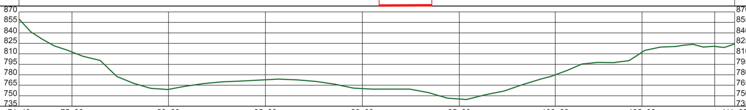
71+40 MAOP:Y PI:Y 111+62

PROPOSED PIPE TO BE 22" O.D. x 0.375" W.T., X-60

PIPE MATERIAL

71+40
1 - A - 1 1,994'
~~1 - A - 1~~ 4,022'
91+34
2 - C - 2 233'
93+67
1 - A - 1 1,795'
111+62

GROUND PROFILE



REDLINED 2/7/2023
TTR - C. GEMAEHLICH
60% ISSUED FOR REVIEW

COATING MATERIAL INDEX 1

INDEX	TYPE
A	Bitumastic Jet Set Primer
B	Johns-Manville 15# Felt Wrapped

C | Valspar Pipeclad 2000

MOP1

INDEX	CURRENT_MOP
1	720

2 | Pipe MOP 773

PIPE MATERIAL INDEX

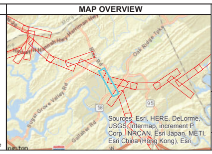
INDEX	OD	WT	GRADE	IN SERVICE	SEAM	MFR
1	22	0.281	API-5LX-42	04/01/1959	SMLS	National Tube Works
2	22	0.375	API-5L X-60	##/##/2023	HFW	MANNESMANN LINE PIPE

Note:
1) STATIONING VALUES WILL BE CONFIRMED DURING AS-BUILT PROCESS.

LEGEND

Ball, Check, Gate, Wafer Check, Casing, Ground Bed, River Weight, Tee, Tap, PI, EQUATION
Plug, Regulator, Swing, Class 1, Class 2, Class 3, Class 4, 660' Corridor, HCA Range, Abndnd. Pipe

MAP OVERVIEW



Spectra Energy Partners
East Tennessee Natural Gas, LLC
5400 Westheimer Ct. Houston, TX 77056-5310 713 / 627-5400

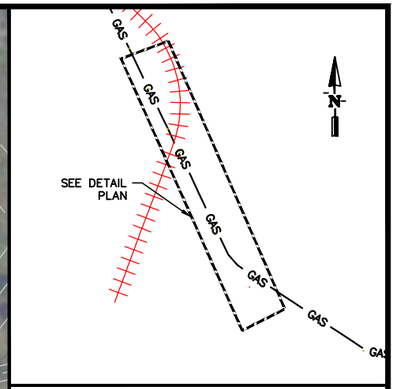
WART-TOPS 3100-1
SEGMENT/LINE ID

012
SHEET ID

300 150 0 300 600
GRAPHIC SCALE - FEET

OPERATIONS ALIGNMENT SHEET
GENERATION DATE: 8/4/2016

ROANE COUNTY, TENNESSEE



EASEMENT WORKSPACE 0.766 ACRE

PRE-CERTIFICATION WORKSPACE 0.353 ACRE

PRE-CERTIFICATION WORKSPACE 0.092 ACRE

EXISTING ACCESS ROAD 16' WIDE X 540' LONG

ADDITIONAL TEMPORARY WORKSPACE 0.148 ACRE

ADDITIONAL TEMPORARY WORKSPACE 0.219 ACRE

33570 - START CASING
LAT: N035.942928
LONG: W084.389528

VENT
LAT: N035.942926
LONG: W084.389534

END OF BRIDGE STRUCTURE

VENT
LAT: N035.942636
LONG: W084.389357

33777 - END CASING
LAT: N035.942630
LONG: W084.389359

PRE-CERTIFICATION WORKSPACE 0.043 ACRE

EXISTING ENBRIDGE 22" PIPELINE

EASEMENT WORKSPACE 0.066 ACRE

PRE-CERTIFICATION WORKSPACE 0.003 ACRE

PROPOSED ACCESS ROAD 20' WIDE 346' LONG

EXISTING ACCESS ROAD

ADDITIONAL TEMPORARY WORKSPACE 0.109 ACRE

ADDITIONAL TEMPORARY WORKSPACE 0.265 ACRE

NOTES:
1. TETRA TECH ROONEY AND EAST TENNESSEE NATURAL GAS, LLC ARE NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ROONEY AND EAST TENNESSEE NATURAL GAS, LLC FOR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
2. ALL COORDINATES ARE IN TENNESSEE STATE PLANE, NAD83, US FOOT.
3. EXISTING TOPOGRAPHY, PIPELINE DATA AND SURVEY DATA FROM LW SURVEY, DECEMBER 2022.
4. ENVIRONMENTAL WETLAND DATA FROM MERJENT, DECEMBER 2022.
5. TOTAL AREA OF WETLAND IMPACTED BY WORK SPACE: 0.06 ACRE.

PLAN

LEGEND:

- EDGE OF CLEARED ROW
- TREE BRUSH CLEARING REQUIRED
- 50' EXISTING PIPELINE EASEMENT
- ADDITIONAL TEMPORARY WORK SPACE
- PROPOSED ACCESS ROAD
- EXISTING ACCESS ROAD
- EXISTING ENBRIDGE PIPELINE — GAS
- POWERLINE — OHE
- RAILROAD
- TOE OF BANK
- TOP OF BANK
- DRAINAGE SWALE
- WETLAND
- WATERWAY
- EASEMENT WORKSPACE
- RAILROAD EASEMENT

REV:	PROJECT TITLE:	SEQ #:
0.D	9255 RR, WART-TOPS 3100-1 PIPE REPLACEMENT	
AFE: 30001299	PROJ NO:	
WP NO:		

REV	SUBSEQUENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR CLIENT REVIEW	2023-01-11 MS	CAG
0.B	UPDATED PER CLIENT COMMENTS	2023-01-18 MS	CAG
0.C	UPDATED PER COMMENTS RECEIVED	2023-01-25 MS	CAG
0.D	ISSUED FOR 60%	2023-02-07 MS	CAG

0 60 120 180
1" = 60'-0"

REFERENCE DRAWINGS

REV NO.	REVISION DESCRIPTION	DATE BY	CHK	APPR.

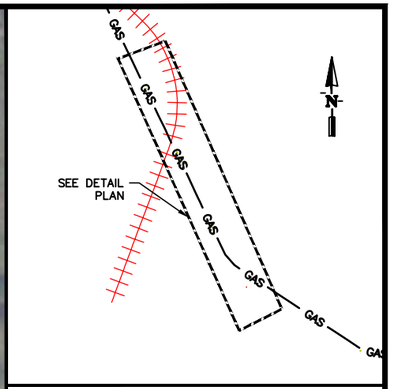
ENBRIDGE

MP 1.76
9255 WART-TOPS
HERITAGE RAILROAD
WORKSPACE EXHIBIT

BY: MHP	CHK: JLM	ENG. : CAG	ENB APPR: JLM
DATE: 2022-01-11	SCALE: AS SHOWN		STATUS: DESIGN

DWG. NO.: WART-P.501-0001 REV. NO.: 0.D

ROANE COUNTY, TENNESSEE



ADDITIONAL TEMPORARY WORKSPACE 0.219 ACRE

PRE-CERTIFICATION WORKSPACE 0.043 ACRE

EXISTING ENBRIDGE 22" PIPELINE

PRE-CERTIFICATION WORKSPACE 0.353 ACRE

EASEMENT WORKSPACE 0.766 ACRE

19.5'

18'

32'

5.5'

18'

32'

EASEMENT WORKSPACE 0.066 ACRE

PRE-CERTIFICATION WORKSPACE 0.003 ACRE

PRE-CERTIFICATION WORKSPACE 0.092 ACRE

EXISTING ACCESS ROAD 16' WIDE X 540' LONG

PROPOSED ACCESS ROAD 20' WIDE 346' LONG

ADDITIONAL TEMPORARY WORKSPACE 0.265 ACRE

ADDITIONAL TEMPORARY WORKSPACE 0.148 ACRE

EXISTING ACCESS ROAD

ADDITIONAL TEMPORARY WORKSPACE 0.109 ACRE

25'

25'

NOTES:
1. TETRA TECH ROONEY AND EAST TENNESSEE NATURAL GAS, LLC ARE NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ROONEY AND EAST TENNESSEE NATURAL GAS, LLC FOR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
2. ALL COORDINATES ARE IN TENNESSEE STATE PLANE, NAD83, US FOOT.
3. EXISTING PIPELINE DATA AND SURVEY DATA FROM LW SURVEY, DECEMBER 2022.

PLAN

LEGEND:

- 50' EXISTING PIPELINE EASEMENT
- ADDITIONAL TEMPORARY WORK SPACE
- PROPOSED ACCESS ROAD
- EXISTING ACCESS ROAD
- EXISTING ENBRIDGE PIPELINE — GAS
- RAILROAD
- EASEMENT WORKSPACE
- RAILROAD EASEMENT

REV:	PROJECT TITLE:	SEQ #:
0.C	9255 RR, WART-TOPS 3100-1 PIPE REPLACEMENT	
AFE: 30001299	PROJ NO:	
WP NO:		

REV	SUBSEQUENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR CLIENT REVIEW	2023-01-18 MS	CAG
0.B	UPDATED PER COMMENTS RECEIVED	2023-01-25 MS	CAG
0.C	ISSUED FOR 60%	2023-02-07 MS	CAG

0 60 120 180
1" = 60'-0"

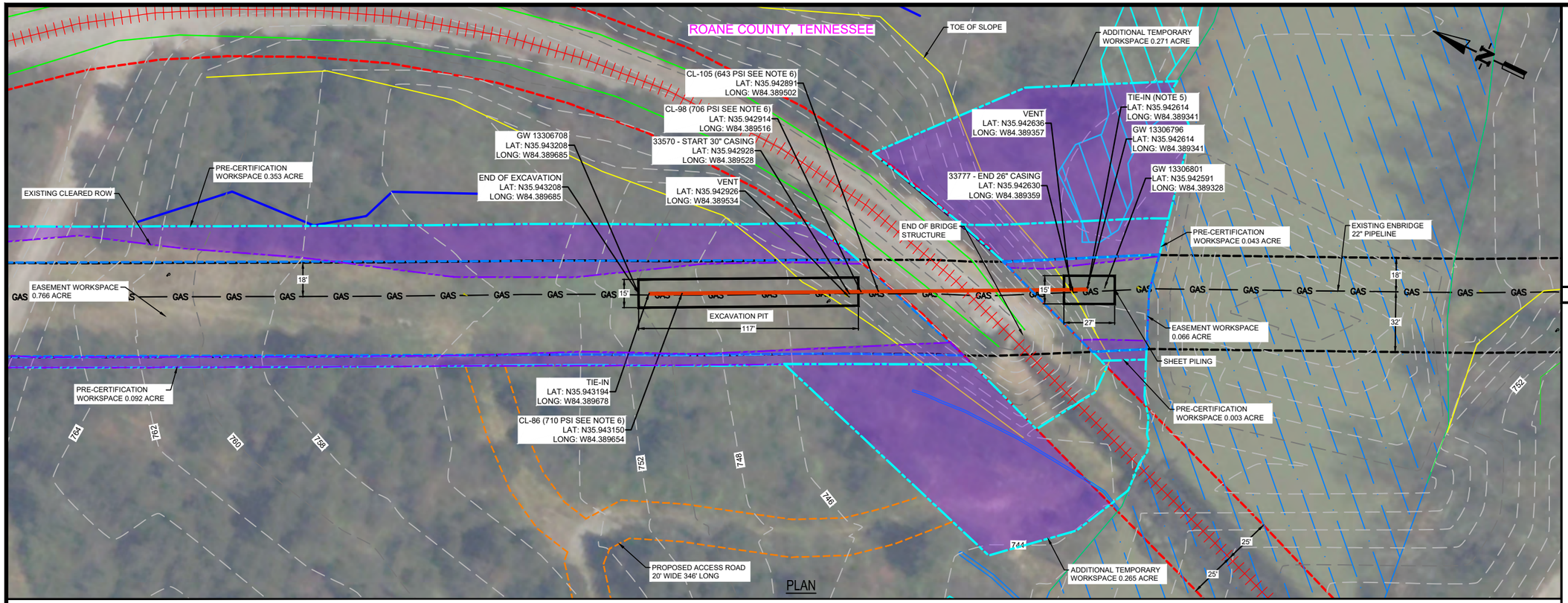
REFERENCE DRAWINGS

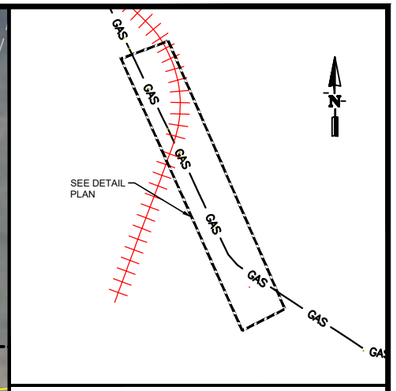
REV NO.	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

MP 1.76
9255 WART-TOPS
HERITAGE RAILROAD
LAND EXHIBIT

BY: MHP	CHK: JLM	ENG. : CAG	ENB APPR: JLM
DATE: 2022-01-11		SCALE: AS SHOWN	STATUS: DESIGN
DWG. NO.: WART-P.505-0001			REV. NO: 0.C



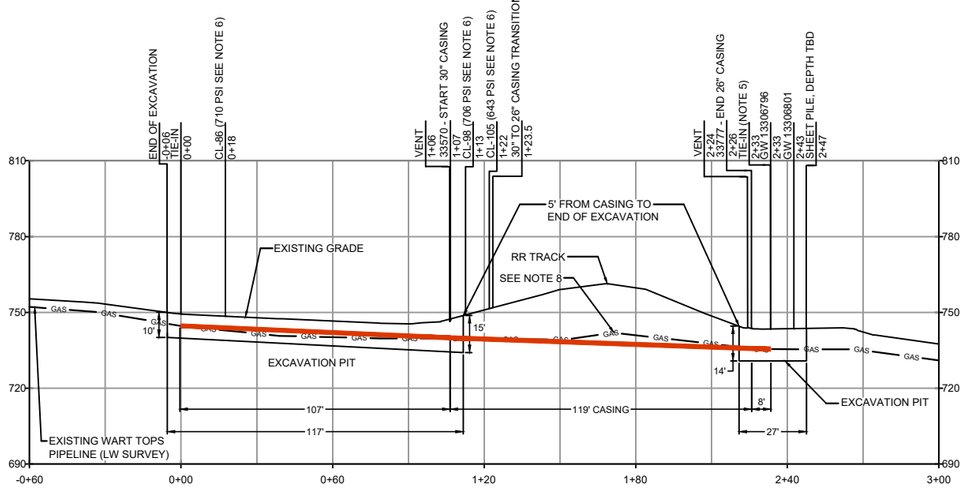


LEGEND:

- EDGE OF CLEARED ROW
- TREE BRUSH CLEARING REQUIRED
- 50' EXISTING PIPELINE EASEMENT
- ADDITIONAL TEMPORARY WORK SPACE
- PROPOSED ACCESS ROAD
- EXISTING ACCESS ROAD
- EXISTING ENBRIDGE PIPELINE — GAS
- POWERLINE — OHE
- RAILROAD
- TOE OF BANK
- TOP OF BANK
- DRAINAGE SWALE
- WETLAND
- WATERWAY
- EASEMENT WORKSPACE
- RAILROAD EASEMENT
- REPLACEMENT PIPE

NOTES:

1. TETRA TECH ROONEY AND EAST TENNESSEE NATURAL GAS, LLC ARE NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES IN THIS DRAWING. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF TETRA TECH ROONEY AND EAST TENNESSEE NATURAL GAS, LLC FOR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
2. ALL COORDINATES ARE IN TENNESSEE STATE PLANE, NAD83, US FOOT.
3. EXISTING TOPOGRAPHY, PIPELINE DATA AND SURVEY DATA FROM LW SURVEY, DECEMBER 2022.
4. ENVIRONMENTAL WETLAND DATA FROM MERJENT, DECEMBER 2022.
5. GW 13306796 AND HEAT AFFECTED ZONE WILL BE CUT OUT PRIOR TO TIE-IN.
6. CONTRACTOR MUST FOLLOW SAFE EXCAVATION PRESSURE (SEP) REQUIRED FOR ANY EXCAVATION WITHIN 10 FEET OF FEATURES (CL-86, CL-98, CL-105).
7. HIGH POTENTIAL TO FIND DISBONDED COATING. DISBONDED COATING WILL NOT BE CHASED BEYOND LIMITS OF EXCAVATION REQUIRED FOR PIPE REPLACEMENT. REFER TO PDR-XXX FOR DETAILS.
8. PIPELINE PROFILE IS BASED ON DEPTH OF COVER SURVEY. ACTUAL CASING AND PIPE EXPECTED TO BE LINEAR WITHOUT ELEVATION ABNORMALITIES.
9. TOTAL AREA OF WETLAND IMPACTED BY WORK SPACE: 0.06 ACRE.
10. EXCAVATION AND SHEET PILE DETAIL WILL BE PROVIDED BY THE CONTRACTOR.



PROFILE

REV:	PROJECT TITLE:	SEQ #:
0.C	9255 RR, WART-TOPS 3100-1 PIPE REPLACEMENT	
AFE: 30001299	PROJ NO.:	
WP NO.:		

REV	SUBSEQUENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR CLIENT REVIEW	2023-01-18 MS	CAG
0.B	UPDATED PER COMMENTS RECEIVED	2023-01-25 MS	CAG
0.C	ISSUED FOR 60% REVIEW	2023-02-07 MS	CBW

0 30 60 90

1" = 30'-0"

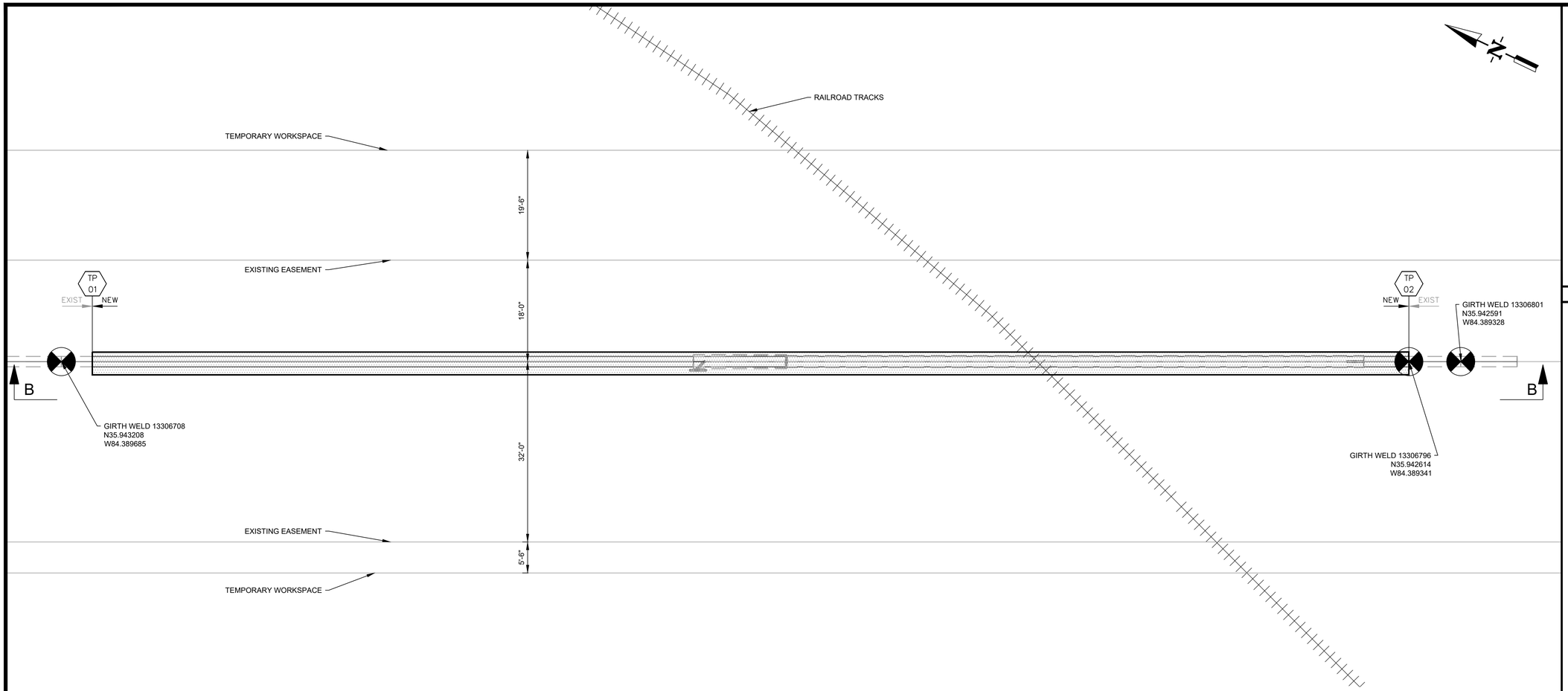
REFERENCE DRAWINGS

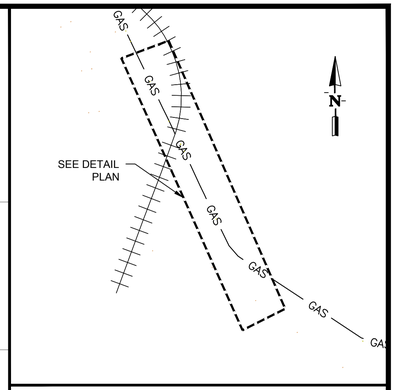
REV NO.	REVISION DESCRIPTION	DATE BY	CHK	APPR.

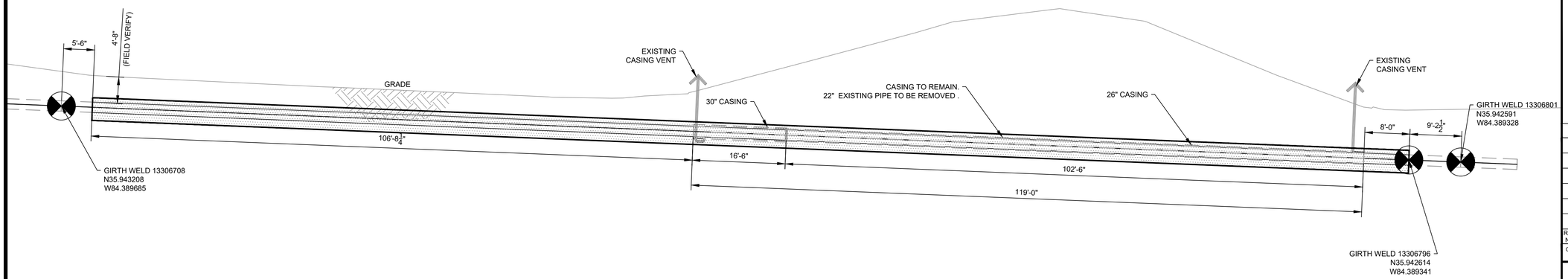
ENBRIDGE

MP 1.76
9255 WART-TOPS
HERITAGE RAILROAD
WORKSPACE EXHIBIT

BY: MHP	CHK: JLM	ENG. : CAG	ENB APPR: JLM
DATE: 2022-01-11	SCALE: AS SHOWN	STATUS: DESIGN	
DWG. NO.: WART-P.511-0001			REV. NO.: 0.C







SECTION B-B
1" = 10'-0"

CONSTRUCTION NOTES

1. PIPE ELEVATIONS, DEPTHS, AND UNDERGROUND UTILITIES SHOWN ARE BASED ON ELECTRONIC DEPTH OF COVER SURVEY PERFORMED BY LW SURVEY, DECEMBER 2022. DEPTHS SHALL BE FIELD CONFIRMED PRIOR TO CONSTRUCTION. THE ENGINEER MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE ENGINEER FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE ENGINEER HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.
2. ALL COORDINATES ARE BASED ON TENNESSEE STATE PLANE, NAD83, US FOOT.
3. MINIMUM DEPTH OF COVER ON ALL NEW BURIED LINES SHALL BE 36" FROM FINAL GRADE PER CS-PL1, UNLESS OTHERWISE NOTED. BURIED PIPE CROSSINGS SHALL HAVE A MINIMUM SEPARATION DISTANCE OF 1'-6" UNLESS APPROVED BY THE COMPANY.
4. CONTRACTOR SHALL COORDINATE WITH EAST TENNESSEE NATURAL GAS, LLC ROW GROUP PRIOR TO ACCESSING THE SITE. DO NOT COMMENCE ANY WORK WITHOUT REQUIRED EAST TENNESSEE NATURAL GAS, LLC PERSONNEL ON SITE.
5. WORK SHALL BE IN ACCORDANCE WITH ROAD AND RAILROAD CROSSINGS DP-PX1.2
6. WORK SHALL BE IN ACCORDANCE WITH CASED ROAD CROSSING (USING CLOCK SPRING CASING SPACERS) SG-4008
7. WORK SHALL BE IN ACCORDANCE WITH CIVIL EARTHWORKS ENG-SPEC-0018
8. THE LOCATION FOR STOCKPILING SHALL BE COORDINATED WITH EAST TENNESSEE NATURAL GAS, LLC AND THE LANDOWNER. EROSION CONTROLS SHALL BE INSTALLED AT THE PERIMETER OF ALL TEMPORARY STOCKPILES.
9. DISTURBED AREAS ON THE ROW SHALL BE RESTORED PER THE ENBRIDGE ENVIRONMENTAL PROTECTION PLAN (EPP) UNLESS OTHERWISE SPECIFIED. CONSTRUCTION ACTIVITIES SHALL COMPLY WITH ALL SECTIONS OF THE ENBRIDGE EPP.
10. CONTRACTOR IS RESPONSIBLE FOR ALL SURVEY INCLUDING STAKING, RECORDING TOP OF PIPE ELEVATIONS EVERY 5 FEET IN AREAS WHERE THE PIPELINE IS EXPOSED (OR DAYLIGHTED), AND FINISHED GRADE ELEVATIONS ABOVE THE PIPELINE WITHIN THE CONSTRUCTION LIMITS. CONTRACTOR SHALL PROVIDE AS-BUILT INFORMATION WITHIN TWO WEEKS OF CONSTRUCTION COMPLETION.
11. CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL AND SAFE HAULING OF THE DEMOLISHED PIPE TO THE COMPANY YARD.

PIPE TO BE DEMOLISHED

REV:	PROJECT TITLE:	SEQ #:
0.A	9255 RR.WART-TOPS 3100-1 PIPE REPLACEMENT	
AFE: 30001299	PROJ NO:	
WP NO:		

REV	SUBSEQUENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR 60% REVIEW	2023-02-07 WFP	CBW

0 10 20 30
1" = 10'-0"

REFERENCE DRAWINGS

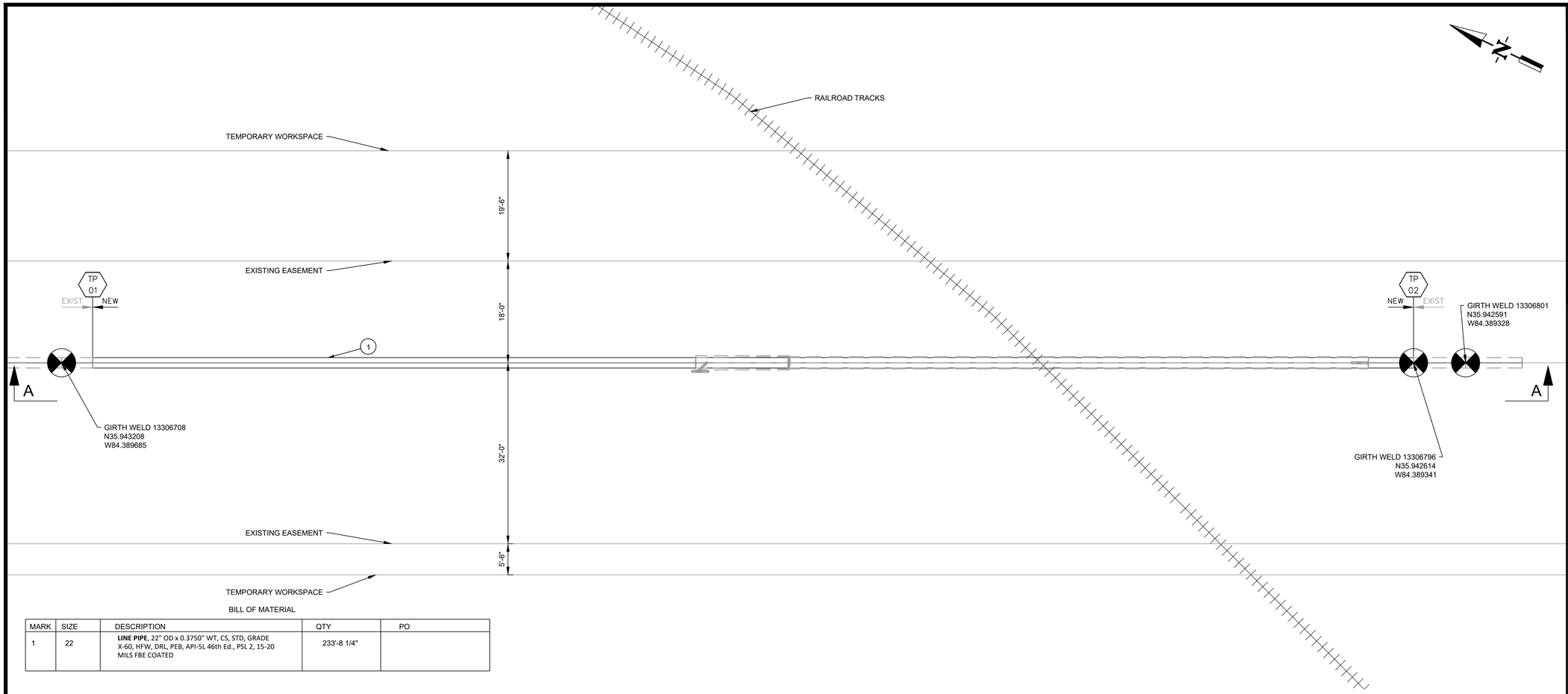
REV NO	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

MP 1.76
9255 WART-TOPS
HERITAGE RAILROAD
DEMOLITION PLAN SKETCH

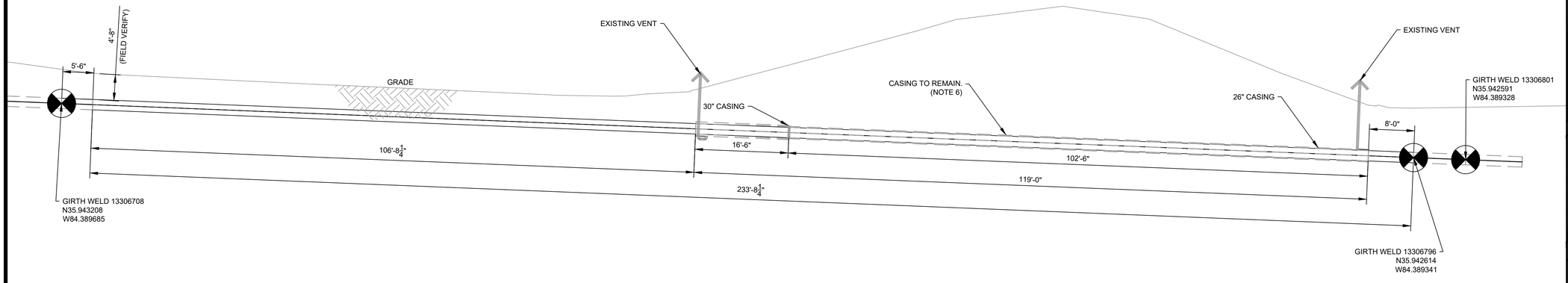
BY: WFP	CHK: CBW	ENG. :CAG	ENB APPR:
DATE: 2023-02-03		SCALE: 1" = 10'-0"	STATUS: DESIGN

DWG NO.: WART-M.211-R0001 REV NO: 0.A

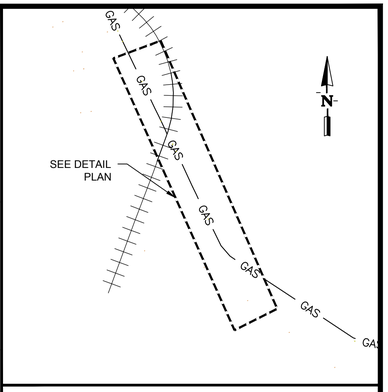


BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY	PO
1	22	**LINE PIPE**, 22" OD x 0.3750" WT, CS, STD, GRADE X-60, HFW, DRL, PEB, API-5L 46th Ed., PSL 2, 15-20 MILS FBE COATED	233'-8 1/4"	



SECTION A-A
1" = 10'-0"



CONSTRUCTION NOTES

1. PIPE ELEVATIONS, DEPTHS, AND UNDERGROUND UTILITIES SHOWN ARE BASED ON ELECTRONIC DEPTH OF COVER SURVEY PERFORMED BY LW SURVEY, DECEMBER 2022. DEPTHS SHALL BE FIELD CONFIRMED PRIOR TO CONSTRUCTION. THE ENGINEER MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE ENGINEER FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE ENGINEER HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.
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4. CONTRACTOR SHALL COORDINATE WITH EAST TENNESSEE NATURAL GAS, LLC ROW GROUP PRIOR TO ACCESSING THE SITE. DO NOT COMMENCE ANY WORK WITHOUT REQUIRED EAST TENNESSEE NATURAL GAS, LLC PERSONNEL ON SITE.
5. WORK SHALL BE IN ACCORDANCE WITH ROAD AND RAILROAD CROSSINGS DP-PX1.2
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11. CONTRACTOR SHALL PRESSURE TEST INSTALLED PIPING IN ACCORDANCE WITH CS-PL1-23.12
12. CATHODIC PROTECTION INSTALLATION SHALL BE IN ACCORDANCE WITH CATHODIC PROTECTION INSTALLATION CS-PL1-27
13. ALL TIE IN WELDS SHALL BE ACCORDANCE TO ONSHORE COMPRESSOR STATIONS-WELDING AND TIE- INS CS-CS1-11.9A
14. TRANSITION FROM THE REPLACEMENT PIPE AND THE EXISTING PIPE SHALL BE IN ACCORDANCE WTH THE ASME SPECIFICATION B31.8 (FIGURE 1-5) AND ENBRIDGE SPECIFICATION CS-PL1.12A.

REV:	PROJECT TITLE:	SEQ #:
0.A	9255 RR.WART-TOPS 3100-1 PIPE REPLACEMENT	
AFE: 30001299	PROJ NO:	
WP NO:		

REV	SUBSEQUENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR 60% REVIEW	2023-02-07 WFP	CBW

0 10 20 30
1" = 10'-0"

REFERENCE DRAWINGS

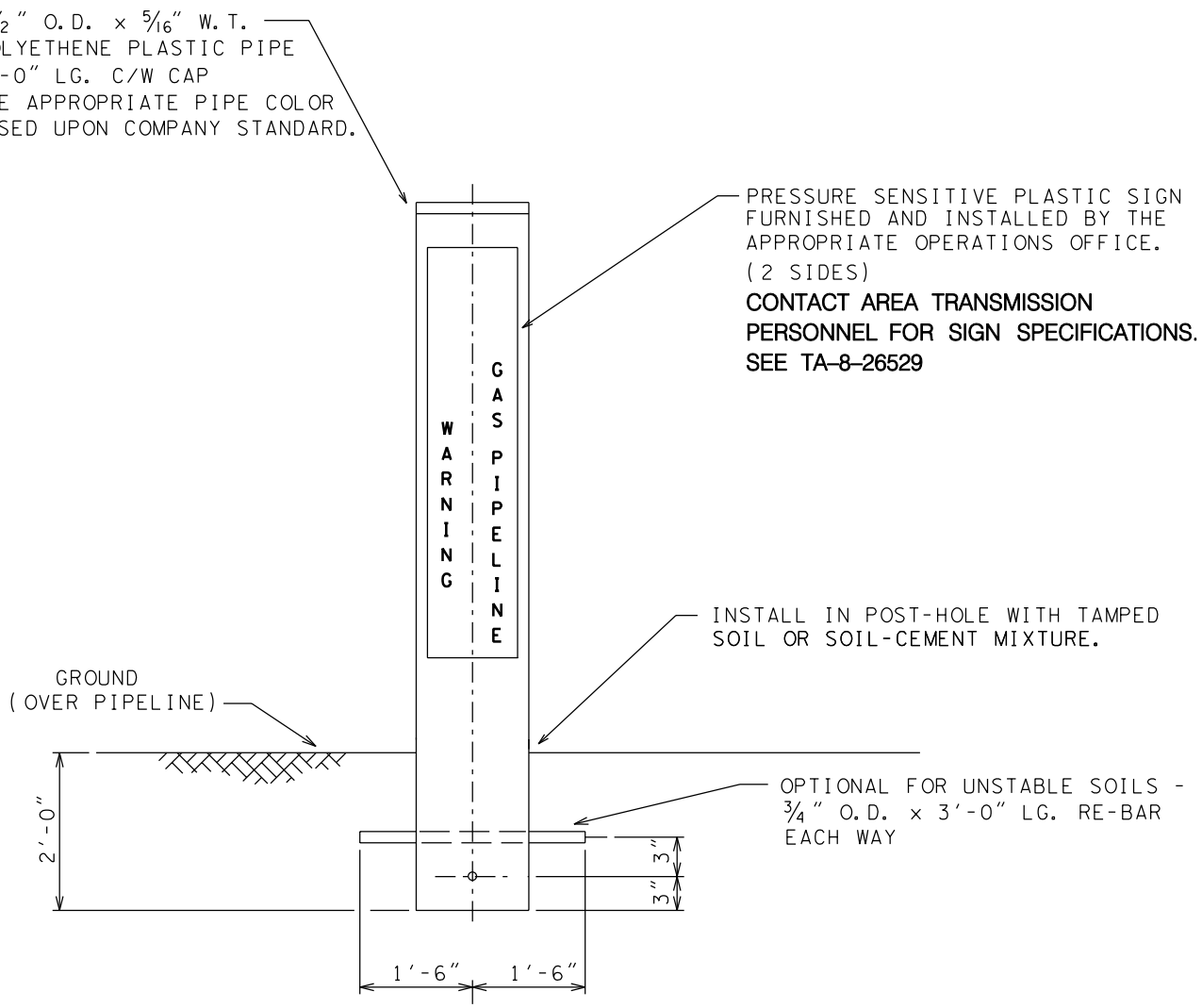
REV NO	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

MP 1.76
9255 WART-TOPS
HERITAGE RAILROAD
PLAN AND SECTION SKETCH

BY: WFP	CHK: CBW	ENG. : CAG	ENB APPR:
DATE: 2023-02-03		SCALE: 1" = 10'-0"	STATUS: DESIGN

DWG NO.:	REV NO:
WART-M.211-0001	0.A



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Username: daseymour

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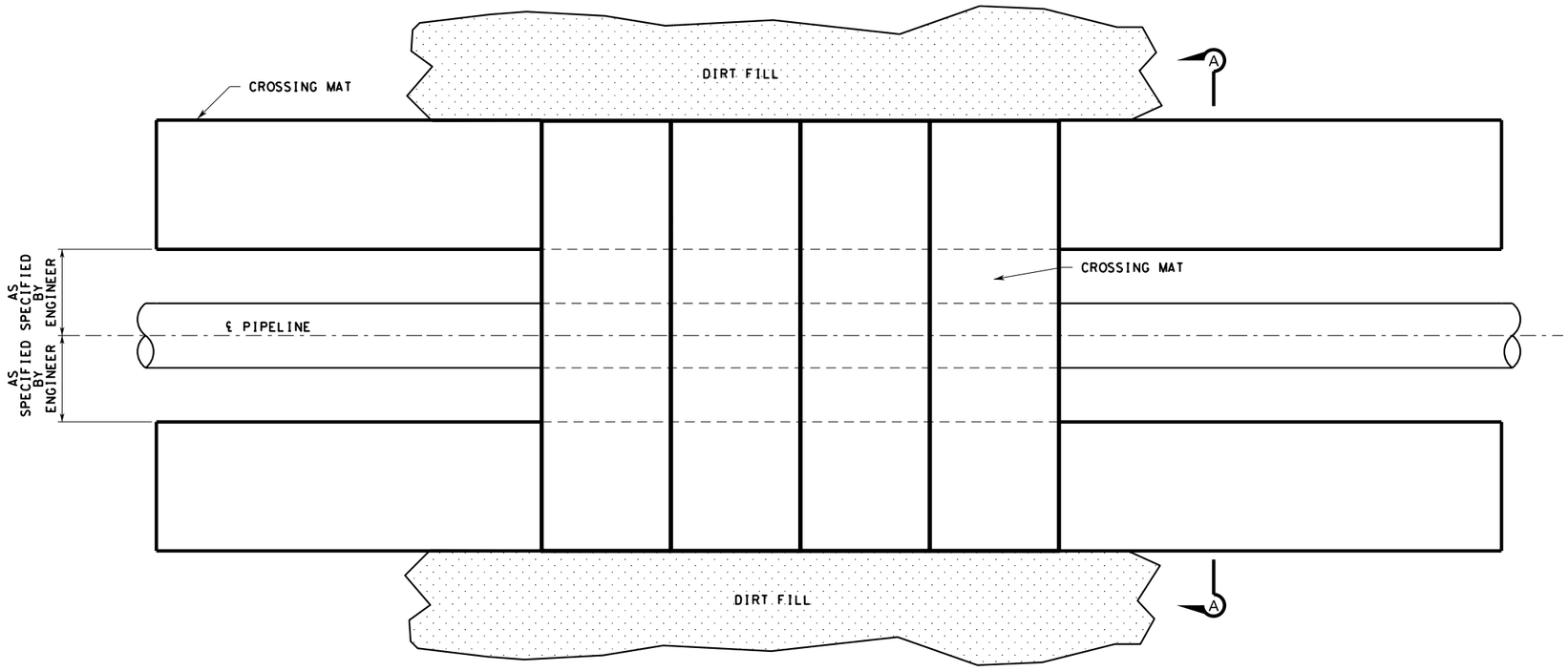
Time: 3/13/2008

I.G.

No.	REVISION	DATE
1	Added verbiage for using appropriate pipe color	8-27-07

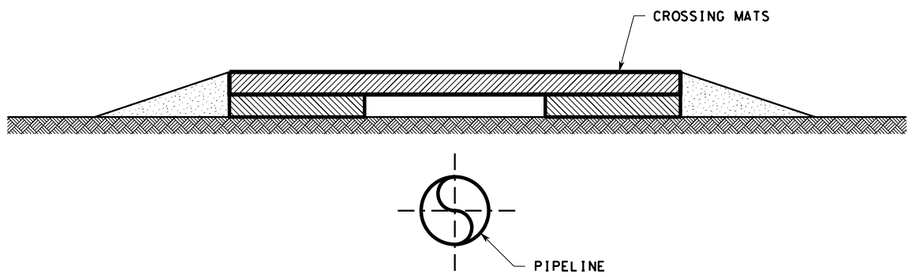
PIPELINE MARKER

DESIGN MANAGER	AKL	08-27-07	**STANDARDS**
			DWG. **SG-0003** REV. **1**
	INITIALS	DATE	



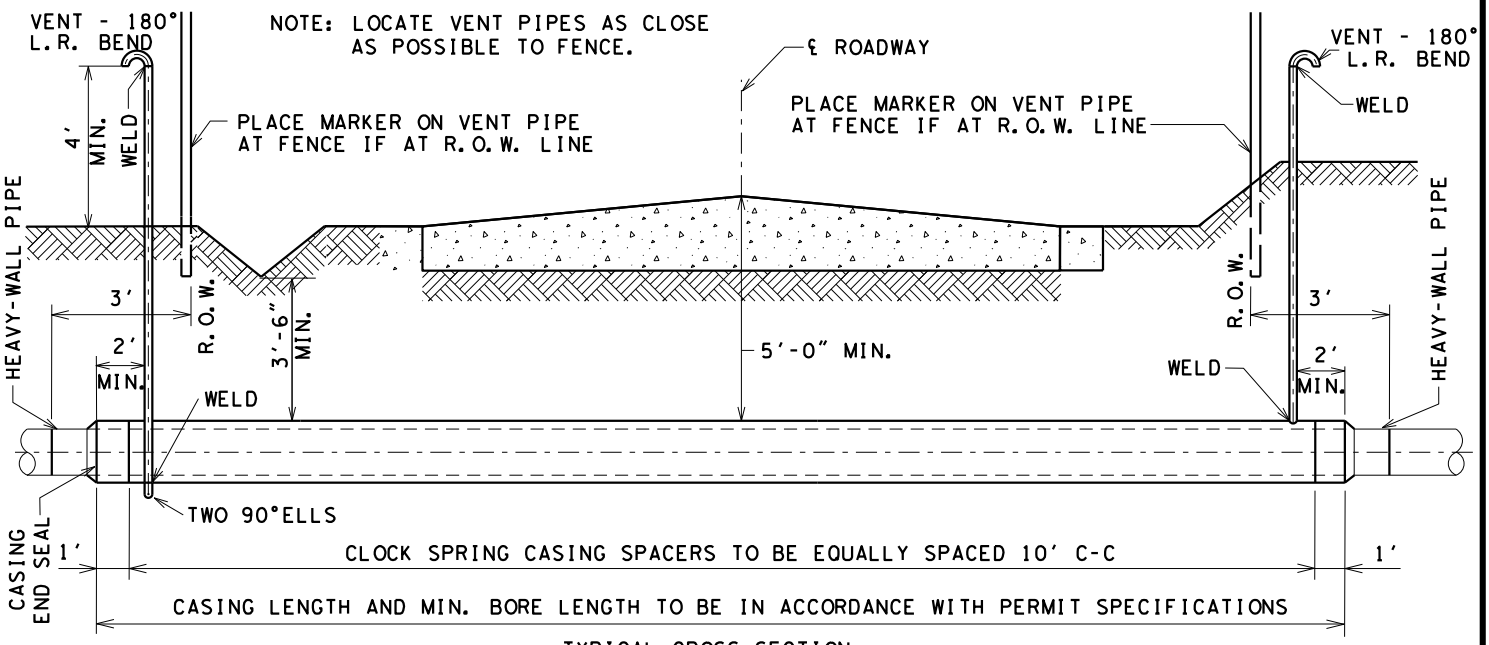
PLAN

(AS REQUIRED - FOR PIPELINE X-INGS)



SECTION "A-A"

IG. #	PIPELINE CROSSING MAT	DESIGN MANAGER	RWG	02-25-15	STANDARDS
					DWG. SP-1000 REV. 3
			INITIALS	DATE	

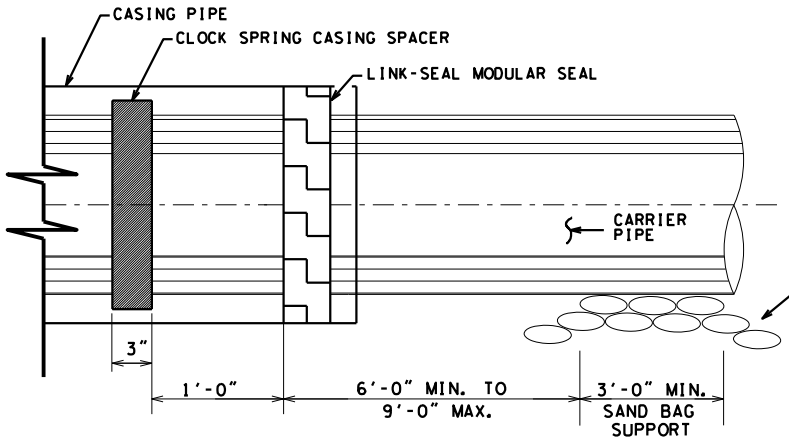


TYPICAL CROSS SECTION

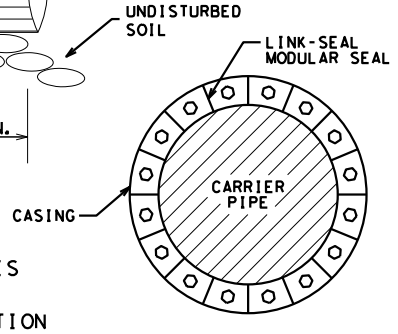
NOMINAL SIZES (IN INCHES)

A: PIPE
B: CASING
C: VENT

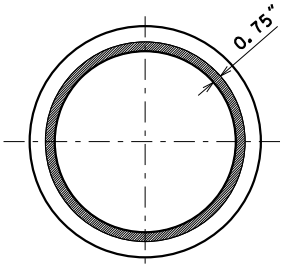
A	B	C
3	8	2
4	10	2
6	12	2
8	16	4
10	16	4
12	20	4
14	20	4
16	24	4
18	24	4
20	30	4
22	30	4
24	30	4
26	36	4
30	36	4
36	42	4
42	48	4



CASING END SEAL DETAIL



TYPICAL CROSS SECTION
LINK-SEAL MODULAR SEAL INSTALLATION



TYPICAL CROSS SECTION
CLOCK SPRING CASING SPACER INSTALLATION

CASING END SEAL DETAIL - GENERAL NOTES

1. WHERE CONFLICTS MAY EXIST, PERMIT SPECIFICATIONS SHALL ALWAYS GOVERN THIS DRAWING.
2. THE INTERIOR OF THE CASING SHALL BE CLEAN AND DRY PRIOR TO THE INSTALLATION OF THE END SEALS.
3. WELD THE VENT PIPE IN THE TOP OF THE CASING BEFORE INSERTING THE CARRIER PIPE.
4. THE CASING LENGTH AND THE MINIMUM BORE LENGTH SHALL BE IN ACCORDANCE WITH THE PERMIT SPECIFICATIONS.
5. ANY EXCAVATION WITHIN THE LIMITS OF THE R.O.W. SHALL BE REPLACED WITH BACKFILL SPECIFIED BY THE ENGINEER AND COMPACTED IN 6-INCH LAYERS AT 95% PROCTOR, OR IN ACCORDANCE WITH SPECIFIC PERMIT REQUIREMENTS.
6. THE VENT PIPING SHALL BE PAINTED PER COMPANY SPECIFICATIONS.
7. SAND BAG SUPPORT SHALL BE PLACED ON UNDISTURBED SOIL UNDER THE CARRIER PIPE TO AVOID SAGGING WHEN BACKFILLED.
8. THE COMPLETED ASSEMBLY SHALL BE TESTED FOR ELECTRICAL INSULATION OF PIPE FROM CASING AS DIRECTED BY THE ENGINEER.
9. PIPE TO BE IN ACCORDANCE WITH SPECIFIC STATE REQUIREMENTS AND BE DESIGNED TO AT MOST 50% OF SPECIFIED MINIMUM YIELD STRENGTH. HEAVY-WALL PIPE SHALL EXTEND A MINIMUM OF 3 FEET OUTSIDE THE RIGHT-OF-WAY LIMITS ON EITHER SIDE OF THE ROADWAY.
10. THE CLOCK SPRING CASING SPACERS SHALL REMAIN INTACT DURING THE INSTALLATION OF THE CARRIER PIPE INTO THE CASING PIPE.
11. THE VENT PIPING LOCATED AT THE BOTTOM OF THE CASING SHALL BE INSTALLED ON THE LOWER ELEVATION SIDE OF THE CROSSING.

I.G.

CASED ROAD CROSSING (USING CLOCK SPRING CASING SPACERS)

DESIGN MANAGER	DRL	01-23-18	STANDARDS
			DWG. SG-4008 REV.
	INITIALS	DATE	

Attachment C: Enbridge Erosion & Sedimentation Control Plan

Erosion and Sedimentation Control Plan

Company:

Project:

Location:

Person Responsible (ECP Lead):

Effective 6 June, 2014
Revised September 2017

Environmental Construction Permitting
5400 Westheimer Court
Houston, Texas 77056-5310

TABLE OF CONTENTS

LIST OF FIGURES

APPENDIX A

LIST OF FIGURES, continued

DEFINITIONS

7(c) – Activities authorized under a project-specific Certificate of Public Convenience and Necessity from the Federal Energy Regulatory Commission (FERC), pursuant to Section 7(c) of the Natural Gas Act, to transport or sell natural gas, as well as construct, acquire, extend, alter or operate specific natural gas facilities that provide natural gas service.

Abandonment – Permanent reduction in the availability for service of a FERC jurisdictional facility, including facility modifications which would result in changes to certificated parameters (e.g., permanently operating compressors at lower than certificated horsepower or pipelines at lower than certificated design pressures) as well as changes in operating status (e.g., abandoned-in-place, idled and not maintained, decommissioned or removed facilities). Abandonment of pipe or facilities may be authorized under the blanket certificate or a project-specific Order of Abandonment by FERC, in accordance with Section 7(b) of the Natural Gas Act.

Agricultural Land – Actively cultivated and rotated land used for the production of crops including but not limited to corn, grains, orchards, vineyards and hayfields.

Blanket Certificate Project – Blanket certificate authorization is obtained from FERC by the Company and allows the Company to construct, modify, acquire, operate, and abandon a limited set of natural gas facilities, and offer a set of services without the need for further activity-specific certificate authorizations. Regulations for FERC's Blanket Certificate program are provided under Title 18 CFR Part 157, Subpart F. Examples of these projects include, but is not limited to, pipe replacements requiring new permanent right-of-way (ROW) or temporary workspace outside of the original construction footprint, miscellaneous pipe rearrangements, new receipt and delivery points, abandonments, temporary compression facilities, underground storage field remediation and maintenance activities, and underground storage testing and development activities.

Chief Inspector – Person, designated by the Company, responsible for the quality assurance of construction activities on a project by managing on-site project inspection staff and ensuring the construction contractor meets the requirements of the Company's construction specifications, permits, and any plans and drawings related to specific construction activities. All inspectors on the project report to the Chief Inspector and the Chief Inspector reports to the Company's Construction Superintendent.

Clearance Package/Permit Book – The document issued by the Company's Environmental Construction Permitting (ECP) Department that contains all of the necessary environmental permits, clearances, plans and other requirements specific to a project. The Clearance Package/Permit Book is also included as part of the construction contract.

Deviation – A change to the placement of work limits, structures specified in the construction drawings, or changes in the design of control measures as set forth in the E&SCP, with the exception of minor variations from specifications in the typical E&SCP figures (refer to Appendix A) that are required due to site-specific conditions and which are designed to achieve an equivalent or greater degree of environmental protection.

Environmental Inspector (EI) – On-site Company representative responsible for inspecting and verifying site compliance with environmental conditions identified in the E&SCP as well as project-specific terms and conditions

contained within the Clearance Package / Permit Book. The environmental inspector will perform the duties that are outlined in Section 2.1 of this plan.

Ephemeral stream – Waterbody which flows water only during precipitation events in a typical year and for a short duration after the events. Runoff from rainfall is the primary source of water for stream flow. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream.

Intermediate waterbody – Defined by FERC as a waterbody greater than 10 feet wide but less than or equal to 100 feet wide, measured from water's edge to water's edge at the time of construction.

Intermittent stream – Waterbody which flows during certain times of the year when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Line List – A list prepared by the Company of project-specific instructions for all properties affected by the project, specifying each property owner, the length of crossing, and any special instructions or restrictions for construction crew(s).

Major waterbody – Defined by FERC as a waterbody greater than 100 feet wide, measured at the water's edge at the time of construction.

Minor waterbody – Defined by FERC as a waterbody less than or equal to 10 feet wide, measured at the water's edge at the time of construction.

Pasture – Non-forested land used for grazing of domesticated livestock (horses, cattle, sheep, etc.). Pasture receives periodic renovation and treatments such as tillage, fertilization, mowing, weed control, and may be irrigated. Typical vegetation consists primarily of grasses, herbaceous plants, legumes, and forbs.

Perennial stream – Waterbody which flows water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow and runoff from rainfall is a supplemental source of water for stream flow.

Riparian area – Ecosystems that occupy the transitional zone between terrestrial and aquatic ecosystems. Typical examples of riparian areas include floodplains, streambanks, and lakeshores.

Spill Prevention, Control and Countermeasure Plan /
Preparedness, Prevention and Contingency Plan for Construction Projects (SPCC / PPC Plan) – Company document that contains measures to prevent or reduce the risk of spills or accidental exposure of oil or hazardous materials associated with construction activities, as well as procedures to be employed in the event of a spill, including measures that provide for prompt and effective cleanup of spills, notifications and proper disposal of waste generated during cleanup.

State-designated waterbody – Waterbodies specifically identified or recognized by the States or authorized Indian Tribe for water use, value or quality. Designations take into consideration the protection and propagation fish, shellfish and wildlife, as well as use and value for public water supplies, agricultural, industrial, recreational and other purposes, such as navigation. FERC's Procedures contain specific requirements with regards to state-designated fisheries.

Sensitive resource area – Areas (defined by FERC) that include wetlands, waterbodies, cultural resource sites, or sensitive species habitats.

Take up-and-Relay Pipeline Construction – Also called “lift and relay”, Company construction terminology for the removal of existing pipe and installation of new pipe at the same alignment within the existing permanent easement.

Wetland – Areas that are inundated or saturated by surface or groundwater at a frequency or duration sufficient to support and, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Types of wetlands include swamps, marshes, bogs, sloughs, wet meadows, mudflats and natural ponds.

Waterbody – Any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing during construction, as well as other permanent waterbodies such as ponds and lakes.

1. INTRODUCTION

1.1 PURPOSE OF THIS PLAN

This Erosion and Sedimentation Control Plan (E&SCP) has been prepared for use by the Company and its contractors as a guidance manual for minimizing erosion of disturbed soils and transportation of sediments off the construction ROW and into sensitive resource and residential areas during natural gas construction projects. The procedures developed in this plan, which represent the Company's best management practices, are designed to accommodate varying field conditions while achieving compliance with regulatory requirements and protecting environmentally sensitive areas.

This E&SCP is designed to provide guidelines, best management practices and typical techniques for the installation and implementation of soil erosion and sediment control measures while permitting adequate flexibility to use the most appropriate best management practice measures based on site-specific conditions. The intent of the E&SCP is to provide general information on the pipeline construction process and sequence, and to describe specific measures that will be employed during and following construction to minimize impacts to the environment.

Figures provided in Appendix A of this plan illustrate typical and minimum requirements of best management practices for design and utilization of construction workspace areas, access roads and erosion controls, as well as construction methods for special use areas (e.g., agricultural and residential land) and crossing of features during pipeline construction, including wetlands, waterbodies and roads. References to specific figure numbers provided in Appendix A are indicated throughout the E&SCP.

The goal of the E&SCP is to preserve the integrity of environmentally sensitive areas and to maintain existing water quality by:

- Minimizing the extent and duration of disturbance;
- Diverting runoff to stabilized areas;
- Installing temporary and permanent erosion control measures; and
- Establishing an effective inspection and maintenance program.

The E&SCP is intended to be used on Company projects that have been authorized by Federal Energy Regulatory Commission (FERC) pursuant to Section 7(b) and/or 7(c) of the Natural Gas Act to construct, acquire, alter, abandon or operate gas facilities or to provide gas services. This plan is also intended to be used for projects that are conducted under Company's blanket certificate which are regulated under 18 CFR Part 157, Subpart F. All blanket certificate projects that involve ground disturbance or changes to operational air and noise emissions are subject to the FERC's standard environmental conditions, including adherence to FERC's *Upland Erosion Control, Revegetation and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), May 2013 Version.

1.2 GUIDELINES AND REQUIREMENTS

The measures described in this E&SCP have been developed based on guidelines from the FERC, United States Army Corps of Engineers (COE), the United States Fish and Wildlife Service, the United States Department of Agriculture, the Natural Resource Conservation Service, and various state agencies as well as from the Company's

significant experience and practical knowledge of pipeline construction and effective environmental protection measures. Lessons and insights gained during pipeline construction projects and comments from agency representatives are also incorporated into this E&SCP.

In accordance with FERC regulations, projects under the jurisdiction of Section 7 or the Company's blanket certificate are required to comply with the FERC's Plan and Procedures unless written approval to deviate from the Plan or Procedures is received from the Director of the Office of Energy Projects and the appropriate state agency. This revised version of the E&SCP is consistent with the requirements of FERC's Plan and Procedures (May 2013 version).

If conflicts or differences occur between project-specific conditions of appropriate federal and state agencies and the best management practices described in this E&SCP, consult with the Company Environmental Construction Permitting Department (ECP) representative or ECP Lead. The more stringent or site-specific requirement is typically applicable unless otherwise approved by ECP. With the exception of minor variations from the typical figures that may be required due to site-specific conditions and are designed to achieve an equivalent or greater degree of environmental protection, any deviations from the construction drawings or changes in the design of control measures as set forth in this E&SCP must be approved by the Company's ECP Lead and the appropriate permitting agency prior to implementation. Measures and practices identified within this plan are to be implemented during construction unless otherwise specified by project-specific permit conditions.

1.3 SURVEYS, PERMITS & NOTIFICATIONS

The Company shall perform the required environmental field surveys and acquire the necessary environmental permits, clearances and authorizations prior to start of construction of the project. The Company shall notify the appropriate federal, state, and local agencies prior to, during, and/or subsequent to the construction of the project, as identified in the Clearance Package/Permit Book.

1.4 INQUIRIES

Inquiries regarding this E&SCP should be addressed to the ECP Department at the address shown on the front cover. For field conditions requiring an immediate response, contact the designated person responsible at the address shown on the front cover.

2. SUPERVISION AND INSPECTION

To effectively mitigate project-related impacts, the E&SCP must be properly implemented in the field. Quick and appropriate decisions in the field regarding critical issues such as stream and wetland crossings, placement of erosion controls, trench dewatering, spoil containment, and other construction-related items are essential.

To ensure that the E&SCP is properly implemented, at least one Environmental Inspector (EI) will be designated by the Company for each construction spread during active construction or restoration activities. The EI is responsible for verifying environmental compliance on the construction spread, and performing the duties that are outlined in Section 2.1 below.

2.1 ROLE & RESPONSIBILITIES OF THE ENVIRONMENTAL INSPECTOR

EIs will have the authority to stop activities that violate the environmental conditions of the FERC's Orders (if applicable), stipulations of other environmental permits or approvals, or landowner easement agreements, as well as order appropriate corrective action.

The EI will have peer status with all other activity inspectors and will report directly to the Chief Inspector who has overall authority on the construction spread or project.

The number and experience of EIs assigned to each construction spread shall be appropriate for the length of the construction spread and the number/significance of resources affected. On 7(c) and other large construction projects, the person designated as the EI will typically be a dedicated role for each construction spread. On blanket certificate projects and any other small construction activities carried out under this E&SCP, the EI role may be carried out by the Chief Inspector or another designated and properly trained Company Inspector on site, at the discretion of the Company. In such instances, the Company may employ additional periodic oversight of the EI by an environmental specialist.

At a minimum, the EI shall be responsible for:

1. Inspecting construction activities for compliance with the requirements of this E&SCP, the construction drawings, the environmental conditions of the FERC's Orders (if applicable), proposed mitigation measures, other federal or state and local (if applicable) 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, including waterbodies and 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 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 resource areas, including wetlands, waterbodies, cultural resource sites, and sensitive species habitat; 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 Inspector when environmental conditions (such as wet weather, severe storm events or frozen soils) make it advisable to restrict or delay construction activities to avoid topsoil mixing excessive compaction;

10. Ensuring restoration of contours and topsoil;

11. Verifying that the soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner, and is considered clean and free of hazardous materials;

12. Ensuring that the appropriate erosion/sediment control and stabilization needs are implemented in all areas, including ensuring that erosion and sediment controls are properly installed and maintained daily to prevent sediment flow into sensitive 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 and sediment 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 and sediment 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. Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase;

16. Ensuring proper seed mixes, rates and restoration methods are used, and obtaining documentation;

17. Ensuring that the Contractor implements and complies with the Company's *Spill Prevention, Control and Countermeasure Plan & Preparedness, Prevention and Contingency Plan for Construction Projects* (SPCC/PPC Plan), the Company's *Waste Management Plan*, and other Company environmental documents and standard operating procedures;

18. Verifying that locations for any disposal of excess construction materials for beneficial reuse comply with this E&SCP and any applicable permits / clearances; and,

19. Keeping records of compliance with the environmental conditions of the FERC's Orders and the mitigation measures proposed by the Company in the application submitted to the FERC (if applicable), and other federal or state environmental permits during active construction and restoration. Records should include photo documentation.

2.2 ENVIRONMENTAL TRAINING FOR CONSTRUCTION

Environmental training will be given to both the Company personnel and contractor personnel whose activities have the potential to impact the environment during pipeline construction. All construction personnel from the Chief Inspector, EI, craft inspectors, contractor job superintendent to loggers, welders, equipment operators, and laborers will be given some form of environmental training. The level of training will be commensurate with the type of duties of the personnel. At the discretion of the Company, environmental training for personnel may also be required on projects where it is not required by FERC.

Training will be given prior to the start of construction and throughout the construction process, as needed, and will cover the following issues:

- Specifics of this E&SCP and other Company plans;
- Job or activity specific permit requirements;
- Company policies and commitments;
- Cultural resource procedures and restrictions;
- Threatened and endangered species procedures and restrictions; and
- Any other pertinent information related to the job.

In addition to the EI, all other construction personnel are expected to play an important role in maintaining strict compliance with all permit conditions, and to promptly report any conditions that are perceived as having the potential to threaten environmental protection to the appropriate inspector during construction.

3. CONSTRUCTION TECHNIQUES FOR NATURAL GAS FACILTIES

3.1 TYPICAL ROW REQUIREMENTS

Pipeline construction workspace requirements are a function of pipe diameter, equipment size, topography, geological rock formations, location of construction such as at road crossings or river crossings, pipeline crossovers, methods of construction such as boring or open-cut construction, or existing soil conditions encountered during construction. As the diameter of the pipeline being installed increases, so does the depth of trench, excavated spoil material, equipment size, and ultimately the amount of construction work space that will be required to construct a project. See Figure CW-1 for a detail of a typical trench and Figures CW-3, CW-4 and CW-5 for typical construction ROW widths. All workspace locations for a given project will be shown on the construction drawings.

Additional construction ROW may be required at specific locations including, but not limited to, steep side or vertical slopes, road crossings, pipeline crossovers, areas requiring supplemental topsoil segregation, and staging areas associated with wetland and waterbody crossings. In particular, as shown on the construction drawings, the construction ROW width may be expanded up to 25 feet for the following situations / areas without approval from the FERC, however, prior approval is required from the EI or ECP:

- Accommodate full construction ROW topsoil segregation;
- Ensure safe construction where topographic conditions, such as side-slopes, or soil limitations exist; and
- Facilitate truck turn-arounds where no reasonable alternative access exists in limited, upland, non-riparian or non-forested areas.

All construction activities, including staging areas and additional spoil storage areas, are restricted to the construction ROW limits identified on the construction drawings, except for specific activities in limited, non-wetland and non-riparian areas that are allowed by the FERC Plan and Procedures (i.e. slope breakers, energy-dissipating devices, dewatering structures, and drain tile system repairs). Use of these limited areas is subject to landowner or land management agency approval and compliance with all applicable survey, permit, and reporting requirements; therefore, prior Company approval is required to use these areas. In some cases, federal, state and local permits and authorizations may require additional approvals.

Minor field realignments and workspace shifts per landowner needs and requirements are only allowed if construction activities remain within the environmental field survey area, comply with project-specific environmental permits and landowner easements, and do not affect new landowners or sensitive resource areas.

3.2 ACCESS ROADS & ACCESS POINTS

To the extent practical, all access to the construction ROW will be limited to existing roads and will be minimized in wetlands. However, additional access roads to the construction ROW may be required at various points along the project where other road crossings (paved or gravel state/local roads) do not exist. Examples of types of access used include pipeline ROWs, abandoned town roads, railroad ROWs, power

line service roads, logging roads and farm roads. Improvements to access roads (i.e., grading, placing gravel, replacing/installing culverts, and trimming overhanging vegetation) may be required due to the size and nature of the equipment that would utilize the road (Figure RD-1). The following conditions apply to the use of all access roads:

1. During construction and restoration activities, access to the ROW is limited to the use of new or existing access roads identified on the construction drawings.

2. The only access roads that can be used in wetlands, other than the construction ROW, are those existing roads requiring no modification or improvements, other than routine repair, and posing no impact on the wetland.

3. The construction ROW may be used for access across wetlands when the wetland soil is firm enough to avoid rutting or the construction ROW has been appropriately stabilized to avoid rutting (e.g., with timber riprap, prefabricated equipment mats, or terra mats). However, access is not allowed through wetlands that are specifically being avoided by HDD or would not otherwise be impacted by the project.

4. 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 ROW.

5. Blanket certificate projects may not have construction drawings available in which case access to the ROW will be identified in the Clearance Package / Permit Book.

6. Maintain safe and accessible conditions at all road crossings and access points during construction and restoration. Access road maintenance through the construction sequence may include grading and the addition of gravel or stone when necessary.

7. Maintain access roads in a stable manner to prevent off-ROW impacts, including impacts to adjacent and/or nearby sensitive resource areas, and implement all appropriate erosion and sediment control measures for construction/improvement of access roads.

8. Minimize the use of tracked equipment on public roadways.

9. Remove any soil or gravel spilled or tracked onto roadways daily or more frequent as necessary to maintain safe road conditions.

10. Repair any damages to roadway surfaces, shoulders, and bar ditches.

11. If crushed stone/rock access pads are used in residential or agricultural areas, stone shall be placed on synthetic, nonwoven geotextile fabric to facilitate removal after construction (Figure RD-2).

12. All access roads across a waterbody must use an equipment bridge in accordance with Section 5.1.2.

13. For access through a saturated wetland, use timber mats or an equivalent, unless otherwise authorized by agency permits (Figure RD-3).

14. Limit construction equipment operating in wetland areas to that needed to clear the ROW, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction ROW. All other construction equipment shall use access roads located in upland areas to the maximum extent practical.

3.3 PIPE AND CONTRACTOR WAREYARDS

Pipe and contractor wareyards are required for storing and staging equipment, pipe, fuel, oil, pipe fabrication, and other construction-related materials and preparations. The Contractor shall perform the following measures at pipe and contractor wareyards:

1. Strip and segregate topsoil in agricultural lands;
2. Install erosion and sediment control structures as directed by the EI or identified on the construction drawings, and as outlined in this E&SCP and the SPCC/PPC Plan. Maintain controls throughout construction and restoration activities;
3. Implement and comply with the SPCC/PPC Plan and the Waste Management Plan, including the completion of any required site-specific forms and attachments; and,
4. Restore and revegetate all disturbed areas in accordance with the measures outlined in this E&SCP, landowner agreements and/or as directed by the EI. At a minimum, the area must be returned to preconstruction contours and stabilized prior to contractor demobilization.

3.4 OFF-ROW DISTURBANCE

All construction activities are restricted to the construction ROW limits identified on the construction drawings, except for specific activities in limited, non-wetland and non-riparian areas that are allowed by the FERC Plan and Procedures. Activities allowed to occur off-ROW are limited to the installation of slope breakers, energy-dissipating devices and dewatering structures, as well as repairs to drain tile. Minor field realignment and workspace shifts per landowner needs and requirements are only allowed if construction activities remain within the environmental field survey area, maintain compliance with project-specific environmental permits and landowner easements, do not affect new landowners or environmental resources, and do not require the operation of heavy equipment off ROW. In the event that inadvertent off-ROW disturbance occurs, the following measures will be implemented:

1. The EI will immediately report the occurrence to the Chief Inspector and ROW Agent;
2. The conditions that caused the disturbance will be evaluated by the Chief Inspector and the EI, and they will determine whether work at the location can proceed under those conditions; and
3. If determined to be necessary by the Chief Inspector and EI, one or more of the following corrective actions will be taken: immediate restoration of the preconstruction contours, seeding and mulching of the disturbed area, and/or installation of erosion or sediment control devices, conduct additional tailgate or employee/contractor training, and investigation of the issue to develop lessons learned for future issue prevention.

4. The Company's ECP Department will be notified.

3.5 CONSTRUCTION SEQUENCE FOR PIPELINE INSTALLATION

Natural gas pipelines are installed using conventional overland buried pipeline construction techniques. These activities are necessary for the installation of a stable, safe, and reliable transmission facility consistent with U.S. Department of Transportation (U.S.DOT) requirements and regulations. This section provides an overview of the equipment and operations necessary for the installation of a natural gas pipeline, describes potential impacts that may occur from each operation, and identifies the measures that will be implemented to control these potential impacts. This section also discusses in detail the erosion and sediment control techniques that typically apply to each construction activity including clearing, grading, trenching, lowering-in of pipe, backfilling, and hydrostatic testing. Pipe abandonment in-place or removal, which may be associated with a pipeline replacement activity or occur as an independent activity on an existing pipeline, are also covered at the end of this section. ROW restoration is the final step in the typical construction sequence and will be addressed in Section 3.6.

Installation of the pipeline typically proceeds in a linear manner from one end of the construction spread to the other in an assembly line or "mainline" fashion. However, different stages may be running in parallel on different physical segments of the project. In some cases, this means that full completion of one of the construction sequence stages described below may not occur before the next construction sequence stage is initiated. Construction sequencing should be planned to limit the amount and duration of open trench sections, as necessary, to prevent excessive erosion or sediment flow into sensitive environmental resource areas. This is due to the Company's effort to adhere to strict construction schedules in order to minimize safety concerns, landowner effects, and environmental disturbance. The spacing between the individual crews responsible for each interdependent activity is based on anticipated rate of linear progress. The activities listed below are typically performed in the following sequence:

- Surveying and flagging the ROW;
- Clearing the ROW;
- Installing temporary sediment barriers;
- Grading the ROW;
- Installing temporary slope breakers;
- Trenching/excavating the trench;
- Pipe stringing and bending;
- Welding and weld inspection;
- Lowering the pipe into the trench;
- Backfilling the trench;
- Hydrostatic testing of pipe; and
- ROW restoration and clean-up.

Obstacles to the mainline technique are often encountered and are not considered to be out of the ordinary. These obstacles, which include side hill crossings, rock, wetlands, streams, roads and residential areas, do not normally interrupt the assembly line flow.

3.5.1 Clearing & Flagging

Clearing operations include the removal of vegetation within the construction ROW. Various clearing methods are employed depending on tree size, contour of the land, and the ability of the ground to support clearing equipment. Vegetative clearing can be accomplished either by hand or by cutting equipment. The following procedures will be standard practice during clearing:

1. Prior to beginning the removal of vegetation,
    a. The limits of clearing will be established and visibly marked before clearing;
    b. Signs and highly visible flagging will also be used to mark the boundaries of sensitive resource areas, including waterbodies and wetlands, and/or areas with special requirements along the construction work area, in accordance with the construction drawings;
    c. Flagging or marking shall be maintained throughout construction;
    d. Trees to be protected per landowner requests or as otherwise directed will be clearly marked;
2. All construction activities and ground disturbance will be confined to within the construction ROW shown on the construction drawings (with the limited exception of compliance activities described above in Section 3.4);
3. All brush and trees will be felled into the construction ROW to minimize damage to trees and structures adjacent to the ROW. Trees that inadvertently fall beyond the edge of the ROW will be immediately moved onto the ROW and disturbed areas will be immediately stabilized, per landowner approval;
4. Trees will be chipped and removed or cut into lengths identified by the landowner and then stacked at the edge of the ROW or removed. Trees may be burned depending on local and state restrictions, applicable permits, construction Line List stipulations, and landowner agreements;
5. Brush and limbs may be disposed of in one or more of the following ways depending on local restrictions, applicable permits, construction Line List stipulations, and landowner agreements:
    a. Stockpiled along the edge of the ROW;
    b. Burned;
    c. Chipped, spread across the ROW in upland areas, and plowed in at the discretion of the Chief Inspector or EI (excess material must be removed);
    d. Used as part of erosion control mix material; or
    e. Hauled off site to a Company-approved location.
6. Existing surface drainage patterns shall not be altered by the placement of timber or brush piles at the edge of the construction ROW.

3.5.2 Temporary Sediment Barriers

Sediment barriers, which are temporary sediment controls intended to minimize the flow and deposition of sediment beyond approved workspaces or into sensitive resource areas, shall be installed following vegetative clearing operations. They may be constructed of materials such as silt fence, staked straw bales, compacted earth (e.g., drivable berms across travel lanes), sand bags, or other appropriate materials (Figures EC-1, EC-2, EC-3 and EC-5). Where allowed by regulatory agencies, hay bales may be used in lieu of straw bales with the following restrictions**:** hay bales shall not be used for mulching and the Contractor is responsible for their removal and disposal.

1. Install temporary sediment barriers at the base of slopes greater than 5% where the base of the slope is less than 50 feet from a road crossing, waterbody and/or wetland in accordance with Sections 5.1.4 and 6.3 respectively.
2. Do not stake or trench in place straw bales used on equipment bridges or on mats across the travel lane.
3. Inspect temporary sediment barriers daily in areas of active construction to ensure proper functioning and maintenance. In other areas with no construction or equipment operation, sediment barriers will be inspected and maintained on a weekly basis throughout construction, and within 24 hours of each 0.5 inch of rainfall. Conduct an inspection within 24 hours once a storm event has produced 0.5 inch of rainfall, even if the storm event is still continuing.
4. Maintain all temporary sediment barriers in place until permanent revegetation measures are successful or the upland areas adjacent to wetlands, waterbodies, or roads are stabilized.
5. Remove temporary sediment barriers from an area when replaced by permanent erosion or sediment control measures or when the area has been successfully restored as specified in Section 8.1.

3.5.3 Grading

The construction ROW will be graded as needed to provide a level workspace for safe operation of heavy equipment used in pipeline construction. The following procedures will be standard practice during grading:

3.5.3.1 Topsoil Segregation

During construction, topsoil and subsoil will be disturbed by grading of the right-of-way, trench excavation, and by heavy equipment moving along the right-of-way. Implementation of proper topsoil segregation is intended to mitigate these construction impacts and promote or facilitate post-construction revegetation success.

Topsoil segregation methods will be used in all residential areas (except where the topsoil is being replaced), wetlands (except areas where standing water is present or soils are saturated), cultivated or rotated croplands, managed pastures, hayfields, and other areas at the landowner's or land managing agency's request. Either the "ditch plus spoil side" or the "full right-of-way" segregation method will be used, as illustrated in Figure CW-2.

a. 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) as stipulated in the Construction Contract or Line List.

b. Segregate at least 12 inches of topsoil in deep soils with more than 12 inches of topsoil. In soils with less than 12 inches of topsoil, make every effort to segregate the entire topsoil layer.

c. Within wetlands, segregate the top 12 inches of topsoil within the trenchline, except in areas where standing water is present or soils are saturated.

d. In residential areas, importation of topsoil (i.e. topsoil replacement) is an acceptable alternative to topsoil segregation, if approved by the landowner and Chief Inspector.

e. Maintain separation of salvaged topsoil and subsoil throughout all construction activities.

f. Leave gaps in the topsoil piles and spoil piles for the installation of temporary slope breakers to allow water to be diverted off the construction ROW.

g. Never use topsoil for padding the pipe, constructing temporary slope breakers, trench breakers or trench plugs, improving or maintaining roads, or as a fill material.

h. 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.

3.5.3.2 Tree Stump Removal and Disposal

a. Remove tree stumps in upland areas along the entire width of the permanent ROW to allow adequate clearance for the safe operation of vehicles and equipment. Stumps within the temporary ROW will be removed or ground below the surface in accordance with Company construction specifications to allow the safe passage of equipment, as determined by the Chief Inspector or EI.

b. In wetlands, limit pulling of tree stumps and grading activities to directly over the trenchline.

c. Dispose of stumps by one of the following methods with the approval of the Chief Inspector and the landowner and in accordance with regulatory requirements:

- Buried at a Company-approved off-site location (except in wetlands and agricultural areas);
- Burned on construction ROW;
- Chipped, spread across the construction ROW in upland areas, and plowed in;
- Used as erosion control mix material;

- Ground to grade in wetlands, excess chips will be removed for proper disposal; or
- Hauled off-site.

d. Grading operations and tree stump removal in wetland areas will be conducted in accordance with Section 6.2.

3.5.3.3 Rock Management

Rock, including blast rock, will be used, removed or disposed of in one of the following ways:

a. 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 material or waste, unless approved for use as mulch or for some other use on the construction work areas by the land owner or land managing agency.);

b. Windrowed per written landowner agreement with the Company;

c. Removed and disposed of at a Company-approved landfill; or

d. Used as riprap for streambank stabilization as allowed by applicable regulatory agency(ies) and provided the rock is uncontaminated and free of soil and other debris (Figure WC-6).

3.5.4 Temporary Slope Breakers

Temporary slope breakers, also called interceptor dikes, are temporary erosion control measures intended to reduce runoff velocity and divert water off the construction ROW. Temporary slope breakers may be constructed of materials such as compacted soil, silt fence, staked straw bales, or sand bags. Segregated topsoil may not be used for constructing temporary slope breakers. If permitted by regulatory agency(ies), hay bales may be used in lieu of straw bales except for mulching. If hay bales are used, the Contractor is responsible for their removal and Company-approved disposal.

1. Install temporary slope breakers on all disturbed areas as necessary following grading operations (Figure EC-7) to avoid excessive erosion. Unless otherwise specified by permit conditions, temporary slope breakers must be installed on slopes greater than 5% at the recommended spacing interval indicated below (Closer spacing should be used if necessary):

Slope (%)	**Spacing (feet)**
< 5	No structure
5 – 15	300
> 15 – 30	200
> 30	100

2. Direct the outfall of each slope breaker to a stable, well vegetated area or construct an energy-dissipating device (silt fence, staked straw bales, erosion control fabric) at the end of the slope breaker.

3. Position the outfall of each temporary slope breaker to prevent sediment discharge into wetlands, waterbodies, or other sensitive resource areas.

4. Install temporary slope breakers across the entire construction ROW along slopes greater than 5 % where the base of the slope is less than 50 feet from waterbody, wetland, and road crossings.

5. Inspect temporary slope breakers daily in areas of active construction to insure proper functioning and maintenance. In other areas, the slope breakers will be inspected and maintained on a weekly basis throughout construction, and within 24 hours of each 0.5 inch of rainfall. Repairs should be made within 24 hours of identification, if possible.

Drivable berms, which are smaller versions of slope breakers constructed of compacted soil or sand bags, may be used in place of staked straw bales at the entrances and exits of travel lanes at road crossings, waterbodies, and wetlands. They are installed across the width of the travel lane at the start of the equipment crossing and made low enough to allow equipment and other vehicles to pass. Yet, they should function to reduce and divert water runoff from sensitive resource areas.

3.5.5 Trenching

The trench centerline will be staked after the construction ROW has been prepared. In general, a trench will be excavated to a depth that will permit burial of the pipe with a minimum of 3 feet of cover (Figure CW-1). Overland trenching may be accomplished using a conventional backhoe or a rotary wheel-ditching machine. In shale or rocky areas where the use of the conventional excavation equipment is limited, a tractor-drawn ripper or rock hammer may be employed to break and loosen hard substratum material. In areas where rock cannot be ripped or hammered, drilling and blasting may be required. A backhoe may then be used to remove rock and soil from the ditch.

The following procedures will be standard practice during ditching:

- Flag drainage tiles damaged during ditching activities for repair;
- Place spoil in additional extra work areas or at least 10 feet away from the waterbody's edge in the construction ROW. Spoil will be contained with erosion and sediment control devices to prevent spoil materials or sediment-laden water from transferring into waterbodies and wetlands or off of the ROW; and,
- If temporary erosion or sediment controls are damaged or removed during trenching, they shall be repaired and/or replaced before the end of the work day.

3.5.5.1 Temporary Trench Plugs

Temporary trench plugs are barriers within the ditch that are intended to segment the continuous open trench prior to backfill. They typically consist of unexcavated portions of the ditch (hard plug), compacted subsoil or sandbags (soft plug) placed across the ditch, or some functional equivalent. Along steep slopes, they serve to reduce erosion and sedimentation in the trench and minimize dewatering problems at the base of slopes where sensitive environments such as waterbodies and wetlands are frequently located. In addition, they provide access across the trench for wildlife and livestock.

a. Do not use topsoil for constructing trench plugs.

b. Coordinate with the landowner to identify optimal locations for the placement of temporary hard plugs designed to provide access for livestock.

c. Temporary trench plugs may be used in conjunction with slope breakers to prevent water in the trench from overflowing into sensitive resource areas (Figure EC-6). Attempt to divert trench overflow to a well-vegetated off-ROW location or construct an energy-dissipating device.

d. 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.

3.5.6 Trench & Site Dewatering

Dewatering may be periodically conducted to remove accumulated groundwater or precipitation from the construction ROW, including from within the trenchline. The need for erosion controls as well as the type of control used will vary depending on the type and amount of sediment within the water, and volume and rate of discharge.

1. Conduct dewatering (on or off the construction ROW) in such a manner that does not cause erosion and does not result in silt-laden water flowing into any waterbody or wetland.
2. Elevate and screen the intake of each hose used to withdraw the water from the trench to minimize pumping of deposited sediments.
3. Water may be discharged into areas where adequate vegetation is present adjacent to the construction ROW to function as a filter medium.
4. Where vegetation is absent or in the vicinity of waterbody / wetland areas, water will be pumped into a discharge structure that accommodates the anticipated discharge volumes as well as type and amount of sediment within the water being discharged, including
    a. a filter bag, as illustrated in Figure WD-1, or
    b. a structure composed of sediment barriers (Options for these types of controls are illustrated in Figure WD-2 and WD-3.).

    A structure that is more typically used for discharges of hydrostatic test water, as illustrated in Figure WD-2, may be necessary for large volumes of water.
5. When using filter bags, secure the discharge hose to the bag with a clamp.
6. Remove dewatering structures as soon as practicable after the completion of dewatering activities.

3.5.7 Pipe Installation

During all phases of the pipe installation process, ensure that all roadway crossings and access points are safe and accessible conditions. Repair damaged temporary erosion controls by the end of the work day. If portions of slope breakers are removed from the travel lane to facilitate safe work conditions, they shall be restored prior to the end of the work day.

3.5.7.1 Stringing and Bending

Following trench excavation, pipe sections will be delivered to the construction site by truck or tracked vehicle, and strung out along the trench. Individual pipe sections will be placed on temporary supports or wooden skids and staggered to allow room for work on the exposed ends. Certain pipe sections will be bent, as necessary, to conform to changes in slope and direction of the trench.

All rope bands should be collected and disposed of properly.

3.5.7.2 Welding

Once the bending operation is complete, the pipe sections will be welded together on supports using approved welding procedures that comply with Company welding specifications. After welding, the welds will be inspected radiographically or ultrasonically to ensure their structural integrity.

3.5.7.3 Lowering-in and Tie-ins

Lowering-in consists of placing the completed pipeline sections into the trench typically using two or more sideboom tractors acting in unison and spaced so as not to buckle or otherwise damage the pipe. The pipeline will be lifted from the supports, swung out over the trench, and lowered directly into the trench. The equipment uses a “leap frogging” technique requiring sufficient area to safely move around other tractors within the construction ROW to gain an advanced position on the pipe. The unwelded ends of the completed pipeline segments (typically present at road crossings, stream crossings, etc.) are then welded together or “tied-in” by specialized tie-in crews.

3.5.8 Backfilling

Backfilling consists of covering the pipe with the earth removed from the trench or with other fill material hauled to the site when the existing trench spoil is not adequate for backfill. Backfilling will follow lowering-in of the pipeline as close as is practical.

In areas where the trench bottom is irregularly shaped due to consolidated rock or where the excavated spoil materials are unacceptable for backfilling around the pipe, padding material may be required to prevent damage to the pipe. This padding material will generally consist of sand or screened spoil materials from trench excavation.

1. Under no circumstances shall topsoil be used as padding material.

2. Excess rock, including blast rock, may be used to backfill the trench only to the top of the existing bedrock profile in accordance with Company specifications. Rock that is not used to backfill the trench will be managed as described in Section 3.5.3.3.

3. Any excess material will be spread within the ROW in upland areas and land contours will be roughed-in to match adjacent topography.

4. The trench may be backfilled with a crown over the pipe to compensate for compaction and settling. Openings will be left in the completed trench crown to restore pre-construction drainage patterns. Crowning shall not be used in wetland areas.

3.5.8.1 Permanent Trench Breakers

Permanent trench breakers are intended to slow subsurface water flow and erosion along the trench and around the pipe in sloping terrain. An engineer or similarly qualified professional shall determine the need for and spacing of permanent trench breakers. However, trench breakers will not be installed within a wetland.

Permanent trench breakers will be constructed with sand bags, polyurethane foam, or an equivalent as identified in the permit requirements (Figure EC-10 and EC-11). Topsoil shall not be used to construct trench breakers. Sakrete may be used at the discretion of the Chief Inspector on severe slopes greater than 30 percent.

Permanent trench breakers, which are used in conjunction with slope breakers, shall be installed at the locations shown on the construction drawings, at the same spacing interval as and upslope of permanent slope breakers, or as otherwise determined by an engineer or similarly qualified professional, such as the EI (Figure EC-12). At a minimum, install trench breakers:

a. At the base of slopes greater than 5% where the base of the slope is less than 50 feet from a waterbody or wetland;

b. Where needed to avoid draining of a resource, including at wetland boundaries where the pipeline trench may drain a wetland, and/or seal the trench bottom as necessary to maintain the original wetland hydrology; and,

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.

3.5.9 Hydrostatic Testing

Once the pipeline is completed and before it is placed into service, it will be hydrostatically tested for structural integrity. Hydrostatic testing involves filling the pipeline with clean water and maintaining a test pressure in excess of normal operating pressures for a specified period of time (typically 8 hours). The testing procedure involves filling the pipeline with water, performing the pressure test, and discharging the test water.

The following general hydrostatic testing procedures shall be adhered to for all projects. Environmental conditions for hydrostatic testing activities are also addressed in the project-specific Hydrostatic Test Clearance Package that is issued by ECP if permits are required for water appropriation and/or discharge. During planning and permitting of test events:

1. Identify the location of all waterbodies proposed for use as a hydrostatic test water source or discharge location. Use only the water sources identified in the Clearance Package/Permit Book.

a. Do not use water from or discharge into state-designated exceptional value waters, waterbodies that 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.

2. Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.
3. Attempt to locate discharge sites in a well-vegetated and stabilized area, if practical, at least 50-feet from adjacent waterbody/wetland areas.
4. Apply for and obtain state-issued water withdrawal permits and National Pollutant Discharge Elimination System (NPDES) or state-issued discharge permits, as required.

During preparation for testing, including appropriation of source water and preparing discharge/outfall site:

1. At least 48 hours before testing activities, the EI shall notify appropriate state agencies (as identified in the relevant permit for hydrostatic test discharges) of the intent to use specific test water sources (unless waived in writing).
2. If pumps used for hydrostatic testing are within 100 feet of any waterbody or wetland, the use of secondary containment, operation and refueling of those pumps will be addressed and conducted in accordance with the SPCC/PPC Plan.
3. Screen the intake hose to minimize the potential for entrainment of fish and other aquatic life.
4. Maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.
5. Install all discharge structures in a well-vegetated and stabilized area, if practical, and attempt to maintain at least a 50-foot vegetated buffer from adjacent waterbody/wetland areas. If an adequate buffer is not available, sediment barriers or similar sediment control measure must be installed.

During the discharge of hydrostatic test water on-site:

1. Discharge water only at the locations shown on the construction drawings or locations identified in the Clearance Package/Permit Book or ECP's Hydrostatic Test Clearance Package.
2. Regulate rate of discharge water and use energy dissipation device(s) and sediment barriers, as necessary, to prevent erosion, streambed scour to aquatic resources, sedimentation, flooding or excessive stream flow (Figures WD-2 and WD-3).
3. Use absorbent booms as necessary during discharge from existing pipe or as stipulated by the applicable NPDES permit.
4. The test water may be discharged through an appropriate filtration system including holding tanks or frac tanks and/or carbon filters if needed to meet effluent limitations or conditions stipulated in the NPDES permit.

5. 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.

6. The EI or appropriate designee shall sample and test the source water and discharge water in accordance with the permit requirements.

3.5.10 Pipeline Abandonment and Removal

Pipeline abandonment and removal activities may occur when gas service is no longer needed, such as the abandonment of a lateral to a customer receipt or delivery point. Removal or in-place abandonment of pipe can also be conducted as part of an expansion or maintenance project, such as the lift-and-relay of existing pipe, the replacement or relocation of an existing pipeline due to road or highway modifications, or activities required to maintain compliance with U.S.DOT requirements.

Abandonment approval from FERC, such as project-specific Section 7(b) Order or blanket certificate authorization, is required prior to abandoning facilities or services. Abandonment of FERC-regulated natural gas pipelines or storage facilities, either in place or by removal, must follow FERC's regulations.

Where removal of a section of existing pipeline is required, construction activities typically proceed in a construction sequence similar to what has been described above in Section 3.5, except that instead of the pipeline installation step, the existing pipeline would be cut and removed from the trench. If the pipeline removal is associated with a lift-and-relay project or a replacement, then the new pipeline installation would follow the removal of the old pipe. Pipe that is abandoned by removal will be handled, taken off-site and properly disposed of or recycled in accordance with Company procedures.

When a pipeline is abandoned in place, typically work involves only relatively small excavations to remove above-ground appurtenances and meters, as well as expose the pipe in certain locations, cut it, fill with grout or blanket gas and cap the ends of the pipe, in accordance with agency and Company requirements.

Mitigation measures for pipeline abandonment and removal activities, such as erosion control measures, will follow the same requirements outlined within the E&SCP for pipeline installation in order to minimize erosion and enhance revegetation, as well as mitigate the extent and duration of project-related disturbance to wetlands and waterbodies.

3.6 ROW RESTORATION & FINAL CLEANUP

Restoration of the ROW will begin after pipeline construction activities have been completed. Restoration measures include the re-establishment of final grades and drainage patterns as well as the installation of permanent erosion and sediment control devices to minimize post-construction erosion. Residential areas will be restored in accordance with Section 4.3.3. Property shall be restored as close to its preconstruction condition as practical unless otherwise specified by the landowner.

1. The Contractor shall make every reasonable effort to complete final cleanup of an area (including final grading, topsoil replacement and installation of permanent erosion control structures) within 20 days after backfilling the trench in that area (within 10 days in residential areas). If seasonal or other weather conditions prevent compliance with these timeframes, continue to inspect and maintain temporary erosion and sediment 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, follow the requirements of Frozen Conditions & Winter Construction, Section 3.6.4.

2. Seed all disturbed soils within 6 working days of final grading, weather and soil conditions permitting.

3. If construction or restoration unexpectedly cannot be completed and is delayed until the next recommended growing season, the winter stabilization measures shall be followed.

4. Grade the ROW to pre-construction contours, with the exception of the installation of any permanent measures required herein.

5. Spread segregated topsoil back across the graded ROW to its original profile.

6. Remove excess rock from at least the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields, residential areas, as well as other areas at the landowner's request. The size, density, and distribution of rock on the construction ROW shall be similar to adjacent areas not disturbed by construction. The landowner or land managing agency may approve other provisions in writing.

7. A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion and sediment control structures are installed, regularly inspected and maintained. When access is no longer required, the travel lane must be removed and the ROW restored.

8. Remove all construction debris (used filter bags, skids, trash, etc.) from all construction work areas unless the landowner or land managing agency approves leaving material onsite for beneficial reuse, stabilization, or habitat restoration. Grade or till the ROW to leave the soil in the proper condition for planting.

3.6.1 Permanent Erosion Control

3.6.1.1 Permanent Slope Breakers

Permanent slope breakers are intended to reduce runoff velocity, divert water off the construction ROW, and prevent sediment deposition into sensitive resources. Permanent slope breakers will be constructed of compacted soil (Figure EC-8). Stone or some functional equivalent may be used when approved by the Company.

a. Construct and maintain permanent slope breakers in all areas, except cultivated areas and lawns, unless requested by the landowner, at the locations shown on the construction drawings.

b. Use spacing recommendations obtained from the local soil conservation authority or land managing agency. If not shown on the construction drawings or in the absence of written recommendations, use the following spacing (same as temporary slope breaker spacing) unless closer spacing is necessary to avoid excessive erosion on the construction ROW:

Slope (%)	Spacing (feet)
< 5	No structure
5 – 15	300
> 15 – 30	200
> 30	100

c. A permanent trench breaker will be located immediately upslope of the slope breaker.

d. Install permanent slope breakers across the construction ROW at the base of slopes adjacent to roads. When the ROW parallels an existing utility ROW, permanent slope breakers may be installed to match existing slope breakers on the adjacent undisturbed utility ROW.

e. Install permanent slope breakers across the construction ROW at the base of slopes greater than 5% that are less than 50 feet from a wetland or waterbody, or as needed to prevent sediment transport into a wetland or waterbody.

f. Construct slope breakers with a 2 to 8 percent outslope to divert surface flow to a stable vegetative area without causing water to pool or erode behind the slope breaker. In the absence of a stable vegetative area, install an energy-dissipating device at the end of the slope breaker.

g. Slope breakers may extend slightly (about 4 feet) beyond the edge of the construction ROW to effectively drain water off the disturbed area. Where slope breakers extend beyond the edge of the construction ROW, they are subject to compliance with all applicable survey and permit requirements.

h. Install chevron-style slope breakers on slopes as appropriate (Figure EC-9).

i. Where drainage is insufficient in upland areas, install a rock-lined drainage swale as approved by the EI. The drainage swale is generally 8 feet wide and a maximum of 18-24 inches deep (Figure EC-4).

3.6.1.2 Erosion Control Fabric / Blankets

Erosion control fabric or blankets are used during restoration, including as mulch, to slow down stormwater and stabilize soil until vegetation becomes established. Examples of these erosion controls include jute thatching or bonded fiber blankets. 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.

Install erosion control fabric or blankets where necessary or as recommended by the EI

a. at slope breaker outlets and drainage swales (Figure EC-7, EC-8 and EC-4);

b. on slopes adjacent to roads or waterbodies (Figure EC-14); and

c. on waterbody banks at the time of final bank recontouring (Figure WC-5).

Anchor the erosion control fabric or blanket with staples or other appropriate devices in accordance with the manufacturers' recommendations (Figure EC-13). Evaluate flow conditions to determine if erosion control fabric is suitable as an effective vegetation stabilization technique on waterbody banks. High-velocity erosion control fabric should be used on the swale side of permanent slope breakers.

3.6.2 Revegetation and Seeding

Successful revegetation of soils disturbed by project-related activities is essential. Seeding will be conducted using the following requirements:

1. Fertilize and add soil pH modifiers in accordance with the recommendations in Appendix C. Incorporate recommended soil pH modifier and fertilizer into the top 2 inches of soil as soon as practicable after application;

2. Seed all disturbed areas within 6 working days of final grading, weather and soil conditions permitting;

3. Prepare seedbed in disturbed areas to a depth of 3 to 4 inches to provide a firm seedbed. When hydroseeding, scarify the seedbed to facilitate lodging and germination of seed;

4. Seed disturbed areas in accordance with the seed mixes, rates, and dates in Appendix C, except in upland areas where landowners or a land management agency may request alternative seed mixes, however, seeding is not required in cultivated croplands unless requested by the landowner;

5. Perform seeding of permanent vegetation within the recommended seeding dates as outlined in Appendix C. If seeding cannot be done within those dates, use appropriate temporary erosion control measures discussed in Section 3.5.2 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 EI. Mulch in accordance with Section 3.6.3. Lawns may be seeded on a schedule established with the landowner;

6. Base seeding rates on Pure Live Seed (PLS);

7. Use seed within 12 months of seed testing;

8. 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 hydroseeding); and,

9. Uniformly apply and cover seed in accordance with the appropriate seed mix from Appendix C, in the absence of any recommendations from the local soil conservation authorities, landowner, or land managing agency to the contrary.

    a. A seed drill equipped with a cultipacker is preferred for application but, where permitted by regulatory agencies, broadcast or hydroseeding can be used at double the recommended seeding rates.

    b. Where seed is broadcast, firm the seedbed with a cultipacker or roller after seeding.

    c. 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 EI.

3.6.3 Mulch

Mulch is intended to stabilize the soil surface and shall consist of weed-free straw, wood fiber hydromulch, erosion control fabric or some functional equivalent as approved by the EI and Chief Inspector.

1. Mulch all disturbed upland areas (except cultivated cropland) **before** seeding if:

    a. Final cleanup, including final grading and installation of permanent erosion control measures, is not completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas); or

    b. Construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.

    NOTE: When mulching before 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.

2. 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 ROW at a rate of 2 tons/acre of straw or equivalent.

3. Mulch with woodchips only under the following conditions with prior approval from the Chief Inspector or the EI:

    a. Do not use more than 1 ton/acre; and

    b. Add the equivalent of 11 lbs/acre available nitrogen (at least 50% of which is slow release).

4. Ensure that mulch is anchored to minimize loss by wind and water. Anchoring may be achieved by wet soil conditions, when approved by the EI, mechanical means, or use of liquid mulch binders.

5. When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 100 feet of wetlands and waterbodies, except where the product is certified environmentally non-toxic by the appropriate state or federal agency or independent standards-setting organization.

6. If used, install erosion control fabric or blankets in accordance with Section 3.6.1.2.

3.6.4 Frozen Conditions & Winter Construction

Winter weather may not provide suitable conditions for soil handling or restoration of disturbed areas. In the event that the construction occurs too late in the year for cleanup activities to adequately proceed or if construction is planned to occur during winter weather conditions, the Company will develop a project-specific Winter Construction Plan that addresses:

- Winter construction procedures (e.g., snow handling and removal, access road construction and maintenance, soil handling under saturated or frozen conditions, topsoil stripping);
- 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,
- Final restoration procedures (e.g., subsidence and compaction repair, topsoil replacement, seeding).

The Winter Construction Plan will be provided within the project-specific Clearance Package / Permit Book. Section 7(c) and prior notice projects are required to file the Winter Construction Plan for the review and written approval by the FERC. (The requirement to file a plan does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.)

3.6.5 Unauthorized Vehicle Access to ROW

The Company will offer to install and maintain measures to control unauthorized vehicle access to the ROW based on requests by the manager or owner of forested lands. These measures may include:

- Signs;
- Fences with locking gates;
- Permanent access roads;
- Slash and timber barriers, pipe barriers, or a line of boulders across the ROW; or
- Conifers or other appropriate shrubs with a mature height of 4 feet or less across the ROW.

3.7 ABOVEGROUND FACILITY CONSTRUCTION

Construction at aboveground facilities, including compressor stations, meter stations, valve sites, and other facilities, will follow the same best management practices identified for pipeline installation and removal on

the ROW. Work activities in this category can include installation of new aboveground facilities, modification or relocation of facilities at existing compressor station sites, upgrades or installations at existing meter station sites, construction of new receipt or delivery points, and a variety of other activities. Certain project types covered in this section may trigger additional stormwater permitting. Check with the ECP Lead to ensure that all stormwater requirements are met prior to construction.

1. Aboveground facilities shall not be located in any wetland, except as permitted or where the location of such facilities outside of wetlands would prohibit compliance with U.S.DOT regulations.

2. Install temporary sediment barriers at the base of slopes adjacent to roads and at waterbodies and wetlands in accordance with Sections 5.1.4 and 6.3 respectively.

3. Inspect temporary sediment barriers daily in areas of active construction to ensure proper functioning and maintenance. In other areas with no construction or equipment operation, sediment barriers will be inspected and maintained on a weekly basis throughout construction, and within 24 hours of each 0.5 inch of rainfall. Conduct an inspection within 24 hours once a storm event has produced 0.5 inch of rainfall, even if the storm event is still continuing.

4. If a waterbody is present on or immediately adjacent to an existing facility property where work is being conducted, install sediment barriers as necessary along the edge of the construction area to contain spoil and sediment within the work area.

5. All extra work areas should be located at least 50 feet away from the water's edge of a waterbody or a wetland, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. FERC approval is necessary for the use of work areas if these setback conditions cannot be met.

6. Wetland boundaries and 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.

7. When work is required within a wetland at an existing facility, and 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. Do not use more than two layers of timber riprap to stabilize the work area.

8. Maintain all temporary sediment barriers in place until permanent revegetation measures are successful or the upland areas adjacent to wetlands, waterbodies and roads are stabilized.

9. Remove temporary sediment barriers from an area when replaced by permanent erosion or sediment control measures or when the area has been successfully restored as specified in Section 8.1.

10. Temporary slope breakers are to be installed on all disturbed areas as necessary to avoid excessive erosion as described in Section 3.5.4.

11. Where required for work in wetlands (except areas where standing water is present or soils are saturated) segregate topsoil as described in Section 3.5.3.1.

12. Place spoil at least 10 feet upgradient from the edge of waterbodies or as indicated on construction drawings. Spoil will be contained with erosion and sediment control devices to prevent spoil materials or silt-laden water from transferring into waterbodies and wetlands or off of the facility property.

13. If required, dewatering should be conducted as described in Section 3.5.6.

14. The Contractor shall make every reasonable effort to complete final cleanup of an area (including final grading and installation of permanent erosion control structures) within 20 days after ground disturbing activities are completed. If seasonal or other weather conditions prevent compliance with these time frames, continue to inspect and maintain temporary erosion and sediment controls (temporary slope breakers and sediment barriers) until conditions allow completion of cleanup. Cleanup shall be conducted in accordance with Section 3.6 of this document.

15. Grade to contours shown on construction drawings or site plans or return grade to pre-construction contours.

16. New gravel, stone and paving at the site shall be placed in accordance with construction drawings. No additional gravel, stone, or paving shall be added without prior approval by ECP.

17. Install permanent erosion controls and post-construction stormwater measures at the locations shown on the construction drawings.

18. Disturbed soils will be seeded within 6 working days of final grading, weather and soil conditions permitting, unless permit conditions indicate otherwise.

19. Remove all timber riprap and prefabricated equipment mats in any wetlands upon completion of construction.

4. SPECIAL CONSTRUCTION METHODS

The Company will utilize the following specialized construction procedures for agricultural areas, road crossings, and residential areas along the pipeline project, when applicable. The project construction drawings, Line Lists, and Construction Contract will indicate the locations where specialized construction methods will be used.

4.1 AGRICULTURAL AREAS

The following sections identify construction procedures and best practices for activities within actively cultivated or rotated land used for the production of crops including but not limited to corn, grains, orchards, vineyards and hayfields.

4.1.1 Drain Tiles

Develop procedures for constructing through drain-tiled areas and repairing drain tiles after construction. Engage qualified drain tile specialists, as needed, to conduct or monitor repairs to drain tile systems affected by construction. Use drain tile specialist from the project area, if available.

1. Attempt to locate existing drain tiles.
2. Probe all drainage tile systems within the area of disturbance to check for damage.
3. Ensure that the depth of cover over the new pipeline is sufficient to avoid interference with drain tile systems (existing or proposed). For adjacent pipeline loops in agricultural areas, install the new pipeline with at least the same depth of cover as the existing pipeline(s).
4. Repair damaged drain tiles to their original or better condition (Figure SU-1). Filter-covered drain tiles may not be used unless the local soil conservation authorities and the landowner agree in writing prior to construction.

4.1.2 Irrigation

Maintain water flow in crop irrigation systems, unless shutoff is coordinated with affected parties. Repair any damage to irrigation systems as soon as practical.

4.1.3 Soil Compaction Mitigation & Restoration

The following measures are to be employed during decompaction and restoration of soil within agricultural areas disturbed by construction activities:

1. In agricultural areas, test topsoil and subsoil disturbed by construction activities for compaction at regular intervals. Use penetrometers or other appropriate devices to conduct tests. In order to approximate preconstruction conditions, conduct tests on the same soil type under similar moisture conditions in undisturbed areas.
2. Plow severely compacted soils with a paraplow or other deep tillage implement;
    a. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil.

b. If subsequent construction and cleanup activities result in further compaction, conduct additional tilling.

3. Soils imported for use within agricultural areas are to be certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner.

4. Remove excess rock from at least the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields. 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.

4.2 ROAD CROSSINGS

The "open cut" method is typically used when installing the pipeline across small roads (Figure RD-4). Traffic is diverted while the trench is excavated across the road and the pipeline is installed. An open cut crossing may involve closing the road to all traffic and constructing an adequate detour around the crossing area, or excavating one-half of the road at a time allowing through traffic to be maintained. Any detour constructed around the crossing area must remain within the approved construction workspace. After completing the crossing, all backfill is compacted, the road bed is repaired and the road surface is replaced.

Bores are often used to install the pipeline across highways, major roads with heavy traffic, and railroads (Figure RD-5), unless the crossing permit allows an open cut crossing. Similar to a directional drill, as discussed in Section 4.4, the road bore is accomplished with a horizontal drill rig or boring machine. The boring machine drills a hole under the road to allow insertion of the pipe. Typically, a dummy pipe section is pulled through which is welded to the line pipe. The dummy pipe is pulled back through placing the line pipe in the crossing. In some instances, a casing (another larger pipe) is installed in the hole and the pipeline is inserted inside the casing. Casings typically are not installed today, although some states require casings on rail crossings. Casings also may be used in soils where it is difficult to pull pipe. The benefit of the road bore is that it allows installation of the pipeline without disrupting traffic.

Access roads shall be used and maintained in accordance with Section 3.2.

4.3 RESIDENTIAL AREAS

Specialized construction procedures will be utilized in areas of heavy residential or commercial/ industrial congestion where residences or business establishments lie within 50 feet from the edge of the construction ROW.

1. Install safety fence at the edge of the construction ROW for a distance of 100 feet on either side of the residence or business establishment.

2. For a distance of 100 feet on either side any residence or business establishment, maintain a minimum distance of 25 feet between any structure and the edge of the construction work area. If a distance of 25 feet cannot be maintained, refer to Section 4.3.2.

3. If crushed stone/rock access pads are used in residential areas, rock shall be placed on nonwoven synthetic geotextile fabric to facilitate rock removal after construction.

4. Attempt to leave mature trees and landscaping intact within the construction work area unless the trees and landscaping interfere with the installation techniques or present unsafe working conditions, or as specified in landowner agreements.

5. Prevent the mixing of subsoil and topsoil by implementing segregation methods in all residential areas, except where the topsoil is being replaced, as stipulated in Section 3.5.3.1, unless the landowner or land managing agency specifically approves otherwise.

In addition to the aforementioned specialized procedures, smaller "spreads" of labor and equipment, operating independent of the mainline work force, will utilize either the stove pipe or drag section pipeline construction techniques in those areas of congestion where a minimum distance of 25 feet cannot be maintained between the residence (or business establishment) and the edge of the construction work area. In no case shall the temporary work area be located within 10 feet of a residence unless the landowner agrees in writing, or the area is within the existing maintained ROW.

The following techniques shall be utilized for a distance of 100 feet on either side of the residence or business establishment at the locations identified in the Company Construction Contract and/or Line List. Refer to site-specific residential construction plans, as applicable.

4.3.1 Stove Pipe Technique

The stove pipe construction technique is a less efficient alternative to the mainline method of construction, typically used when the pipeline is to be installed in very close proximity to an existing structure or when an open trench would adversely impact a commercial/industrial establishment. The technique involves installing one joint of pipe at a time whereby the welding, weld inspection, and coating activities are all performed in the open trench. At the end of each day after the pipe is lowered-in, the trench is backfilled and/or covered with steel plates or timber mats. The length of excavation performed each day cannot exceed the amount of pipe installed.

4.3.2 Drag Section Technique

The drag section construction technique, while less efficient than the mainline method, is normally preferred over the stove pipe alternative. This technique involves the trenching, installation, and backfill of a prefabricated length of pipe containing several segments all in one day. At the end of each day after the pipe is lowered-in, the trench is backfilled and/or covered with steel plates or timber mats. Use of the drag section technique will typically require adequate staging areas outside of the residential and/or commercial/industrial congestion for assembly of the prefabricated sections.

4.3.3 Residential Area Cleanup and Restoration

Restore all lawn areas and landscaping immediately following cleanup operations, or as specified in landowner agreements, including

1. Perform appropriate soil compaction mitigation in severely compacted residential areas.

2. Remove excess rock from at least the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields. 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.
3. Importation of topsoil is an acceptable alternative to topsoil segregation. Soils imported for use within residential areas are to be certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner.
4. Reseed all disturbed lawns with a seed mixture acceptable to landowner or comparable to the adjoining lawn.

In residential areas, complete final grading, topsoil replacement, and installation of permanent erosion control structures within 10 days after backfilling the trench. Mulch all disturbed areas before seeding if final grading and installation of permanent erosion control measures will not be completed within 10 days after the trench in that area is backfilled 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.

Landowners shall be compensated for damages in a fair and reasonable manner, and as specified in the damage provision within the controlling easement on each property.

4.4 HORIZONTAL DIRECTIONAL DRILL METHOD

Horizontal Directional Drilling (HDD) is a trenchless crossing method that can help avoid direct impacts to sensitive resources (e.g., waterbodies and wetlands) or infrastructure (e.g., roads and railways) by directionally drilling beneath them. HDD installation typically is carried out in three stages:

1. Directional drilling of a small diameter pilot hole;
2. Enlarging the pilot hole to a sufficient diameter to accommodate the pipeline; and,
3. Pulling the prefabricated pipeline, or pull string, into the enlarged bore hole.

For each waterbody or wetland that would be crossed using the HDD method, the Company will prepare a project-specific HDD Plan that includes:

- Site-specific construction diagrams that show the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction;
- Justification that disturbed areas are limited to the minimum needed to construct the crossing;
- Identification of any aboveground disturbance or clearing between the HDD entry and exit workspaces during construction;
- A description of how an inadvertent release of drilling mud would be contained and cleaned up; and
- 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 HDD Plan will be provided within the project-specific Clearance Package / Permit Book.

Section 7(c) and prior notice projects are required to file HDD plans for the review and written approval by the FERC. (This requirement to file a plan does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.)

During post-construction maintenance activities, do not conduct any routine vegetation mowing or clearing in riparian areas or wetlands that are between HDD entry and exit points.

5. WATERBODY CROSSINGS

The intent of these procedures is to minimize the extent and duration of project related disturbances within waterbodies. The following section describes the construction procedures and mitigation measures that will be used for pipeline installations at waterbodies. The length of the crossing, the sensitivity of the area, existing conditions at the time of the crossing, and permit requirements will determine the most appropriate measures to be used.

The *Waterbody Reference Citing FERC Requirements* in Appendix B summarizes general waterbody crossing methods and requirements identified in the FERC Procedures. These tables provide a brief reference of the restrictions on construction techniques for waterbody crossings; equipment bridges; construction time windows. However, as more stringent agency specific requirements may exist, refer to the Clearance Package / Permit Book for project-specific requirements.

5.1 GENERAL WATERBODY PROCEDURES

Pipeline construction across waterbody channels may result in short term water quality impacts. The following general procedures are to be followed to minimize or avoid impacts at waterbody crossings:

1. Crossings of waterbodies may proceed using standard upland construction techniques when they are dry or frozen and not flowing provided that the EI verifies that water is unlikely to flow between initial disturbance and final stabilization of the feature. In the event of perceptible flow, all applicable requirements of Section 5 must be followed.
2. Construct crossings as close to perpendicular to the axis of the waterbody channel as engineering and routing conditions permit.
3. Where waterbodies meander or have multiple channels, route the pipeline to minimize the number of waterbody crossings.
4. Perform mobilization of construction equipment, trench excavation, and backfilling in a manner that will minimize the potential for erosion and sedimentation within the waterbody channel.
5. Locate all extra work areas, such as staging 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. Site-specific written approval by FERC is required for all extra work areas with a less than 50-foot setback and associated measures to be used to ensure the waterbody is adequately protected.
6. Implement erosion control measures to confine water quality impacts within the immediate construction area and to minimize impacts to downstream areas.
7. Place all spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings.
8. Maintain adequate flow rates to protect aquatic life and prevent the interruption of existing downstream uses.
9. Dewater trench in accordance with the procedures described in Section 3.5.6.

5.1.1 Time Windows for Instream Work

Unless expressly permitted or further restricted by the appropriate federal or state agency in writing on a site-specific basis, instream work must occur during the following time windows:

- Coldwater fisheries – June 1 through September 30; and
- Coolwater and warmwater fisheries – June 1 through November 30.

Installation or removal of equipment bridges above the top of bank is not subject to the aforementioned time windows.

5.1.2 Equipment Bridges

Equipment bridges may be installed and used where needed to allow equipment access across waterbodies.

1. Until the equipment bridge is installed, only clearing equipment and equipment necessary for installation of equipment bridges may cross the waterbody, and the number of crossings shall be limited to one crossing per piece of equipment, unless otherwise authorized by the appropriate permitting agency. EI approval is required prior to equipment crossing a waterbody without an equipment bridge.

2. Construct and maintain equipment bridges that allow unrestricted flow and prevent sediment from entering the waterbody. The Construction Contract agreement and/or permit conditions may specify the type of bridge to be used. Examples of bridges are provided below:
    a. Equipment pads with or without culvert(s), as illustrated in Figure BR-1;
    b. Clean crushed stone and culvert(s), as illustrated in Figure BR-2;
    c. Flexi-float or portable bridges, as illustrated in Figure BR-3;
    d. Double equipment pads, geotextile fabric and sideboards with or without culvert(s); or
    e. Railroad car bridges without culverts.

3. Design and maintain each equipment bridge to withstand the highest flows that would occur. Align culverts/flumes to prevent bank erosion or streambed scour. If necessary, install energy dissipating devices downstream of culverts.

4. Do not use soil to construct or stabilize equipment bridges.

5. Design and maintain equipment bridges to prevent sediment from entering the waterbody.

6. Remove temporary equipment bridges as soon as practicable after permanent seeding.

7. If there will be more than 1 month between final cleanup and the beginning of permanent seeding and reasonable alternative access to the ROW is available, remove temporary equipment bridges as soon as practicable after final cleanup.

8. Obtain any necessary approval or authorization from the COE and/or the appropriate state agency for temporary and permanent bridges.

5.1.3 Clearing and Grading near Waterbodies

1. Confine construction activities and ground disturbance to the construction ROW boundaries, as shown on the construction drawings. Restrict extra work areas (such as staging areas and additional spoil storage areas) to only those shown on the construction drawings.

2. If the pipeline parallels a waterbody, maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the ROW except where maintaining this offset will result in greater environmental impact.

3. Clear the ROW adjacent to all waterbodies *up to the high water bank* (where discernible). *Within 10 feet of the high water bank*, trees shall be cut to ground level and with little to no ground disturbance. **Do not grub** this 10-foot vegetative strip with equipment.

4. Immediately remove all cut trees and branches that inadvertently fall into a waterbody and stockpile in an upland area within the construction ROW for disposal.

5. Grade the ROW adjacent to waterbodies *up to within 10 feet of the high water bank*, leaving an ungrubbed vegetative strip intact.

6. Clearing and grading operations may proceed through the 10-foot vegetative strip **only on the working side of the ROW** in order to install the equipment bridge and travel lane. Use temporary sediment barriers to prevent the flow of bank spoil into the waterbody.

5.1.4 Temporary Erosion and Sediment Controls at Waterbodies

Install sediment barriers immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers must be properly maintained throughout construction and repaired or reinstalled as necessary (such as after backfilling of the trench), until replacement by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in Section 3.5, however, the following specific measures must be implemented at stream crossings:

1. Install sediment barriers across the entire construction ROW at all waterbody crossings, where necessary to prevent the flow of sediments into the waterbody.

2. Install sediment barriers along the edge of the construction ROW as necessary to contain spoil within the construction ROW and prevent sediment flow into the waterbody where waterbodies are adjacent to the construction ROW or parallel to the construction ROW and the ROW slopes toward the waterbody.

3. Removable or temporary sediment barriers, such as slope breakers or drivable berms as described in Section 3.5.4, may be used in lieu of sediment barriers in front of equipment bridges or timber mats across the travel lane. Removable sediment barriers can be removed during the construction day, but must be reinstalled after construction has stopped for the day or whenever heavy precipitation is imminent.

4. 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. Trench plugs shall be of sufficient size to withstand upslope water pressure.

5.2 TYPES OF WATERBODY CROSSING METHODS

Waterbody crossing techniques allowed for use on a project will be determined by agency consultations and permits. Construction at waterbodies will be conducted using two principal crossing methods, a "dry" crossing and a "wet" crossing. The "dry" or "dry-ditch" crossing procedure is further divided into a flume crossing and a dam-and-pump crossing methods. These methods are designed to maintain downstream flow at all times and to isolate the construction zone from the stream flow by channeling the water flow through a flume pipe or by damming the flow and pumping the water around the construction area. The overall objective is to minimize siltation of the waterbody and to facilitate trench excavation of saturated spoil. The two "dry" crossings are further described below in Sections 5.2.1 and 5.2.2.

The "wet" or "open-cut" crossing method involves trenching in the waterbody without isolating the construction zone from the stream flow. The objective of this method is to complete the waterbody crossing as quickly as practical in order to minimize the duration of impacts to aquatic resources. The wet crossing method is further described below in Section 5.2.3.

All streams, their classifications, timing windows, applicable permits and crossing procedures will be identified in the project-specific Clearance Package/Permit Book and on the construction drawings. Unless approved otherwise by the appropriate federal or state agency, pipeline construction and installation must occur using one of the two "dry" crossing methods for waterbodies state-designated as either coldwater or significant coolwater or warmwater fisheries, or federally designated as critical habitat. The flume and dam-and-pump crossing methods are applicable to waterbodies up to 30 feet wide (possibly wider depending on flow volume and rate) at the water's edge at the time of construction.

5.2.1 Flume Crossing

The flume crossing method utilizes a flume pipe(s) to transport stream flow across the disturbed area and allows trenching to be done in drier conditions (Figure WC-3). The flume pipe(s) installed across the trench will be sized to accommodate anticipated stream flows. Flumes are generally not recommended for use on a waterbody with a broad unconfined channel, unstable banks, a permeable substrate, excessive stream flow, or where the installation and construction of the flume crossing will adversely affect the bed or banks of the stream.

The flume waterbody crossing shall be installed as follows:

1. Install flume pipe(s) after blasting and other rock breaking measures (if required), but before trenching;
2. Properly align flume pipe(s) to prevent bank erosion and streambed scour;
3. Use sand bags or equivalent dam diversion structure to provide a seal at either end of the flume to channel water flow (some modifications to the stream bottom may be required to achieve an effective seal);

4. **Do not remove flume pipe** during trenching, pipe laying (thread pipe underneath the flume pipe(s)), or backfilling activities, or initial streambed restoration efforts, except for crossings where a dam-and-pump method (as described in Section 5.2.2 below) has been established as an alternative measure to redirect stream flow; 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.

5.2.2 Dam-and-Pump Crossing

The dam-and-pump crossing method is presented as an alternative dry crossing procedure to the flume crossing (in limited cases, it may be used in combination with a flume crossing). The dam-and-pump method is accomplished by utilizing pumps to transport stream flow across the disturbed area (Figure WC-4). This method involves placing sandbags across the existing stream channel upstream from the proposed crossing to stop water flow and downstream from the crossing to isolate the work area. Pumps are used to pump the water across the disturbed area and back into the stream further downstream.

The dam-and-pump procedure allows for more space and flexibility during trenching and pipe installation, which shortens the duration of time spent at the waterbody. The dam-and-pump method may be used for crossings of waterbodies where pumps can adequately transfer stream flow volumes around the work area, and where there are no concerns about sensitive species passage.

The dam-and-pump crossing method shall be installed as follows:

1. Install and properly seal sandbags at the upstream and downstream location of the crossing;
2. Create an in-stream sump using sandbags if a natural sump is unavailable for the intake hose;
3. Initiate pumping of the stream around the work area prior to excavating the trench;
4. Monitor dam and pumps at all times to ensure proper operation until the waterbody crossing is completed; and,
5. Remove the sandbag dams, pumps and hoses and return normal flow back to the waterbody following installation and restoration of the streambed.

Implementation of the dam-and-pump crossing method will meet the following performance criteria:

- Use sufficient pumps, including onsite backup pumps, to maintain downstream flows;
- Construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);
- Screen all intake hoses to minimize the entrainment of fish and other aquatic life
- Prevent streambed scour at pump discharge; and
- Continuously monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

5.2.3 Wet Crossing

Open-cut crossings involve excavating a trench for the pipeline across the bottom of the waterbody to be crossed (Figure WC-2). Depending on the depth of the water, construction equipment may be placed on barges or other floating platforms to excavate the pipe trench.

This construction technique is typically used to cross waterbodies that are not state-designated, such as ephemeral drainage ditches, and ephemeral and intermittent streams, as well as intermediate and major waterbodies with substantial flows that cannot be effectively flumed or pumped around the construction zone using one of the dry crossing techniques.

5.3 FERC WATERBODY CLASSIFICATIONS

In the FERC Procedures, a “waterbody” is defined to include 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. Waterbodies have been further divided into three classifications by FERC depending on the width of the feature, which dictate construction limitations or requirements.

5.3.1 Minor Waterbodies

FERC defines a "minor waterbody” as a waterbody less than or equal to 10 feet wide at the water’s edge at the time of crossing. Minor waterbodies shall be crossed in accordance with the following requirements:

1. All spoil from minor waterbody crossings must be placed in the construction ROW at least 10 feet from the water’s edge or in additional extra work areas as described above in Section 5.1.

2. Unless approved otherwise by the appropriate federal or state agency, utilize a dry crossing construction technique to install crossings at all minor waterbodies that are state-designated fisheries or federally designated as critical habitat, as identified in the Clearance Package/ Permit Book (Figures WC-3 or WC-4).

    a. All construction equipment must use an equipment bridge to cross state-designated fisheries as specified in Section 5.1.2.

3. Where a dry-ditch crossing is not required, minor waterbodies may be crossed using the wet 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;

    c. If a flume is installed within the waterbody during mainline activities, it can be removed just prior to lowering in the pipeline (The 24-hour timeframe starts as soon as the flume is removed.); and,

d. 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 5.1.2.

5.3.2 Intermediate Waterbodies

FERC defines an "intermediate waterbody" as a waterbody greater than 10 feet wide but less than or equal to 100 feet wide at the water's edge at the time of crossing. Intermediate waterbodies shall be crossed in accordance with the following requirements:

1. All spoil from intermediate waterbody crossings must be placed in the construction ROW at least 10 feet from the water's edge or in additional extra work areas as described above in Section 5.1.

2. Unless approved otherwise by the appropriate federal or state agency, install the pipeline using a dry crossing method for crossings of waterbodies up to 30 feet wide (at the water's edge at the time of construction) that are
    a. state-designated as either coldwater or significant coolwater or warmwater fisheries, or
    b. federally designated as critical habitat.

3. Where a dry-ditch crossing is not required, intermediate waterbodies may be crossed using the wet 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 5.1.2.

5.3.3 Major Waterbodies

FERC defines a "major waterbody" as a waterbody greater than 100 feet wide at the water's edge at the time of crossing. Before construction, the Company shall prepare and file for the review and written approval by the FERC a detailed, site-specific construction plan and scaled drawings identifying all areas to be disturbed by construction for each major waterbody crossing, however the scaled drawings are not required for any offshore portions of pipeline projects. (The requirement to file major waterbody crossing plans does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.) This site-specific 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.

Upland spoil from major waterbody crossings must be placed in the construction ROW at least 10 feet from the water's edge or in additional extra work areas as described in Section 5.2.

5.4 Restoration

Restore and stabilize the waterbody banks and channel in accordance with this section.

1. Return all waterbody banks to preconstruction contours or to stable angle of repose as approved by the EI.

2. Use clean gravel or native cobbles for the upper 12 inches of trench backfill in all waterbodies identified in the Clearance Package/Permit Book as coldwater fisheries, unless otherwise specified by state-specific agency recommendations or permit conditions.

3. For wet crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing the crossing.

4. For dry crossings, complete bank stabilization before returning flow to the waterbody channel.

5. Limit the use of rock riprap to areas where flow conditions preclude effective vegetation stabilization techniques such as seeding and erosion control fabric, unless otherwise specified by COE and state permits. Limit the placement of rock riprap to the slopes along the disturbed waterbody crossing. Application of riprap for bank stabilization must comply with COE, or its delegated agency, permit terms and conditions.

6. Install erosion control fabric, in accordance with Section 3.6.1.2, or a functional equivalent on waterbody banks at the time of final bank contouring (Figure EC-13, WC-5). 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.

7. Revegetate disturbed riparian areas with native species of conservation grasses, legumes and woody species similar in density to adjacent undisturbed lands.

8. In the event that final cleanup is deferred more than 20 days after the trench is backfilled, all slopes within 100 feet of waterbodies shall be mulched with 3 tons/acre of straw.

9. Remove all temporary sediment barriers when replaced by permanent erosion controls or when restoration of adjacent upland areas is successful as specified in Section 8.1.

10. Install a permanent slope breaker and a trench breaker at the base of slopes greater than 5% that are less than 50 feet from each waterbody crossed.

6. WETLAND CROSSINGS

The term “wetland” as used in this plan includes any area that satisfies the requirements of the current federal methodology for identifying and delineating wetlands. The requirements outlined below do not apply to wetlands in actively cultivated or rotated cropland. Standard upland protective measures, including workspace and topsoil segregation requirements, apply to these agricultural wetlands.

Wetland boundaries are identified on the construction drawings and within the Clearance Package / Permit Book. Wetlands are delineated prior to construction using current federal methodology and summarized within a wetland delineation report, which identifies the following information for all wetlands that would be affected by the construction ROW:

- Location, including pipeline milepost if crossed by centerline;
- National Wetland Inventory (NWI) classification;
- Crossing length in feet;
- Area of permanent and temporary disturbance that would occur in each wetland, sorted by NWI classification type.

6.1 General Wetland Procedures

Crossing procedures are to comply with COE, or its delegated agency, permit terms and conditions. Project-specific permits or authorizations issued by the COE or other appropriate agenc(ies) are provided in the Clearance Package / Permit Book. Implement the following general requirements during planning and construction near or across wetlands:

1. Route the pipeline to avoid wetland areas to the maximum extent possible.

2. 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. 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. Limit construction activity and ground disturbance in wetland areas to a construction ROW width of 75 feet or as shown on the construction drawings. Only with prior written approval from the FERC, construction ROW width within the boundaries of federally delineated wetlands may be expanded beyond 75 feet if required by site-specific topographic conditions or soil limitations.

5. All extra work areas must be located at least 50 feet away from wetland boundaries, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. Only with prior written approval from the FERC, the Company can locate extra work areas closer than 50 feet from the wetland if site-specific conditions justify a less than 50-foot setback.

6. Aboveground facilities shall not be located in any wetland, except as permitted or where the location of such facilities outside of wetlands would prohibit compliance with U.S.DOT regulations.

7. In the event a waterbody crossing is located within or adjacent to a wetland crossing, the Company must file a site-specific crossing plan for review and obtain written approval by the FERC before construction if all measures of Sections V. and VI. of the FERC Procedures cannot be met.

8. Limit construction equipment operating in wetland areas to that needed to clear the ROW, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction ROW. All other construction equipment shall use access roads located in upland areas to the maximum extent practical. Refer to Section 3.2 for other requirements and restrictions pertaining to access to the construction ROW or use of roads across wetlands.

6.2 Clearing and Grading at Wetlands

1. Wetland boundaries and 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.

2. 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 on the working side of the ROW during clearing operations.

3. Attempt to use no more than two layers of timber riprap to stabilize the ROW. If approved by the COE, woody debris can be burned in wetlands as long as it is in accordance with state and local regulations, ensuring that all woody debris is removed for disposal.

4. Cut vegetation just above ground level and grind stumps to ground level, leaving existing root systems in place and remove any excess vegetation (e.g., wood chips). Immediately remove all cut trees, limbs and branches from the wetland and stockpile in an upland area on ROW for disposal.

5. 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 ROW in wetlands unless the Chief Inspector and EI determine that safety-related construction constraints require grading or the removal of tree stumps from under the working side of the construction ROW.

6. Do not cut trees outside of the construction ROW to obtain timber for riprap or equipment mats.

7. Cleared materials, such as slash, logs, brush, and wood chips, shall not be permanently placed within wetland areas.

6.3 Temporary Erosion & Sediment Control at Wetlands

Install sediment barriers immediately after initial ground disturbance at the following locations:

- Within the ROW at the edge of the boundary between wetland and upland;
- At the base of slopes greater than 5% where the base of the slope is less than 50 feet from a wetland;
- Across the entire ROW immediately upslope of the wetland boundary to contain spoil within the construction ROW and prevent sediment flow into the wetland;
- Along the edge of the ROW, where the ROW slopes toward the wetland, to protect adjacent, off ROW wetland; and
- Along the edge of the ROW as necessary to contain spoil and prevent sediment from migrating outside the construction ROW in areas where a wetland is both within and adjacent to the construction ROW.

Maintain all sediment barriers throughout construction and reinstall as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete in accordance with Section 8.1. Remove the sediment barriers during right-of-way cleanup.

6.4 Wetland Crossing Procedure

Procedures used to install a pipeline across wetlands vary depending on the level of soil stability and saturation encountered during construction. The following best management practices are to be employed during standard wetland crossings:

1. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.

2. Do not use rock, soil imported from outside the wetland, tree stumps, or brush riprap to stabilize the ROW.

3. Perform topsoil segregation in accordance with Section 3.5.3.1, including segregating 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.

4. If required, dewatering should be conducted as described in Section 3.5.6.

5. 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.

6. Use “push-pull” or “float” construction techniques to place the pipe in the trench where water and other site conditions allow (Refer to Section 6.4.1 below).

7. Install permanent trench breakers at the wetland boundaries and/or seal the trench bottom as necessary to maintain the original wetland hydrology at locations where the pipeline trench may drain a wetland.

8. Install a permanent slope breaker and a trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas for each wetland crossed.

9. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5% 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 some areas, with the approval of the EI, an earthen berm may be suitable as a sediment barrier adjacent to the wetland.

10. Restore segregated topsoil to its original position after backfilling is complete. When required, additional fill material imported from off the ROW must be approved by the EI.

11. Preconstruction wetland contours and flow regimes will be restored to the extent practical.

6.4.1 Push-pull Technique

The "push-pull" or "float" or "drag section" method may be utilized during wetland crossings if conditions are suitable at the time of construction. Sufficient, naturally present groundwater volumes that fill the excavated trench are required to facilitate this installation method. This method may be used to install the pipeline if the wetland to be crossed contains standing water or saturated and/or unstable soils.

- Trenching equipment will excavate a trench across the wetland, either using low-ground-weight equipment or working on timber matting.
- While the trench is being excavated, the pipeline crossing sections will be assembled and welded together in uplands.
- Prefabricated pipeline crossing sections will then be pushed or pulled into the trench; floated across the wetland and released into the trench if the trench is filled with water; or, carried into position with sideboom tractors supported on equipment mats.
- The excavating equipment will "walk through" the wetland by carrying timber mats and repositioning the mats as it operates from one mat to the next through the wetland during trenching, backfilling, and cleanup activities.

6.5 Wetland Cleanup and Restoration

1. Restore pre-construction wetland contours to maintain the wetland hydrology.

2. Revegetate the ROW with annual ryegrass at 40 lbs/acre PLS or with the recommended Wetland Seed Mix in Appendix C or project-specific seed mix where applicable, unless standing water is present or unless prohibited by state or land management agency.

3. **Do not use lime, mulch or fertilizer in wetland areas** unless required in writing by the appropriate federal or state agency**,** as identified in the Clearance Package/Permit Book.

4. In the event that final cleanup is deferred more than 20 days after the trench is backfilled, all slopes adjacent to wetlands shall be mulched with 3 tons/acre of straw for a minimum of 100 feet on each side of the crossing.

5. Remove all project-related material used to support equipment on the construction ROW, including timber riprap and prefabricated equipment mats, upon completion of construction.

6. Develop specific procedures in coordination with the appropriate federal or state agency, where necessary, to prevent the invasion or spread of invasive vegetation (such as purple loosestrife and phragmites).

7. Ensure that all disturbed areas permanently revegetate in accordance with Section 8.1.

8. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after upland revegetation and stabilization of adjacent upland areas are successful as specified in Section 8.1.

7. SPILL PREVENTION & RESPONSE

7.1 SPCC / PPC Plan

The Company and Contractor shall adhere to the SPCC/PPC Plan at all times. This plan has been prepared to meet the requirements of several federal regulations and guidelines: the FERC's Plan and Procedures; Oil Pollution Act; Federal Water Pollution Control Act; Comprehensive Environmental Response, Compensation and Liability Act of 1980; the Resource Conservation and Recovery Act; Toxic Substances Control Act; and, the Clean Water Act.

The purpose of the SPCC/PPC Plan is to reduce the probability and risk of a potential spill or release of oil or hazardous materials during construction-related activities. The objectives of this plan are to identify and address:

- The type and quantity of material handled, stored, or used on site during construction;
- Measures to be taken for spill preparedness and prevention;
- Emergency response procedures;
- Spill incident reporting/notification procedures; and
- Local emergency response team arrangements.

7.2 Spill Prevention Measures

Structure operations in a manner that reduce the risk of spills or the accidental exposure of fuels or hazardous materials to waterbodies or wetlands. At a minimum,

1. All employees handling fuels and other hazardous materials are to be properly trained.

2. All equipment shall be in good operating order and inspected on a regular basis.

3. Fuel trucks transporting fuel to on-site equipment should travel only on approved access roads.

4. All equipment is to be parked overnight and/or fueled at least 100 feet from any wetland or waterbody. These activities can occur closer only if the EI determines that there is no reasonable alternative, and appropriate steps have been taken (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill.

5. Do not store hazardous materials, including chemicals, fuels, and lubricating oils 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. If the 100-foot setback cannot be met, this activity can be performed within the 100-foot setback, with EI approval, if done in accordance with the SPCC/PPC Plan.

6. Do not perform fondu or concrete coating activities within 100 feet of any wetland or waterbody boundary, unless the location is an existing industrial site designated for such use. If the 100-foot setback cannot be met, these activities can be performed within the 100-foot setback, if the EI

determines that there is no reasonable alternative and appropriate steps have been taken (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill.

7. Pumps operating within 100 feet of a waterbody or wetland boundary shall utilize appropriate secondary containment systems to prevent spills; and

8. Bulk storage of hazardous materials, including chemicals, fuels, and lubricating oils have appropriate secondary containment systems to prevent spills.

7.3 Spill Cleanup & Response

Structure operations in a manner that provides for the prompt and effective cleanup of spills of fuel and other hazardous materials. At a minimum,

1. 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;

2. Ensure that each construction crew has on hand sufficient tools and material to stop leaks; and,

3. 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 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.

8. POST-CONSTRUCTION ACTIVITIES

8.1 POST-CONSTRUCTION MONITORING

Projects conducted under the blanket certificate or a project-specific Section 7 Order, shall meet the monitoring requirements set forth in this section. Company personnel shall perform the following:

1. Establish and implement a program to monitor the success of restoration upon completion of construction and restoration activities.

2. Conduct follow-up inspections of all disturbed upland 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.

3. In nonagricultural upland areas, revegetation shall be considered successful if the vegetative cover is sufficient to prevent the erosion of soils on the disturbed ROW and density and cover are similar to that in adjacent undisturbed area. Sufficient coverage in upland areas is defined when vegetation has a uniform 70 percent vegetative coverage.

4. In agricultural areas, revegetation shall be considered successful when upon visual survey, growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise.

5. In wetlands, monitor and record the success of revegetation annually, until wetland revegetation is successful:

    a. Wetland revegetation will be considered successful when the affected wetland satisfies the current federal definition for a wetland (i.e. soils, hydrology, and vegetation);

    b. Vegetation should be 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 must be consistent with early successional wetland plant communities in the affected ecoregion;

    d. Invasive species and noxious weeds should be absent unless they are abundant in adjacent areas that were not disturbed by construction; and,

    e. For any wetland where revegetation is not successful at the end of 3 years after construction, the Company shall develop and implement (in consultation with a professional wetland ecologist) a remedial plan to actively revegetate the wetland.

6. Inspect all remaining temporary erosion and sediment controls during routine patrols to ensure proper functioning. Any deficiencies found will be reported and corrected as needed. Once the area has revegetated and stabilized, the erosion controls will be removed.

7. Revegetation efforts (such as fertilizing or reseeding) will continue until revegetation is successful.

8. Restoration shall be considered successful if the ROW surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless otherwise approved by the land owner or land managing agency), revegetation is successful, and proper drainage has been restored.

9. Monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in agricultural areas until restoration is successful.

10. Make efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, throughout the life of the project. Maintain signs, gates, and vehicle trails as necessary.

8.2 POST-CONSTRUCTION MAINTENANCE

Routine maintenance of the ROW is required to allow continued access for routine pipeline patrols, maintaining access in the event of emergency repairs, and visibility during aerial patrols. Where the newly established pipeline ROW is located on other existing ROWs not affiliated with the Company, the easement holder or owner will continue to maintain their ROWs using procedures specified in their vegetative management programs.

Projects conducted under this E&SCP and subject to the FERC Plan and Procedures, shall meet the maintenance requirements set forth in this section. The following requirements restrict the amount of vegetation maintenance that can occur within new ROW.

8.2.1 Uplands

In upland areas, maintenance of the ROW will involve clearing the entire ROW of woody vegetation.

1. Routine vegetation mowing or clearing over the full width of the permanent ROW in uplands shall be conducted no more frequently than once every 3 years. However, to facilitate periodic corrosion and leak surveys, a 10-foot wide corridor centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state.

2. Routine vegetation mowing or clearing shall not occur between April 15 and August 1 of any year unless specifically approved in writing by the responsible land management agency of the U.S. Fish and Wildlife Service.

8.2.2 Waterbodies and Wetlands

1. Do not conduct routine vegetation mowing or clearing over the full width of the permanent ROW in wetlands or riparian areas.

    a. Limit routine vegetation mowing or clearing practices adjacent to waterbodies to allow a riparian strip that measures 25 feet back from the waterbody's mean high water mark. This riparian strip will be allowed to permanently revegetate with native plant species across the entire construction ROW.

    b. To facilitate periodic corrosion and leak surveys within wetlands and the 25-foot-wide riparian strip adjacent to waterbodies, a corridor up to 10 feet wide centered on the

pipeline may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state.

c. Trees 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 ROW.

2. Do not conduct any routine vegetation mowing or clearing in riparian areas or wetlands that are between HDD entry and exit points.

3. Herbicides or pesticides shall not be used in or within 100 feet of a wetland or waterbody, except as specified by the federal or state agency.

4. Time of year restrictions apply to routine mowing as well as selective clearing of trees within riparian or wetland areas. These activities are prohibited between April 15 – August 1 of any year.

8.3 REPORTING

The Company shall maintain records that identify by milepost:

1. Method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;
2. Acreage treated;
3. Dates of backfilling and seeding;
4. The location of any subsurface drainage repairs or improvements made during restoration;
5. Names of landowners requesting special seeding treatment and a description of the follow-up actions; and
6. Any problem areas and how they were addressed.

The Contractor is responsible for providing the EI with the information and documentation on applications, rates, and types of fertilizer, pH modifying agents, seed and mulch that are used during a project.

For the FERC-authorized projects, other than projects conducted under the blanket certificate, the Company will file quarterly activity reports documenting problems, including those identified by the landowner, and corrective actions taken for at least 2 years following construction.

A wetland revegetation monitoring report identifying the status of the wetland revegetation efforts will be filed at the end of 3 years following construction, and annually thereafter documenting progress within the wetland until revegetation is successful. The requirements to file wetland restoration reports with FERC does not apply to projects authorized under the blanket certificate (i.e. automatic and prior notice) or advanced notice provisions in the FERC regulations.

APPENDIX A

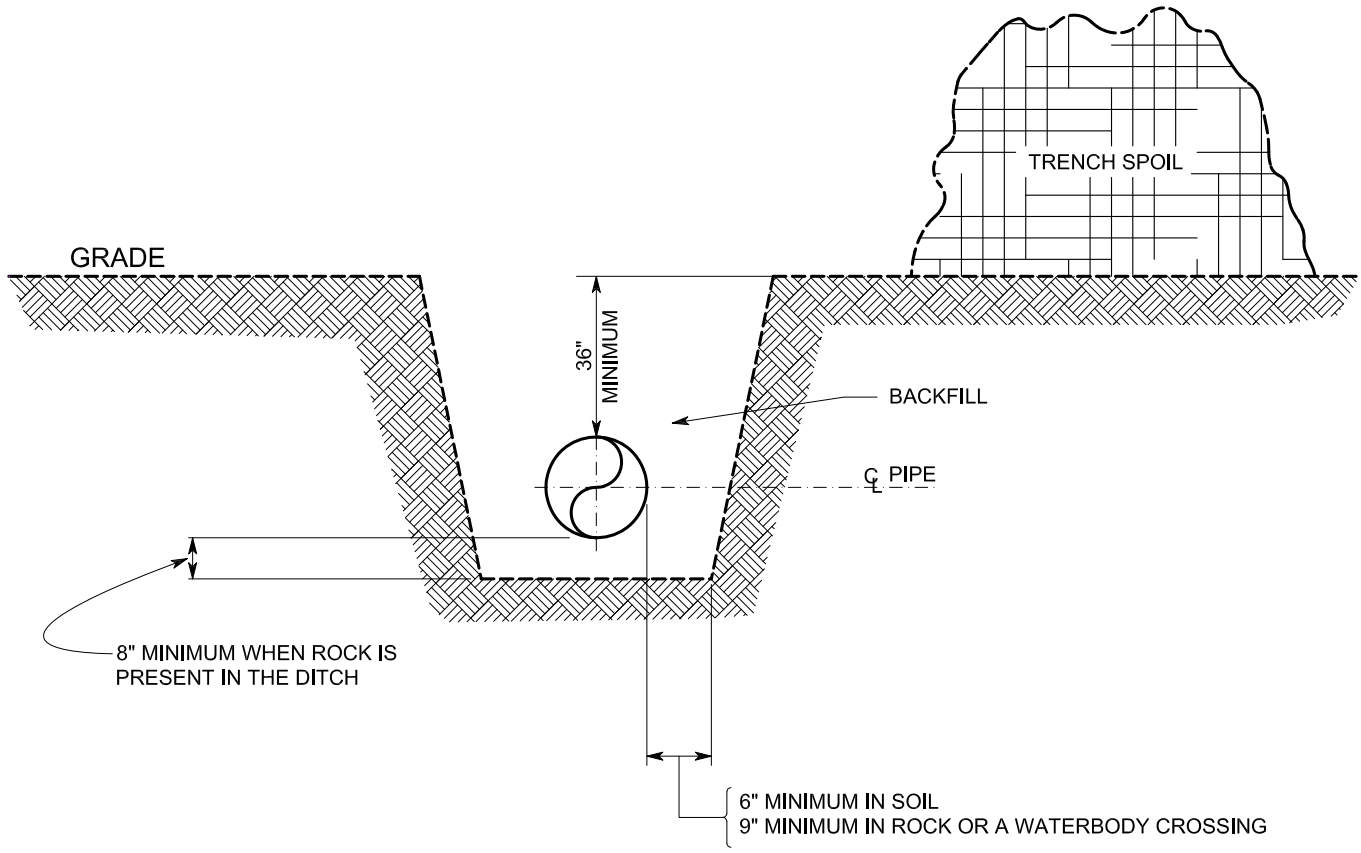
E&SCP FIGURES

FIGURE NUMBER	STANDARD NUMBER	DRAWING TITLE
CONSTRUCTION WORKAREAS (CW)		
CW-1	ES-0001	TYPICAL TRENCH DETAIL
CW-2	ES-0002	RIGHT-OF-WAY TOPSOIL SEGREGATION TECHNIQUES
CW-3	ES-0003	TYPICAL CONSTRUCTION WIDTHS ACQUIRING NEW PERMANENT RIGHT-OF-WAY
CW-4	ES-0004	TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING NEW PERMANENT RIGHT-OF-WAY (SINGLE LINE SYSTEM)
CW-5	ES-0005	TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING NEW PERMANENT RIGHT-OF-WAY (MULTIPLE LINE SYSTEM)
ACCESS ROADS & ROAD CROSSINGS (RD)		
RD-1	ES-0006	ACCESS ROAD CROSS SECTION
RD-2	ES-0007	ROCK ACCESS PAD
RD-3	ES-0008	TYPICAL TEMPORARY ACCESS ROAD THROUGH WETLANDS
RD-4	ES-0009	TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (OPEN CUT)
RD-5	ES-0010	TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (BORED)
EROSION CONTROLS (EC)		
EC-1	ES-0011	SILT FENCE DETAIL
EC-2	ES-0012	STRAW BALE DETAIL
EC-3	ES-0013	STRAW BALE CHECK DAM IN A DRAINAGEWAY
EC-4	ES-0014	ROCK-LINED DRAINAGE SWALE
EC-5	ES-0015	STORM DRAIN INLET PROTECTION
EC-6	ES-0016	TEMPORARY TRENCH PLUG OPTIONS
EC-7	ES-0017	TEMPORARY SLOPE BREAKERS
EC-8	ES-0018	PERMANENT SLOPE BREAKERS
EC-9	ES-0019	CHEVRON SLOPE BREAKER
EC-10	ES-0020	TRENCH BREAKER DETAIL (SACK)
EC-11	ES-0021	TRENCH BREAKER DETAIL (FOAM)
EC-12	ES-0022	PERMANENT TRENCH BREAKER OPTIONS
EC-13	ES-0023	EROSION CONTROL FABRIC INSTALLATION
EC-14	ES-0024	TYPICAL EROSION CONTROL BLANKETS ON SLOPES
WATER DISCHARGES (WD)		
WD-1	ES-0025	FILTER BAG
WD-2	ES-0026	DISCHARGE STRUCTURE FOR HYDROSTATIC TEST WATER
WD-3	ES-0027	OPTIONS FOR SMALL WATER DISCHARGES
WD-4	ES-0028	DISCHARGE OF HYDROSTATIC TEST WATER TO A SURFACE WATER
BRIDGES (BR)		
BR-1	ES-0029	TEMPORARY EQUIPMENT BRIDGE (EQUIPMENT PADS WITH OR WITHOUT CULVERTS)
BR-2	ES-0030	TEMPORARY EQUIPMENT BRIDGE (CRUSHED STONE WITH CULVERTS)
BR-3	ES-0031	TEMPORARY EQUIPMENT BRIDGE (FLEXI-FLOAT OR PORTABLE BRIDGE)
WATERBODY AND WETLAND CROSSINGS (WC)		
WC-1	ES-0032	TYPICAL STANDARD WETLAND CROSSING
WC-2	ES-0033	TYPICAL WET WATERBODY CROSSING
WC-3	ES-0034	TYPICAL FLUME WATERBODY CROSSING
WC-4	ES-0035	TYPICAL DAM-AND-PUMP WATERBODY CROSSING
WC-5	ES-0036	TYPICAL EROSION CONTROL BLANKETS ON STREAMBANKS
WC-6	ES-0037	TYPICAL RIP-RAP PLACEMENT
SPECIAL USE / AGRICULTURAL AREAS (SU)		
SU-1	ES-0038	DRAIN TILE REPAIR PROCEDURE

INDEX OF FIGURES

APPENDIX A

DWG. ES-0000 REV.



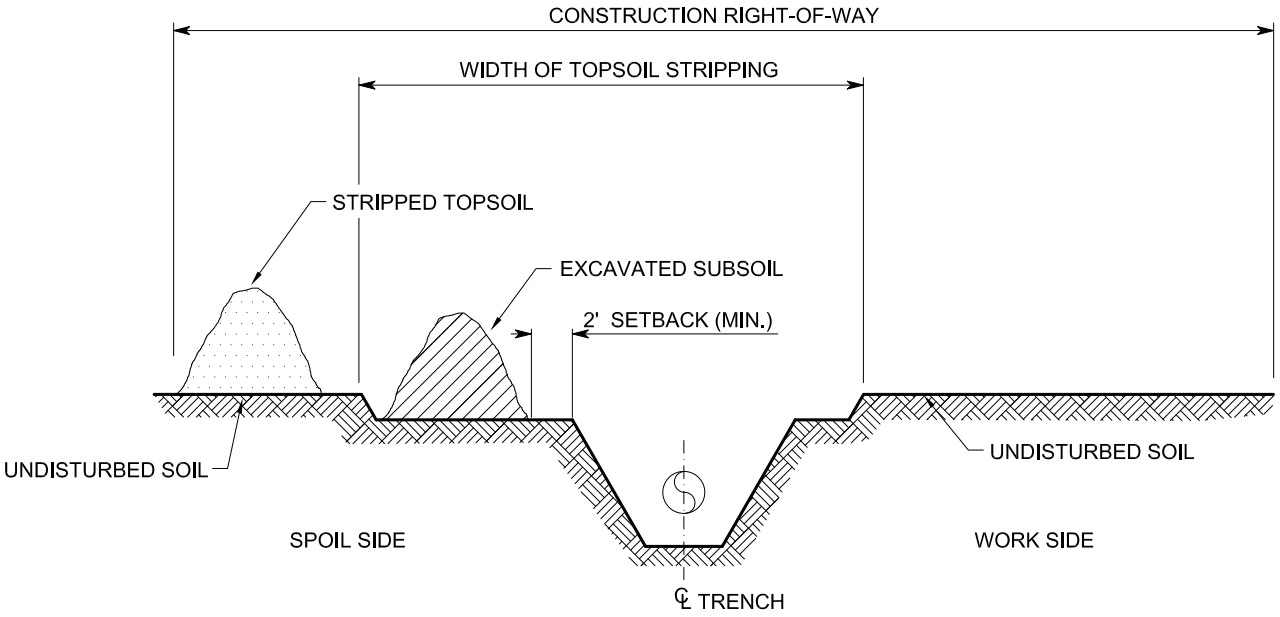
CROSS-SECTION VIEW

NOTES:

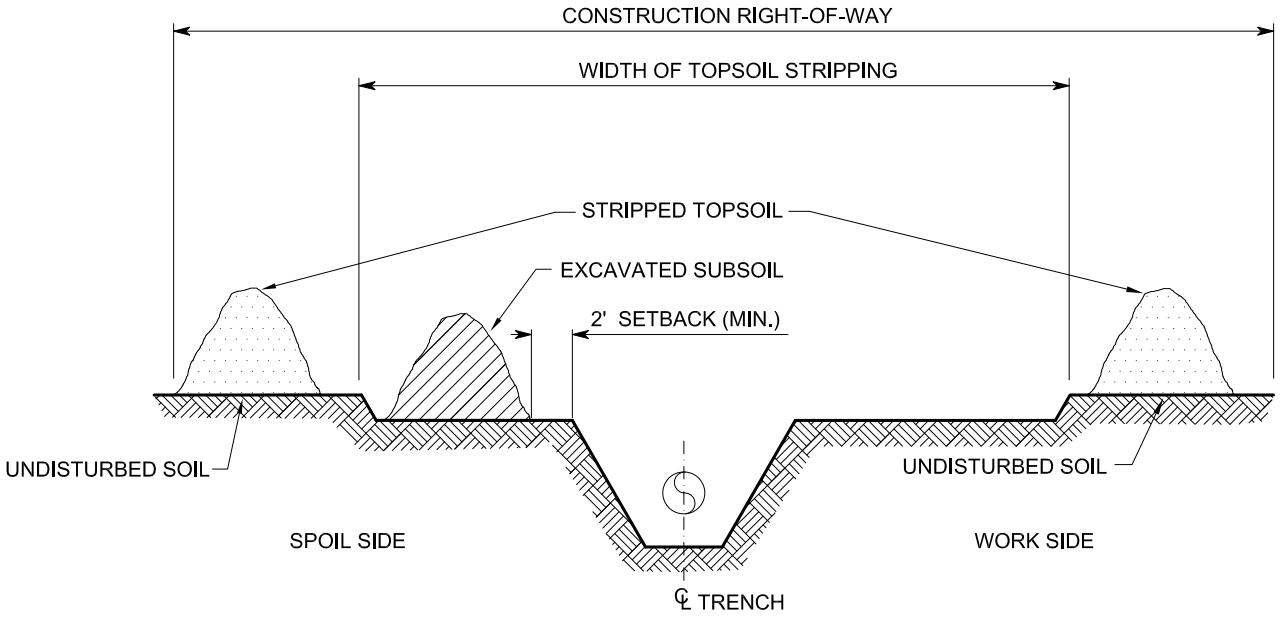
1. ALL PRECONSTRUCTION CONTOURS WILL BE RE-ESTABLISHED UPON COMPLETION OF PIPE INSTALLATION. EXCEPT IN WETLANDS, A CROWN MAY BE LEFT TO ACCOUNT FOR DITCH SETTLING, AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

2. IN COLD WATER FISHERY STREAMS, THE TOP 12" OF THE TRENCH WILL BE BACKFILLED WITH CLEAN GRAVEL OR NATIVE COBBLES UNLESS OTHERWISE SPECIFIED BY THE PERMITTING AGENCY.

	TYPICAL TRENCH DETAIL	FIGURE CW-1
		DWG. ES-0001 REV.



DITCH PLUS SPOILSIDE TOPSOIL SEGREGATION

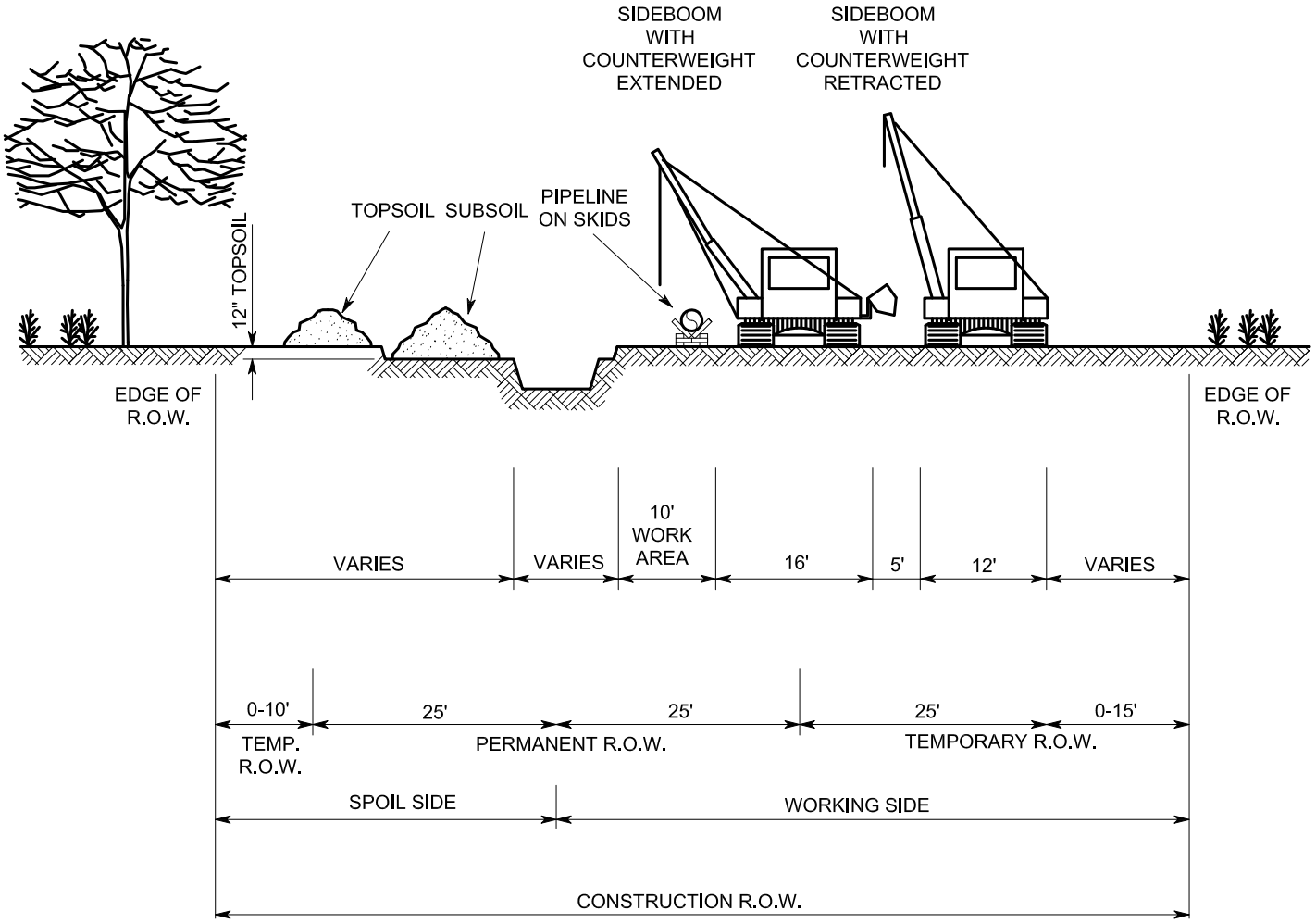


FULL RIGHT-OF-WAY TOPSOIL STRIPPING

NOTES:

1. TOPSOIL MAY BE STORED IN LOCATIONS AS SHOWN ABOVE OR AT OTHER COMPANY APPROVED LOCATIONS WITHIN THE CONSTRUCTION R.O.W.
2. LEAVE GAPS IN SPOIL PILES FOR WATER RUN-OFF.
3. MAINTAIN SEPARATION OF SALVAGED TOPSOIL AND SUBSOIL THROUGHOUT ALL CONSTRUCTION ACTIVITIES.
4. STABILIZE TOPSOIL PILES AND MINIMIZE LOSS DUE TO WATER OR WIND EROSION WITH USE OF SEDIMENT BARRIERS, MULCH, TEMPORARY SEEDING, TACKIFIERS OR FUNCTIONAL EQUIVALENTS, WHERE NECESSARY.

	RIGHT-OF-WAY TOPSOIL SEGREGATION TECHNIQUES	FIGURE CW-2
		DWG. ES-0002 REV.



PIPE DIAMETER	SPOIL SIDE (FT.)	WORKING SIDE (FT.)	CONSTRUCTION R.O.W. (FT.)
12" OR LESS	25	50	75
14" - 30"	35	50	85
36" - 42"	35	65	100
WETLANDS	25	50	75

NOTES:

1. ALTHOUGH THE DIMENSIONS SHOWN ARE TYPICAL, SOME VARIATIONS MAY EXIST DUE TO SITE SPECIFIC CONDITIONS. UNLESS OTHERWISE INDICATED ON THE ALIGNMENT SHEETS, THE MAXIMUM WIDTH OF THE CONSTRUCTION RIGHT-OF-WAY SHALL BE AS SHOWN IN THE TABLE FOR THE APPROPRIATE PIPE DIAMETER.

2. TOPSOIL SEGREGATION METHODS WILL BE USED IN ALL RESIDENTIAL AREAS AND WHEN THE CONSTRUCTION ROW IS WIDER THAN 30 FEET IN CULTIVATED OR ROTATED AGRICULTURAL LANDS, MANAGED PASTURES, HAYFIELDS, AND OTHER AREAS AT THE LANDOWNER'S OR LAND MANAGEMENT AGENCY'S REQUEST. FOR WETLANDS, SEGREGATE THE TOP 12 INCHES OF TOPSOIL WITHIN THE DITCH LINE, EXCEPT IN AREAS WHERE STANDING WATER IS PRESENT OR SOILS ARE SATURATED.

TYPICAL CONSTRUCTION WIDTHS ACQUIRING NEW PERMANENT RIGHT-OF-WAY

FIGURE CW-3

DWG. ES-0003 REV.

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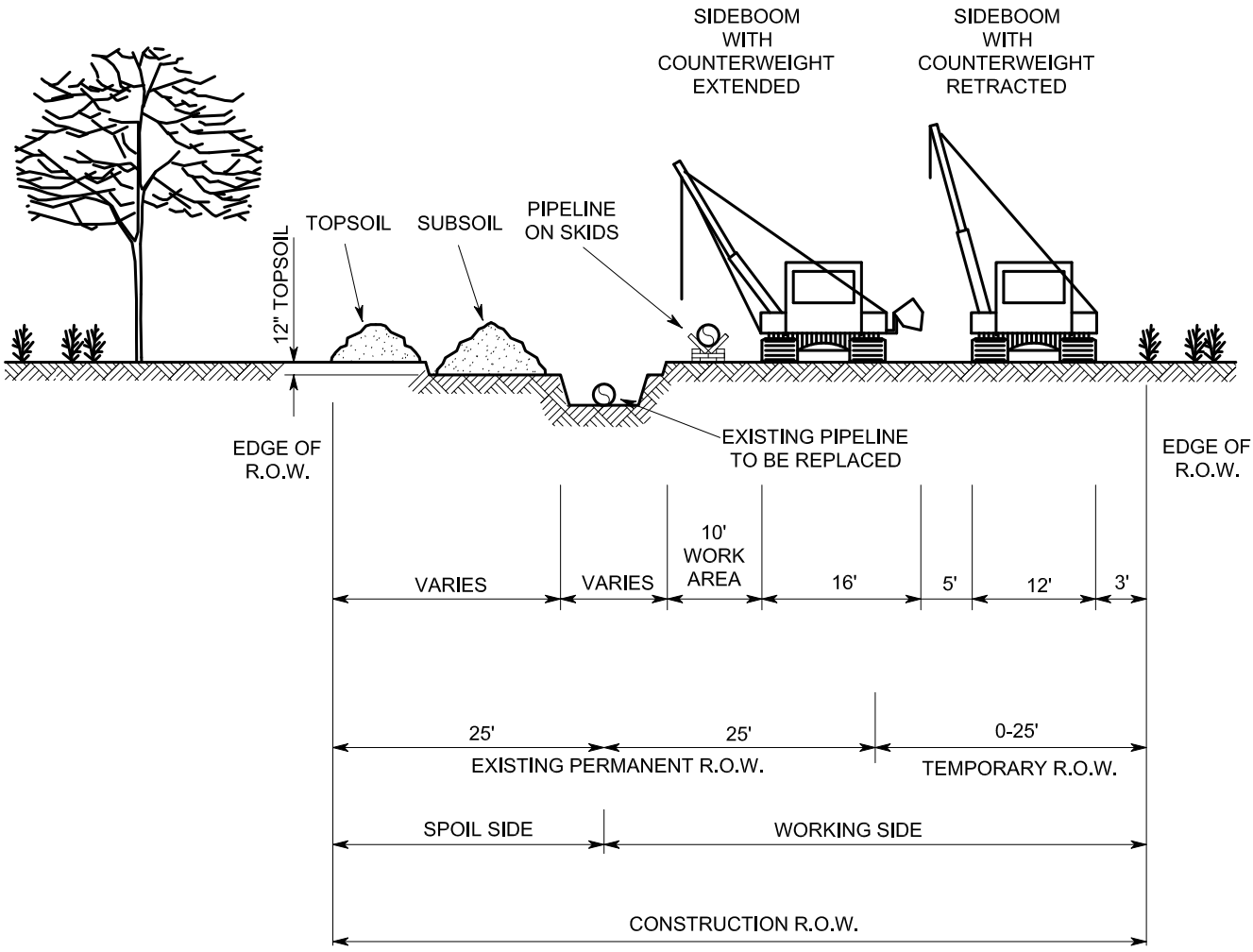


PIPE DIAMETER	SPOIL SIDE (FT.)	WORKING SIDE (FT.)	CONSTRUCTION R.O.W. (FT.)
12" OR LESS	25	25	50
14" - 30"	25	50	75
36" - 42"	25	50	75
WETLANDS	25	50	75

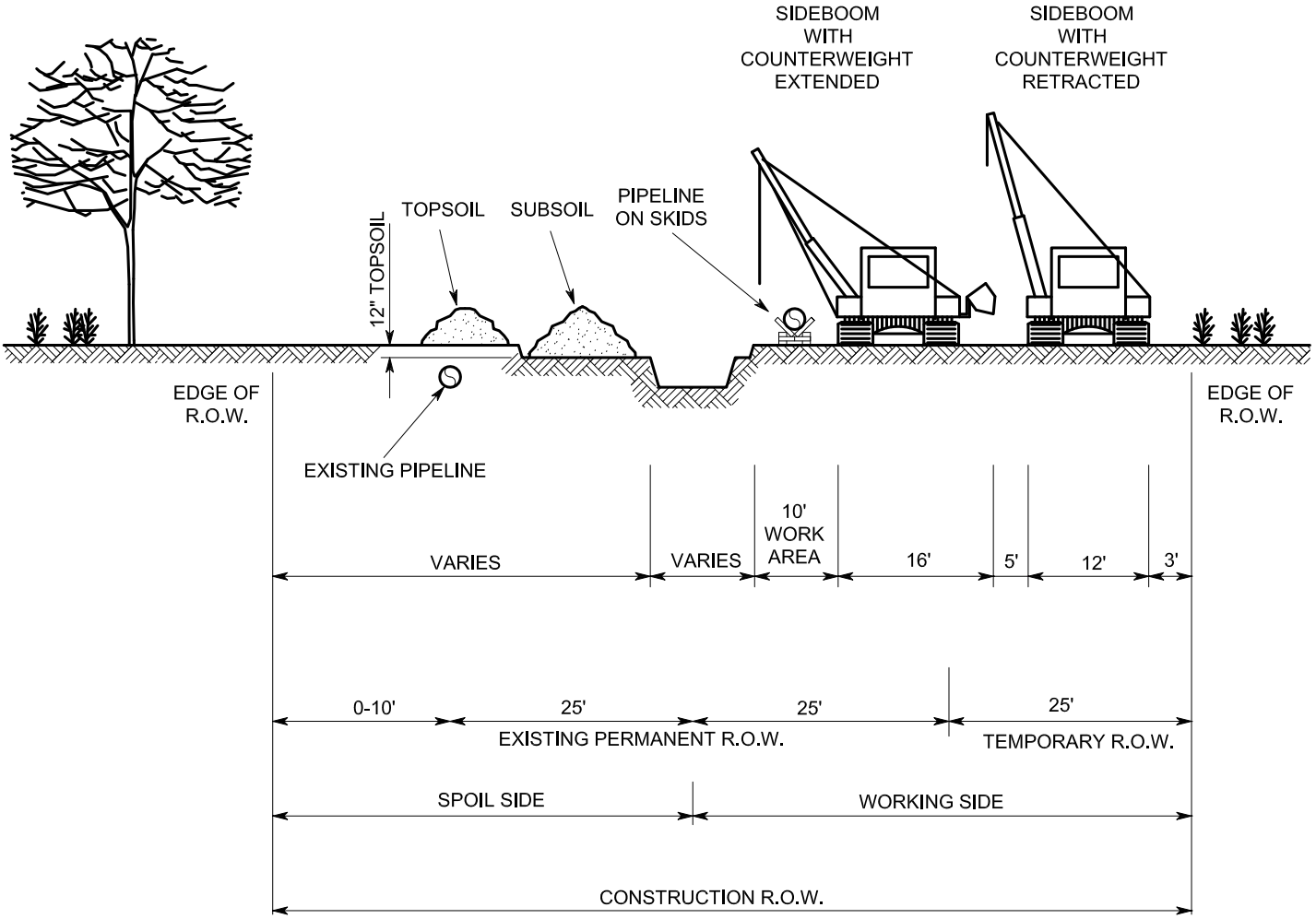
NOTES:

1. ALTHOUGH THE DIMENSIONS SHOWN ARE TYPICAL, SOME VARIATIONS MAY EXIST DUE TO SITE SPECIFIC CONDITIONS. UNLESS OTHERWISE INDICATED ON THE ALIGNMENT SHEETS, THE MAXIMUM WIDTH OF THE CONSTRUCTION RIGHT-OF-WAY SHALL BE AS SHOWN IN THE TABLE FOR THE APPROPRIATE PIPE DIAMETER.

2. TOPSOIL SEGREGATION METHODS WILL BE USED IN ALL RESIDENTIAL AREAS AND WHEN THE CONSTRUCTION ROW IS WIDER THAN 30 FEET IN CULTIVATED OR ROTATED AGRICULTURAL LANDS, MANAGED PASTURES, HAYFIELDS, AND OTHER AREAS AT THE LANDOWNER'S OR LAND MANAGEMENT AGENCY'S REQUEST. FOR WETLANDS, SEGREGATE THE TOP 12 INCHES OF TOPSOIL WITHIN THE DITCH LINE, EXCEPT IN AREAS WHERE STANDING WATER IS PRESENT OR SOILS ARE SATURATED.

3. IF THE WORKING SIDE MUST BE GREATER THAN THE VALUES SHOWN IN THE TABLE, COMPANY MUST REQUEST APPROVAL FROM THE F.E.R.C.

	TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING NEW PERMANENT RIGHT-OF-WAY (SINGLE LINE SYSTEM)	FIGURE CW-4
		DWG. ES-0004 REV.



PIPE DIAMETER	SPOIL SIDE (FT.)	WORKING SIDE (FT.)	CONSTRUCTION R.O.W. (FT.)
12" OR LESS	25	50	75
14" - 30"	35	50	85
36" - 42"	35	50	85
WETLANDS	25	50	75

NOTES:

1. ALTHOUGH THE DIMENSIONS SHOWN ARE TYPICAL, SOME VARIATIONS MAY EXIST DUE TO SITE SPECIFIC CONDITIONS. UNLESS OTHERWISE INDICATED ON THE ALIGNMENT SHEETS, THE MAXIMUM WIDTH OF THE CONSTRUCTION RIGHT-OF-WAY SHALL BE AS SHOWN IN THE TABLE FOR THE APPROPRIATE PIPE DIAMETER.

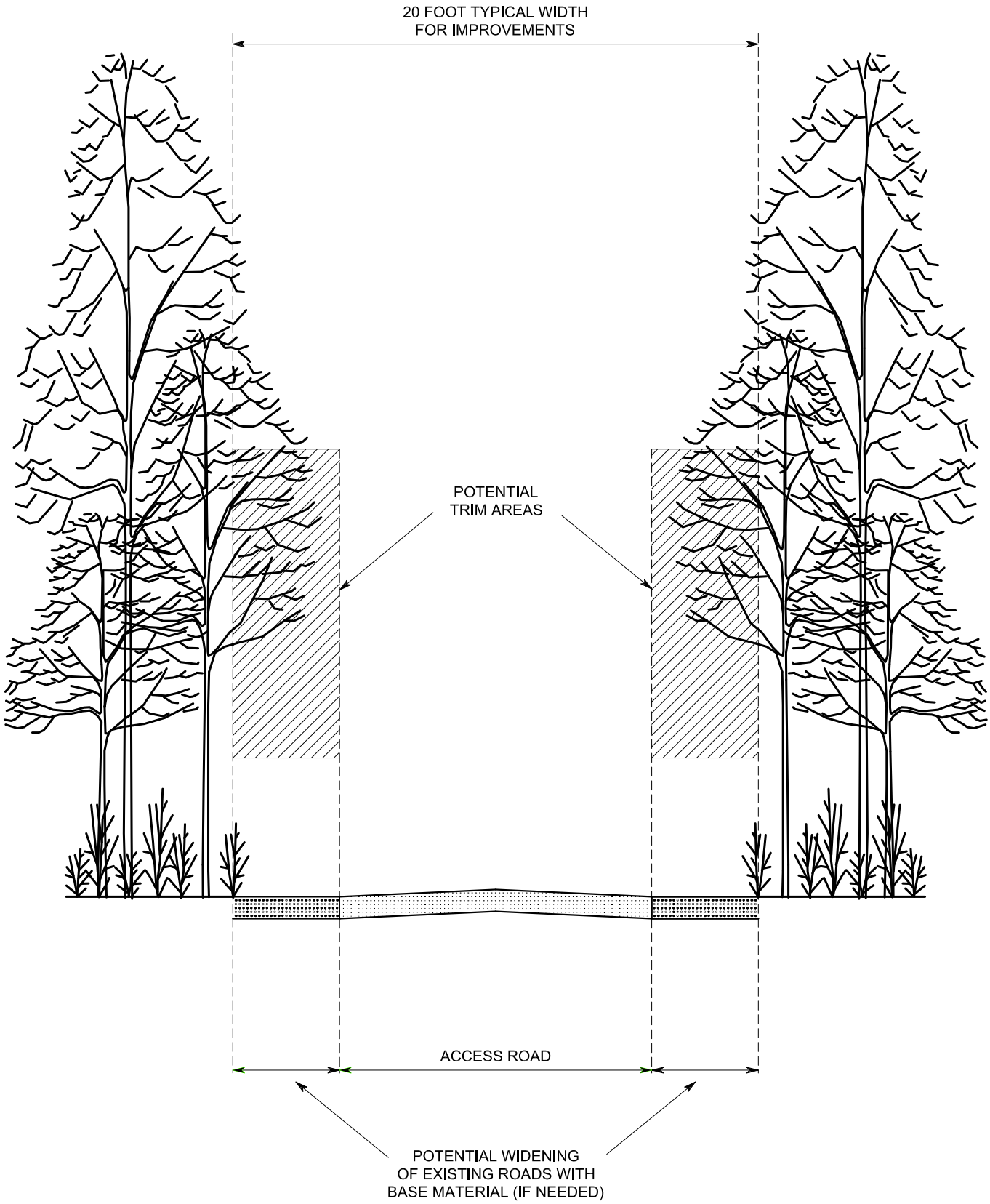
2. TOPSOIL SEGREGATION METHODS WILL BE USED IN ALL RESIDENTIAL AREAS AND WHEN THE CONSTRUCTION ROW IS WIDER THAN 30 FEET IN CULTIVATED OR ROTATED AGRICULTURAL LANDS, MANAGED PASTURES, HAYFIELDS, AND OTHER AREAS AT THE LANDOWNER'S OR LAND MANAGEMENT AGENCY'S REQUEST. FOR WETLANDS, SEGREGATE THE TOP 12 INCHES OF TOPSOIL WITHIN THE DITCH LINE, EXCEPT IN AREAS WHERE STANDING WATER IS PRESENT OR SOILS ARE SATURATED.

3. IF THE WORKING SIDE MUST BE GREATER THAN 50 FEET (i.e. TEMPORARY WORKSPACE IS GREATER THAN 25 FEET), COMPANY MUST REQUEST APPROVAL FROM THE F.E.R.C.

TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING NEW PERMANENT RIGHT-OF-WAY (MULTIPLE LINE SYSTEM)

FIGURE CW-5

DWG. ES-0005 REV.



ACCESS ROAD CROSS SECTION

FIGURE RD-1

DWG. ES-0006 REV.

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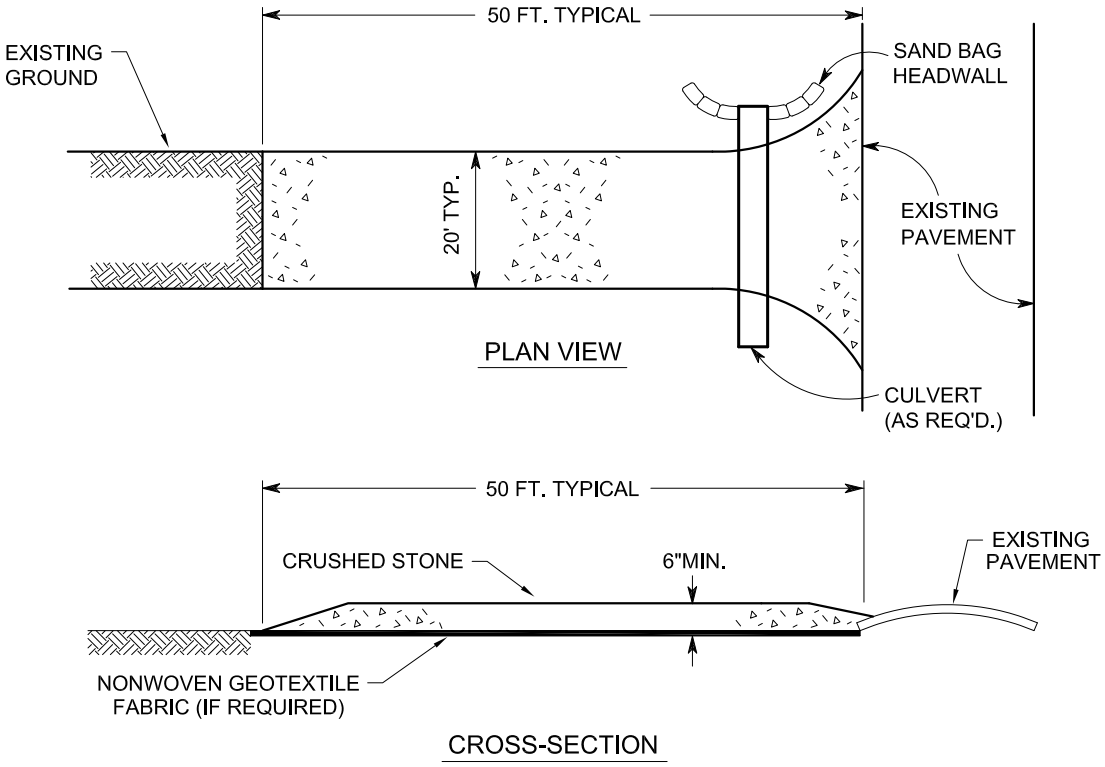
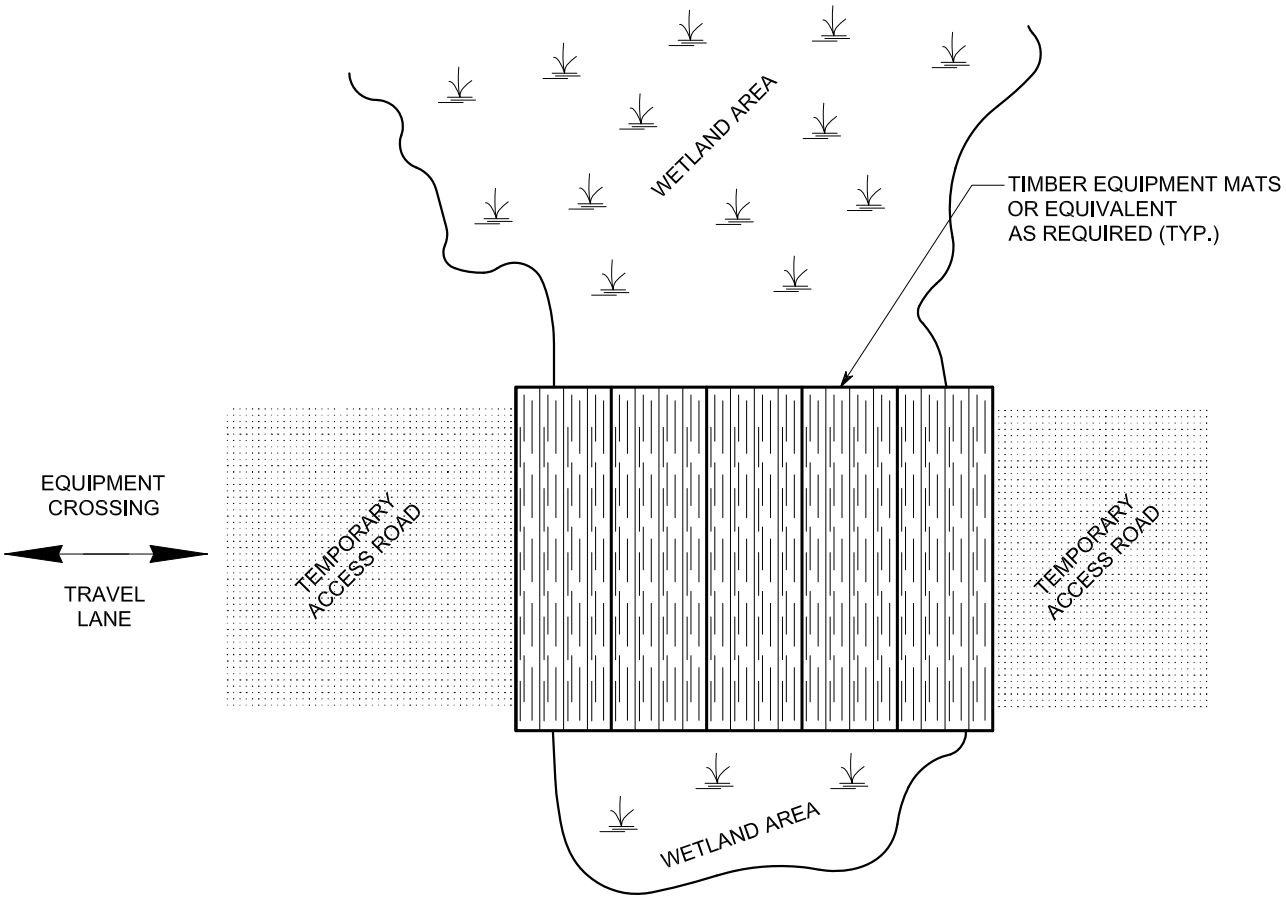


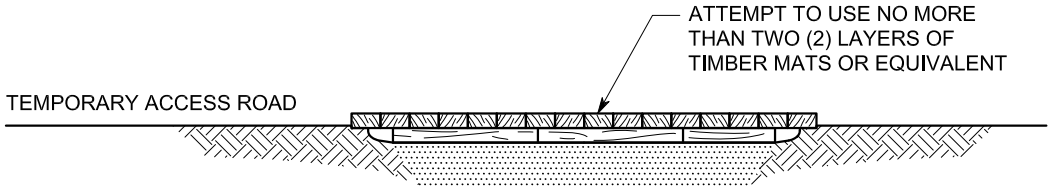
CONSTRUCTION SPECIFICATIONS:

1. STONE SIZE = 4" - 6" AVG. DIAMETER
2. ALL STONE MUST BE PLACED ON NON-WOVEN GEOTEXILE FABRIC IF USED IN RESIDENTIAL OR AGRICULTURAL AREAS.
3. LENGTH = FIFTY (50) FOOT TYPICAL (IF SITE CONDITIONS ALLOW)
4. WIDTH = TWENTY (20) FOOT TYPICAL.
5. THICKNESS = SIX (6) INCHES MINIMUM.
6. ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A DRIVEABLE BERM OR OTHER TEMPORARY EROSION CONTROL DEVICE CAN BE USED.
7. THE ENTRANCE SHALL BE PERIODICALLY INSPECTED AND MAINTAINED IN A CONDITION THAT MINIMIZES TRACKING OR FLOWING OF SEDIMENT ONTO ROADWAYS. MAINTENANCE MAY INCLUDE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR THE REPAIR / CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ANY SEDIMENT THAT IS SPILLED, DROPPED, WASHED OR TRACKED ONTO ROADWAYS MUST BE REMOVED AS SOON AS PRACTICAL.

	ROCK ACCESS PAD	FIGURE RD-2
		DWG. ES-0007 REV.



PLAN VIEW
NOT TO SCALE



CROSS-SECTION
NOT TO SCALE

NOTE:

1. SILT FENCE OR STRAW BALES MAY BE USED, AS NECESSARY, TO PREVENT SEDIMENT FROM MIGRATING OUTSIDE OF ACCESS ROAD LIMITS.

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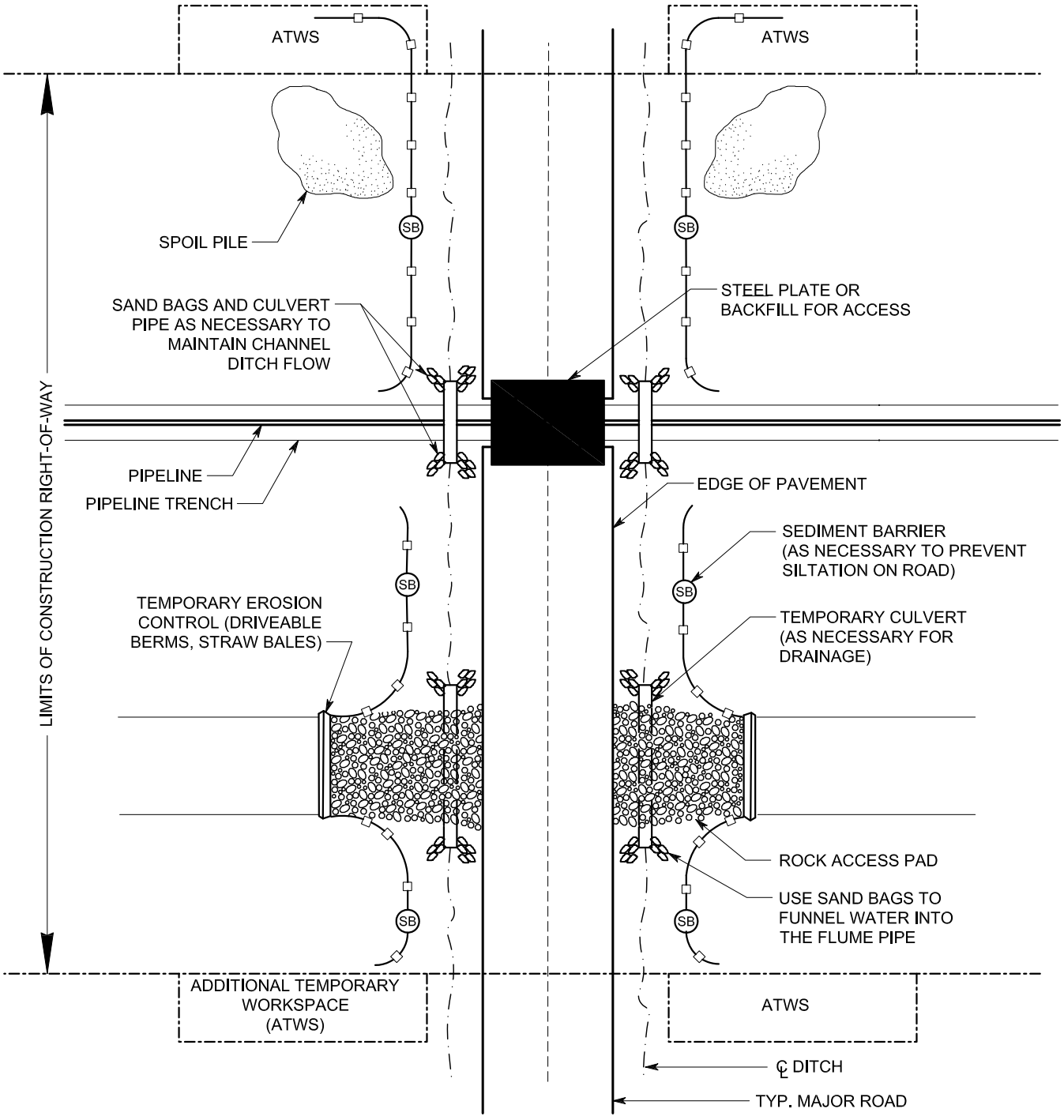
TYPICAL TEMPORARY ACCESS ROAD THROUGH WETLANDS

FIGURE RD-3

DWG. ES-0008 REV.



NOTES:

1. FIRST LAY SAND BAGS IN DITCH, THEN PLACE END OF CULVERT IN THE MIDDLE OF THE SAND BAGS BEFORE BUILDING HEAD WALLS TO CULVERT.
2. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS.

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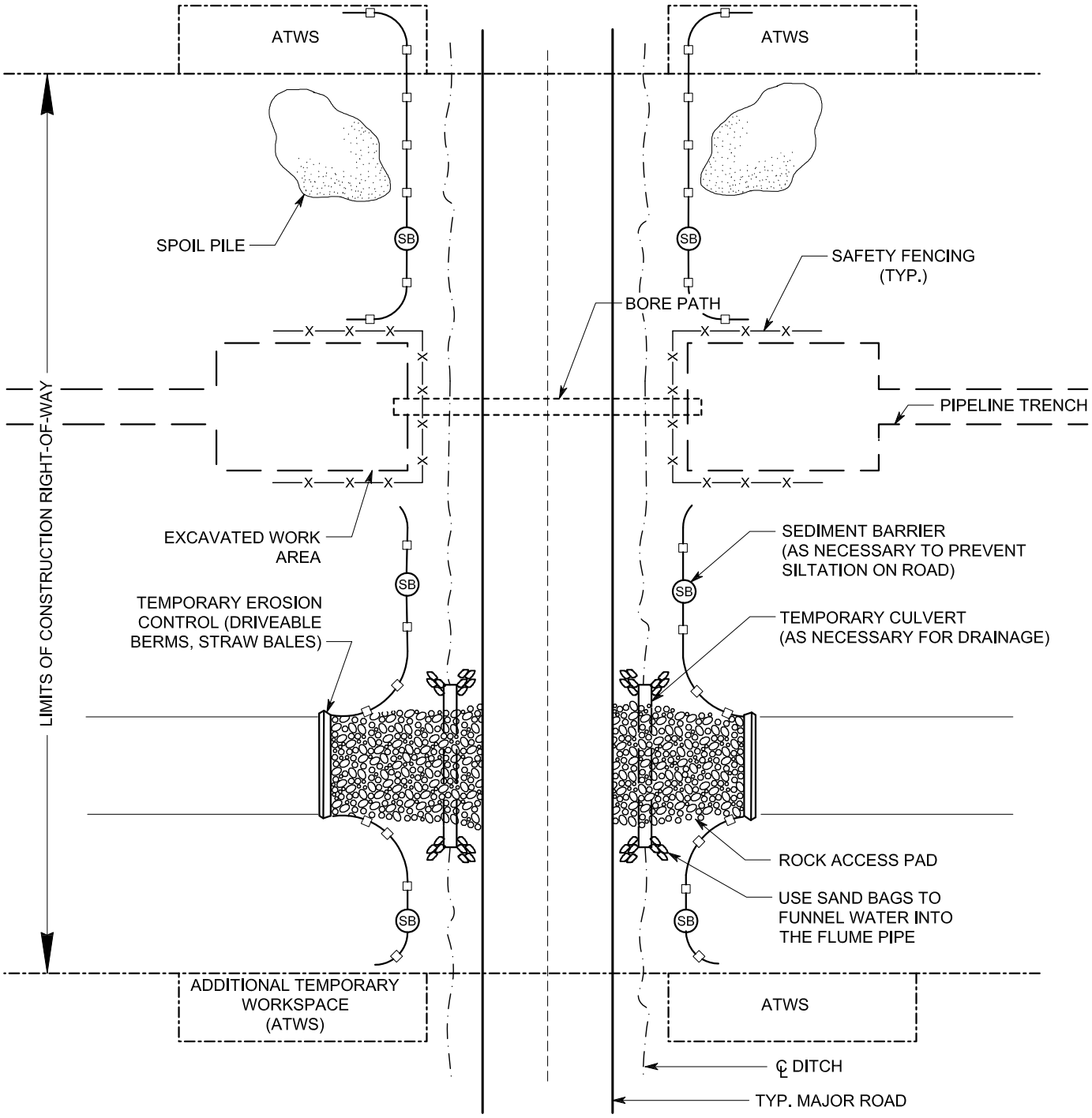
TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (OPEN CUT)

FIGURE RD-4

DWG. ES-0009 REV.



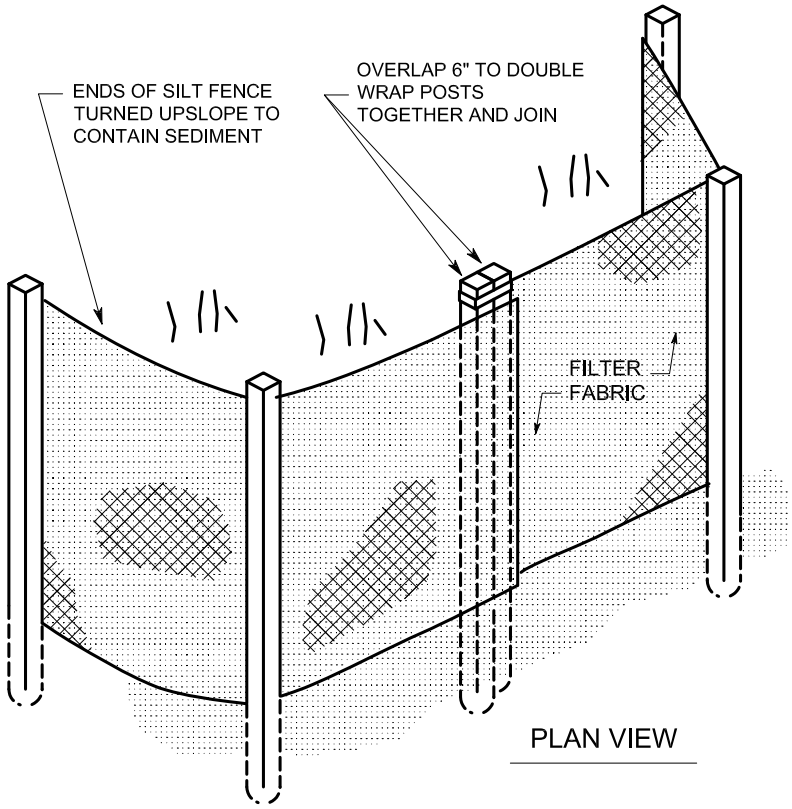
NOTES:

1. BORE PIT DIMENSIONS WILL BE DICTATED BY SITE-SPECIFIC CONDITIONS (E.G. SOIL TYPE, WIDTH OF ROAD, DEPTH OF COVER).
2. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS.

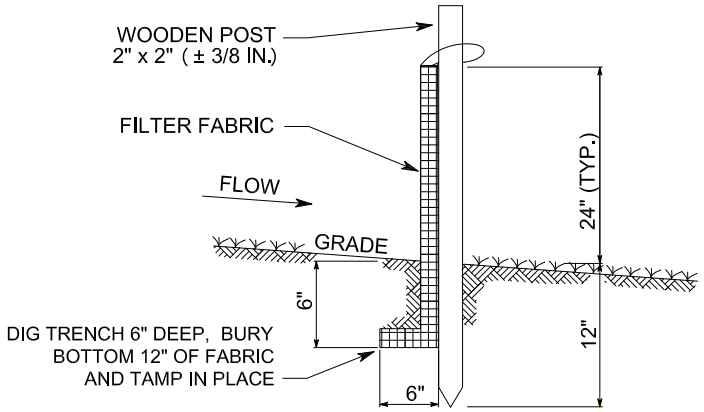
TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (BORED)

FIGURE RD-5

DWG. ES-0010 REV.



PLAN VIEW



CROSS SECTION

INSTALLATION REQUIREMENTS:

- WHEN USING SILT FENCE, PLACE IT:
  - BETWEEN DISTURBED AREAS AND DOWN-SLOPE ENVIRONMENTAL RESOURCE AREAS
  - AT THE BASE OF ALL SLOPES NEXT TO WETLANDS, WATERBODIES, AND ROAD CROSSINGS
  - AT THE INLET AND OUTLET OF OPEN DRAINAGE STRUCTURES
  - APPROXIMATELY 8 FEET BEYOND THE TOE OF THE SLOPE TO GIVE THE SEDIMENT ROOM TO COLLECT (IF POSSIBLE)
- USE SANDBAGS OR BACKFILLING TO KEY IN THE BOTTOM OF THE FABRIC WHERE IT IS NOT FEASIBLE TO TRENCH IT IN (LEDGES, ROCKY SOIL, LARGE ROOTS, ETC.)

MAINTENANCE REQUIREMENTS:

- INSPECT SILT FENCE:
  - DAILY IN AREAS OF ACTIVE CONSTRUCTION
  - WEEKLY IN AREAS WITH NO CONSTRUCTION
  - WITHIN 24 HOURS FOLLOWING EACH RAINFALL EVENT OF ≥ 0.5 INCH.
- REPAIR OR REPLACE SILT FENCE AS NEEDED
- REMOVE ACCUMULATED SEDIMENTS TO AN UPLAND AREA WHEN SEDIMENT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE SILT FENCE.

	SILT FENCE DETAIL	FIGURE EC-1
		DWG. ES-0011 REV.

I.G. ES0011.DWG

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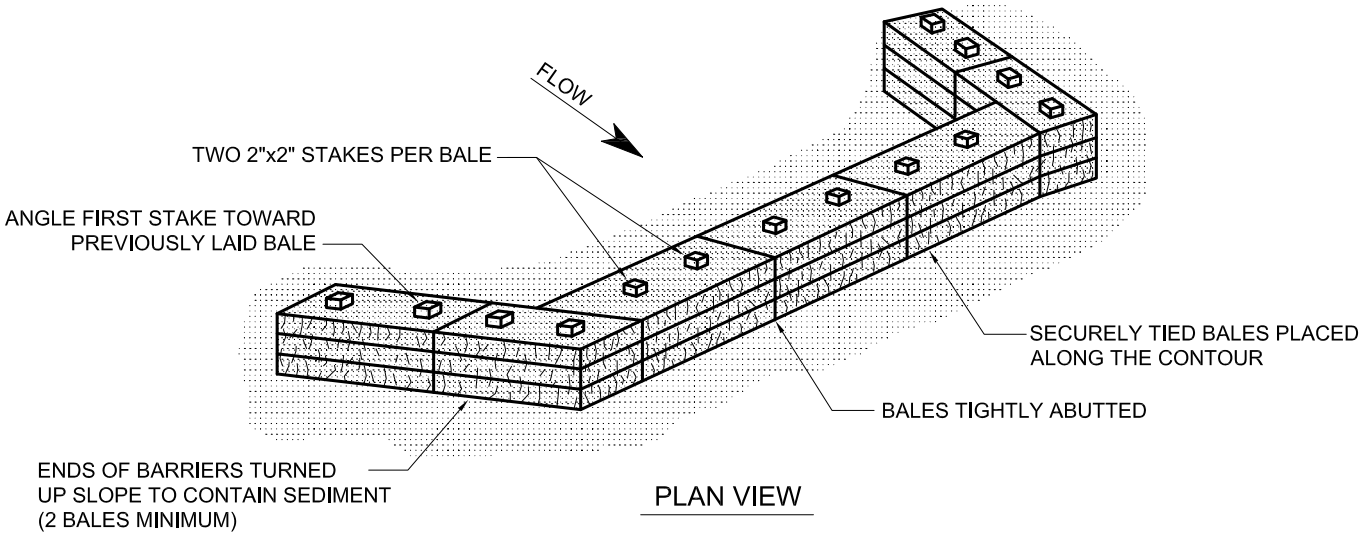
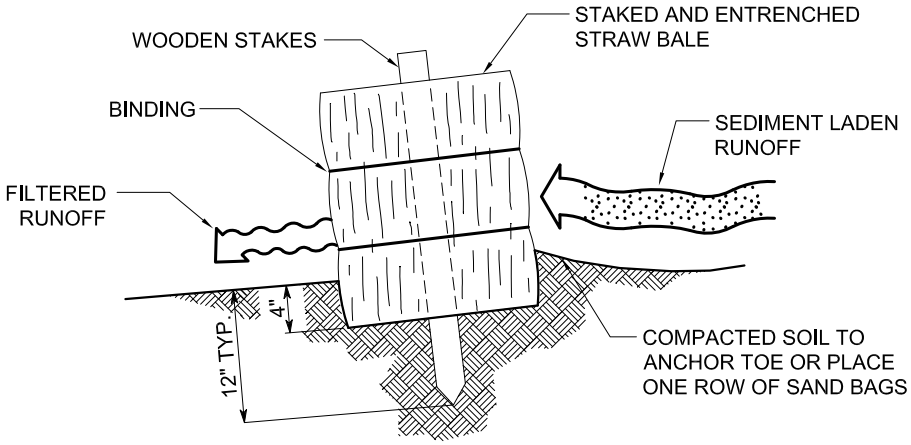


PLAN VIEW



CROSS-SECTION

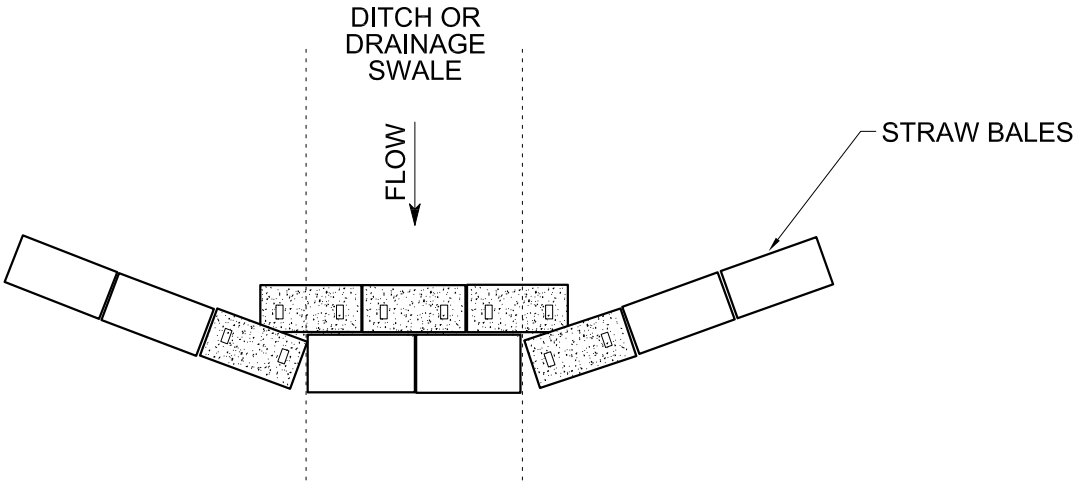
INSTALLATION REQUIREMENTS:

- WHEN USING STRAW BALES, PLACE THEM:
  - WITH THEIR ENDS TIGHTLY ABUTTING AND EMBEDDED IN THE SOIL A TYPICAL OF 4".
  - BETWEEN DISTURBED AREAS AND DOWN-SLOPE ENVIRONMENTAL RESOURCE AREAS.
  - AT THE BASE OF ALL SLOPES NEXT TO WETLANDS, WATERBODIES, AND ROAD CROSSINGS
  - AT THE INLET AND OUTLET OF OPEN DRAINAGE STRUCTURES.
  - APPROXIMATELY 6 FEET BEYOND THE TOE OF THE SLOPE TO GIVE THE SEDIMENT ROOM TO COLLECT.
- KEY IN THE BOTTOM OF THE BALE. IN AREAS WHERE IT IS NOT FEASIBLE TO TRENCH IT IN (LEDGES, ROCKY SOIL, LARGE TREE ROOTS, ETC.), USE NATIVE SOIL AS BACKFILL UP-SLOPE OF THE BALE OR PLACE ONE ROW OF SAND BAGS.
- DO NOT STAKE OR TRENCH IN PLACE STRAW BALES USED ON EQUIPMENT BRIDGES OR ON MATS ACROSS THE TRAVEL LANE.
- IF USED IN CONJUNCTION WITH SILT FENCE, BALES ARE PLACED DOWNSLOPE / UPSLOPE OF THE SILT FENCE AND DO NOT NEED TO BE TRENCHED IN.

MAINTENANCE REQUIREMENTS:

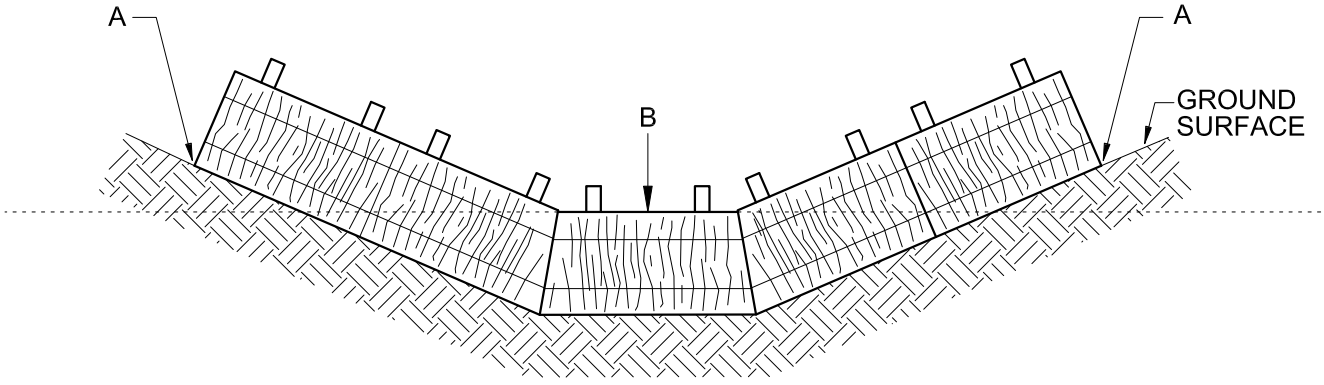
- INSPECT BALES:
  - DAILY IN AREAS OF ACTIVE CONSTRUCTION.
  - WEEKLY IN AREAS WITH NO CONSTRUCTION.
  - WITHIN 24 HOURS FOLLOWING EACH RAINFALL EVENT OF ≥ 0.5 INCH.
- REPAIR OR REPLACE BALES AS NEEDED.
- REMOVE ACCUMULATED SEDIMENTS TO AN UPLAND AREA AS NEEDED.

	STRAW BALE DETAIL	FIGURE EC-2
		DWG. ES-0012 REV.



PLAN VIEW
NOT TO SCALE

POINTS A SHALL BE HIGHER THAN POINT B

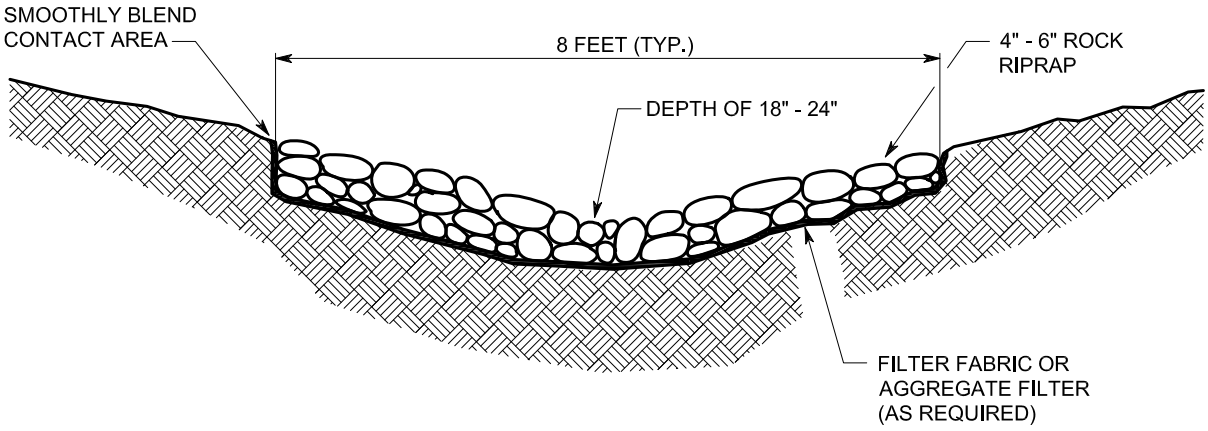


CROSS-SECTION
NOT TO SCALE

NOTE:

1. THE NUMBER OF BALES IS DETERMINED BASED ON SITE SPECIFIC FACTORS.

	STRAW BALE CHECK DAM IN A DRAINAGEWAY	FIGURE EC-3
		DWG. ES-0013 REV.



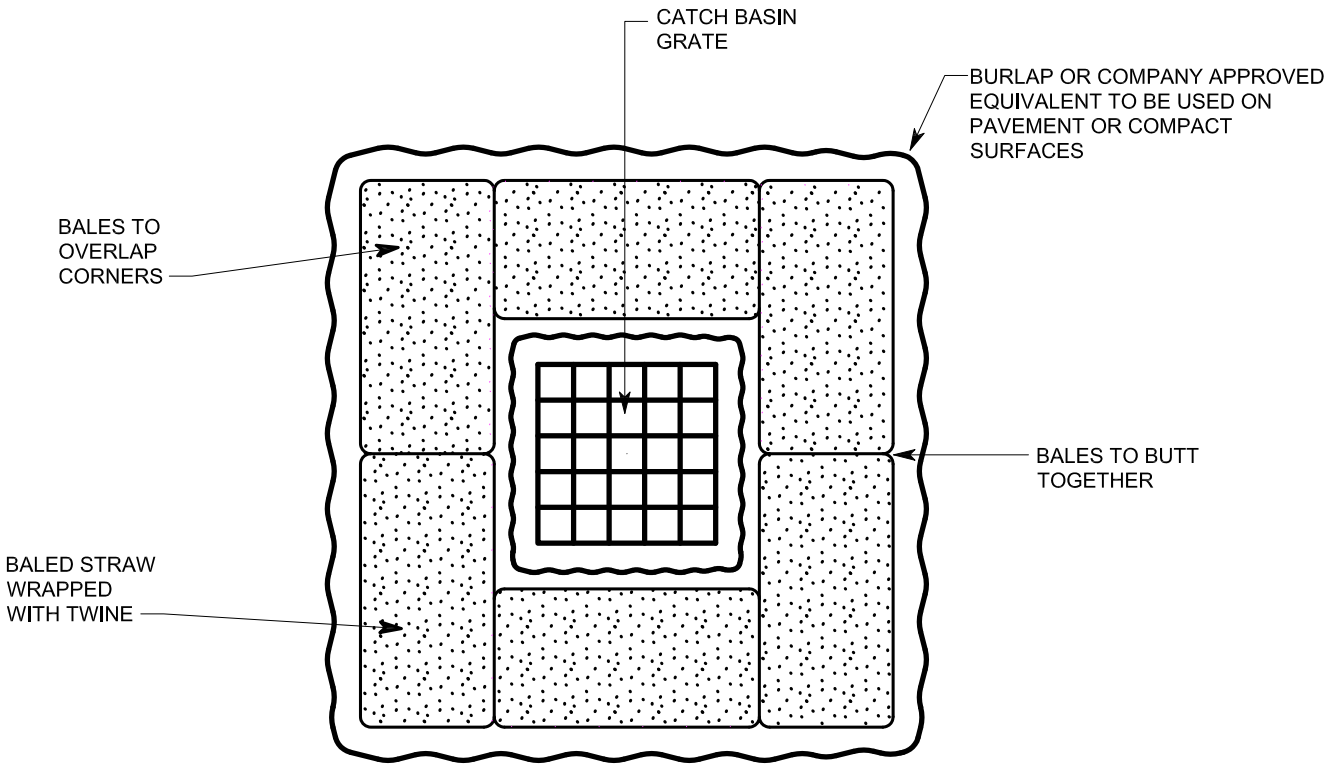
INSTALLATION REQUIREMENTS:

1. RIPRAP CHANNELS CAN BE CONSTRUCTED WITH GRASS-LINED SLOPES WHERE SITE CONDITIONS WARRANT.
2. STABILIZE CHANNEL INLET POINTS AND INSTALL OUTLET PROTECTION (AS NEEDED) DURING CHANNEL INSTALLATION.
3. INSTALL ENERGY DISSIPATING DEVICE (AS NEEDED) TO PREVENT SCOUR TO THE RECEIVING OUTLET.
4. REMOVE ALL TREES, BRUSH, AND OTHER OBJECTIONABLE MATERIAL FROM THE CHANNEL.
5. INSTALL FILTER FABRIC OR GRAVEL LAYER TO PREVENT PIPING (AS REQUIRED)

MAINTENANCE REQUIREMENTS:

1. INSPECT CHANNEL DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
2. KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.

	ROCK-LINED DRAINAGE SWALE	FIGURE EC-4
		DWG. ES-0014 REV.

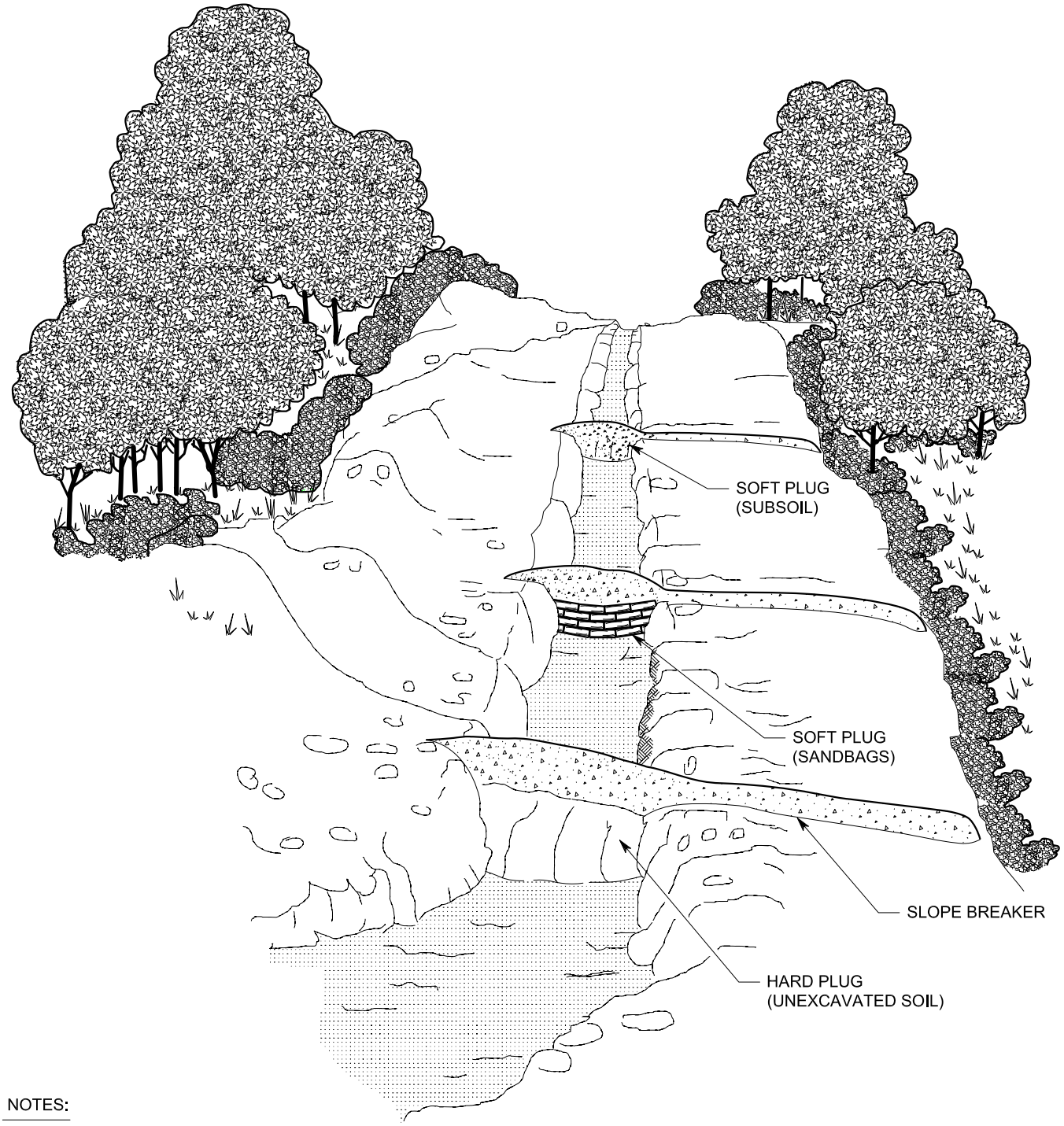


PLAN VIEW

NOTES:

1. SURROUND STREET DRAINAGE STRUCTURE INLET WITH STRAW BALES PRIOR TO CONSTRUCTION AND MAINTAIN UNTIL CONSTRUCTION IS COMPLETED.
2. FOR BALES PLACED ON PAVEMENT (OR COMPACT SURFACES), PLACE BURLAP OR COMPANY APPROVED EQUIVALENT BETWEEN PAVEMENT AND BALE.
3. REMOVE ACCUMULATED SEDIMENT.
4. AN ALTERNATIVE STORM DRAIN INLET PROTECTION MAY USE ONLY FABRIC LINING WITHOUT STRAW BALES BASED ON THE DISCRETION OF THE THE ENVIRONMENTAL INSPECTOR.

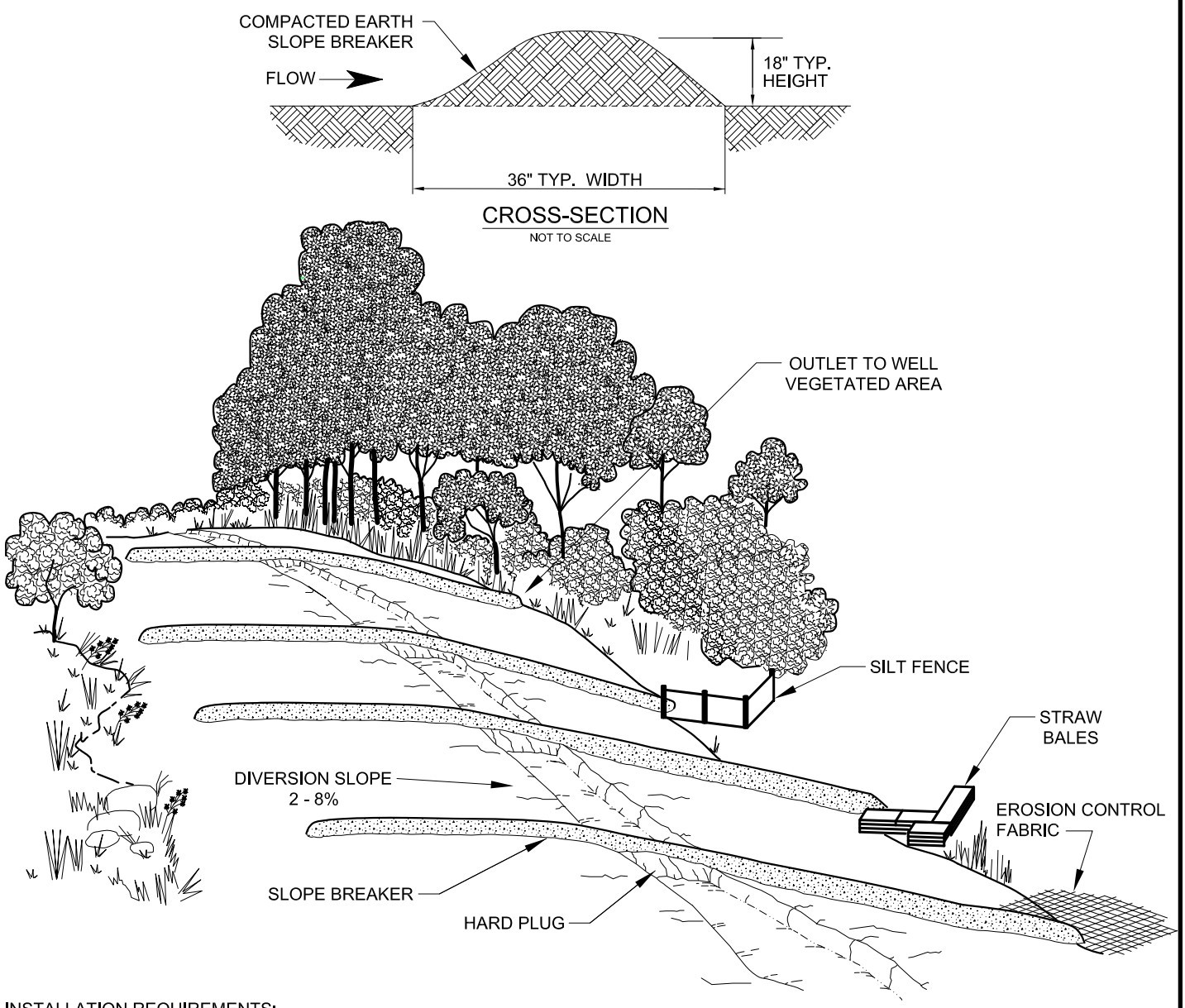
	STORM DRAIN INLET PROTECTION	FIGURE EC-5
		DWG. ES-0015 REV.



NOTES:

1. TEMPORARY TRENCH PLUG MATERIALS MAY CONSIST OF UNEXCAVATED PORTIONS OF THE TRENCH (HARD PLUG), COMPACTED SUBSOIL OR SANDBAGS PLACED ACROSS THE DITCH (SOFT PLUG), OR SOME FUNCTIONAL EQUIVALENT. THESE OPTIONS ARE DEPICTED ABOVE. DO NO USE TOPSOIL FOR TRENCH PLUGS.
2. 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. TEMPORARY TRENCH PLUGS MAY BE USED IN CONJUNCTION WITH SLOPE BREAKERS TO DIVERT TRENCH WATER OVERFLOW AND PREVENT OVERFLOW INTO SENSITIVE RESOURCE AREAS.
4. DIVERT TRENCH OVERFLOW TO A WELL-VEGETATED OFF-R.O.W. LOCATION OR INSTALL APPROPRIATE ENERGY DISSIPATING DEVICE.
5. USE TEMPORARY TRENCH PLUGS AT WATERBODY CROSSINGS, AS NECESSARY.

	TEMPORARY TRENCH PLUG OPTIONS	FIGURE EC-6
		DWG. ES-0016 REV.



INSTALLATION REQUIREMENTS:

- INSTALL SLOPE BREAKERS IN ALL DISTURBED AREAS AS NECESSARY TO AVOID EXCESSIVE EROSION AT THE LOCATIONS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS APPROVED BY THE ENVIRONMENTAL INSPECTOR (EI).
- MUST BE INSTALLED ON SLOPES GREATER THAN 5% WHERE THE BASE OF THE SLOPE IS LESS THAN 50 FEET FROM A WATERBODY, WETLAND OR ROAD CROSSING AT THE FOLLOWING MINIMUM SPACING:

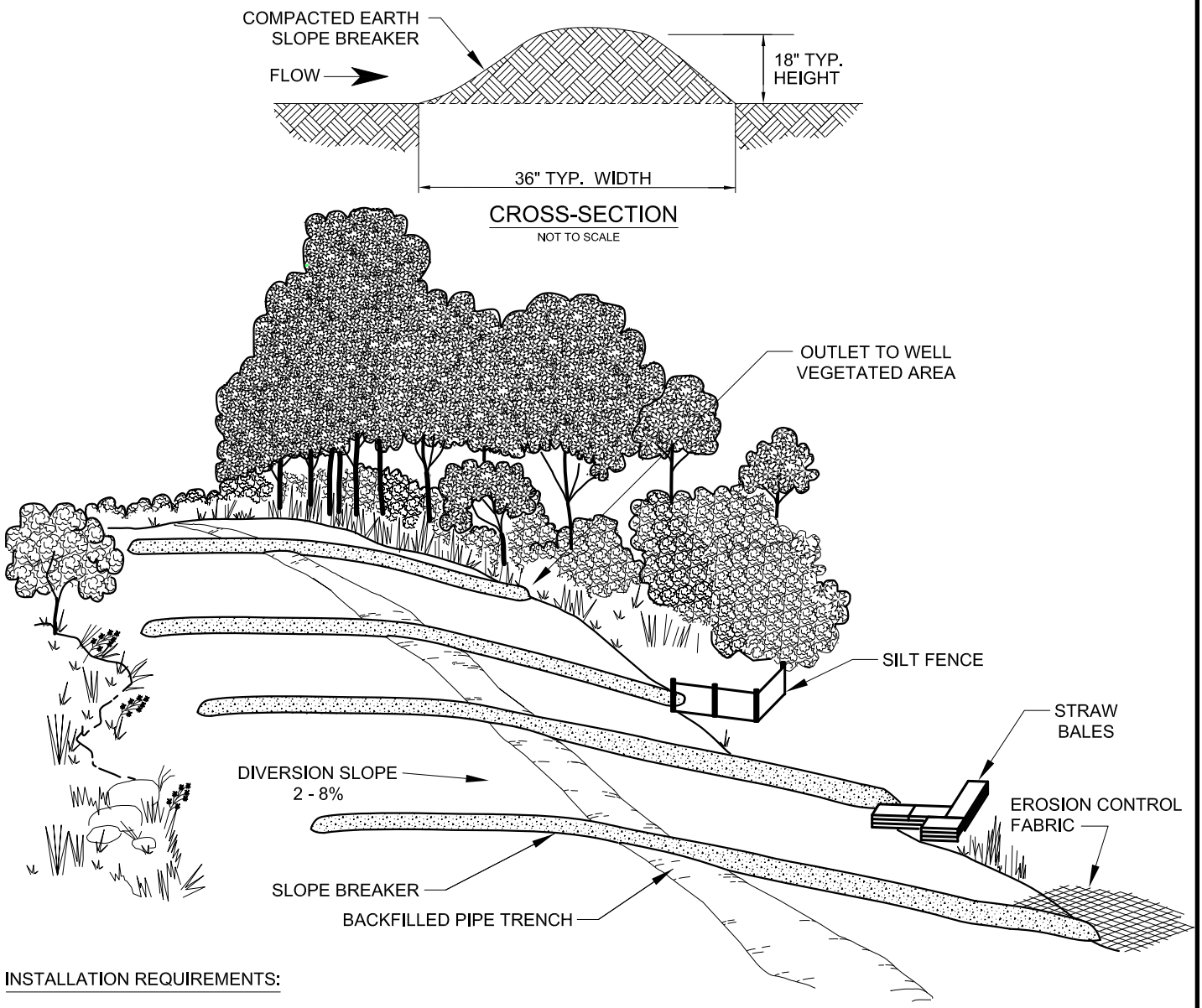
SLOPE (%)	SPACING (FT.)
5 - 15	300
> 15 - 30	200
> 30	100

- CONSTRUCT USING SAND BAGS, STAKED STRAW BALES, SILT FENCE, OR SOIL.
- 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). IF NEEDED, THE TYPE OF ENERGY DISSIPATION DEVICE WILL DEPEND ON SITE CONDITIONS (OPTIONS ARE DEPICTED ABOVE).

MAINTENANCE REQUIREMENTS:

- INSPECT DURING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
- KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.

	TEMPORARY SLOPE BREAKERS	FIGURE EC-7
		DWG. ES-0017 REV.



INSTALLATION REQUIREMENTS:

- INSTALL AND MAINTAIN IN ALL DISTURBED AREAS TO AVOID EXCESSIVE EROSION, EXCEPT CULTIVATED AREAS AND LAWNS (UNLESS REQUESTED BY THE LANDOWNER), USING SPACING RECOMMENDATIONS OBTAINED FROM THE LOCAL SOIL CONSERVATION AUTHORITY OR LAND MANAGEMENT AGENCY, AT THE LOCATIONS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS APPROVED BY THE ENVIRONMENTAL INSPECTOR (EI).
- INSTALL ON SLOPES GREATER THAN 5% WHERE THE BASE OF THE SLOPE IS LESS THAN 50 FEET FROM A WATERBODY, WETLAND OR ROAD CROSSING AT THE FOLLOWING MINIMUM SPACING IN THE ABSENCE OF WRITTEN RECOMMENDATIONS:

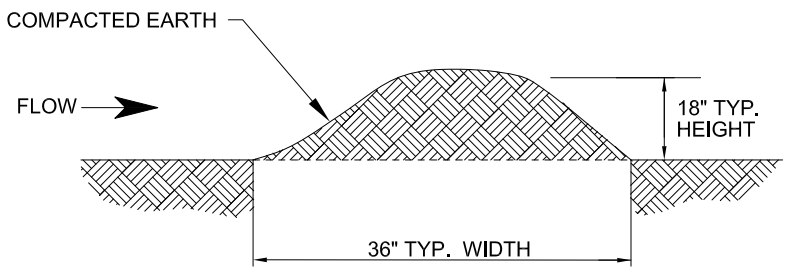
SLOPE (%)	SPACING (FT.)
5 - 15	300
> 15 - 30	200
> 30	100

- CONSTRUCT USING SOIL, STONE, OR SOME FUNCTIONAL EQUIVALENT.
- 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). IF NEEDED, THE TYPE OF ENERGY DISSIPATION DEVICE WILL DEPEND ON SITE CONDITIONS (OPTIONS ARE DEPICTED ABOVE).
- IF NECESSARY, OUTFALL MAY EXTEND SLIGHTLY, UP TO 4 FEET, BEYOND THE EDGE OF THE CONSTRUCTION RIGHT-OF-WAY, SUBJECT TO ALL APPLICABLE SURVEY REQUIREMENTS.

MAINTENANCE REQUIREMENTS:

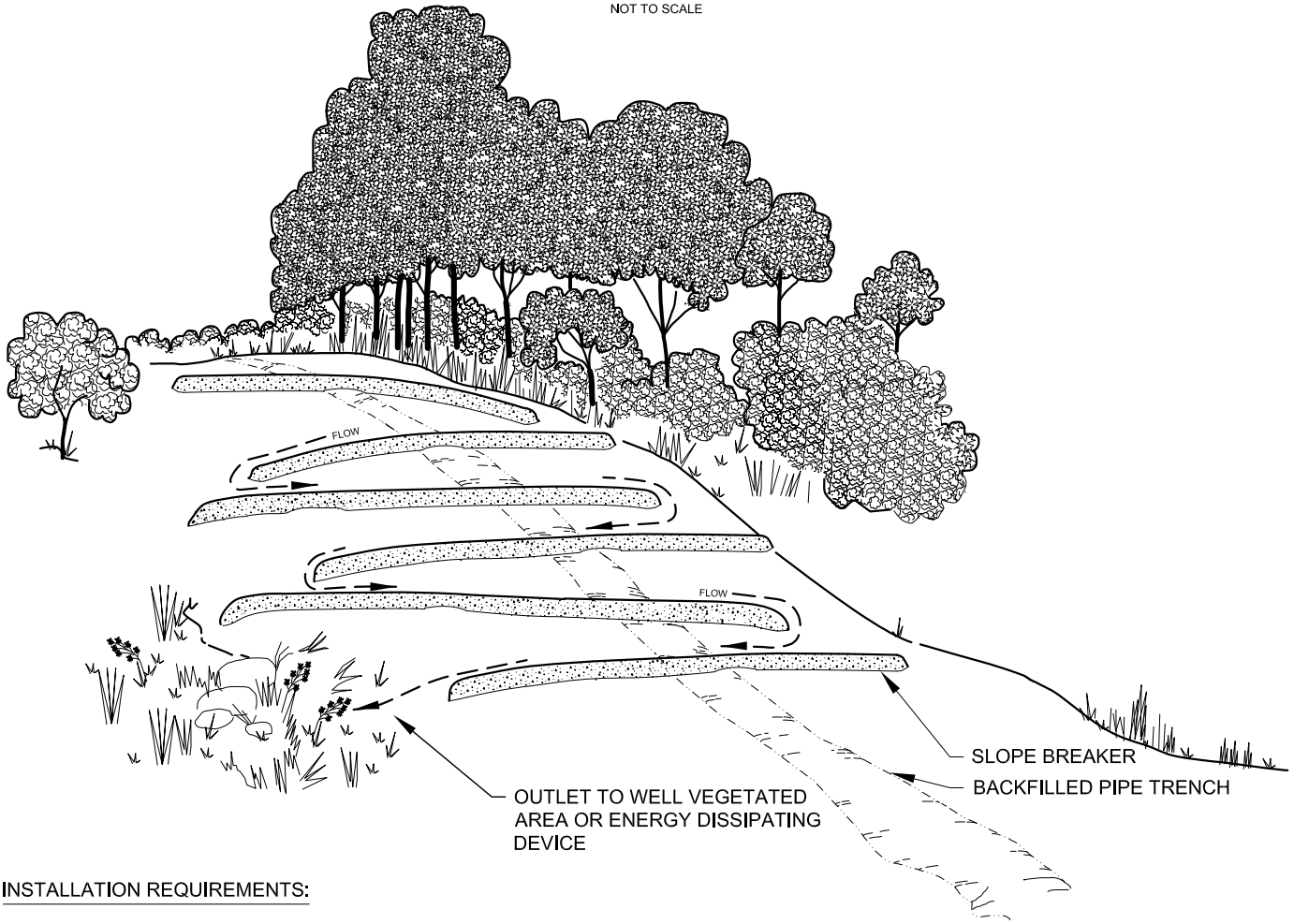
- INSPECT DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
- KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.
- SEED AND MULCH PERMANENT SLOPE BREAKERS FOLLOWING CONSTRUCTION.

	PERMANENT SLOPE BREAKERS	FIGURE EC-8
		DWG. ES-0018 REV.



CROSS-SECTION

NOT TO SCALE



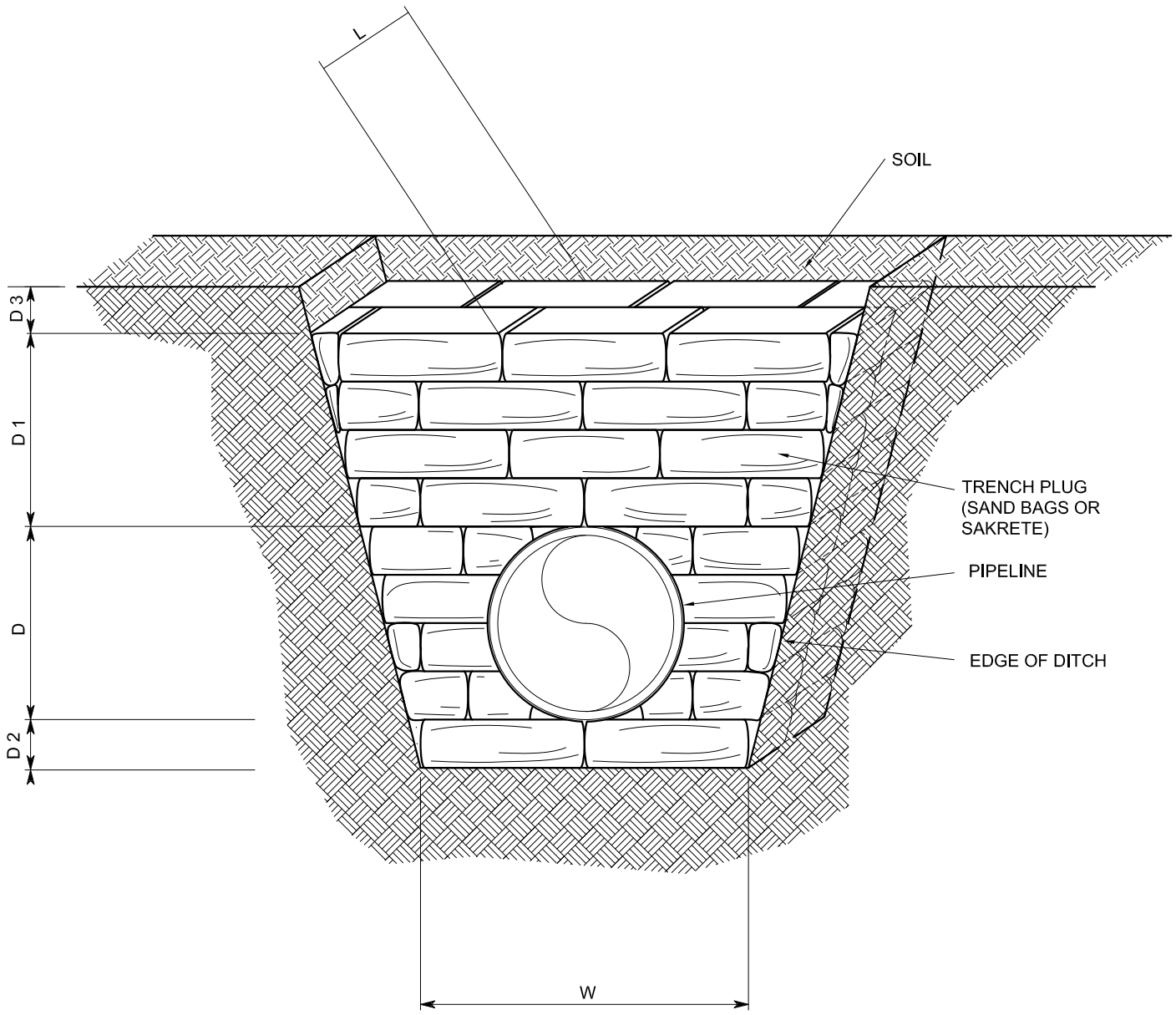
INSTALLATION REQUIREMENTS:

- INSTALL IN ALL AREAS EXCEPT RESIDENTIAL OR AGRICULTURAL (UNLESS AUTHORIZED BY LANDOWNER OR LAND MANAGING AGENCY).
- CONSTRUCT USING EARTH FILLED SACKS OR STAKED STRAW BALES FOR TEMPORARY OR COMPACTED EARTH AND ROCK FOR PERMANENT.
- 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, EROSION CONTROL FABRIC), AS APPROVED 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.

	CHEVRON SLOPE BREAKER	FIGURE EC-9
		DWG. ES-0019 REV.



D = PIPE DIAMETER
D1 = APPROXIMATELY 24"
D2 = APPROXIMATELY 6" (8" MIN. IN ROCK)
D3 = APPROXIMATELY 12"
W = D + 2 to 4 FEET
L = APPROXIMATELY 18" - 24"
D1 + D3 = 36" MINIMUM

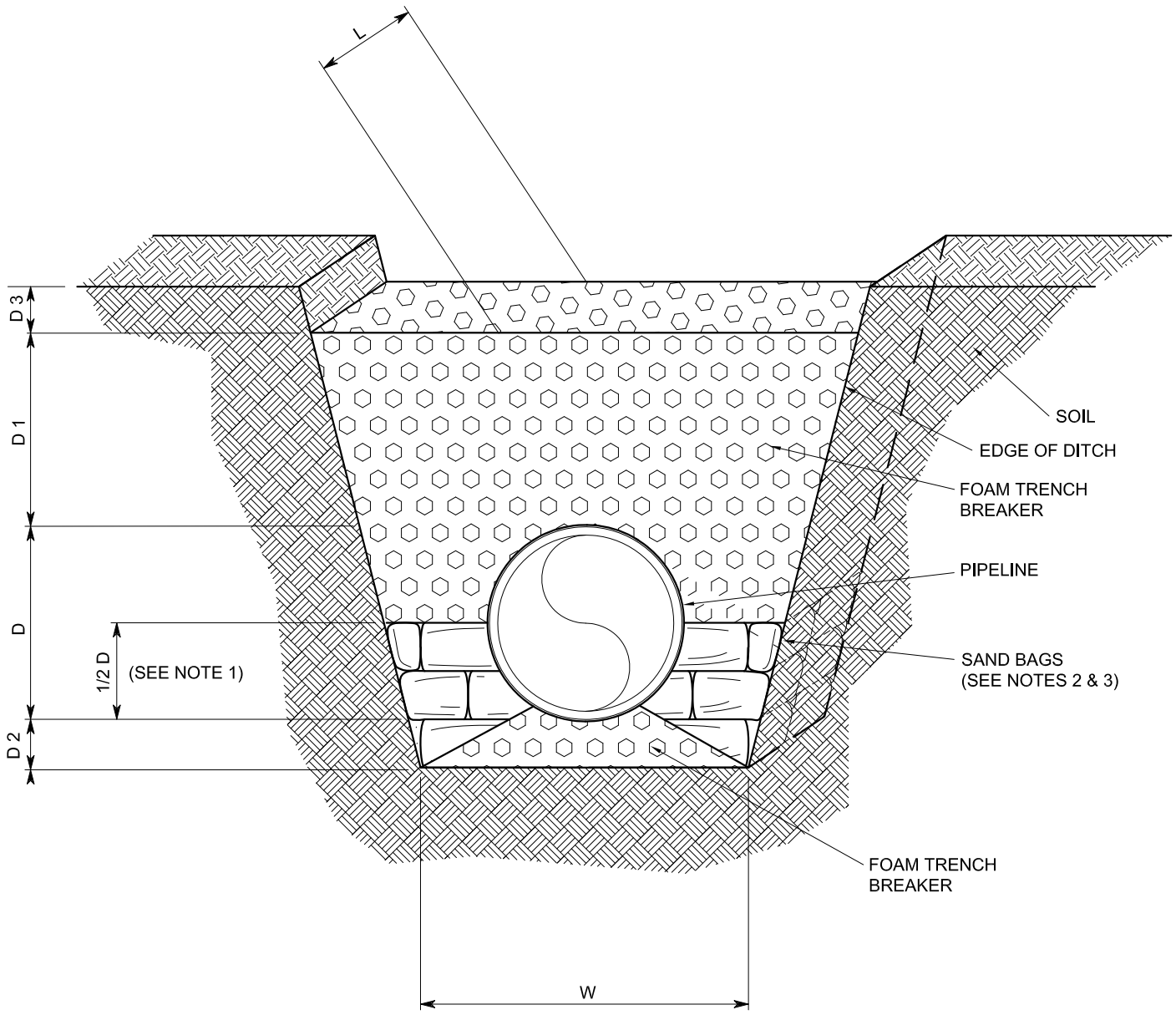
NOTE:

1. USE OF SAKRETE SHALL REQUIRE PRIOR COMPANY APPROVAL.
2. TOPSOIL SHALL NOT BE USED TO CONSTRUCT BREAKERS.
3. DO NOT INSTALL TRENCH BREAKERS WITHIN A WETLAND.

TRENCH BREAKER DETAIL (SACK)

FIGURE EC-10

DWG. ES-0020 REV.



D = PIPE DIAMETER
D1 = APPROXIMATELY 24"
D2 = APPROXIMATELY 6" (8" MIN. IN ROCK)
D3 = APPROXIMATELY 12"
W = D + 2 to 4 FEET
L = APPROXIMATELY 18" - 24"
D1 + D3 = 36" MINIMUM

NOTE:

1. A MINIMUM OF TWO LAYERS OF BAGS SHALL BE INSTALLED.
2. THE ADDITION OF SAND BAGS UNDER THE FOAM WILL BE PLACED AS PRESCRIBED IN THE E&S PLAN OR AT THE DISCRETION OF THE ENVIRONMENTAL INSPECTOR (EI).
3. FOAM TRENCH BREAKERS ARE TO BE USED WITHIN UPLAND AREAS. DO NOT USE FOAM TRENCH BREAKERS AT WATERBODY OR WETLAND BOUNDARIES..

	TRENCH BREAKER DETAIL (FOAM)	FIGURE EC-11
		DWG. ES-0021 REV.

I.G. ES0021.DWG

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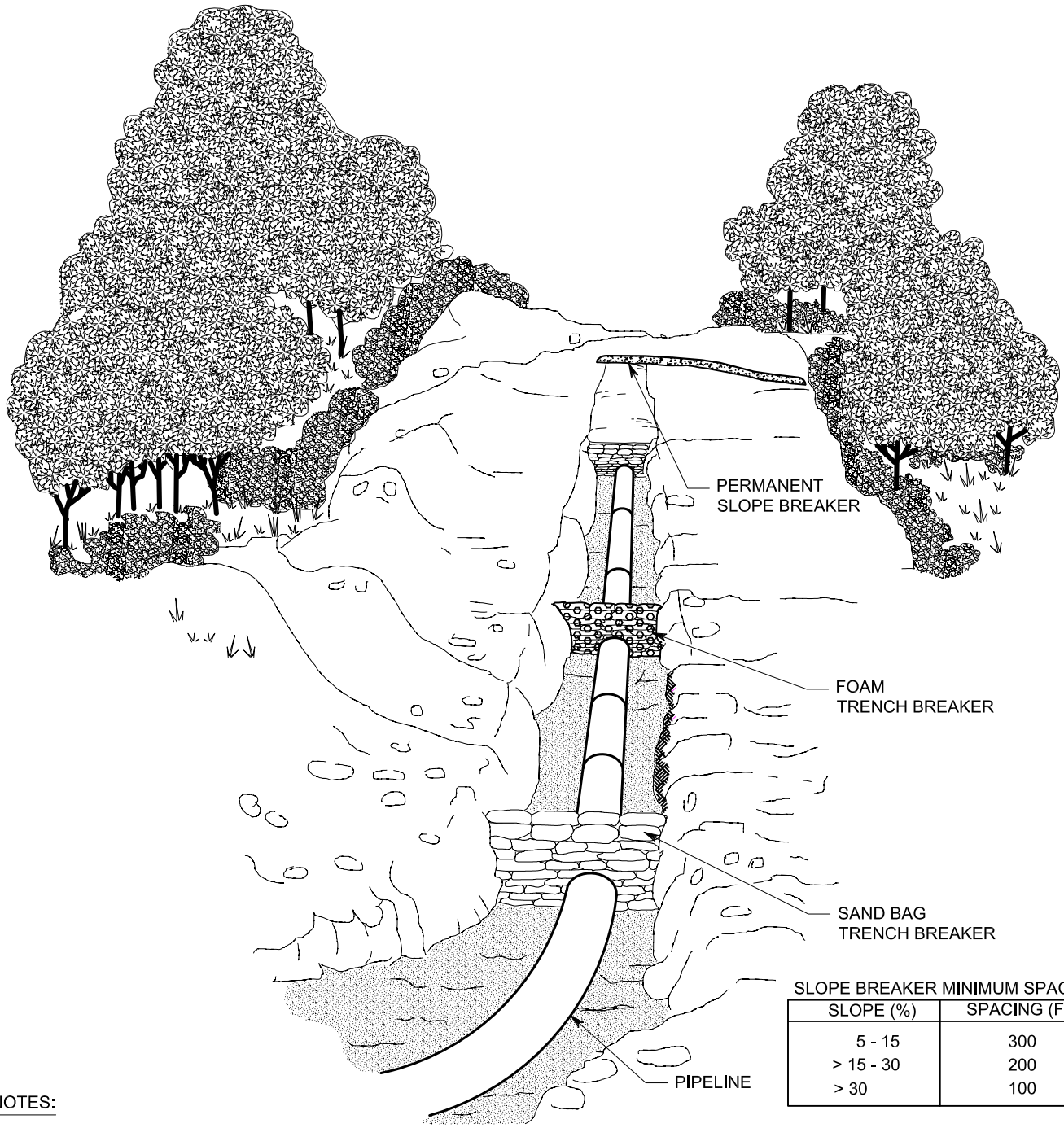


SLOPE BREAKER MINIMUM SPACING

SLOPE (%)	SPACING (FT)
5 - 15	300
> 15 - 30	200
> 30	100

NOTES:

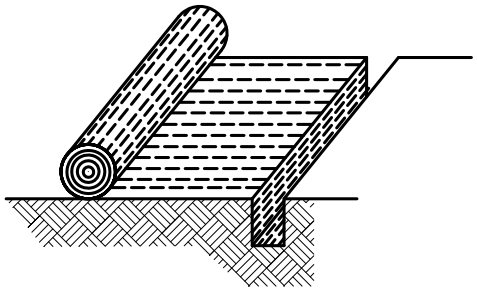
1. PERMANENT TRENCH BREAKER MATERIALS WILL CONSIST OF SAND BAGS, POLYURETHANE FOAM OR SOME FUNCTIONAL EQUIVALENT PLACED ACROSS THE DITCH AS IDENTIFIED IN PERMIT REQUIREMENTS. DO NOT USE TOPSOIL FOR TRENCH BREAKERS. THESE OPTIONS ARE DEPICTED ABOVE.
2. PERMANENT TRENCH BREAKERS, WHICH ARE USED IN CONJUNCTION WITH SLOPE BREAKERS, SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS DETERMINED IN THE FIELD BY THE ENVIRONMENTAL INSPECTOR.
3. 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.
4. INSTALL TRENCH BREAKERS AT WETLAND BOUNDARIES AND/OR SEAL THE TRENCH BOTTOM AS NECESSARY TO MAINTAIN THE ORIGINAL WETLAND HYDROLOGY. DO NOT INSTALL TRENCH BREAKERS WITHIN A WETLAND.
5. 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.

PERMANENT TRENCH
BREAKER OPTIONS

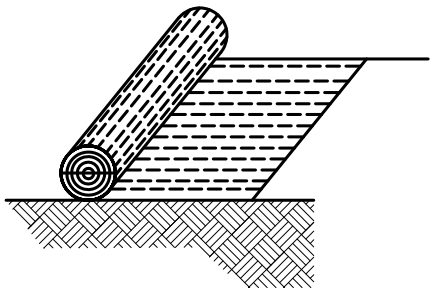
FIGURE EC-12

DWG. ES-0022 REV.

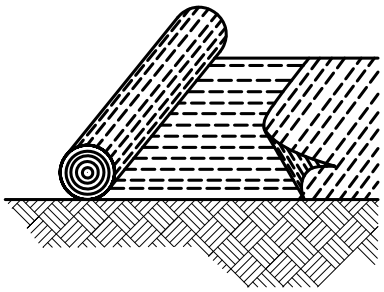
A. BURY THE TOP END OF THE ROLL IN A 6" TRENCH (TYPICAL)



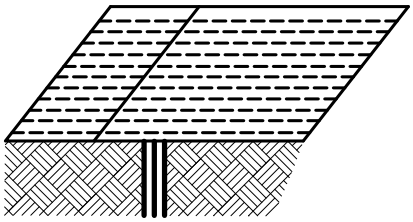
B. DOUBLE STAPLE EVERY 12" BEFORE BACKFILLING AND COMPACTING.

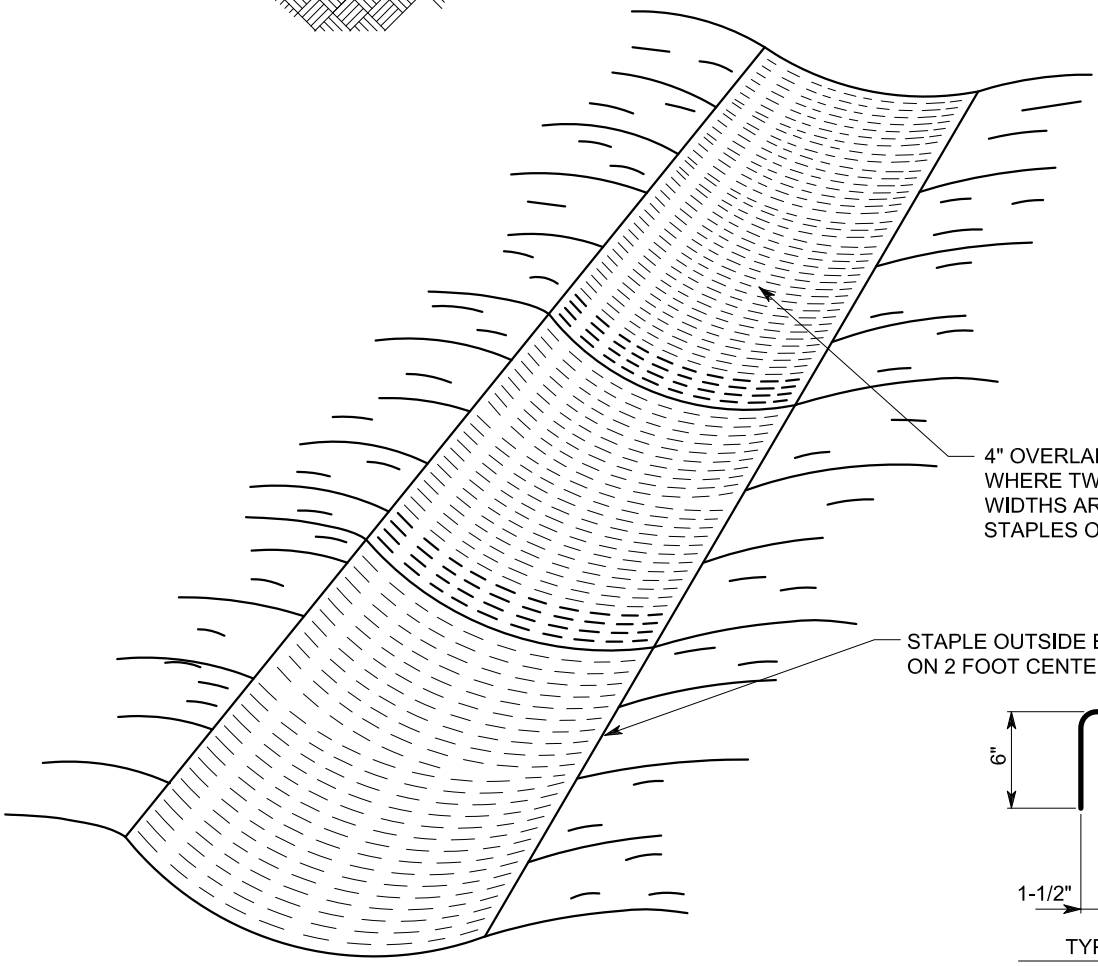


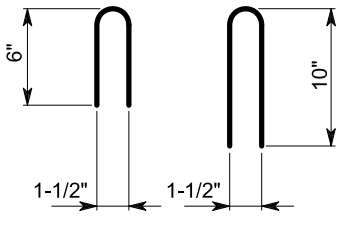
C. BURY AND TAMP UPPER END OF LOWER STRIP AS IN "A" AND "B". OVERLAP END OF TOP STRIP 4" AND STAPLE.



D. WHERE FABRIC STOPS, FOLD, BURY, AND TAMP ROLL IN SLIT TRENCH. PROVIDE DOUBLE ROW OF STAPLES







TYPICAL STAPLES
NO. 11 GAUGE WIRE

EROSION CONTROL FABRIC INSTALLATION

FIGURE EC-13

DWG. ES-0023 REV.

I.G. ES0023.DWG

Wayne Sicora
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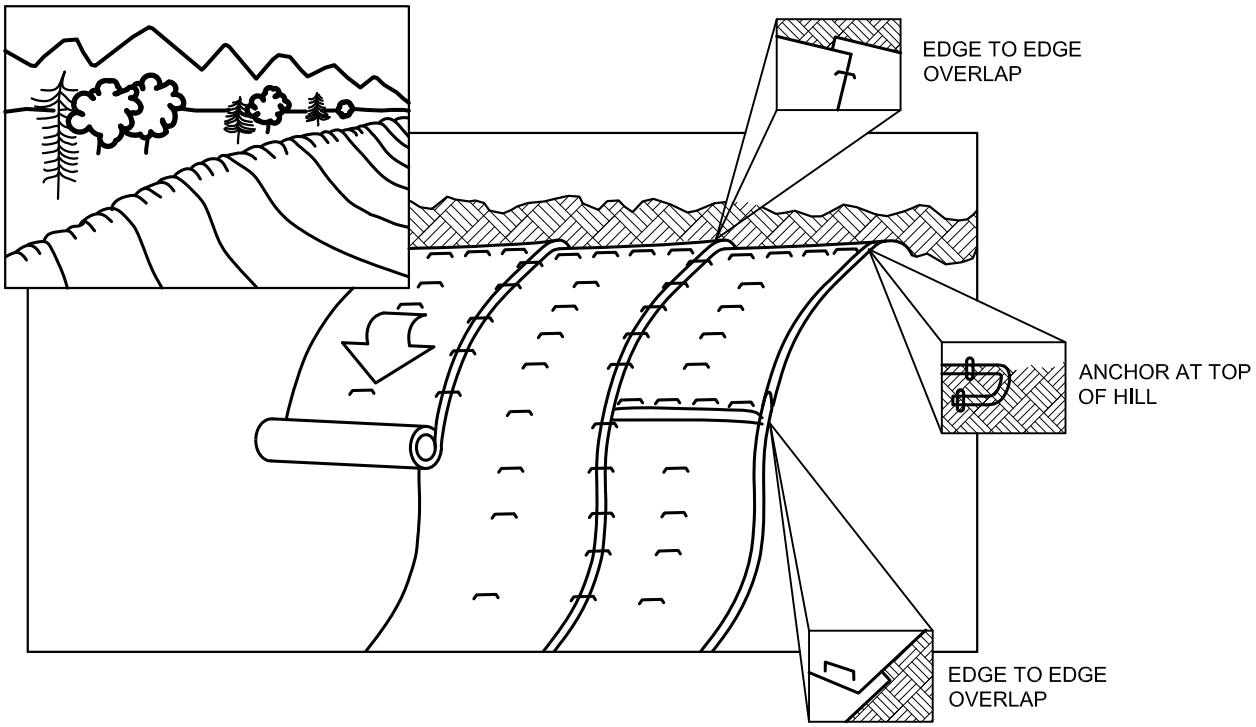
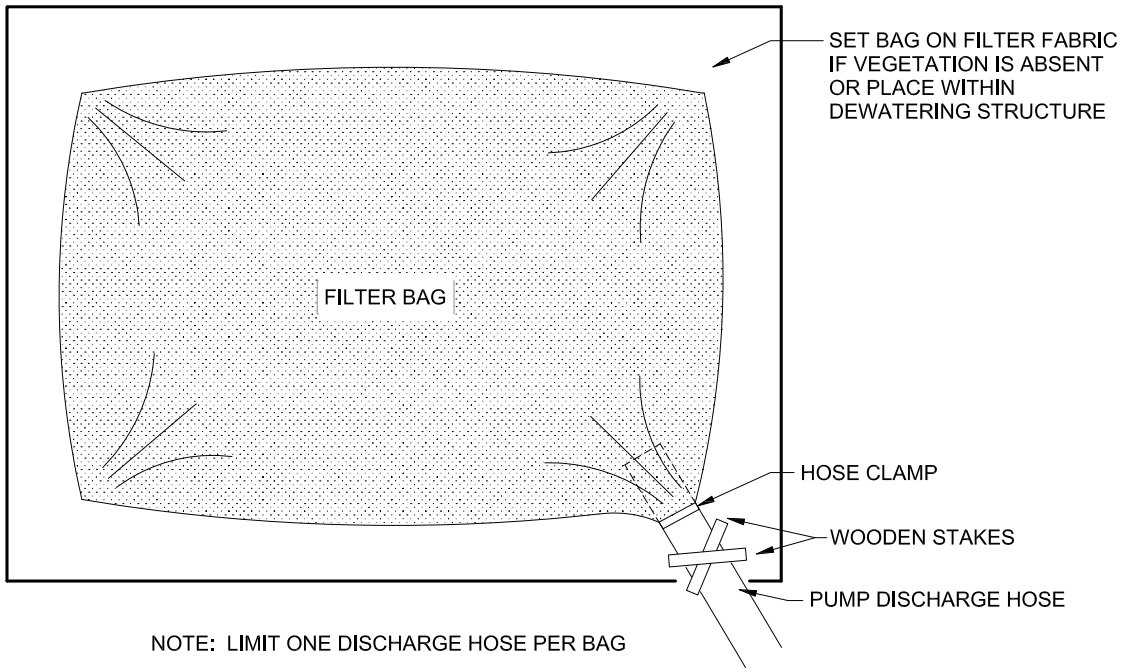


NOTES:

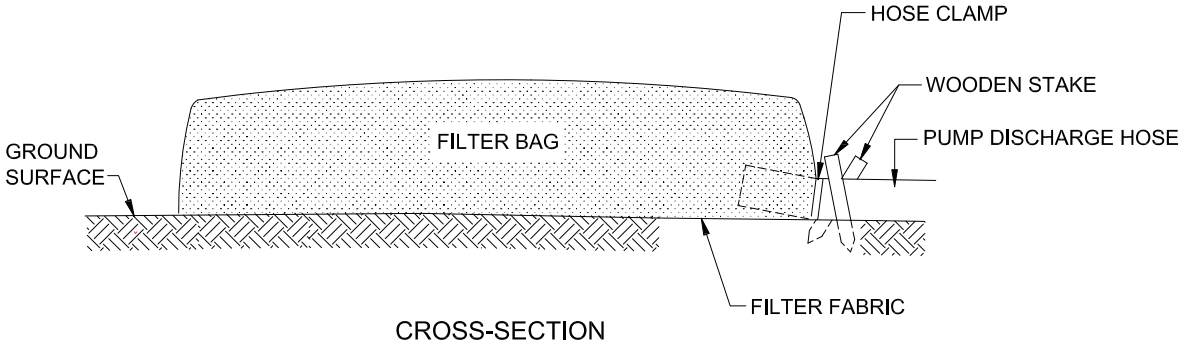
1. EROSION CONTROL BLANKETS (FABRIC) SHALL BE USED AT LOCATIONS IDENTIFIED IN THE PLAN AND/OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
2. EROSION CONTROL BLANKETS SHALL MEET THE REQUIREMENTS SPECIFIED IN THE PLAN AND/OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
3. STAPLES SHALL BE MADE OF 11 GAUGE WIRE, U-SHAPED WITH 6" LEGS AND A 1" CROWN. STAPLES SHALL BE DRIVEN INTO THE GROUND FOR THE FULL LENGTH OF THE STAPLE LEGS.
4. BLANKETS SHALL BE INSTALLED ACCORDING TO MANUFACTURER SPECIFICATIONS OR AS STATED BELOW:
   - EXTEND TOP OF BLANKET 3 FEET PAST THE UPPER EDGE OF THE SLOPE.
   - ANCHOR ("KEY") THE UPPER EDGE OF THE BLANKET INTO THE SLOPE USING A 6" DEEP TRENCH AND ROLL THE BLANKET DOWN THE HILL. DOUBLE STAPLE EVERY 12" BEFORE BACKFILLING AND COMPACTING TRENCH.
   - INSTALL LOOSELY ON SLOPE AND AVOID STRETCHING EROSION CONTROL BLANKETS DURING INSTALLATION.
   - BRING ROLL BACK OVER THE TOP OF THE TRENCH AND CONTINUE TO ROLL DOWN SLOPE. STAPLE EVERY 12" WHERE BLANKETS EXIT THE TRENCH AT THE TOP OF THE SLOPE.
   - WHEN BLANKETS ARE SPLICED DOWN-SLOPE TO ADJOINING BLANKETS (SLOPE OR STREAMBANK MATS), THE UPPER BLANKET SHALL BE PLACED OVER THE LOWER (SHINGLE STYLE) WITH APPROXIMATELY 6" OF OVERLAP. STAPLE THROUGH THE OVERLAPPED AREA EVERY 12".
   - OVERLAP ADJACENT BLANKETS 6". STAPLE EDGES OF BLANKETS AND CENTER EVERY 36".
5. IN LIVESTOCK AREAS WHERE EROSION CONTROL BLANKETS ARE APPLIED TO THE SLOPES, FENCING WILL BE USED IF NECESSARY TO EXCLUDE LIVESTOCK, WITH PERMISSION OF THE LANDOWNER.
6. MONITOR WASHOUTS, STAPLE INTEGRITY OR BLANKET MOVEMENT. REPLACE OR REPAIR AS NECESSARY.
7. DO NOT USE SYNTHETIC MONOFILAMENT MESH / NETTED MATERIALS IN AREAS DESIGNATED AS SENSITIVE WILDLIFE HABITAT, UNLESS THE PRODUCT IS SPECIFICALLY DESIGNED TO MINIMIZE HARM TO WILDLIFE.

	TYPICAL EROSION CONTROL BLANKETS ON SLOPES	FIGURE EC-14
		DWG. ES-0024 REV.



NOTE: LIMIT ONE DISCHARGE HOSE PER BAG

PLAN VIEW



CROSS-SECTION

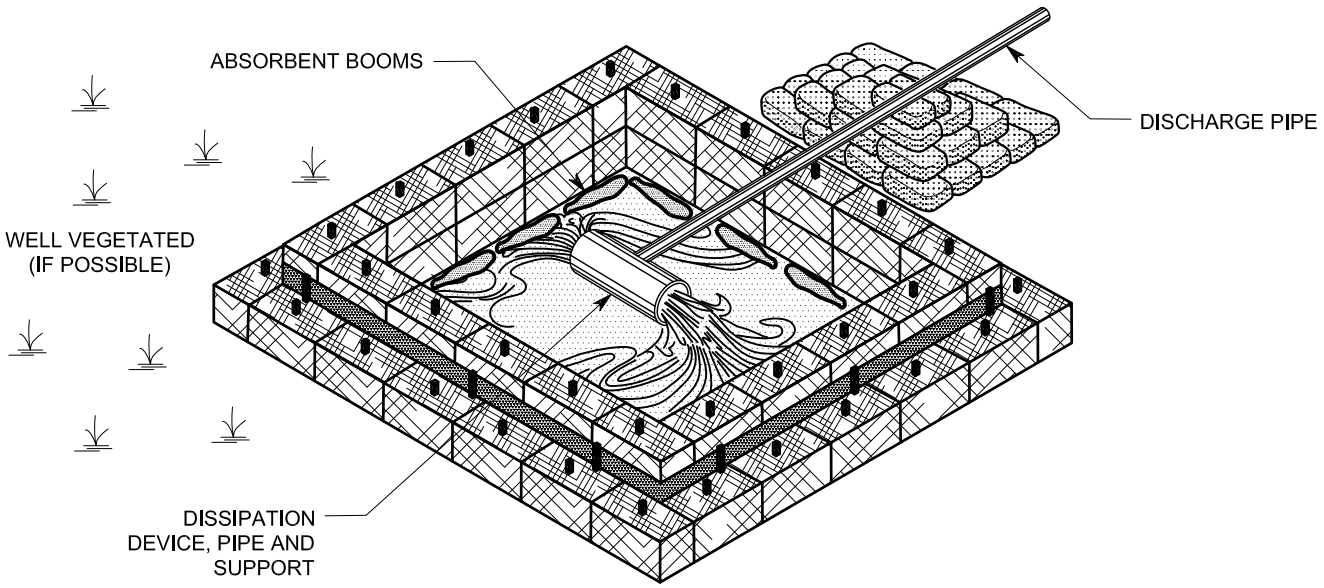
NOTES:

1. THE FILTER BAG OR STRUCTURE MUST BE MANNED WHEN THE PUMPING IS INITIATED TO ENSURE PROPER OPERATION AND FUNCTIONALITY.

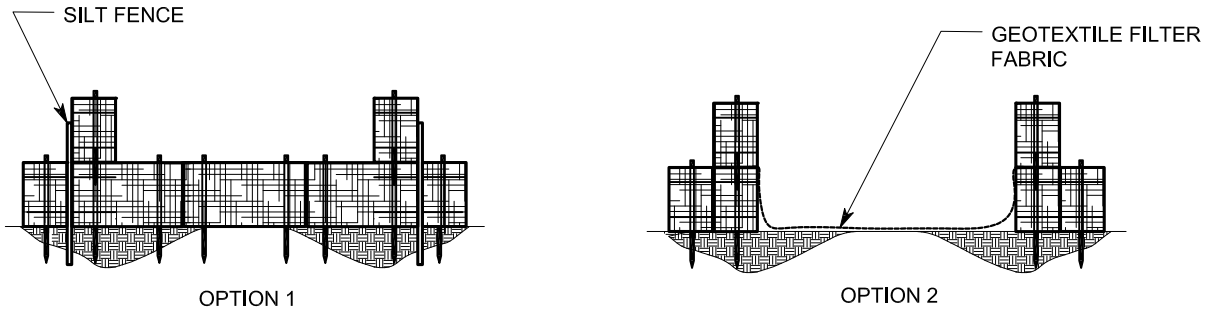
2. REMOVE DEWATERING STRUCTURE AS SOON AS PRACTICABLE AFTER COMPLETION OF DEWATERING ACTIVITIES.

3. PLACEMENT OF FILTERBAGS SHOULD BE IN A MANNER THAT BAG USE DOES NOT CAUSE EROSION. IF SITE CONDITIONS ALLOW, PLACE FILTER BAG IN WELL-VEGETATED AREA, A MINIMUM OF 50 FEET FROM WETLANDS OR WATERBODIES.

	FILTER BAG	FIGURE WD-1
		DWG. ES-0025 REV.



PLAN VIEW



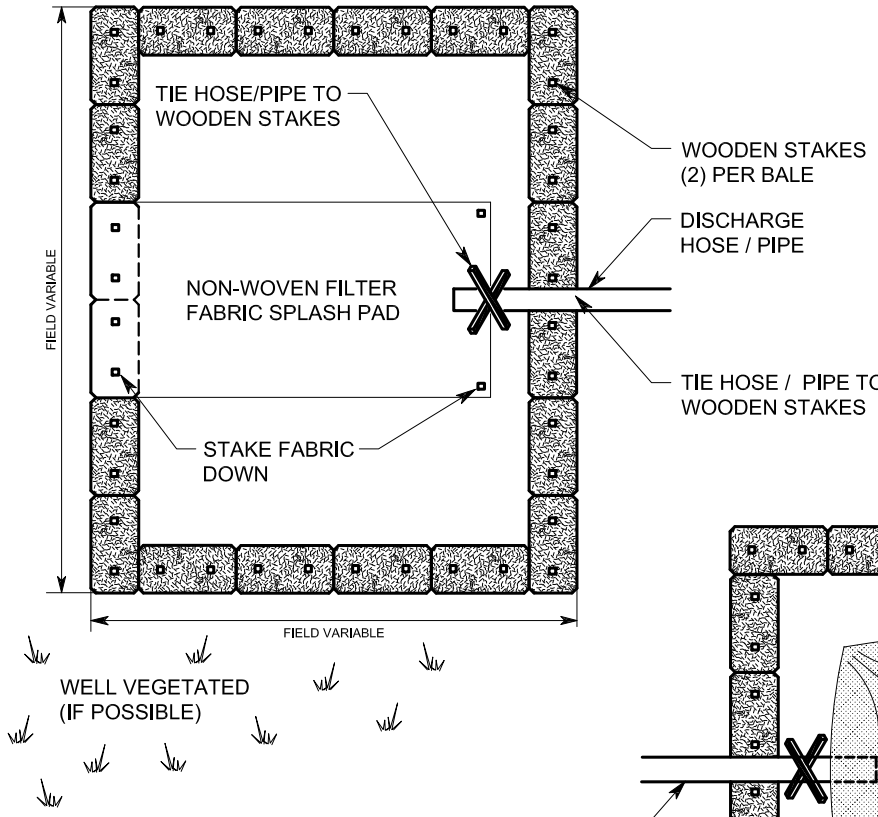
CROSS SECTION VIEWS

NOTES:

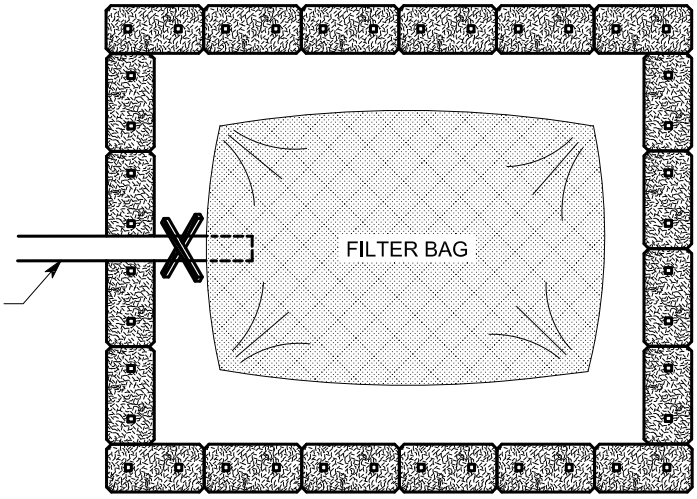
1. SIZE AND DIMENSION OF DEWATERING STRUCTURE WILL VARY DEPENDING ON THE VOLUME AND RATE OF DISCHARGE. STAGGER PLACEMENT OF STRAW BALES WHEN TWO ROWS ARE USED.
2. COVER THE BASE OF THE DISCHARGE STRUCTURE EITHER WITH STRAW BALES (OPTION 1) OR LINE WITH GEOTEXTILE FABRIC (OPTION 2).
3. PROVIDE SUPPORT TO ENSURE THAT DISCHARGE PIPE DOES NOT REST ON STRAW BALES.
4. PLASTIC SHEETING, WOODEN MATS OR STEEL PLATES MAY ALSO BE USED, AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR, TO PREVENT EROSION, STREAMBED SCOUR, SUSPENSION OF SEDIMENTS OR EXCESSIVE STREAMFLOW.
5. ABSORBENT BOOMS MUST BE USED DURING DISCHARGES FROM EXISTING / USED PIPE OR AS DIRECTED BY PERMIT REQUIREMENTS.
6. PREVENT EROSION, STREAMBED SCOUR, SUSPENSION OF SEDIMENTS AND EXCESSIVE STREAMFLOW BY PROPER DESIGN OF STRUCTURE, REGULATING THE WATER DISCHARGE RATE AS WELL AS USE OF ENERGY DISSIPATION DEVICE(S) AND SEDIMENT BARRIERS, AS NECESSARY.

	DISCHARGE STRUCTURE FOR HYDROSTATIC TEST WATER	FIGURE WD-2
		DWG. ES-0026 REV.

OPTION A



OPTION B



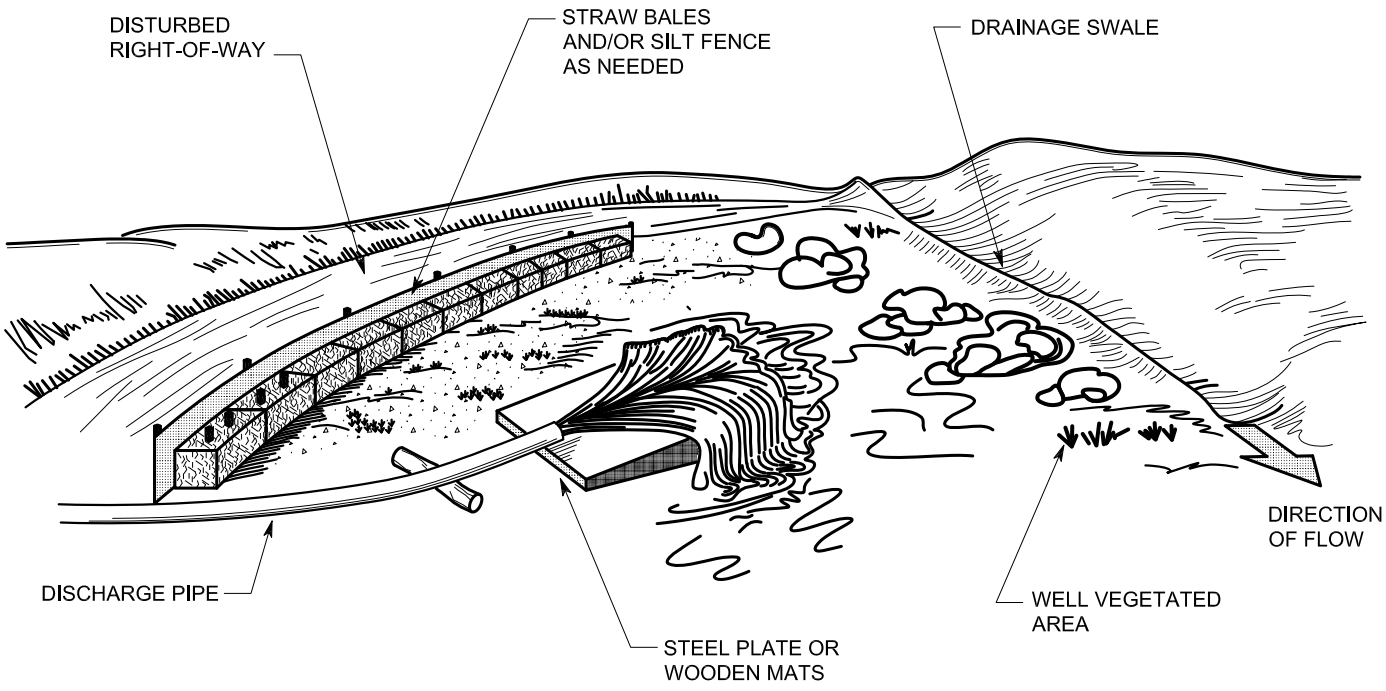
PLAN VIEW

NOT TO SCALE

NOTES:

1. SIZE AND DIMENSION OF DEWATERING STRUCTURE, INCLUDING NUMBER OF STRAW BALES USED, WILL VARY DEPENDING ON VOLUME OF WATER DISCHARGED, RATE OF DISCHARGE AND SITE CONDITIONS, SUCH AS THE TYPE AND AMOUNT OF SEDIMENT WITHIN THE DISCHARGE WATER.
2. PREVENT EROSION, STREAMBED SCOUR, SUSPENSION OF SEDIMENTS AND EXCESSIVE STREAMFLOW BY PROPER DESIGN OF STRUCTURE, REGULATING THE WATER DISCHARGE RATE AS WELL AS USE OF ENERGY DISSIPATION DEVICE(S) AND SEDIMENT BARRIERS, AS NECESSARY.
3. MONITOR AND CONDUCT DISCHARGES IN A MANNER THAT DOES NOT CAUSE EROSION AND DOES NOT RESULT IN SILT-LADEN WATER FLOWING INTO ANY WATERBODY OR WETLAND.
4. DO NOT DEPOSIT SAND, SILT, AND/OR SEDIMENT INTO SENSITIVE ENVIRONMENTAL RESOURCE AREAS, INCLUDING WETLANDS, WATERBODIES, CULTURAL RESOURCE SITES, AND SENSITIVE SPECIES HABITATS. STOP DEWATERING ACTIVITIES IF SUCH DEPOSITION IS OCCURRING AND ENSURE THE DESIGN OF THE DISCHARGE IS CHANGED TO PREVENT REOCCURRENCE.
5. ABSORBENT BOOMS MUST BE USED DURING DISCHARGES FROM EXISTING / USED PIPE OR AS DIRECTED BY PERMIT REQUIREMENTS.
6. FILTER BAGS SHOULD BE INSTALLED ACCORDING TO THE DETAILS SHOWN IN "FILTER BAG" FIGURE.
7. REMOVE STRUCTURE AS SOON AS PRACTICABLE AFTER COMPLETION OF WATER DISCHARGES.

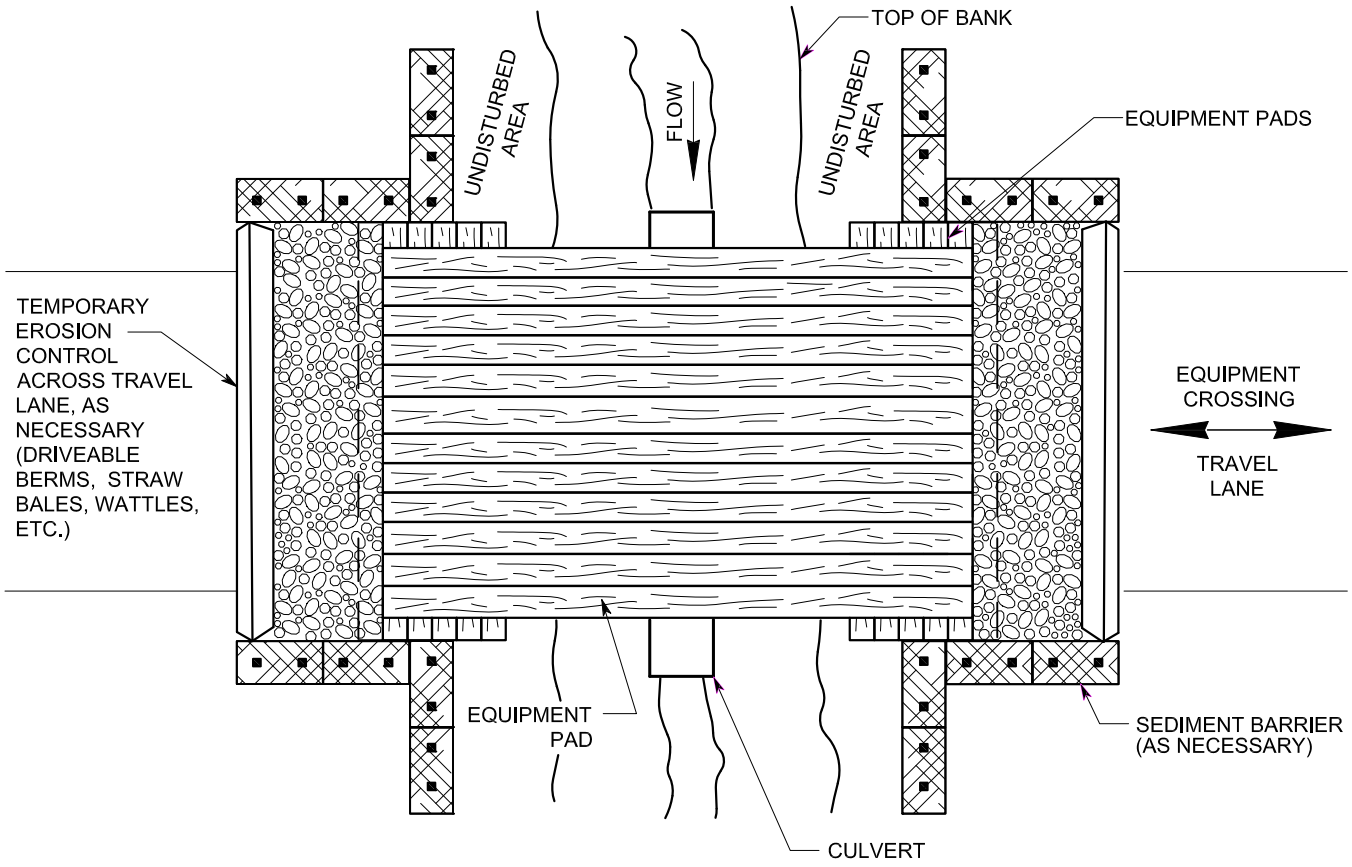
	OPTIONS FOR SMALL WATER DISCHARGES	FIGURE WD-3
		DWG. ES-0027 REV.



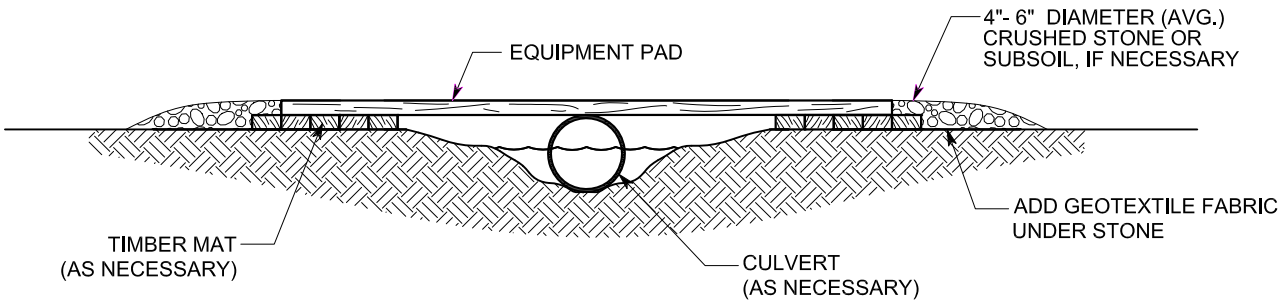
NOTES:

1. USE BACKHOE BUCKET OR DOZER BLADE TO ANCHOR DISCHARGE PIPE.
2. ON FLAT TERRAIN, USE STACKED STRAW BALES AND SILT FENCE AS NEEDED TO DIVERT WATER AWAY FROM DISTURBED RIGHT-OF-WAY.

	DISCHARGE OF HYDROSTATIC TEST WATER TO A SURFACE WATER	FIGURE WD-4
		DWG. ES-0028 REV.



PLAN VIEW

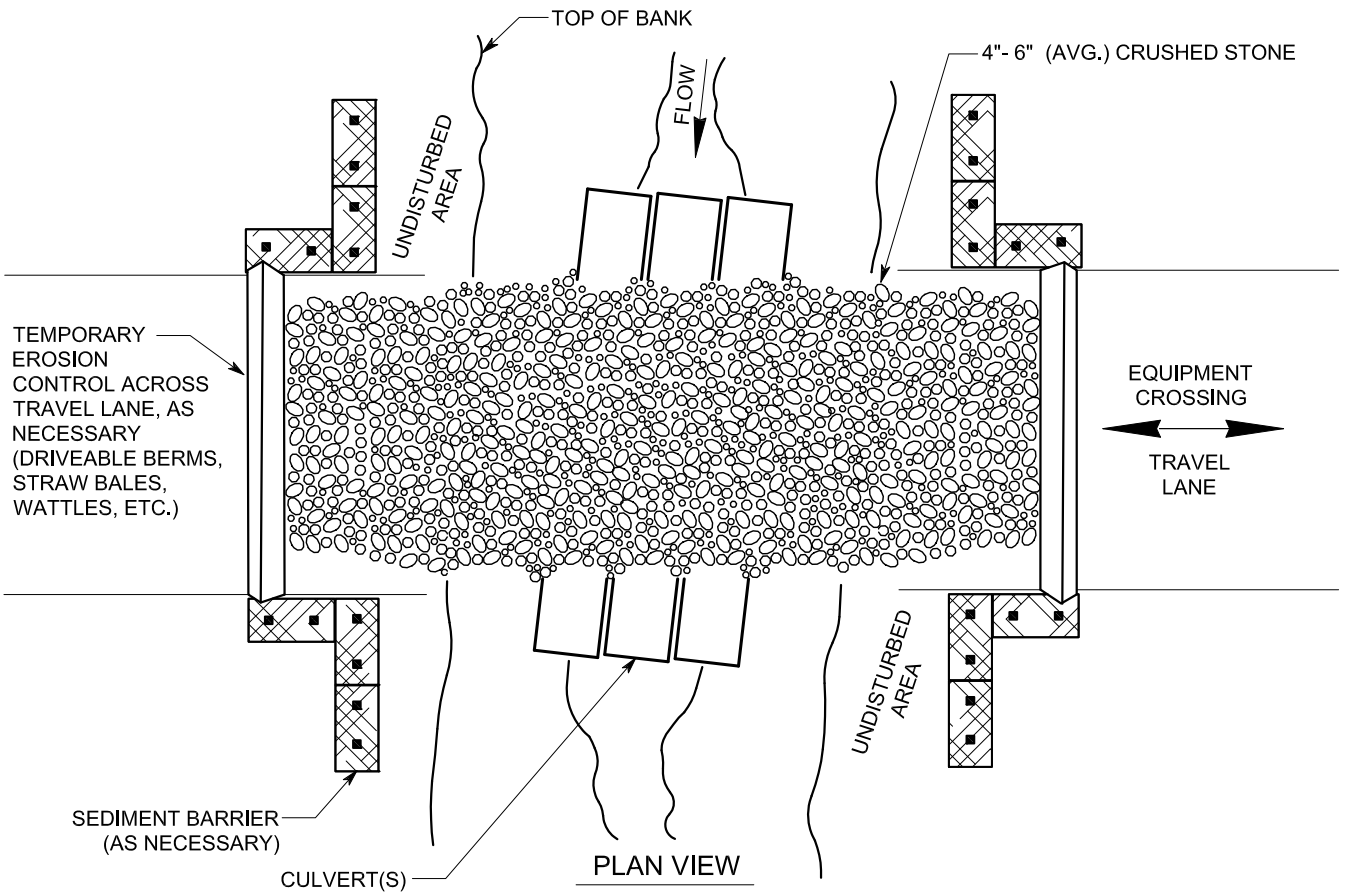


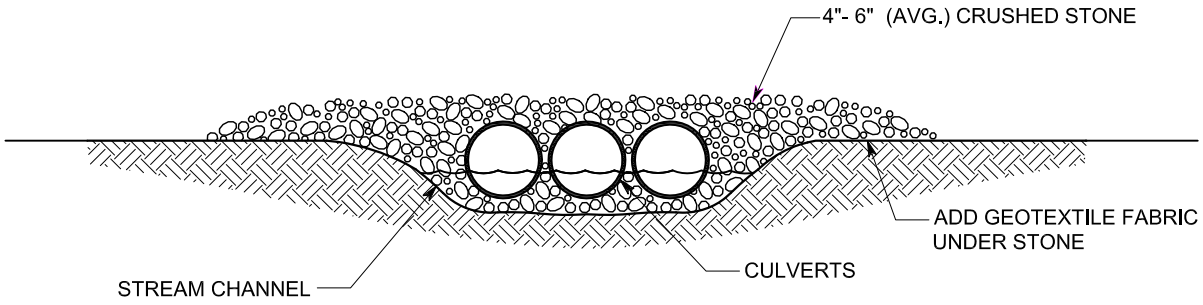
CROSS SECTION VIEW

NOTES:

1. TEMPORARY SEDIMENT BARRIER CONSISTS OF SILT FENCE AND/ OR STRAW BALES, OR OTHER APPROPRIATE MATERIAL.
2. NUMBER AND DIAMETER OF CULVERTS, AS WELL AS USE OF CULVERTS, WILL DEPEND ON SITE-SPECIFIC CONDITIONS.
3. EQUIPMENT PAD, TYPICALLY CONSTRUCTED OF HARDWOOD, SHALL BE IN GOOD CONDITION AND MUST ACCOMMODATE THE LARGEST EQUIPMENT USED. ADDITIONAL EQUIPMENT PADS CAN BE PUT SIDE BY SIDE IF EXTRA WIDTH IS REQUIRED. BRIDGE MUST SPAN FROM TOP OF BANK TO TOP OF BANK.
4. CRUSHED STONE OR SUBSOIL MAY BE USED AS ILLUSTRATED, IF NECESSARY, WITHIN TRAVEL LANE AS RAMP.
5. CONSTRUCT AND MAINTAIN BRIDGE TO WITHSTAND THE HIGHEST EXPECTED FLOW WHILE BRIDGE IS IN USE AND PREVENT SOIL FROM ENTERING WATERBODY. DO NOT USE SOIL TO CONSTRUCT OR STABILIZE BRIDGE.

	TEMPORARY EQUIPMENT BRIDGE (EQUIPMENT PADS WITH OR WITHOUT CULVERTS)	FIGURE BR-1
		DWG. ES-0029 REV.





CROSS SECTION VIEW

NOTES:

1. NUMBER AND DIAMETER OF CULVERTS WILL DEPEND ON SITE-SPECIFIC CONDITIONS. USE CULVERTS A MINIMUM OF 12-INCH DIAMETER.
2. ALIGN CULVERTS TO PREVENT EROSION AND STREAMBED SCOUR.
3. TEMPORARY SEDIMENT BARRIER CONSISTS OF SILT FENCES AND/OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS.
4. ATTEMPT TO REMOVE ALL IMPORTED ROCK DURING REMOVAL OF THE BRIDGE.
5. DO NOT USE SOIL TO CONSTRUCT OR STABILIZE BRIDGES.

TEMPORARY EQUIPMENT BRIDGE (CRUSHED STONE WITH CULVERTS)

FIGURE BR-2

DWG. ES-0030 REV.

I.G. ES0030.DWG

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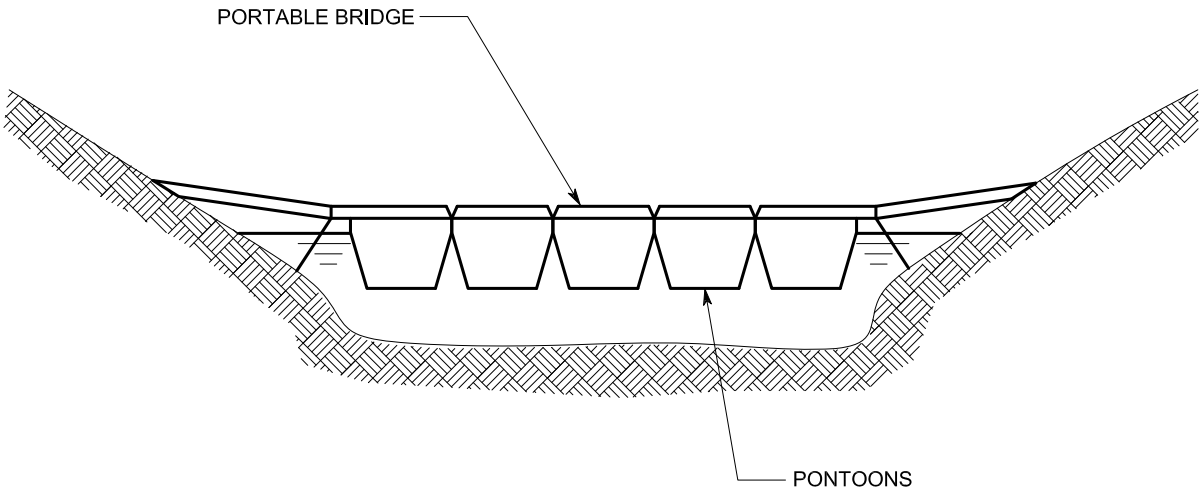
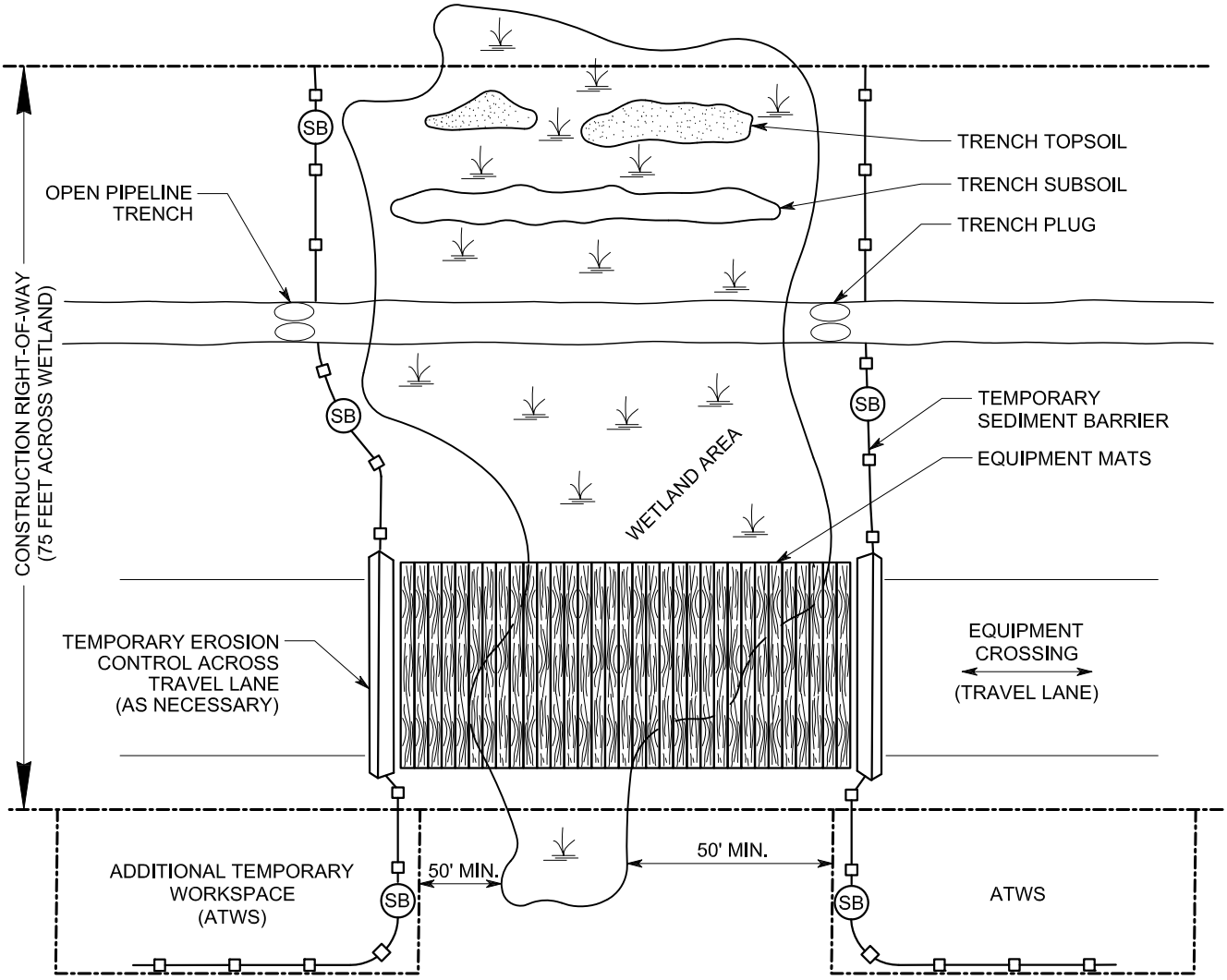


NOTES:

1. STABILIZE EDGES WITH SANDBAGS OR STONE.

2. REMOVE BRIDGE DURING CLEANUP.

	TEMPORARY EQUIPMENT BRIDGE (FLEXI-FLOAT OR PORTABLE BRIDGE)	FIGURE BR-3
		DWG. ES-0031 REV.



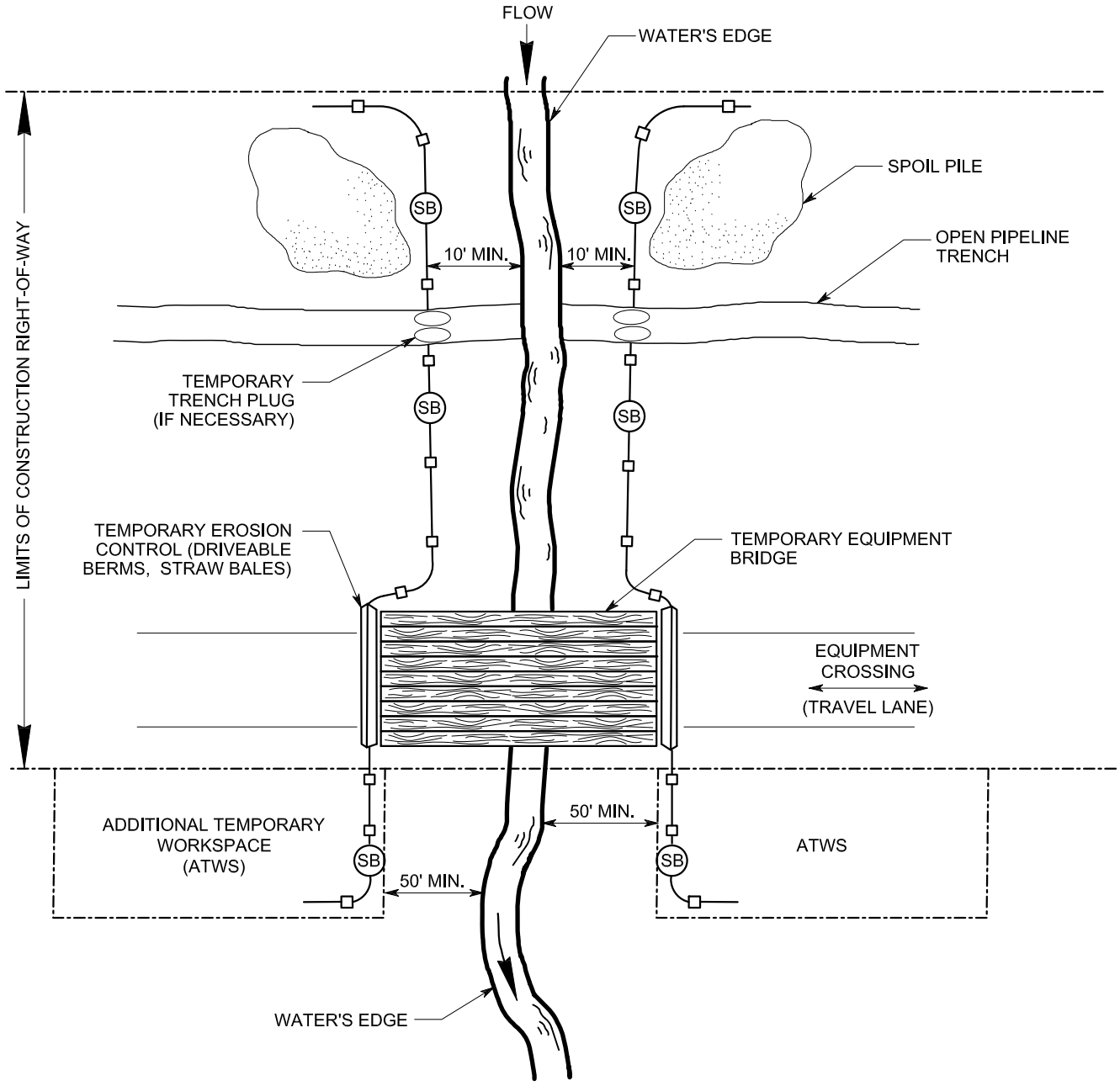
NOTES:

1. IN WETLANDS, EQUIPMENT MATS OR LOW GROUND WEIGHT EQUIPMENT SHALL BE UTILIZED IN SATURATED GROUND CONDITIONS.
2. LIMIT PULLING OF TREE STUMPS AND GRADING TO DIRECTLY OVER TRENCHLINE, EXCEPT IN SITUATIONS THAT THE CHIEF INSPECTOR AND ENVIRONMENTAL INSPECTOR DETERMINE SAFETY-RELATED CONSTRUCTION CONSTRAINTS REQUIRE GRADING OR THE REMOVAL OF STUMPS FROM UNDER THE WORKING SIDE.
3. SEGREGATE THE TOP 12 INCHES OF TOPSOIL WITHIN THE DITCHLINE IN WETLANDS, EXCEPT IN AREAS WHERE STANDING WATER IS PRESENT OR SOILS ARE SATURATED.
4. DO NOT TRENCH THE WETLAND UNTIL THE PIPELINE IS ASSEMBLED AND READY FOR LOWERING IN.
5. CONCRETE COATING OR PIPELINE WEIGHTS OF AN APPROPRIATE TYPE, WEIGHT AND SPACING WILL BE USED AS REQUIRED. NO CONCRETE COATING ACTIVITIES WITHIN 100 FEET OF A WETLAND OR WATERBODY BOUNDARY, UNLESS THE LOCATION IS AN EXISTING INDUSTRIAL SITE DESIGNATED FOR SUCH USE.
6. INSTALL SEDIMENT BARRIERS (SB) ALONG THE EDGE OF THE CONSTRUCTION RIGHT-OF-WAY AS NECESSARY TO CONTAIN SPOIL AND SEDIMENT WITHIN THE CONSTRUCTION RIGHT-OF-WAY THROUGH WETLANDS.
7. IN THE TRAVEL LANE, SEDIMENT BARRIERS MAY CONSIST OF REMOVABLE SEDIMENT BARRIERS OR DRIVABLE BERMS.
8. AT THE BASE OF SLOPES (GREATER THAN 5 PERCENT) THAT ARE LESS THAN 50 FEET FROM A WETLAND, INSTALL AND MAINTAIN TEMPORARY SEDIMENT BARRIERS ACROSS THE ENTIRE CONSTRUCTION RIGHT-OF-WAY UNTIL REVEGETATION IS SUCCESSFUL.
9. NO FERTILIZER OR LIME SHALL BE USED WITHIN WETLANDS.
10. DEWATER THE TRENCH IN A MANNER THAT DOES NOT CAUSE EROSION OR RESULT IN SILT-LADEN WATER FLOWING INTO ANY WETLAND.

TYPICAL STANDARD WETLAND CROSSING

FIGURE WC-1

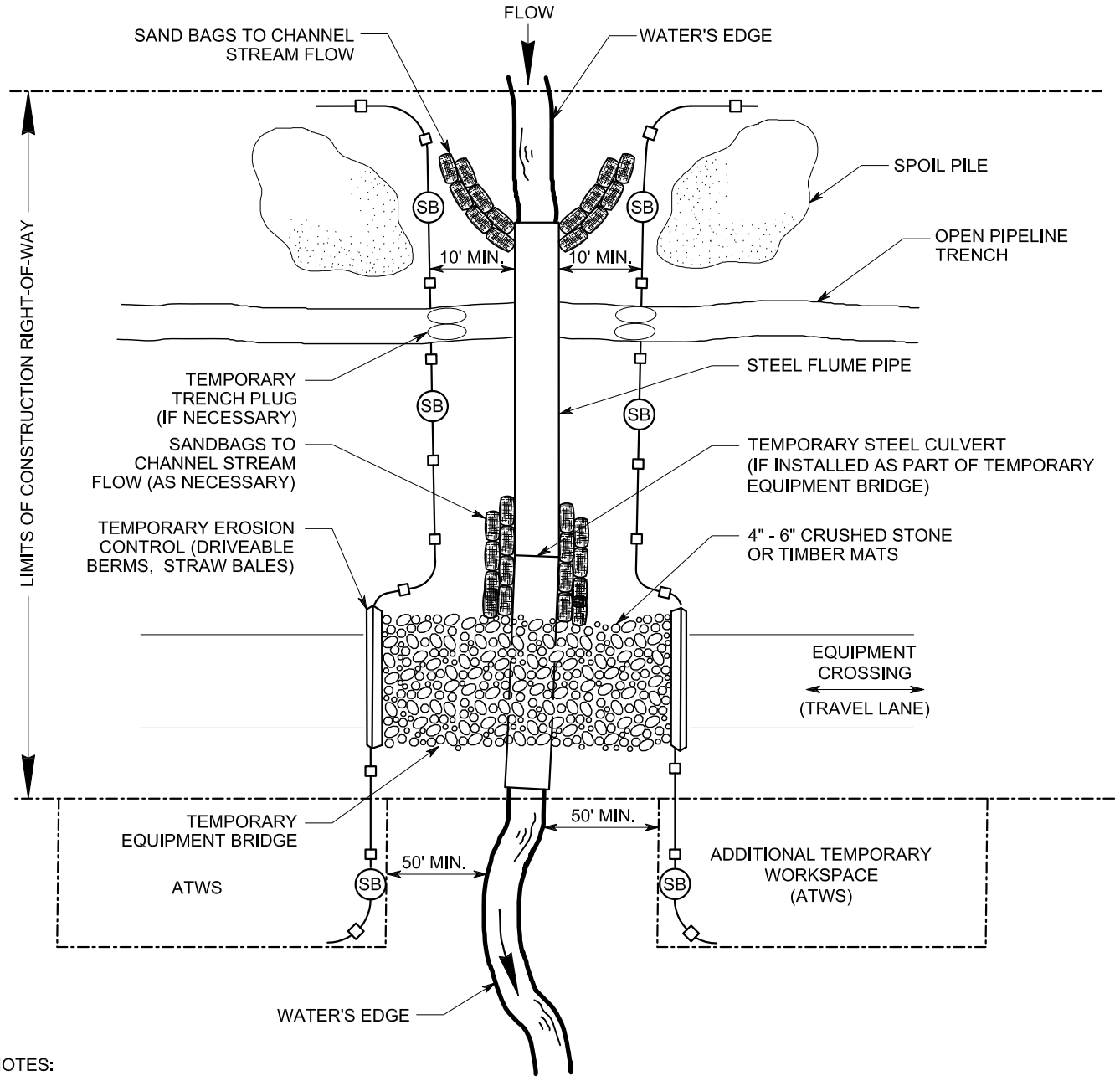
DWG. ES-0032 REV.



NOTES:

1. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/OR STRAW BALES, OR APPROPRIATE MATERIALS.
2. FOR MINOR WATERBODIES, COMPLETE TRENCHING AND BACKFILLING IN THE WATERBODY (NOT INCLUDING BLASTING OR OTHER ROCK BREAKING MEASURES) WITHIN 24 CONTINUOUS HOURS. IF A FLUME IS INSTALLED WITHIN THE WATERBODY DURING MAINLINE ACTIVITIES, IT CAN BE REMOVED JUST PRIOR TO LOWERING IN THE PIPELINE. THE 24-HOUR TIMEFRAME STARTS AS SOON AS THE FLUME IS REMOVED.
3. FOR INTERMEDIATE WATERBODIES (>10 FEET TO 100 FEET WIDE MEASURED WATER'S EDGE TO EDGE), COMPLETE TRENCHING AND BACKFILLING IN THE WATERBODY (NOT INCLUDING BLASTING OR OTHER ROCK BREAKING MEASURES) WITHIN 48 CONTINUOUS HOURS, UNLESS SITE-SPECIFIC CONDITIONS MAKE COMPLETION WITHIN 48 HOURS INFEASIBLE.

	TYPICAL WET WATERBODY CROSSING	FIGURE WC-2
		DWG. ES-0033 REV.



NOTES:

1. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/ OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS.
2. SAND BAGS MUST BE FILLED WITH SAND FREE OF SILT, ORGANICS, AND OTHER MATERIAL.
3. ENSURE SANDBAGS ARE INSTALLED BEFORE PLACING FLUME PIPE.
4. ALIGN FLUME(S) TO PREVENT BANK EROSION AND STREAM SCOUR.
5. CONDUCT ALL IN-STREAM ACTIVITY (EXCEPT BLASTING OR OTHER ROCK BREAKING MEASURES) WITH THE FLUME(S) IN PLACE. FLUME PIPE(S) MAY NOT BE REMOVED FOR LOWERING IN PIPE OR INITIAL STREAMBED RESTORATION EFFORTS.
6. THE ENDS OF THE FLUME AND CULVERT MUST EXTEND TO AN UNDISTURBED AREA.
7. CONTRACTOR TO DETERMINE ACTUAL NUMBER AND SIZE OF FLUMES AND CULVERTS REQUIRED BASED ON STREAM WIDTH AND STREAM FLOW RATE AT THE TIME OF CROSSING.
8. WATER ACCUMULATING WITHIN THE WORK AREA SHALL BE PUMPED TO A FILTER BAG OR DEWATERING STRUCTURE PRIOR TO DISCHARGING INTO ANY SURFACE WATER.

TYPICAL FLUME WATERBODY CROSSING

FIGURE WC-3

DWG. ES-0034 REV.

I.G. ES0034.DWG

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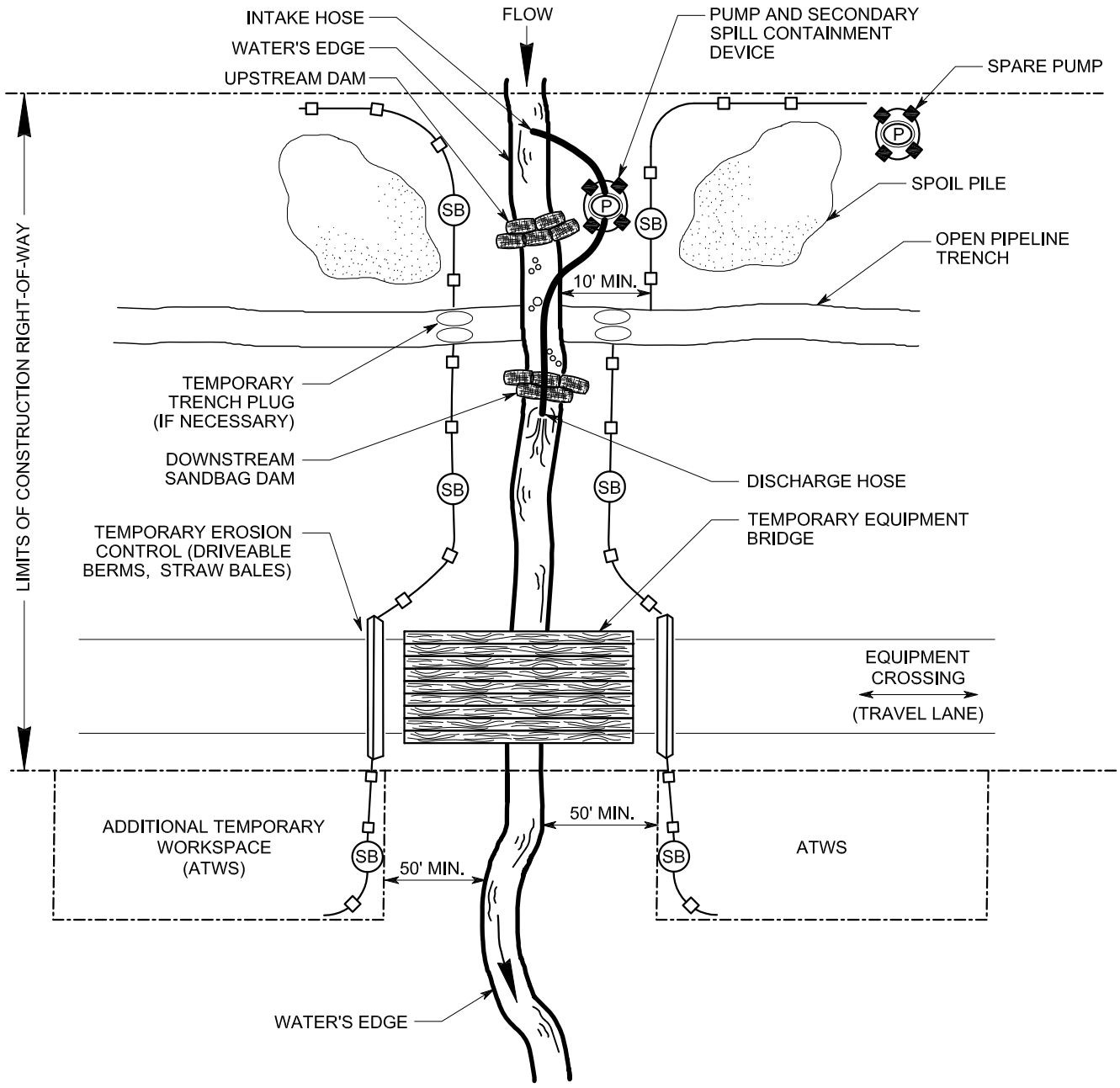


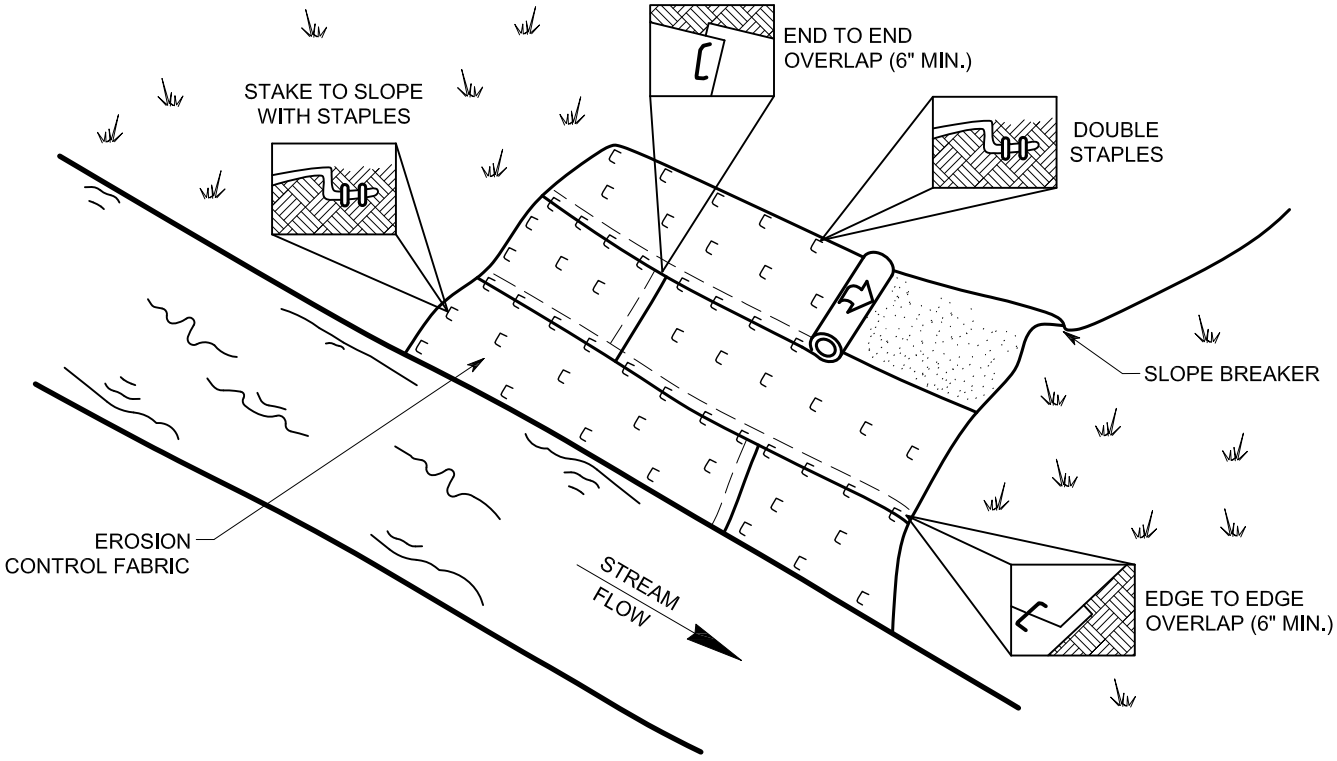
NOTES:

1. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/ OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS
2. INSTALL AND SEAL SANDBAGS UPSTREAM AND DOWNSTREAM OF THE CROSSING.
3. CREATE AN UPSTREAM SUMP USING SANDBAGS IF NATURAL SUMP IS UNAVAILABLE FOR THE INTAKE HOSE.
4. EXCAVATE ACROSS STREAM CHANNEL FOLLOWING WATER REROUTING.
5. DO NOT REFUEL OR STORE FUEL WITHIN 100 FEET OF THE WATERBODY. IF NOT FEASIBLE, ALTERNATIVE METHODS MUST BE APPROVED BY ENVIRONMENTAL INSPECTOR.
6. MONITOR PUMPS AT ALL TIMES DURING STREAM CROSSING PROCEDURE.
7. (P) USE SUFFICIENT PUMPS, INCLUDING ONSITE BACKUP PUMPS, TO MAINTAIN DOWNSTREAM FLOW.
8. SCREEN PUMP INTAKES. PREVENT SCOURING WITHIN WATERBODY BY HOSE DISCHARGE.

TYPICAL DAM-AND-PUMP WATERBODY CROSSING

FIGURE WC-4

DWG. ES-0035 REV.



NOTES:

1. EROSION CONTROL BLANKETS (FABRIC) SHALL BE PLACED ON THE BANKS OF FLOWING STREAMS WHERE VEGETATION HAS BEEN REMOVED OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

2. EROSION CONTROL BLANKETS SHALL MEET THE REQUIREMENTS SPECIFIED IN THE E&S PLAN AND/OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

3. STAPLES SHALL BE MADE OF 11 GAUGE WIRE, U-SHAPED WITH 6" LEGS AND A 1" CROWN. STAPLES SHALL BE DRIVEN INTO THE GROUND FOR THE FULL LENGTH OF THE STAPLE LEGS. ALTERNATELY 1" WOODEN PEGS 6" LONG AND BEVELED TO SECURE MATTING.

4. BLANKETS SHALL BE INSTALLED ACCORDING TO MANUFACTURER SPECIFICATIONS OR AS STATED BELOW:

   - EXTEND TOP OF BLANKET 2 FEET PAST THE UPPER EDGE OF THE HIGH WATER MARK. IF A SLOPE BREAKER IS PRESENT ON THE APPROACH SLOPE, BEGIN THE BLANKET ON THE UPHILL SIDE OF THE SLOPE BREAKER.
   - INSTALL BLANKET(S) ACROSS THE SLOPE IN THE DIRECTION OF THE WATER FLOW.
   - ANCHOR ("KEY") THE UPSTREAM EDGE OF THE BLANKET(S) INTO THE SLOPE USING A 6" DEEP TRENCH. DOUBLE STAPLE EVERY 12" BEFORE BACKFILLING AND COMPACTING TRENCH
   - OVERLAP THE EDGES OF PARALLEL BLANKETS A MINIMUM OF 6". PLACE THE UPPER BLANKET OVER THE LOWER BLANKET (SHINGLE STYLE) AND STAPLE EVERY 12" ALONG THE LENGTH OF THE EDGE.
   - WHEN BLANKET ENDS ARE ADJOINED, PLACE THE UPSTREAM BLANKET OVER THE DOWNSTREAM BLANKET (SHINGLE STYLE) WITH APPROXIMATELY 6" OF OVERLAP AND STAPLE THROUGH THE OVERLAPPED AREA EVERY 12".
   - STAPLE DOWN THE CENTER OF THE BLANKET(S), THREE STAPLES IN EVERY SQUARE YARD.

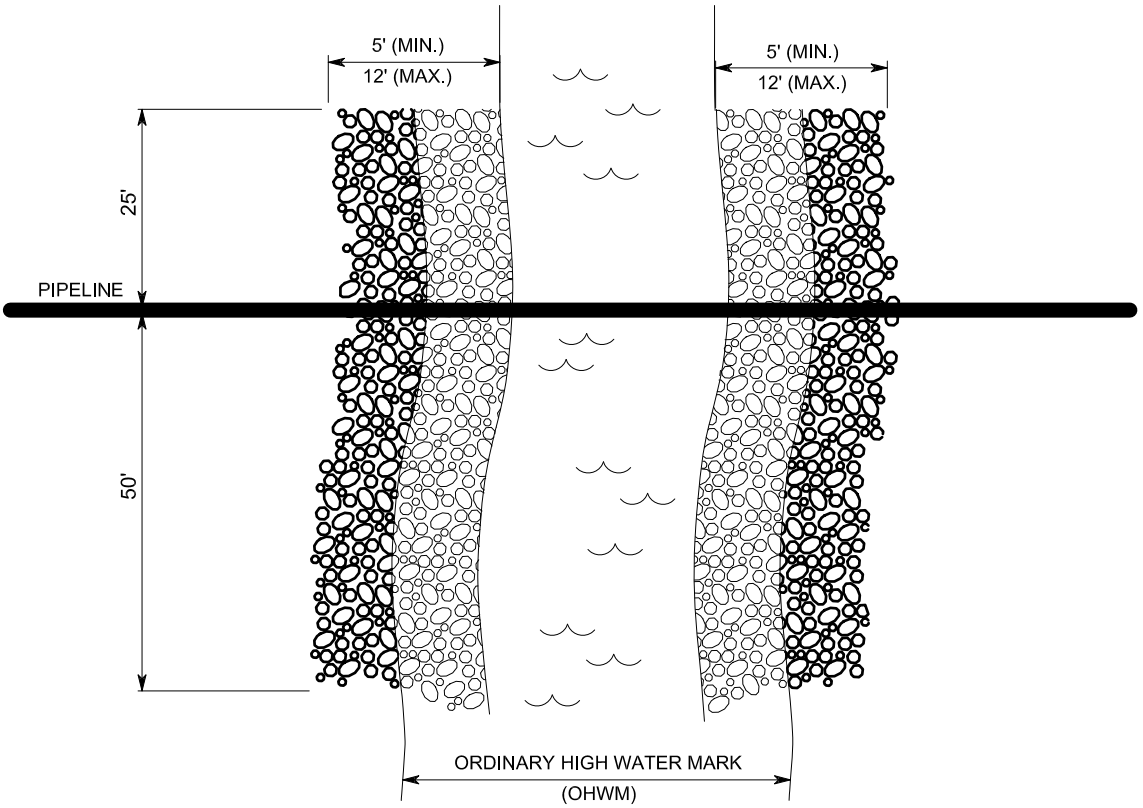
5. IN LIVESTOCK AREAS WHERE EROSION CONTROL BLANKETS ARE APPLIED TO THE STREAMBANKS, FENCING MAY BE USED IF NECESSARY TO EXCLUDE LIVESTOCK, WITH PERMISSION OF THE LANDOWNER.

6. MONITOR WASHOUTS, STAPLE INTEGRITY OR BLANKET MOVEMENT. REPLACE OR REPAIR AS NECESSARY.

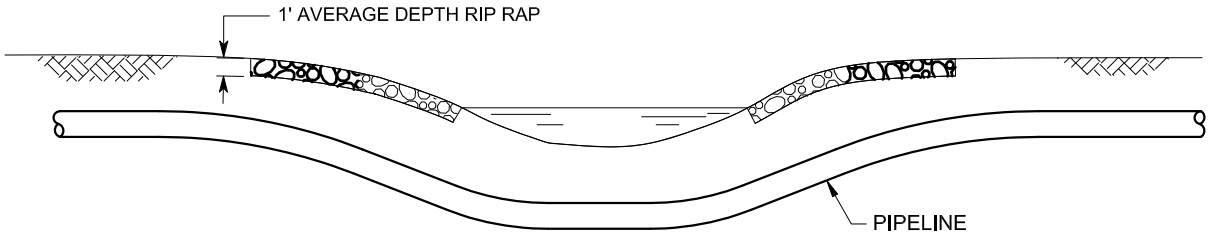
7. DO NOT USE SYNTHETIC MONOFILAMENT MESH / NETTED MATERIALS IN AREAS DESIGNATED AS SENSITIVE WILDLIFE HABITAT, UNLESS THE PRODUCT IS SPECIFICALLY DESIGNED TO MINIMIZE HARM TO WILDLIFE.

NOT TO SCALE

	TYPICAL EROSION CONTROL BLANKETS ON STREAMBANKS	FIGURE WC-5
		DWG. ES-0036 REV.



PLAN VIEW



CROSS-SECTION VIEW

NOTES:

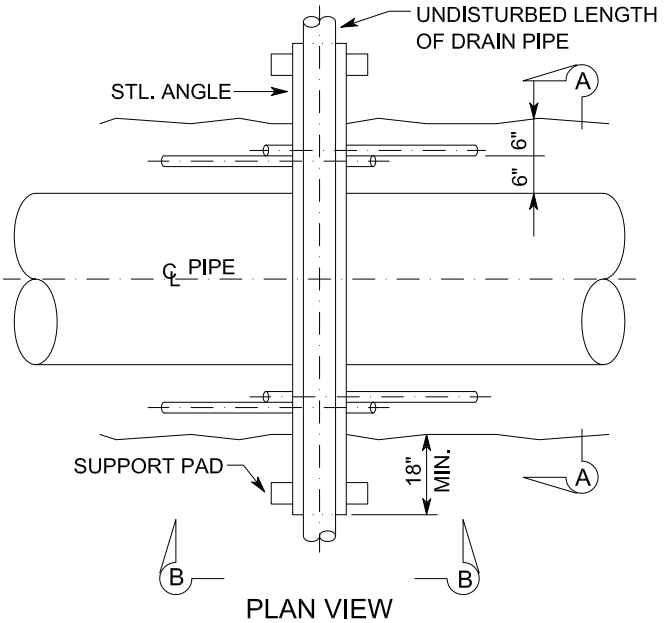
1. RIP-RAP SHALL NOT EXCEED 500 FEET IN LENGTH ALONG THE BANK.
2. RIP-RAP WILL NOT EXCEED AN AVERAGE OF ONE CUBIC YARD PER RUNNING FOOT BELOW THE OHWM.
3. RIP-RAP INSTALLATION SHALL BE IN COMPLIANCE WITH ALL APPLICABLE PERMITS.
4. RIP-RAP MUST BE CLEAN AND FREE OF SOIL AND DEBRIS.
5. RIP-RAP SHALL NOT BE PLACED IN A MANNER THAT IMPAIRS SURFACE WATER FLOW.
6. GEOTEXTILE FABRIC MAY BE INSTALLED BELOW RIP-RAP.

NOT TO SCALE

TYPICAL RIP-RAP PLACEMENT

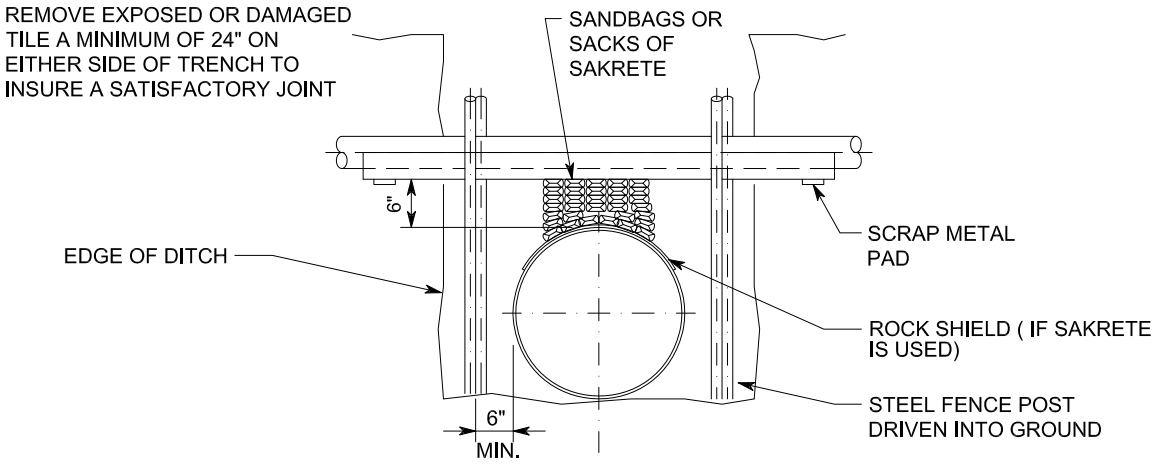
FIGURE WC-6

DWG. ES-0037 REV.



PLAN VIEW

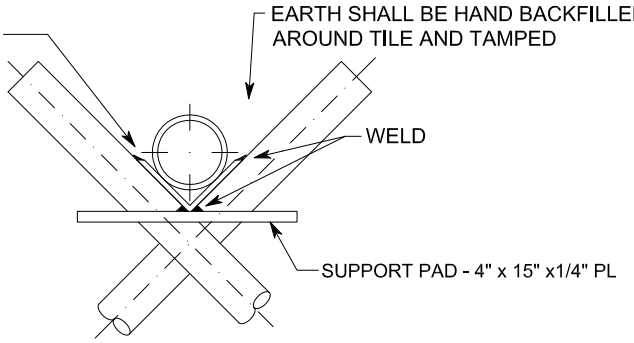
N.T.S.



SECTION "A-A"

N.T.S.

TO SUPPORT 4" & 6" TILE USE 4" x 1 / 4" ANGLE
" 8" " 6" x 7/ 16" "
" 10" " 6" x 7/ 16" "
" 12" " 8" x 1 / 2" "
" 16" " 8" x 1 / 2" "



SECTION "B-B"

N.T.S.

NOTE:
USE OF SAKRETE SHALL REQUIRE PRIOR
COMPANY APPROVAL.

DRAIN TILE REPAIR PROCEDURE

FIGURE SU-1

DWG. ES-0038 REV.

I.G. ES0038.DWG

Wayne Sicora
5/29/2014 6:08 PM

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ENBRIDGE

APPENDIX B

WATERBODY REFERENCE CITING FERC REQUIREMENTS

APPENDIX B: Waterbody Reference Citing FERC Requirements

Waterbodies may be specifically identified or recognized by the States or authorized Indian Tribe for water use, value or quality, such as fisheries. FERC's *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures) contain specific requirements with regards to state-designated fisheries which are summarized in the table below. This table is a general reference of waterbody construction techniques and restrictions required by the FERC Procedures, 2013 version. Project-specific permits obtained for a given project may be more restrictive and must be followed (Refer to project-specific Clearance Package/Permit Book).

FERC Waterbody Type[a]	Crossing Width[b]	Construction Crossing Method[c]	Seasonal Timing Restriction[d]	Waterbody Construction Duration[e]
Not Designated Fisheries				
MINOR	*≤ 10 feet*	Dry or Wet	No	24 hours
INTERMEDIATE	*> 10 feet but ≤ 100 feet*	Dry or Wet	No	48 hours
MAJOR	*> 100 feet*	Refer to site-specific plan	No	N/A
Designated Fisheries				
MINOR	*≤ 10 feet*	Dry only	Yes	N/A
INTERMEDIATE	*> 10 feet but ≤ 100 feet*	Dry or Wet	Yes	N/A
MAJOR	*> 100 feet*	Refer to site-specific plan	Yes	N/A

a) Waterbody types or classifications as defined in the FERC Procedures. Refer to Section 5.3 of E&SCP.

b) Measured from the water's edge at the time of crossing.

c) "Dry" = Dry crossing includes dam-and-pump or flume crossing methods where the stream flow is isolated from the construction area. A dry crossing is generally required for crossings up to 30 feet wide for state designated fisheries or federally designated critical habitat.
"Wet" = Wet crossing generally refers to the open-cut method that allows continuous flow of the stream across the construction area.
"Refer to site-specific plan" = A plan is required for each major crossing as well as each waterbody or wetland that would be crossed using the HDD method requires a project-specific HDD Plan (refer to Section 4.4).

d) For designated fisheries, instream work must occur during the following seasonal time windows, unless expressly permitted or further restricted by the appropriate federal or state agency in writing on a site-specific basis:
- coldwater fisheries construction must occur from June 1 through September 30.
- coolwater and warmwater fisheries construction must occur from June 1 through November 30.

NOTE: project-specific waterbody crossings may have other federal and state agency timing restrictions. Seasonal timing windows will be indicated within the project-specific waterbody crossing table and/or within the Environmental Clearance/Permit Book for the project. The FERC seasonal timing window restrictions do not apply to the installation or removal of equipment bridges.

e) The construction duration of the crossing officially begins with in-stream activities, including in-stream trenching, pipe installation, backfill, and restoration of the streambed contours. Duration does not apply to in-stream work for dry crossings, and does not apply to blasting activities.

APPENDIX C

SEED MIX RECOMMENDATIONS

SEED MIX RECOMMENDATIONS: *"NORTHERN ZONE"*

The Northern Zone is generally defined as areas north of the northern borders of Arkansas and Tennessee.

UPLAND AREAS

Lime	4.0 tons/acre
Fertilizer	1000 lbs./acre (10-20-20)
Mulch (Wheat Straw)	3.0 tons/acre

Upland Seed Mix		75 lbs./acre Pure Live Seed (PLS)
Kentucky Bluegrass		20%
Red Fescue [1]	20%	
Kentucky 31 Tall Fescue [1]		15%
Redtop		10%
Perennial ryegrass		20%
White clover	5%	
Birdsfoot Trefoil (Minimum 20% hard seed)		10%

[1] Fescue must be endophyte-free.

Pasture Mix	20 lbs./acre PLS
(For use only in disturbed pasture areas with landowner's permission.)	
Kentucky Bluegrass	31%
Medium Red clover	26%
Norcen Trefoil	17%
Poly Perennial Rye	26%

Recommended Seeding Dates

(For the establishment of temporary or permanent vegetation.)

Spring: March 15 - May 30

Fall: August 1 - October 15

WINTER STABILIZATION

If restoration does not occur prior to October 15, seed the construction ROW with 1.5 bushels per acre of winter rye or similar variety of rye as requested by the landowner. Mulch the construction ROW at 3.0 tons per acre with wheat straw, including areas adjacent to streams and wetland crossings. Seed segregated topsoil piles with winter rye and mulch at a rate of 3.0 tons per acre.

WETLAND AREAS **DO NOT USE LIME OR FERTILIZER !!!**

Do not use fertilizer, lime, or mulch within wetlands unless required in writing by the appropriate federal or state agency (as identified in the Clearance Package/Permit Book). Mulch consists of weed-free straw, wood fiber hydromulch or some functional equivalent as approved by the EI and Chief Inspector. When used, apply mulch (wheat straw) at a rate of 3.0 tons/acre.

Wetland Seed Mix	
Annual Ryegrass	40 lbs./acre PLS

SEED MIX RECOMMENDATIONS: *"SOUTHERN ZONE"*

The Southern Zone is generally defined as areas south of the northern borders of Arkansas and Tennessee.

UPLAND AREAS

Lime (agricultural limestone)	2.5 tons/acre
Fertilizer (6-12-12)	950 lbs./acre
Mulch (Oats, Wheat or Bermudagrass Straw)	3.0 tons/acre

Seed Mixture[1]

Sorghum, Sudangrass, or Sudangrass Hybrids[2]	40 lbs/acre Pure Live Seed (PLS)
Kentucky 31 Tall Fescue[3]	10 lbs/acre PLS
Big Bluestem	10 lbs/acre PLS
Indiangrass	10 lbs/acre PLS
Bermudagrass	10 lbs/acre PLS
Sericea Lespedeza[4]	10 lbs/acre PLS
White Clover[4]	5 lbs/acre PLS
Birdsfoot Trefoil[4]	10 lbs/acre PLS

[1] An alternative seed mixture may be requested by the landowner(s).

[2] These species may be sold under the following trade names: DeKalb SX17, Greentreat II, Greentreat III, Tastemaker DR, Tastemaker III, FFR202, or Sordan 79.

[3] Fescue must be endophyte-free.

[4] Legumes should be treated with a species specific inoculate prior to seeding. Legume seed and soil should be scarified.

Recommended seeding dates

(For establishment of temporary or permanent vegetation.)

Spring: March 15 - May 30

Fall: August 1 - October 15

WINTER STABILIZATION

If restoration does not occur prior to October 15, seed the construction ROW with 1.5 bushels per acre of winter rye or similar variety of rye as requested by the landowner. Mulch construction ROW at 3.0 tons per acre with wheat straw, including areas adjacent to stream and wetland crossings. Seed segregated topsoil piles with winter rye and mulch at a rate of 3.0 tons per acre.

WETLAND AREAS

DO NOT USE LIME OR FERTILIZER !!!

Do not use fertilizer, lime, or mulch within wetlands unless required in writing by the appropriate federal or state agency (as identified in the Clearance Package/Permit Book). Mulch consists of weed-free straw, wood fiber hydromulch or some functional equivalent as approved by the EI and Chief Inspector. When used, apply mulch (Oats, Wheat, or Bermudagrass straw) at a rate of 3.0 tons/acre.

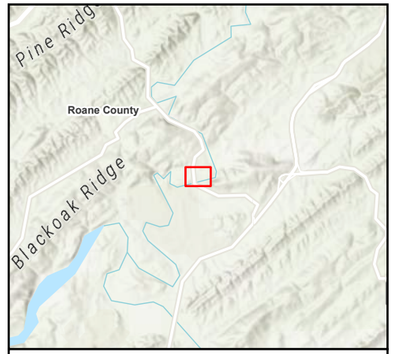
Wetland Seed Mix:

Annual Ryegrass	40 lbs/acre PLS

Attachment D: Wetland and Waterway Impact Map

Feature ID	TRAM Score	Wetland Type	Impact Type	Lat/Long	Proposed Wetland Impacts (Square ft)	Proposed Wetland Impacts (Acres)
w02	62 - Moderate Resource Value	PFO	Temporary	35.942667, -84.388921	2,548	0.058
				Total	2,548	0.058

Feature ID	Flow Regime	Impact Type	Lat/Long	Proposed Waterbody Impacts (Square Ft)	Proposed Waterbody Impacts (Acres)
s03	Ephemeral	Temporary	35.942593, -84.389643	121	0.003
			Total	121	0.003



0 75 150 Feet

1 inch = 150 feet

N
W E
S

- Existing Pipeline
- Existing ROW (50')
- Survey Area
- Easement Workspace
- Temporary Workspace
- Additional Temporary Workspace
- Existing Access Road
- Proposed Access Road
- Wetland/Waterbody Impact Area
- Delineated Waterway
- Delineated Wetland (PFO)

Figure 1: Wetland and Waterbody Impacts Map

Enbridge
WART-TOPS Replacement and Abandonment
Roane County, Tennessee

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Date: (2/9/2023)