



Environmental Protection Plan

Enbridge Energy, Limited Partnership • Line 3 Replacement Project

January 2020

ENBRIDGE®

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

ATWS	additional temporary workspace
BMP	best management practices
BWSR	Minnesota Board of Water & Soil Resources
CLL	Construction Line List
CRP	Conservation Reserve Program
DOT	Department of Transportation
ECD	erosion and sediment control device
EI	environmental inspector
EMCP	Environmental Monitor Control Plan
Enbridge	Enbridge Energy, Limited Partnership
EPP	Environmental Protection Plan
FdL	Fond du Lac Band of Lake Superior Chippewa
HDD	horizontal directional drilling
IEM	independent environmental monitors
L3R or Project	Line 3 Replacement Project
MDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
OHWL	ordinary high water level
OHWM	ordinary high water mark
PHMSA	Pipeline and Hazardous Materials Safety Administration
pig	pipeline inspection gauge
PLS	Pure Live Seed
PWI	Public Water Inventory
ROW	right-of-way
SPCC	Spill Prevention, Containment, and Control
SWPPP	Stormwater Pollution Prevention Plan
TWS	temporary workspace
WQC	Section 401 Water Quality Certification

INTRODUCTION

CONTROLLING REQUIREMENTS FOR CONSTRUCTION AND OPERATION

This Environmental Protection Plan ("EPP") prepared by Enbridge Energy, Limited Partnership ("Enbridge") includes statements, policies, procedures, and protection measures regarding the construction of the proposed Line 3 Replacement Project ("Project" or "L3R") in the states of Minnesota, North Dakota, and Wisconsin. This EPP was developed based on Enbridge's experience implementing Best Management Practices ("BMPs") during construction as well as the Federal Energy Regulatory Commission's Upland Erosion Control, Revegetation, and Maintenance Plan (May 2013 Version) and Wetland and Waterbody Construction and Mitigation Procedures (May 2013 Version). The federal government, Tribal Nations, State of Minnesota, State of North Dakota, State of Wisconsin, and local governments will issue multiple regulatory permits and Clean Water Act Section 401 water quality certifications ("WQCs") to Enbridge for construction and operation of the proposed Project. The EPP is a component of the Construction Environmental Control Plan developed to comply with the conditions of right-of-way ("ROW") preparation, construction, cleanup, and restoration and to meet or exceed federal, Tribal, state, and local environmental protection and erosion control requirements, specifications, and practices. The EPP and the regulatory permits and WQCs must be read together; they do not exist separate from one another. There may be discrepancies between the content of the EPP and the requirements of the regulatory permits and WQCs. For any discrepancy, particularly regarding construction conditions, protection measures, and required notifications, the regulatory permits and WQCs are controlling and supersede EPP content.

If there are discrepancies between contract specifications and Project-specific permit conditions and/or landowner agreements, the more stringent condition will apply. Any doubt as to which condition is more stringent will be resolved by Enbridge.

This document includes the following sections:

- Section 1.0 describes general mitigation measures, including soil erosion and sedimentation control BMPs to be implemented during construction and restoration;
- Section 2.0 describes practices for stream and river construction, crossings, and restoration;
- Section 3.0 describes practices for wetland construction, crossings, and restoration;
- Section 4.0 describes highway, road, and rail crossings;
- Section 5.0 describes construction and hydrostatic testing dewatering;
- Section 6.0 outlines water appropriation practices;
- Section 7.0 addresses revegetation measures;
- Section 8.0 addresses winter construction issues;
- Section 9.0 addresses waste management issues;

- Section 10.0 addresses construction equipment-related spill prevention, containment, and controls; and

- Section 11.0 addresses containment, response, and notification procedures for inadvertent releases of drilling fluid.

Alternative construction procedures implemented in lieu of this EPP will provide an equal or greater level of protection to the environment and will be approved in writing by Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing the activity.

Enbridge and its Contractors (collected referred to as “Enbridge” unless otherwise noted) are responsible for implementing the requirements of this EPP.

Enbridge has developed an Environmental Monitor Control Plan (“EMCP”) to ensure that appropriate systems are in place to achieve compliance with the various permits and plans that have been developed for the Project during the construction phase. The EMCP includes:

- definitions of the roles and responsibilities of the personnel involved with implementing the various environmental requirements;

- the reporting structure and electronic system that will be employed to document compliance during construction; and

- a series of training events to communicate the environmental requirements to the construction personnel.

Enbridge will provide appropriate construction oversight to confirm and document compliance with the measures of this EPP and requirements of applicable federal, Tribal, state, and local permits. Enbridge’s Environmental Inspectors (“EIs”) will assist in interpreting and implementing the requirements of the EPP and verify compliance with these procedures for Enbridge. The roles and responsibilities of the EIs are described in more detail in Section 2.4 of the EMCP.

Enbridge has also committed to applicable agencies to fund a comprehensive third-party monitoring program to be deployed during Project construction. The roles and responsibilities of the independent environmental monitors (“IEMs”), including Tribal Monitors, are described in more detail in Section 3.0 of the EMCP.

1.0 GENERAL MITIGATION MEASURES

1.1 IDENTIFICATION OF AVOIDANCE AREAS

Prior to the commencement of clearing activities, civil survey crews will flag the boundaries of the construction workspace. In addition, Enbridge will post signs for the following environmental features so they can be easily identified by Project personnel and managed as described in applicable permit applications:

- wetland boundaries and waterbody crossing locations;
- drainages/drain tiles as identified by counties and landowners;
- hiking and hunter walking trails, snowmobile and all-terrain vehicle trails, winter access roads, canoe routes and water access sites, or other recreational areas as required by permit conditions;
- buffer zones for environmentally sensitive features, including archaeological and historic sites, bald eagle nests, rare plant or ecological communities, and other sensitive wildlife species and/or habitat per agency consultations (note that the signs will not disclose the specific location and/or species or feature type where federal, Tribal, or state laws require data protection);
- areas where typical construction sequence may be delayed due to permit restriction, such as timing restrictions or clearing restrictions (e.g., hydrotest water infiltration areas); and
- invasive and noxious species locations, including infested waters.

Enbridge's Rare and Sensitive Environmental Resources Plan will include additional mitigation and conservation measures to be implemented near sensitive biological resources. Federally or state-listed species observations within the construction workspace will be reported to the appropriate agency(ies).

1.2 ALIGNMENT SHEETS, CONSTRUCTION LINE LIST, AND PERMITS

Enbridge will prepare detailed alignment sheets of the L3R construction ROW that will include specifications for ROW preparation, construction, cleanup, and restoration. The alignment sheets will depict the plan and profile of the construction ROW, tract (property) boundaries, and environmental features such as wetlands, waterbodies, and buffer zones for sensitive features as listed in Section 1.1. Notations will be included in the alignment sheets to direct the personnel to the appropriate environmental plans/or permit conditions that stipulate the activities, restrictions, and/or BMPs to be employed at each environmental feature.

In addition, Enbridge will prepare detailed Environmental Plan Sheets that accompany the Stormwater Pollution Prevention Plan ("SWPPP") required under the Minnesota Pollution Control Agency ("MPCA") National Pollutant Discharge Elimination System/State Disposal System Construction Stormwater General Permit (MNR100001). The Environmental Plan Sheets will identify the temporary and permanent erosion and sediment control and stabilization

measures for the Project. Refer to the Soil Erosion and Sediment Control Plan (which incorporates SWPPP by reference) for additional information.

Enbridge will also maintain a Construction Line List ("CLL") for each tract (property) that describes special requirements (e.g., clearing, timber salvage, topsoil segregation, restoration measures, herbicide use, fencing requirements) as agreed upon with landowners, provided the special requirements conform to Project permits.

The CLL identifies requirements and comments provided by landowners; however, it is not a comprehensive list of construction requirements. The CLL will be considered in conjunction with other Project documents and permits.

1.3 WET WEATHER SHUTDOWN

During construction, certain activities may be suspended in wet soil conditions, based on consideration of the following factors:

- extent of surface ponding;
- potential for rutting and mixing of soil horizons;
- extent and location of potential rutting and compaction (i.e., can traffic be rerouted around wet area); and
- type of equipment and nature of the construction operations proposed for that day.

Enbridge will cease work in the applicable area until Enbridge determines that site conditions are such that work may continue. Enbridge Construction Management, in collaboration with Enbridge Environment, will ultimately decide if wet weather shutdown is necessary in a given location in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. Refer to Section 1.18 for a discussion of the measures to alleviate soil compaction.

Enbridge will monitor upcoming weather forecasts to determine if significant rainfall is anticipated during construction. Enbridge will be responsible for appropriately planning work, considering the potential for wet conditions, and being prepared to implement mitigation measures in the event of wet weather conditions and/or excessive waterflow. Enbridge will be responsible for implementing any and all such corrective measures deemed necessary should conditions subsequently worsen where the above described criteria cannot be met.

1.4 RIGHT-OF-WAY ACCESS

Enbridge will utilize the following three main types of travel corridors to obtain access to the construction workspace:

- Haul Routes: Existing public roads will typically be used as haul routes, which are used to deliver equipment and materials to the workspace during construction.

- Access Roads: Access roads to the construction workspace may be private or public roads along existing roads or trails, or they may be new greenfield roads on private or public land that are constructed for the purpose of the Project.

- Shoo-flies: In some cases, Enbridge proposes to construct a "shoo-fly," which is a short detour off the main access road or construction workspace used to avoid impacts to sensitive features, such as wetlands.

Enbridge will maintain existing roads, improve existing trails or roads, or build new roads as needed and as approved through applicable permits and leases, and as described in the Summary of Construction Methods and Procedures (Appendix A). Gravel will only be added to maintain existing roads that have an existing gravel road base, or to develop permanent access roads, if needed. If gravel is installed on a road that is not permanently maintained for the Project, it will be removed and the area will be restored to pre-construction conditions following construction.

Enbridge is responsible for posting signs or other methods to identify approved haul routes and access roads in the field and to ensure that access is confined to only the approved roads. Vehicle tracking of soil from construction sites will be minimized by implementation of BMPs such as installing rock access pads or construction mats, reducing equipment/vehicle access to the construction workspace where practicable (off-ROW parking), or equivalent. Installation of rock or construction mat access pads will be in accordance with applicable permits and federal, Tribal, and/or state specifications. Construction mat tracking pads or rock on top of geotextile fabric will be utilized in wetlands and will be removed after construction. Typical drawings for rock and construction mat approaches are provided in Figures 1 and 2. If such BMPs are not adequately preventing sediment from being tracked onto paved public roads, self-contained street sweeping, or other equivalent means of collecting sediment, will be used. If soil is tracked onto a paved roadway, Enbridge will remove accumulated material from the road and return it to the construction workspace within an upland area as soon as possible, but in no circumstances more than 24 hours after discovery. In addition, soil on paved roadways cannot be broomed, washed, and/or graded into the road ditch or onto the shoulder.

After construction, Enbridge will return improved roads to their pre-construction condition unless the road authority, landowner, or land-managing agency requests that the improvements be left in place. No temporary infrastructure in wetlands or waterbodies (e.g., bridges, construction mats) will be permanently left in place without the appropriate regulatory permits, authorizations, and certifications. Enbridge will maintain permanent access roads to aboveground facilities (e.g., pump stations, mainline valves) throughout Project operation.

1.4.1 Bridges and Culverts

Generally, the bridges and culverts associated with existing roads will be sufficient to allow the passage of construction equipment and vehicles. However, in some cases, improvements to existing infrastructure may be required, or new bridges or culverts may be installed as described in Section 2.4.2 of the Summary of Construction Methods and Procedures (Appendix A). Figures 3 and 4 provide typical drawings of the bridge types that may be implemented on the Project; Figure 1 illustrates a rock flume/culvert that may be used at road approaches. Ice bridges are described in Enbridge's Winter Construction Plan. Enbridge will obtain the appropriate permits for new and improved infrastructure, as required, and will comply with the conditions associated with those permits, including in-stream timing restrictions for any work

proposed within the ordinary high water mark ("OHWM") (refer to Section 2.1). Refer to Section 2.4.2 for additional discussion on bridge and culvert design and maintenance.

1.5 RIGHT-OF-WAY REQUIREMENTS

All construction equipment and vehicles will be confined to the approved construction workspace and additional temporary workspace ("ATWS"), except where landowners or land managing agencies have given permission for construction dewatering activities outside of the construction workspace (see Section 5.0).

The width of the construction workspace for the Project will vary and is co-located with Enbridge's existing corridor, third-party (foreign) utilities, roads, railroads, or highways along the majority of the route. The construction workspace is inclusive of the permanent ROW, permitted temporary workspace ("TWS"), and site-specific extra workspaces (referred to as ATWS) as defined below and shown in Figure 5. The construction workspace width will be reduced (i.e., necked down) in selected locations (e.g., wetlands, waterbodies, in/near sensitive features), as indicated on the Project construction alignment sheets and in the field by the use of staking. The typical TWS and permanent ROW dimensions are described in Section 2.3 of the Summary of Construction Methods and Procedures (Appendix A).

(a) ROW (Permanent)

The new permanent ROW will be located entirely within the construction workspace and is co-located with Enbridge's existing corridor along portions of the route. The permanent ROW is the legally acquired land that is used to install, maintain, operate, and access the pipeline system. The permanent ROW is maintained to facilitate access and aerial inspection of the pipeline system in accordance with U.S. Department of Transportation ("DOT") regulations.

(b) TWS

Construction will require TWS to install the pipeline, which will be located adjacent to and contiguous with the permanent ROW.

(c) ATWS

Site-specific ATWS locations (construction work areas beyond the permanent ROW and TWS previously described) will be required at select locations such as steep slopes; road, waterbody, railroad, and some wetland crossings; and, where it is necessary to cross under existing pipelines or foreign utilities. ATWS will typically be located in uplands adjacent to the construction workspace and set back at least 50 feet from sensitive resource boundaries where site-specific field conditions allow. However, to complete work safely, Enbridge may need to locate ATWS within a wetland or within the 50-foot setback from a wetland or waterbody based on site-specific conditions. ATWS adjacent to waterbodies and/or wetlands is addressed further in Sections 2.0 and 3.0, respectively.

1.6 MANAGEMENT OF UNDESIRABLE SPECIES

It is Enbridge's intent to minimize the potential for introduction and/or spread of undesirable species (i.e., invasive or noxious species) along the construction workspace due to pipeline construction activities. However, it is not practicable for Enbridge to eradicate undesirable species that are adjacent to the construction workspace as Enbridge is restricted by its permits and authorizations to the limits of the construction workspace, as described in Section 1.5. Enbridge will minimize the potential for the establishment of undesirable species by minimizing the time duration between final grading and permanent seeding (refer to Section 3.9.1). The measures that Enbridge will implement to avoid the introduction and control the spread of terrestrial and aquatic invasive and noxious species are described in more detail in Enbridge's Invasive and Noxious Species Management Plan provided in Appendix B.

1.7 POTHOLING/HYDROVAC SLURRY

Appropriate safety measures will be implemented before excavation begins, including notification through the One-Call system to ensure third-party utilities and adjacent pipelines are properly marked. Four-way sweeps[1] will also be conducted to positively locate any existing underground utilities.

Potholing is the act of using pressurized water to excavate the soil over pipelines and utilities identified through the One-Call and four-way sweep process. Hydrovac slurry is made up of clean water and subsoil excavated from the area over the utility to positively identify the utility lines and prevent line strike during construction. Enbridge will construct an unlined but bermed containment area or identify comparable containment (e.g., open-top tank) to hold the hydrovac slurry in an Enbridge- and landowner-approved upland area within the construction workspace or dispose of the material at an approved off-site location. The containment area/structure will be sized appropriately to contain the amount of hydrovac slurry material to be generated at that site. Once the slurry is drained and dry, it may be incorporated with the subsoil in an Enbridge- and landowner-approved upland area within the construction workspace in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. Discharging hydrovac slurry onto topsoil is not permitted as the material will degrade the quality of the topsoil and potentially affect revegetation. Once construction activities are complete, the potholes will be backfilled, graded, and restored as described in Sections 1.15, 1.16, and 7.0.

1.8 UPLAND CLEARING

The initial stage of construction involves the clearing of brush, trees, and tall herbaceous vegetation from the construction workspace. Clearing may be accomplished with chain saws, mowers, and hydraulic tree-cutting equipment. Clearing over HDD paths will be limited to the 30-foot-wide construction workspace.

[1] A four-way sweep is a method of locating underground utilities that involves scanning the ground with electromagnetic induction or ground-penetrating radar equipment to detect the presence of buried features; it does not involve digging or other ground-disturbing activities. The term "four-way sweep" comes from the fact that an area typically is scanned (or swept) in at least four directions.

1.8.1 Disposal of Non-Merchantable Timber

Unless otherwise directed by Enbridge, non-merchantable timber and slash will be disposed of by mowing, chipping, grinding, and/or hauling off-site to an approved location or used in stabilizing erodible slopes or construction entrances. In non-agricultural, non-wetland areas, chips, mulch, or mechanically cut woody debris (excluding slash or brush less than 1.5-inch diameter and/or 12 inches in length) may be uniformly broadcast across the construction workspace (less than 1-inch thickness) where the material will ultimately be incorporated into the topsoil layer during grading activities, with landowner approval (coordinated through Enbridge Lands agents). Chips, mulch, or mechanically cut woody debris shall not be stockpiled in a wetland (except in peatlands as described in Section 7.7.3). Non-merchantable timber shall not be disposed of by placing it off the construction workspace.

Burning of non-merchantable wood may be allowed only where the applicable permits and approvals (e.g., agency, Tribal, and landowner) have been acquired and in accordance with all Tribal, state, and local regulations. Burning is not allowed in wetlands. Burning within 100 feet of a wetland or waterbody is prohibited without site-specific approval in advance from an EI and in accordance with applicable permits and/or approvals.

1.8.2 Disposal of Merchantable Timber

All merchantable timber will be managed in accordance with Enbridge contract specifications and applicable permits and licenses.

1.8.3 Upland Grading and Stump Removal

Stumps in the ditch line will be completely removed, ground, and/or hauled off-site to an approved location. Tree stumps outside the ditch line will be ground below normal ground surface to facilitate a safe work area and to allow topsoil removal, if necessary. In some circumstances, tree stumps outside the ditch line may be completely removed to allow for a safe work area and hauled off-site to an approved location. No grading or stump removal will occur along HDD paths.

1.9 TEMPORARY EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES

Temporary Best Management Practices (“BMPs”) to minimize erosion and control sediment, also referred to erosion control devices (“ECDs”), include but are not limited to sediment barriers (silt fence, certified weed-free straw or hay bales, bio-logs, etc.), filter socks (refer to Figures 6 through 9), mulch (Section 1.9.2), slope breakers (Section 1.9.4), and revegetation subsequent to seeding of exposed soils (Section 7.0).

Enbridge will maintain erosion and sediment control BMPs as required in the Project construction documents and as required by all applicable permits, including SWPPPs. Enbridge requires inspections of temporary ECDs at least once every 7 calendar days and within 24 hours after a rainfall event of 0.5 inch or greater. A “rainfall event” is the total amount of rainfall recorded in any continuous 24-hour period. Non-functional ECDs will be repaired, replaced, or supplemented with functional materials within 24 hours after discovery, or as otherwise specified in project permits. ECDs will be installed after initial clearing but before grading activities, and as site and seasonal conditions warrant the installation of additional erosion and

sediment control BMPs during construction activities. Installation of permanent erosion and sediment control BMPs is discussed in Section 1.17.

Temporary ECDs will be installed prior to ground disturbing activities at the base of sloped approaches to streams, wetlands, water conveyances (e.g., ditches, swales) and roads. Temporary ECDs will also be installed at the edge of the construction workspace as needed, and/or in other areas determined by the EI to slow water leaving the site and prevent siltation of waterbodies and wetlands down slope or outside of the construction workspace (e.g., swales and side slopes). Temporary ECDs will be placed across the entire construction workspace at the base of slopes greater than 5 percent and at site-specific locations identified in the SWPPP until the area is revegetated and there is no potential scouring of, or sediment transport to surface waters. Adequate room will be available between the base of the slope and the sediment barrier to accommodate ponding of water and sediment deposition.

If silt fence is used, when the depth of sediment reaches about one-third of the height, the sediment will be removed. Non-functional ECDs will be repaired, replaced, or supplemented with functional structures within 24 hours after discovery, or as otherwise specified in Project permits.

Temporary ECDs installed across the travel lane may be removed during active daytime construction; however, ECDs will be properly reinstalled after equipment passage, or activities in the area are completed for the day. These ECDs will also be repaired and/or replaced prior to inclement weather when forecasted. Enbridge is responsible for monitoring weather conditions and adjusting resources as needed to address pending and/or existing weather conditions.

Additional erosion and sediment control BMPs may be installed as exclusionary fencing to protect other sensitive features, such as state-listed flora species or archaeological, cultural, or historic sites. These measures will be described in the applicable permit conditions and resource protection plans, such as the Rare and Sensitive Environmental Resource Plan.

1.9.1 Temporary Stabilization

Stabilization[2] of all exposed areas, including spoil piles, must be initiated immediately to limit soil erosion when construction activity has permanently or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Stabilization must be completed no later than 14 calendar days after the construction activity has ceased.

In areas within 1 mile of, and draining to, a special or impaired water (refer to Section 2.2.2), stabilization measures will be initiated within 24 hours and completed within 7 calendar days whenever construction activity has permanently or temporarily ceased on any portion of the site. Areas of the Project where this timing restriction applies will be clearly defined on the Environmental Plan Sheets accompanying the SWPPP.

[2] Stabilization means that the exposed ground surface has been covered by appropriate materials such as mulch, staked sod, riprap, erosion control blanket, mats or other material that prevents erosion from occurring. Grass seeding, agricultural crop seeding or other seeding alone is not stabilization. Mulch materials must achieve approximately 90 percent ground coverage (Minnesota Rules 7090).

On portions of the Project where work will be occurring during applicable "work in water restrictions" for Public Waters (refer to Section 2.1), all exposed soil areas within 200 feet of the water's edge, and that drain to that water, will be stabilized within 24 hours. These areas will be identified on the Environmental Plan Sheets accompanying the SWPPP.

Enbridge may require that temporary stabilization materials be installed sooner based on site conditions, or as required in Project permits.

1.9.2 Mulch

Mulch (certified weed-free hay or straw, wood fiber hydromulch, or a functional equivalent) will be applied to disturbed areas (except for actively cultivated land and most wetlands) if requested by the landowner or land managing agency, if specified by the applicable permits or licenses, or as required by Enbridge. Mulch will specifically be required on:

- slopes greater than 5 percent; and
- dry, sandy areas that can blow or wash away (field decision).

Only certified weed-free mulch will be utilized on this Project. Sources will be approved by Enbridge prior to purchase.

Mulch will be applied to cover at least 90 percent of the ground surface unless otherwise stipulated by permit conditions. Mulch will be uniformly distributed by a mechanical mulch blower, or by hand in areas not accessible to the mulch blower. Strands of mulch shall be sized to allow proper anchoring. Mulch will be anchored/crimped using a mulch-anchoring tool or disc set in the straight position to minimize loss by wind and water, as site conditions allow and as approved by Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. In areas not accessible to a mulch-anchoring tool or too steep for safe operation, the mulch may be anchored by liquid tackifiers with advance written approval from Enbridge. The manufacturer's recommended method and rate of application will be followed.

Hydro-mulch and liquid tackifier can be used in place of certified weed-free straw or hay mulch with prior approval from Enbridge. All hydromulch and liquid tackifier products used will be on the applicable state DOT product list. Hydro-mulch and liquid tackifier products containing plastic/polypropylene fiber additives and Malachite Green (colorant) will not be utilized on this Project. Application rates will be at the manufacturer's recommended rate.

1.9.3 Cat Tracking

Cat tracking, also known as horizontal slope grading, may be implemented based on site conditions (sandy or silt soils) to reduce erosion potential. Cat tracking is achieved by driving a bulldozer vertically up and down the slope which results in the tracks being oriented horizontally; creating small speed bumps for water (refer to Figure 10).

1.9.4 Temporary Slope Breakers

Temporary slope breakers will be installed to minimize concentrated or sheet flow runoff in disturbed areas in accordance with the following maximum allowable spacing unless otherwise specified in permit conditions.

Slope (%)	Approximate Spacing (ft)
3-5	250
5-15	200
15-25	150
>25	<100

If the length of the slope is less than the distance of the required spacing, slope breakers are not required unless a sensitive resource area (e.g., wetland or public roadway) is located immediately down slope, or as determined to be needed by the EI. Temporary slope breakers may be constructed using earthen subsoil material, silt fence, certified weed-free straw or hay bales, or in non-agricultural land, rocked trenches may be used. On highly erodible slopes, slope breakers in the form of earthen berms will be used whenever possible.

Temporary slope breakers will be constructed according to the following specifications (refer to Figure 11):

- certified weed-free straw or hay bales used as slope breakers will be trenched in and staked so as to not allow spacing between bales or allow flow underneath the bales;

- the outfall of temporary slope breakers will be directed off the construction workspace into a stable well-vegetated upland area or into an appropriate energy-dissipating sediment control device (e.g., filter sock, silt fence, straw bales, rock aprons, sumps) to prevent the discharge of sediments (refer to Figure 11);

- proper slope breaker outfalls will be established where topsoil segregation and/or grading has created a barrier at the edge of the construction workspace; and

- gaps will be created through spoil piles where necessary to allow proper out-letting of temporary berms.

1.10 TOPSOIL SEGREGATION AND STORAGE

Areas where topsoil will be stripped includes cropland, hay fields, pasture, residential areas, and other areas as requested by the landowner or as specified in the Project plans, commitments, and/or permits.

1.10.1 Topsoil Segregation Methods

The following topsoil segregation methods may be employed during construction:

- Full Construction Workspace (refer to Figures 12 and 13)
- Trench-Line-Only (refer to Figures 14 and 15)
- Modified Ditch-Plus-Spoil Side (refer to Figures 16 and 17)

The Full Construction Workspace topsoil segregation technique will typically be used in agricultural areas, including active cropland, pasture, and hayfields, and will consist of stripping topsoil from the spoil storage area, ditch line, and the primary travel lane.

The Trench-Line-Only topsoil segregation method will be used in wetlands, forested vegetation communities, and where requested by the landowner or land-managing agencies. Topsoil is not

typically segregated in standing water wetlands unless specifically requested by the landowner or managing land agency in accordance with applicable permit conditions.

Alternative topsoil segregation methods may be used on a site-specific basis or as requested by the landowner or land-managing agency.

1.10.2 Topsoil Storage

Gaps will be left and erosion and sediment control BMPs installed where stockpiled topsoil and spoil piles intersect with water conveyances (i.e., ditches, swales, and waterways) to maintain natural drainage. A minimum 1 foot of separation will be maintained between the topsoil and subsoil/spoil piles to prevent mixing. Where the 1-foot separation cannot be maintained, the EI may approve the use of a physical barrier on a site-specific basis, such as a thick layer of mulch or silt fence, between the spoil and topsoil piles to prevent mixing.

1.10.3 Depth of Upland Topsoil Stripping

In deep soils (more than 12 inches of topsoil), topsoil will be stripped to a minimum depth of 12 inches, unless otherwise specified/requested by other plans, permit conditions, or the landowner. If less than 12 inches of topsoil are present, Enbridge will attempt to segregate to the depth that is present. In the Red River Valley, Enbridge will strip topsoil in accordance with the Agricultural Protection Plan.

1.11 UPLAND TRENCHING

Trenching in uplands is typically accomplished with a backhoe excavator or a rotary wheel ditching machine. The trench will be excavated to a depth that complies with the minimum depth of cover requirements described in the Summary of Construction Methods and Procedures (Appendix A) (Figure 18). Enbridge may implement additional depth of cover in upland areas adjacent to waterbodies where requested by the Minnesota Department of Natural Resources (“MDNR”); the extent of these areas will be depicted on the Alignment Sheets. Following installation of the pipeline, Enbridge will confirm that the pipe depth meets federal and state requirements through civil survey.

Excavated material will be side cast (stockpiled) within the approved construction workspace separate from topsoil and stored such that the area subject to erosion is minimized. Enbridge will coordinate with landowners to minimize disruption of access caused by the trench during construction. Where deemed appropriate, Enbridge will leave plugs of subsoil in the ditch or will construct temporary access bridges across the trench for the landowner to move livestock or equipment; temporary bridges may also be utilized by wildlife. Where trenches are left open overnight, trenches will also be sloped (less than 45 degrees) where started and ended to allow wildlife egress. Spacing of plugs and ramps will be determined in the field. Enbridge will inspect the trench and construction area for presence of animals every day before initiating construction activities and prior to backfilling the trench. If an animal is located, it will be relocated outside of the active construction workspace. If the animal is a federally or state-listed species, the appropriate agency(ies) will be notified.

In areas with shallow bedrock, blasting may be required to excavate the trench. Enbridge will follow the procedures outlined in its Blasting Plan wherever blasting may be required.

1.11.1 Timing

The length of time a trench is left open will be minimized to ensure that installation of the pipe and restoration of the construction workspace occurs in a timely fashion. Generally, Enbridge will minimize the length of trench and amount of time that the trench is left open in wetter conditions to minimize water-management issues (e.g., construction dewatering) associated with high groundwater tables or precipitation events. Therefore, unless otherwise specified by regulatory permits or WQCs issued for this Project's construction, Enbridge will limit the amount of excavated open trench to a maximum of 3 days or 3 miles of anticipated welding production per spread. This timeframe or length may be decreased at the discretion of Enbridge based on field conditions including topography, soils, weather conditions, hydrology, presence of sensitive resources, and the construction technique being utilized.

1.12 TRENCH PILLOW INSTALLATION

Pillows are placed under and around the pipe where needed to take stress off the pipe as a result of incidental variabilities in trench depth, or to protect the pipe coating in rocky conditions. For this same reason, the trench pillows are left in the trench. Enbridge will install pillows composed of closed cell polyurethane foam within the external boundaries of the Fond du Lac Band of Lake Superior Chippewa ("FdL") Reservation in Minnesota. Outside of the FdL Reservation, Enbridge will utilize sand bags. Foam pillows are rectangular blocks measuring approximately 3 feet by 2 feet. The foam components are mixed either at an off-site location or on-site on a protective sheet of plastic in an upland area to create the foam pillows. Cured foam pillows are then transported to the construction site for installation within the trench or the foam is applied directly into the trench line. Sand bags will be filled with clean rock-free subsoil or sand; topsoil will not be used to construct trench pillows.

1.13 TRENCH BREAKERS

Trench breakers are installed in sloped areas after the pipe has been lowered into the trench to protect against subsurface water flow along the pipe after the trench is backfilled. Enbridge will install trench breakers composed of closed cell polyurethane foam within the external boundaries of the FdL Reservation in Minnesota. Outside of the FdL Reservation, Enbridge will utilize sand bags. Sand bag trench breakers will be constructed with bags filled with clean rock-free subsoil or sand. Topsoil will not be used to construct sand bag trench breakers. The foam trench breakers will only be used under dry conditions where no groundwater is present, or where the trench has been effectively dewatered. Enbridge will not backfill the trench until foam is completely cured (i.e., finished foam).

Trench breakers will be placed from the bottom of the trench to near the top of the trench, completely surrounding the pipe and will be properly keyed into the undisturbed trench walls (refer to Figure 19). The location of trench breakers will be selected based on field conditions at the time of construction and will consider the degree and length of slope, presence of down-slope sensitive resource areas such as wetland and waterbodies, and proximity to other features such as roads and/or railroads. The following conditions apply to the placement and installation of trench breakers unless otherwise directed by Enbridge:

- Trench breakers will be installed on slopes greater than 5 percent adjacent to streams, wetlands, or other waterbodies.

- Where the pipeline exits a wetland towards areas of lower relief, trench breakers will be installed (within the upland) where there is a potential for underground drainage along the pipe in order to prevent wetland or waterbody drainage.

- At all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep accumulated trench water out of the waterbody.

The general location of trench breakers will be identified on construction alignment sheets with a note to "Field Verify," the precise location through coordination between Enbridge's EIs, Enbridge's Craft Inspectors, and the Contractor's Foreman. The trench breaker may be moved short distances in either direction from the location identified on the construction alignment sheets to more stable soils, or to avoid other site-specific conditions. Additional trench breakers may also be added depending on site-specific conditions. Enbridge will require Contractors to have additional materials on hand to install additional trench breakers as needed. The pipe will then be marked with paint near the location that the trench breaker is needed to alert the trench operators to key the banks for breaker placement.

1.14 DRAIN TILE INLET PROTECTION AND TILE REPAIRS

Enbridge will attempt to locate existing drain tile inlets that are located near the construction work area prior to construction. Drain tile inlets will be marked using flags. Enbridge will protect located drain tile inlets with the potential to receive stormwater from construction of the Project using the appropriate erosion and sediment control BMPs until sources with the potential to discharge have been stabilized. The determination of the specific erosion and sediment control BMP will be made based on the location of an inlet with respect to the Project area, drainage area from the construction workspace to the inlet, topography, vegetation, soils, and accessibility to the inlet. Where drain tile inlets are located off of Enbridge's construction workspace, Enbridge may not have authorization to install erosion and sediment control BMPs at the inlet site. In these cases, sediment control measures (typically silt fence) will be installed along the edge of the construction workspace that drains to the inlet structure to minimize sedimentation.

If underground drain tile is damaged by pipeline construction, it will be repaired in a manner that assures proper tile line operation at the point of repair in accordance with the Agricultural Protection Plan.

1.15 UPLAND BACKFILLING

Backfilling follows pipe installation and consists of replacing the material excavated from the trench. Prior to backfilling, the trench will be dewatered in accordance with the methods discussed in Section 5.0 if water obscures the trench bottom, except during implementation of the push-pull technique (Section 3.7.1) or other site-specific conditions.

1.16 CLEANUP AND ROUGH/FINAL GRADING

All waste materials, including litter generated by construction crews, will be disposed of daily. Initial cleanup and rough grading activities may take place simultaneously. Cleanup involves removing construction debris (including litter generated by construction crews and excess rock) and large woody debris (greater than 1.5-inch-diameter and/or 12 inches in length) and

repairing/replacing fences or other infrastructure removed or damaged during construction as agreed upon with the landowner or land-managing agency.

Rough grading includes restoring disturbed subsoil to as near as practicable to pre-construction conditions and decompacting subsoil (where applicable) (Section 1.18). Final grading includes returning the topsoil where topsoil has been stripped and final contouring to near as practicable to pre-construction conditions. Enbridge will backfill the trench to an elevation similar to the adjacent area outside the ditch line and will add a slight crown of approximately 3 to 6 inches (depending on soil type) over the backfilled trench to allow for subsidence. Generally, excess subsoil displaced by the pipe installation will be spread across the portion of the construction workspace where topsoil removal has occurred (see Section 1.10). Any remaining excess subsoil will be removed and disposed of at an approved off-site location as needed to ensure contours are restored to as near as practicable to pre-construction conditions. Periodic breaks in the crown will be implemented to allow for normal hydrologic flow across the backfilled trench. Crowning will not extend beyond the previously excavated trench limits. As the backfill material settles, there is potential that the original crown may not completely recede to pre-construction contours. Additional (final) grading may occur when conditions allow to ensure the disturbed area has been returned to pre-construction conditions. Enbridge will then prepare the seedbed (Section 7.1.1) and install or repair erosion control measures (Sections 1.9 and 1.17).

1.16.1 Timing

Enbridge will begin cleanup and rough grading (including installation of temporary erosion and sediment control BMPs) as soon as practicable, but not later than the end of the following workday after backfilling the trench (refer to Section 1.9.1 for temporary stabilization timing requirements). Enbridge will attempt to complete this rough cleanup within 1 week. Enbridge will initiate final grading, topsoil replacement, seeding, and installation of permanent erosion and sediment control BMPs as described in Section 7.0. If seasonal or other weather conditions prevent compliance with these timeframes, temporary erosion and sediment control BMPs will be maintained until conditions allow completion of cleanup.

1.17 PERMANENT EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES

During final grading, slopes in areas other than cropland will be stabilized with erosion and sediment control BMPs (i.e., ECDs). With exception for actively cultivated areas, permanent berms (diversion dikes or slope breakers) will be installed on all slopes, according to the following maximum spacing requirements unless otherwise specified in permit conditions (Figure 20):

Slope (%)	Approximate Spacing (ft)
5	250
>5-15	200
15-25	150
>25	<100

Permanent berms will be constructed according to the following specifications:

- Permanent berms will be installed with a 2 to 4 percent out slope.
- Permanent berms will be constructed of compacted earth, stone, or functional equivalent as approved in advance by Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity.
- The outfall of berms will divert surface water flow to a stable area, or in the absence of a stable area, to appropriate energy-dissipating devices. Berms will be extended slightly beyond the edge of the construction workspace if possible.
- Permanent berms will be inspected and repaired as deemed necessary by Enbridge to maintain function and prevent erosion.

1.17.1 Erosion Control Blanket

The appropriate class of erosion control blanket will be installed in accordance with manufacture recommendations and/or state DOT specifications on slopes greater than 33 percent that drain to surface waters (refer to Figure 21), and at other locations based on site-specific conditions. Installation of erosion control blankets and additional erosion and sediment control BMPs may occur after first snowfall depending on construction progress, seasonal weather, and site conditions. Erosion control blankets will be installed running parallel (up and down) with the direction of the slope (not perpendicular).

1.18 SOIL COMPACTION TREATMENT

Decompaction efforts typically occur in agricultural lands. To alleviate soil compaction, Enbridge will decompact the area prior to topsoil replacement with a deep tillage device or chisel plow if agreed to by the landowner or land-managing agency. Soil conditions must be dry enough to shatter the compacted soil between the points of a subsoiler or chisel plow to lower the bulk density of soil and reduce compaction. Soil at the compacted depth must not be wet and plastic at the time of tilling, otherwise it will not reduce compaction. If subsequent construction and cleanup activities result in further compaction, the measures described above will be completed a second time to alleviate the soil compaction. Additional details on soil decompaction in agricultural areas is described in Enbridge's Agricultural Protection Plan.

1.19 STONE REMOVAL

After soil decompaction, a diligent effort will be made to remove excess stones equal to or larger than 4 inches in diameter and other debris brought to the surface from decompaction efforts or as specified in permit conditions, contract documents, or landowner agreements. After the topsoil is replaced, stone removal efforts will cease when the size and density of stones on the construction workspace are similar to undisturbed areas adjacent to the construction workspace as determined by the EI. Excess rock will be piled in upland areas where landowner permission has been obtained or will be hauled off-site to an Enbridge approved disposal location.

1.20 REPAIR OF DAMAGED CONSERVATION PRACTICES

Enbridge will restore all soil conservation practices (such as terraces, grassed waterways, etc.) that are damaged by the pipeline construction to pre-construction conditions to the extent practicable.

1.21 LAND LEVELING FOLLOWING CONSTRUCTION

Following the completion of the pipeline, the construction workspace will be restored to its pre-construction conditions as practical. Should uneven settling or documented surface drainage problems occur following the completion of pipeline construction and restoration, Enbridge will take appropriate steps to remedy the issue.

Additional monitoring and corrective measures for wetlands and waterbodies are described in Enbridge's Post-Construction Monitoring Plan.

1.22 OFF-ROAD VEHICLES

To reduce the potential for members of the public to access public lands with off-road vehicles or other recreational equipment along the cleared permanent ROW, Enbridge will incorporate barriers to restrict access within the operational ROW as practicable where requested and approved by the land-managing agency, and where these barriers will not restrict or impede access for maintenance and emergency response activities. The type of barrier will be selected in consultation with the landowner and/or land-managing agency.

2.0 STREAM AND RIVER CROSSING GENERAL REQUIREMENTS

The procedures in this section apply to streams, rivers, and other waterbodies such as jurisdictional ditches, ponds, basins, and lakes. These procedures require that judgment be applied in the field and will be implemented under the supervision of Enbridge.

Stream crossing requirements, including construction methods, timing, erosion and sediment control BMP usage, and restoration are described in this section and in the stream crossing permits, licenses, and certifications issued by state and federal agencies and by Tribal authorities (as applicable). Requests to change the proposed crossing method will follow the process outlined in Section 6.0 of the EMCP. Written approval from Enbridge must be obtained prior to implementing an alternative crossing method.

Enbridge will monitor upcoming weather forecasts to determine if significant rainfall is anticipated during construction.

2.1 TIME WINDOW FOR CONSTRUCTION

All in-stream work activities (installation of dams, sheet piling, etc.) will be minimized to the extent practicable on an area and time duration basis. In-stream trenching will be conducted during periods permitted by the appropriate regulatory agencies and applicable permits and certifications.

Enbridge will adhere to the following work-exclusion dates for Minnesota Public Water Inventory ("PWI") cool- and warm-water fisheries that require no in-channel work, or will seek a waiver with the MDNR:

- Region 1 (Northwest) Non-Trout Streams: March 15 – June 15;
- Region 1 Lakes: April 1 – June 30; and
- Region 2 (Northeast) Non-Trout Stream and Lakes: April 1 – June 30.

In addition, Enbridge will adhere to the following work-exclusion dates in designated Minnesota trout streams and their designated tributaries to allow for spawning and migration, or will seek a waiver with the MDNR:

- Region 1 (Northwest): September 1 – April 15;
- Region 2 (Northeast): September 15 – May 15; and
- Region 2 within the Lake Superior watershed: September 15 – June 30.

Special waters (including trout waters), impaired waters, and PWIs will be identified on the Environmental Plan Sheets accompanying the SWPPP. Unless otherwise specified in applicable permits or certifications and with exception to blasting and other rock breaking measures and horizontal directional drilling ("HDD"), in-stream construction activities (specifically trenching, pipeline installation, backfill, and restoration of the streambed contours) for open cut (non-isolated) crossing methods will occur within the following timeframes:

- Minor Waterbodies (all waterbodies less than or equal to 10 feet wide at the water's edge at the time of crossing): 24 hours

- Intermediate Waterbodies (all waterbodies greater than 10 feet wide but less than 100 feet wide at the water's edge at the time of crossing): 48 hours

- Major Waterbodies (all waterbodies greater than 100 feet wide at the time of crossing): As specified by Enbridge or in the applicable permits.

These timeframes apply regardless of the presence or absence of flow. These timeframes also apply to dry (isolated) crossing methods as a guideline and can be extended based on site-specific conditions with approval from Enbridge Environment, Construction Management, and the EI in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. Enbridge will contact the MDNR if a crossing of a PWI waterbody crossing will take longer than 24 hours to complete.

Stream crossings have been designed to be as close to perpendicular to the axis of the stream channel as engineering and routing constraints allow, creating the shortest crossing length.

2.2 CLEARING AND GRADING

For trenched crossings of waterbodies, the construction workspace width will consist of a 25-foot-wide neck down beginning 20 feet from the OHWM on the working side of the construction workspace (refer to Figures 22 through 24). Enbridge will properly install and maintain redundant sediment control measures immediately after clearing and prior to initial ground disturbance at surface waters[3] located within 50 feet of the Project and where stormwater flows to the surface water (refer to the Environmental Plan Sheets in the SWPPP). Enbridge will install perimeter sediment controls at least 5 feet apart unless limited by lack of available space. Redundant controls will not be installed adjacent to road ditches, judicial ditches, county ditches, stormwater conveyance channels, storm drain inlets, and sediment basins. Sheet piling is a redundant perimeter control if installed in a manner that retains all stormwater. Clearing, topsoil segregation, and trenching of an upland approach to the surface water will occur as described in Sections 1.8.3, 1.10, and 1.11. If it is a wetland approach to the surface water, clearing, topsoil segregation, and trenching will occur as described in Sections 3.2 and 3.6. Refer to Section 2.2.2 for a discussion of erosion and sediment control BMP installation at special and impaired waterbodies.

Enbridge will clear a 30-foot-wide corridor over the HDD path to allow vehicle and equipment to access the waterbody for appropriations and/or to monitor for inadvertent releases (refer to Section 11.0). No grading or stump removal will occur over the HDD path.

2.2.1 Beaver Dam Removal and Prevention of Dam Rebuilding

Enbridge will obtain the appropriate permits from the applicable agencies for beaver dam removal and/or beaver trapping or implementation of other deterrents as needed.

[3] "Surface water" or "waters" means all streams, lakes, ponds, marshes, wetlands, reservoirs, springs, rivers, drainage systems, waterways, watercourses, and irrigation systems whether natural or artificial, public or private, except that surface waters do not include stormwater treatment systems constructed from upland (Minn. R. Ch. 7090).

2.2.2 Special, Impaired, and Infested Waters

Enbridge will comply with the construction and mitigation measures identified in the applicable permits for special waters, such as trout streams, canoe waters, and other waters designated by state rules and statutes. Additional applicable erosion control and stabilization measures are described in the Project SWPPP. Enbridge will properly install and maintain redundant sediment control measures immediately after clearing and prior to initial ground disturbance at special waters located within 100 feet of the Project and where stormwater flows to the surface water (will be reflected in the Environmental Plan Sheets in the SWPPP).

Where discharges of stormwater may occur to waters designated under Section 303(d) of the Clean Water Act as Impaired Waters for phosphorus (nutrient eutrophication biological indicators), turbidity, total suspended solids, dissolved oxygen, or aquatic biota (fish bioassessment, aquatic plant bioassessment and aquatic macroinvertebrate assessment), additional erosion and sediment control BMPs will be implemented as specified in the Project SWPPP and other applicable Project permits. Enbridge will properly install and maintain redundant sediment control measures immediately after clearing and prior to initial ground disturbance at all relevant impaired waters located within 50 feet of the Project and where stormwater flows to the surface water (will be reflected in the Environmental Plan Sheets in the SWPPP).

During Project construction and restoration, Enbridge plans to appropriate water from local sources, such as lakes, streams, and private wells for construction activities such as dust control, make-up of HDD drilling mud, and hydrostatic testing. The Project will follow applicable permit and lease conditions for appropriation and discharge and the BMPs described in the Invasive and Noxious Species Management Plan (Appendix B) to prevent the spread of aquatic invasive species.

2.3 ADDITIONAL TEMPORARY WORKSPACE

ATWS includes work areas outside the boundary of the typical construction workspace. These spaces are typically used to assemble pipe segments and for temporary spoil storage. Clearing of forested and brushy areas for ATWS will be avoided as much as possible. Woody vegetation in wetlands and riparian areas will typically not be cleared for the purpose of ATWS unless approved by appropriate regulatory agencies as stipulated in permits issued for the Project. ATWS will be constructed as follows:

- ATWS will be located at least 50 feet away from the OHWM/ordinary high water level (“OHWL”) if topographic or other physical conditions such as stream channel meanders allow, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land (refer to Figures 22 through 24).

- If safe work practices or site conditions do not allow for a 50-foot setback, ATWS should be located no closer than 20 feet from the OHWM/OHWL, subject to site-specific approval by Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity.

- ATWS will be limited to the minimum size needed to construct the stream crossing.

2.4 BRIDGES

Temporary equipment bridges will be used on most waterways (upon approval by the appropriate agency), including small waterways such as ditches and intermittent streams, where there is a potential for stormwater runoff or rain events to transport sediment downstream from equipment crossing the waterway. Some bridges may be used on waterbodies crossed using the HDD method, where approved by regulatory agencies. Bridges will be constructed as described below during clearing and will be removed as soon as possible during final restoration once the bridge is no longer required to complete and monitor restoration activities.

Fording of waterways is prohibited (i.e., civil survey, potholing, or other equipment are not permitted to ford waterways prior to bridge placement) unless the waterbody is dry or frozen at the time of crossing.

2.4.1 Types of Bridges

Bridge crossing methods associated with the travel lane of the construction workspace are described in detail in Section 2.4.2 of the Summary of Construction Methods and Procedures (Appendix A). Ice bridges are described in Enbridge's Winter Construction Plan. Equipment bridges will be constructed using one of the following techniques (Figures 1, 3, and 4):

- Clear span bridge;
- Non-clear span bridge (in-stream support); or
- Culvert/flume.

2.4.2 Bridge and Culvert Maintenance

Equipment bridges and culverts will be maintained in accordance with the applicable permits. Debris or vegetation that becomes lodged on the bridge support will be removed and disposed of in an upland area. Bridges will be maintained to prevent soil from entering the waterbody (refer to Figure 3 and 4). Soil that accumulates on the bridge decking will be removed daily, or as deemed necessary by the EI.

2.5 STREAM AND RIVER CROSSING CONSTRUCTION METHODS

Section 4.0 of the Summary of Construction Methods and Procedures (Appendix A) describes the different waterbody crossing techniques that Enbridge intends to utilize during construction, the site-specific conditions required for the method to be feasible, and the advantages and disadvantages associated with each technique. Procedures for frozen conditions are discussed in Enbridge's Winter Construction Plan. The following sections describe the stream and river crossing methods that are typically used, subject to further restrictions by Enbridge and applicable permits and subject to modifications as approved by appropriate regulatory agencies and Tribal resource specialists (as applicable) during construction. Generally, depth of cover under waterbody crossings is a minimum of 48 inches unless otherwise specified in applicable permits or authorizations. Following installation of the pipeline, Enbridge will confirm that the pipe depth meets federal and state requirements through civil survey.

2.5.1 Open Cut (Non-Isolated) Trench Method

Crossing of waterbodies when they are dry or frozen to the bottom and not flowing may proceed using the open cut (non-isolated) trench crossing technique described below, provided that the EI verifies that water is unlikely to flow between initial disturbance and final stabilization of the feature. This also applies to features that have been permitted as waterbodies, but field delineations determined were wetlands based on conditions at the time of survey. If unanticipated flow conditions develop during construction of a given waterbody, Enbridge's EIs will be notified immediately to determine the extent of the flow and Enbridge will install additional erosion and sediment control BMPs, as necessary. If flows are significant, and sedimentation is likely to occur, work will be stopped, or Enbridge will switch to a dry (isolated) crossing technique (see Sections 2.5.2 and 2.5.3), with Enbridge and agency approval.

There are also a limited number of locations where due to surrounding saturated wetlands, it is not feasible to isolate the flow and the open cut trench method, such as the push-pull technique (see Section 3.7.1), may be used.

Installation

The following procedures will be used during open cut trench crossings (Figure 22):

- Sediment control measures will be installed before initial ground disturbance at the waterbody. Spoil containment structures will be installed back from the stream bank so that spoil does not migrate into the stream.

- Grading will be directed away from the waterbody to minimize the potential for sediment to enter the stream. Grading of stream banks will be restricted to the trench line and areas necessary for safe bridge installation.

- After grading, backhoes or draglines will be used to excavate the trench. Where possible, excavating equipment will operate from one or both banks, without entering the stream. If equipment must encroach into the stream, it will operate on clean construction mats. The upper streambed material (e.g., up to 12 inches of streambed material such as gravel, sand, cobble) will be segregated and stored separately from the remaining trench spoil within the construction work area limits. Storage of streambed spoil within the stream is prohibited unless expressly approved in the applicable permits.

- Earthen trench plugs (hard plugs) between the stream and the upland trench will be left undisturbed during excavation of the in-stream trench to prevent diversion of the stream flow into the open trench and to prevent water that may have accumulated in the adjacent upland trench from entering the waterbody. Trench plugs will be removed immediately prior to pipe placement, and then replaced when the pipe is in place. Trench water accumulated upslope of trench plugs will be dewatered appropriately prior to trench plug removal.

- Water within the trench will be managed in accordance with Section 5.0.

- Backfilling will begin after the pipe is positioned in the trench at the desired depth. Backfill material will consist of the spoil material excavated from the trench and parent streambed unless otherwise specified in state, Tribal, or federal permits. The in-stream

trench will be backfilled so that the stream bottom is as near as practicable to its pre-construction condition, with no impediments to normal water flow.

In-Stream Best Management Practices

To minimize downstream sedimentation, Enbridge will install in-stream BMPs (e.g., silt curtains [Figure 25], bladder dams, or water gates) downstream of open cut crossing locations where there is water prior to the initiation of crossing, and where site-specific conditions allow access for BMP installation. The type of in-stream BMP utilized will depend on waterbody conditions (flow velocity, water depth, and the width of the waterbody) and will be selected depending upon the site-specific conditions at the time of crossing.

Temporary Stabilization

Enbridge will restore the stream banks as near as practicable to pre-construction conditions unless that slope is determined to be unstable. If the slope is considered unstable, Enbridge will reshape the banks to prevent slumping. Once the banks have been reshaped, Enbridge will commence soil stabilization activities within 24 hours (refer to Section 1.9.1 for temporary stabilization timing requirements). Temporary slope breakers will be installed on all sloped approaches to streams in accordance with the spacing requirements identified in Section 1.9.3.

Seed mix (refer to Section 7.0) and mulch and/or erosion control blankets will be installed within the required natural buffer on either side of the stream, with exception to actively cultivated land. Redundant controls will be re-installed as needed until stabilization is achieved (refer to Section 2.6 for permanent restoration requirements). Silt fence, or functional equivalent as approved in advance by Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity, will be installed upslope of the temporary seeding area.

2.5.2 Isolated Trench: Dam and Pump Method

Installation

The dam and pump method is an isolated dry crossing technique that is suitable for low flow streams and is generally preferred for crossing meandering channels. The dam and pump method involves damming of the stream upstream and downstream to isolate the trench before excavation (refer to Figure 23) and pumping water around the construction area. Procedures for conducting dry crossing techniques in frozen conditions are described in Enbridge's Winter Construction Plan. The following procedures will be used for dam and pump crossings:

- Dams may be constructed of sandbags, inflatable dams, aqua-dams, sheet piling, and/or steel plates. The dams will prevent the stream from flowing into the construction area. The dams will be continuously monitored for a proper seal. Additional sandbags, plastic sheeting, steel plating, or similar materials will be used where necessary to minimize the amount of water seeping around the dams and into the construction work area. The dam will not be removed until after the pipeline has been installed, the trench has been backfilled, and the banks have been stabilized.

- Pumping of the stream across the construction workspace will commence simultaneously with dam construction to prevent interruption of downstream flow. Stream

flow will be pumped across the construction area through a hose and will be discharged to an energy-dissipation device, such as plywood boards, filter bags, large rock or bricks, or any other material that reduces the concentrated flow of a water pump such that stream bed or banks scouring will not occur. These devices are placed within the channel or on the banks of waterbodies to ensure that stream water being pumped around a crossing will not cause erosion or scouring and that the water will not be inadvertently discharged outside of the feature.

- The pumps and fuel containers will be located on the upstream side of the crossing and will be placed in impermeable, sided structures that will act as containment units (refer to Section 10.0). The pumps used for this crossing method will not be placed directly in the stream or on the streambed. Pumps will have a capacity greater than the anticipated stream flow. The pumping operation will be staffed 24 hours a day and pumping will be monitored and adjusted as necessary to maintain an even flow of water across the work area and near-normal water levels upstream and downstream from the crossing. Backup pumps are required on site for each crossing.

- The pump intake will be installed in a manner to prevent sediment from being sucked from the bottom of the stream and will be equipped with a screen, or equivalent device, to prevent fish uptake.

- Where possible, excavating equipment will operate from one or both banks, without entering the stream. If equipment must encroach into the stream, it will operate on clean construction mats (free of soil and plant material prior to being transported onto the construction workspace). Streambed material will be segregated as stated in the open cut (non-isolated) trench method and will be placed within the construction workspace. Storage of streambed spoil within the stream will only be allowed if expressly approved in the applicable permits.

- Earthen trench plugs (hard plugs) between the stream and the upland trench will be left undisturbed during excavation of the in-stream trench to prevent diversion of the stream flow into the open trench and to prevent water that may have accumulated in the adjacent upland trench from entering the waterbody. Trench plugs will be removed immediately prior to pipe placement, and then replaced when the pipe is in place. Trench water accumulated upslope of trench plugs will be dewatered appropriately prior to trench plug removal.

- Standing water that is isolated in the construction area by the dams will be managed in accordance with Section 5.0.

- Backfilling will begin after the pipe is positioned in the trench to the desired depth. Backfill material will consist of the spoil material and parent streambed excavated from the trench unless otherwise specified in state, Tribal, or federal permits. The in-stream trench will be backfilled so that the stream bottom is similar to its pre-construction condition, with no impediments to normal water flow.

2.5.2.1 Isolated Trench: Modified Dam and Pump Method

In situations where the stream banks are stable, but conditions are too saturated to effectively dewater from the construction workspace, Enbridge will conduct a modified dam and pump

crossing. The only difference from standard dam and pump method and this modified technique is that Enbridge will not dewater the trench and will utilize buoyancy control methods (refer to Section 3.7.3) as appropriate to sink the pipe to the bottom of the trench. Enbridge will install in-stream BMPs downstream of these crossing locations prior to initiating the crossing to mitigate the potential for elevated sedimentation (refer to the discussion in In-Stream BMPs under Section 2.5.1). The exact location of in-stream BMPs will be determined on-site prior to initiating the crossing by Enbridge's EIs in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity.

Temporary Stabilization

Initial stabilization, restoration of the stream banks, and the installation of temporary erosion and sediment control BMPs will be similar to that described for the open cut (non-isolated) trench method above but will occur immediately following installation of the pipeline (refer to Section 2.6 for permanent restoration requirements). Once the stream banks have been stabilized, the dams and pump will be removed.

2.5.3 Isolated Trench: Flume Method

Installation

The flume method is an isolated dry crossing technique that is suitable for crossing relatively narrow streams that have straight channels and are relatively free of large rocks and bedrock at the point of crossing (refer to Figure 24). This method involves placement of flume pipe(s) in the stream bed to convey stream flow across the construction area without introducing sediment to the water. Procedures for conducting dry crossing techniques in frozen conditions are described in Enbridge's Winter Construction Plan. The procedures for using the flume method are described below.

- The flume(s) will be of sufficient diameter to transport the maximum flows anticipated to be generated from the watershed. The flume(s), typically 40 to 60 feet in length, will be installed before trenching and will be aligned so as not to impound water upstream of the flume(s) or cause downstream bank erosion. EIs will evaluate flume discharges; if excessive flows are observed and may cause scouring, then energy dissipation devices (plywood, steel plate, etc.) can be placed within the waterbody to deflect/absorb heavy water flows. The flumes will not be removed until after the pipeline has been installed, trench has been backfilled, and the stream banks have been stabilized.

- The upstream and downstream ends of the flume(s) will be incorporated into dams made of sand bags and plastic sheeting or steel plates (or equivalent). The upstream dam will be constructed first and will funnel stream flow into the flume(s). The downstream dam will prevent backwash of water into the trench and construction work area. The dams will be continuously monitored for a proper seal. Adjustments to the dams will be made where necessary to prevent large volumes of water from seeping around the dams and into the trench and construction work area.

- Where possible, excavating equipment will operate from one or both banks, without entering the stream. If equipment must encroach into the stream, it will operate on clean construction mats. Streambed material will be segregated and placed within the

construction workspace. Storage of streambed spoil within the stream will only be allowed if expressly approved in the applicable permits.

- Earthen trench plugs (hard plugs) between the stream and the upland trench will be left undisturbed during excavation of the in-stream trench to prevent diversion of the stream flow into the open trench and to prevent water that may have accumulated in the adjacent upland trench from entering the waterbody. Trench plugs will be removed immediately prior to pipe placement, and then replaced when the pipe is in place. Trench water accumulated upslope of trench plugs will be dewatered appropriately prior to trench plug removal.

- If additional trench dewatering is necessary to complete the installation of the pipe, the discharge will be managed in accordance with Section 5.0.

- Backfilling will begin after the pipe is positioned in the trench to the desired depth. Backfill material will consist of the spoil material excavated from the trench and parent streambed unless otherwise specified in state, Tribal, or federal permits. The in-stream trench will be backfilled so that the stream bottom is similar to its pre-construction condition, with no impediments to normal water flow.

Temporary Stabilization

Initial stabilization, restoration of the construction workspace, and the installation of temporary erosion and sediment control BMPs will be similar to that described for the open cut (non-isolated) trench method above but will occur immediately following installation of the pipeline (refer to Section 2.6 for permanent restoration requirements). After the stream banks have been stabilized, the dams and flume will be removed from the stream bed allowing water to resume its flow in the channel.

2.5.4 Trenchless Methods: Horizontal Directional Drill Method (Pressurized)

Refer to Section 3.6 of the Summary of Construction Methods and Procedures (Appendix A) for a more detailed description of the HDD method.

Installation

HDD is a trenchless crossing method that involves no direct excavation of the features being crossed; for this reason, it is often used for large waterbodies that cannot be crossed by other methods or to cross sensitive resources such as waterbodies (refer to Figure 26). An HDD occurs in multiple phases. In the first phase, a small-diameter pilot hole will be drilled under the feature along a prescribed profile. After the pilot hole has been completed, barrel reams will be used to enlarge the pilot hole to accommodate the desired pipeline diameter. Drilling mud will be necessary to remove cuttings and maintain the integrity of the hole. Water from an agency-approved source will be used to prepare the slurry of drilling mud and will be appropriated according to applicable permits. In the final phase, the pipe section will be pulled through the hole by the drilling rig (called “pullback”) and welded to the adjoining sections of pipe on each side of the feature. During the pilot hole drilling, reaming, and swabbing, pressure is applied to the borehole as drilling fluids are pumped in. A surveying system is utilized to guide the drill path from entry to exit point.

Drilling Mud

Drilling mud (potentially mixed with additives) is used to provide hydrostatic pressure to prevent fluids from entering the bore hole, to lubricate and cool the drill bit, and return cuttings from the bore hole to the surface to clear the hole and maintain drilling operations. Maintaining drilling fluid circulation to the extent possible is the key to reducing the risk of inadvertent drilling fluid returns (also referred to as an "inadvertent release"). Drilling mud additives help control sand content and flow, water hardness, keep the bore hole open and stable, prevent groundwater inundation, and allow the bentonite to yield properly. Only Enbridge and agency-approved drilling mud additives will be used on this Project.

During drilling operations, drilling mud and slurry will be stored back from the waterbody in an earthen berm sediment control structure, mud pit, in tanks, or by other methods so that it does not flow into the waterbody, adjacent wetlands or off the workspace (refer to Section 11.0 for additional details).

After the pipe is in place, excess drilling mud will be hauled off-site to an Enbridge-approved location (see Section 11.5).

Temporary Stabilization

Enbridge will clear a 30-foot-wide construction workspace along the HDD path for placement of guidewires, and to facilitate response to a potential inadvertent release and pipeline monitoring during operations. However, no grading or stump removal will occur along the HDD path, which reduces the potential for erosion and sedimentation at the stream crossing. Consequently, temporary erosion and sediment control BMP measures will be installed as needed.

2.6 PERMANENT RESTORATION

Stream/channel banks disturbed during installation of the pipeline will be stabilized with erosion and sediment control BMP materials such as an erosion control blanket and seeded in accordance with Section 7.0 (refer to Section 7.8 for discussion of riparian vegetation seed mixes). Permanent stabilization will be initiated within 24 hours after installation of the crossing using the open cut trench method and prior to restoring flow using the dam and pump or flume method, unless site and permit conditions delay permanent installation

Where the banks have been disturbed, Enbridge will restore the slopes as near as practicable to pre-construction conditions unless that slope is determined by Enbridge to be unstable. Where the slope of the banks is determined to be unstable or has the potential to erode or fail, the banks will be reshaped to transition the disturbed areas into the natural stream bank with the intent to stabilize the bank and create a blended, natural appearance.

Berms or other sediment filter devices will be installed at the base of sloped approaches to streams greater than 5 percent and the outlet of the berm will be directed away from the stream into a well vegetated area; berms will not be installed in wetlands or floodplains. Temporary sediment control devices will remain in place until the area has stabilized and adequate revegetation has established.

2.6.1 Vegetative Bank Restoration

Waterbody banks will be restored as near as practicable to pre-construction conditions after backfilling is complete and will be seeded with an appropriate seed mix as specified in Section 7.8 and covered with an erosion control blanket. Erosion and sediment control BMPs (e.g., straw bales, filter socks [Figure 27], silt fences) will be installed as necessary based on site-specific conditions. Wherever practicable at waterbody crossings, Enbridge will utilize wildlife-friendly erosion and sediment control BMPs that contain biodegradable netting (natural fiber, biodegradable polyesters, etc.) and will avoid the use of plastic mesh.

2.6.2 Supplemental Bank Stabilization

Unstable soils and/or site-specific factors such as stream velocity and flow direction may require additional restoration efforts, such as installation of woody vegetation, geotextile fabric, or tree, log, rootwad, or boulder revetments to stabilize disturbed stream banks (see Figure 29). Enbridge does not plan to install rock rip-rap on this Project. Enbridge will prepare site-specific plans in coordination with the applicable agencies to identify riparian areas that may require specialized seed mixes, plantings of woody vegetation, or other specialized restoration techniques. Where specialized restoration measures are required, these locations will be noted on the construction alignment sheets and supplemental restoration plans.

2.6.3 Bridge Removal

Equipment bridges will be removed during final cleanup or, if access is needed, after final cleanup and permanent seeding. Restoration of the bridge area will be completed upon bridge removal. Bridge decking will be removed to ensure sediment and debris are collected by geotextile fabric secured below decking during bridge construction. Subsequently, geotextile fabric will be removed to prevent debris from entering the watercourse.

3.0 WETLAND CROSSING GENERAL REQUIREMENTS

The various crossing techniques employed in different wetland types are described in more detail in Section 3.0 of the Summary of Construction Methods and Procedures (Appendix A). Note that the proposed crossing technique may change depending on seasonality and site-specific conditions at the time of crossing (e.g., saturation level). Procedures for wetland crossings during frozen conditions are discussed in Enbridge's Winter Construction Plan.

The procedures in this section apply to all wetlands that will be affected by the Project. These procedures require that judgment be applied in the field and will be implemented under the supervision of Enbridge and the EI. The intent of these procedures is to minimize construction-related disturbance and sedimentation of wetlands and to restore wetlands as nearly as possible to pre-construction conditions.

In wetlands that are being actively cultivated or hayed at the time of construction, Enbridge will construct the pipeline using standard upland methods. Most seasonally saturated farmed wetlands are used for crop production and topsoil will be segregated in the same manner as topsoil in upland agricultural lands. Pipe stringing and fabrication may occur within the farmed wetland adjacent to the trench, or adjacent to the farmed wetland in a designated ATWS.

Wetland crossing requirements, including construction methods, timing, erosion control, and restoration, are described in this section and in the wetland crossing permits issued by state, federal, and/or Tribal agencies as applicable.

3.1 WETLAND ACCESS

Enbridge will use the construction workspace and only approved roads to access wetland areas. Construction mats will be placed along the travel lane within delineated wetlands within the construction workspace and along access roads (refer to Section 1.4). Section 3.2 of the Summary of Construction Methods and Procedures (Appendix A) provides a description of the various construction mats that may be utilized on the Project. Mat travel lanes are typically a single layer (Figures 30 and 31); however, there may be cases in saturated areas where more than one layer of mats must be placed to provide a stable working surface (Figures 32 and 33). Enbridge will remove the mats during final cleanup activities. If there are multiple layers of mats, Enbridge will probe the soil after mats have been removed to verify that no additional mats remain.

3.2 CLEARING

Clearing the construction workspace in wetlands will be similar to clearing in uplands. For construction to proceed, obstructions (e.g., trees, brush, and logs) need to be removed. Vegetation and trees within wetlands will be cut off at ground level, leaving existing root systems intact; clearing debris will generally be removed from the wetland for disposal. Hydro-axe debris, or similar (less than 1.5-inch diameter and/or 12 inches in length) can be left in the wetland if spread evenly in the construction workspace to a depth that will allow for normal revegetation, as determined by the EI. Clearing over HDD paths will be limited to the 30-foot-wide construction workspace.

3.3 ADDITIONAL TEMPORARY WORKSPACE IN WETLANDS

In general, Enbridge attempts to locate ATWS outside of wetlands wherever practicable; however, ATWS may be sited in select wetlands where the wetland is adjacent to a waterbody, road, railroads, foreign utility crossings, pipeline cross-overs, and/or where required based on site-specific conditions with prior approval from the applicable regulatory agencies. Clearing of forested wetlands for ATWS will be avoided as much as possible.

- Staging areas, additional spoil storage areas, and other ATWS will be located in upland areas at least 50 feet away from wetland boundaries (refer to Figure 34), where safe work practices or site conditions permit, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. If site conditions do not permit a 50-foot setback, then these areas will be located as far away from the wetland as is practicable. Vegetation will not be cleared between these areas and the wetland in any event. No construction activities including vegetation clearing or earthwork will occur between the ATWS and the wetland.

- The size of the ATWS areas will be limited to the minimum needed to construct the wetland crossing.

3.4 GRADING IN A WETLAND

Grading activities will be confined to the area of the trench and will be minimized to the extent practicable. Grading outside the trench will only be allowed where required to ensure safety and restore the construction workspace after backfilling the trench with prior approval from Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity.

Temporary erosion and sediment control BMPs will be installed:

1. across the entire construction workspace upslope of the wetland boundary, where necessary, to prevent sediment flow into the wetland;

2. along the edge of the construction workspace as necessary to prevent sediment flow into off-ROW wetlands;

3. along the edge of the construction workspace as necessary to contain spoil and sediment within the construction workspace through wetlands; and

4. at locations specified in any applicable permits.

Enbridge will identify the potential locations of these erosion and sediment control BMPs at wetland approaches and within wetlands on the Environmental Plan Sheets included with Enbridge's SWPPP. The SWPPP will also describe the procedures the Enbridge Environment will utilize to evaluate the potential location, extent, and type of erosion and sediment control BMPs to be implemented based on site-specific conditions.

Enbridge will properly install and maintain redundant sediment control measures immediately after clearing and prior to initial ground disturbance at wetlands located within 50 feet of the Project and where stormwater flows to the wetland (will be reflected in the Environmental Plan

Sheets in the SWPPP). Enbridge will install perimeter sediment controls at least 5 feet apart unless limited by lack of available space. Redundant controls will not be installed adjacent to road ditches, judicial ditches, county ditches, stormwater conveyance channels, storm drain inlets, sediment basins, and agriculturally-farmed wetlands. Sheet piling is a redundant perimeter control if installed in a manner that retains all stormwater. Clearing, topsoil segregation, and trenching of the upland approaches to wetlands will proceed as described in Sections 1.8.3, 1.10, and 1.11. Erosion and sediment control BMPs will be maintained in proper working order to prevent the flow of sediment into wetlands from spoil piles or sloped approaches that are adjacent to the wetlands.

3.5 RIGHT-OF-WAY STABILIZATION

Tree stumps, brush riprap, imported soil, and rock fill will not be brought in to stabilize the construction workspace in wetlands. Where low ground pressure equipment is not used, construction equipment will operate from construction mats or equivalent means with prior approval from Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. Timber riprap (also known as corduroy road) will not be used on this Project. Corduroy roads in wetlands will be removed if discovered during construction within the construction workspace.

Subsoil from the pipeline trench within the immediate wetland may be placed on top of equipment mats for additional stabilization. Construction mats may be placed over the ditch line or on the working side to facilitate trench excavation. All construction mats, construction debris, and larger woody vegetative debris (greater than 1.5-inch diameter and/or 12 inches in length) will be removed during cleanup of wetlands.

3.6 TRENCHING

Excavation of the pipeline trench in wetlands will typically be accomplished using backhoe excavators. Enbridge will take reasonable steps to ensure that the duration of open trench in wetlands, including tie-ins, is minimized to the fullest extent possible. As described in Section 1.11, where deemed appropriate, Enbridge will leave plugs of subsoil in the ditch or will construct temporary access bridges across the trench for the landowner to move livestock or equipment; temporary bridges may also be utilized by wildlife. Where trenches are left open overnight, trenches will also be sloped (less than 45 degrees) where started and ended to allow wildlife egress. Spacing of plugs and ramps will be determined in the field. Enbridge will inspect the trench and construction area for presence of animals every day before initiating construction activities and prior to backfilling the trench. If an animal is located, it will be relocated outside of the active construction workspace. If the animal is a federally or state-listed species, the appropriate agency(ies) will be notified.

3.6.1 Topsoil Segregation

When constructing in wetland areas without standing water, up to 1 foot of topsoil (organic layer) will be stripped from the trench line and stockpiled separate from trench spoil to preserve the native seed stock. In standing water wetlands, organic soil segregation is not typically practical; however, Enbridge will attempt to segregate as much of the organic layer as possible based on site/saturation conditions. If normally unsaturated wetlands are saturated at the time of construction, topsoil segregation will be attempted as illustrated in Figures 32 and 33 and based on recommendations from the EI and appropriate regulatory agencies.

3.6.2 Trench Breakers

Trench breakers will be installed as outlined in Section 1.13. Where the EI determines that the pipeline trench has the potential to drain or partially drain a wetland, trench breakers will be installed as necessary to maintain the original wetland hydrology.

3.7 PIPELINE INSTALLATION

The following procedures are intended to minimize siltation and disturbance to wetlands during installation. Generally, depth of cover under wetland crossings is a minimum of 48 inches unless otherwise specified in applicable permits or authorizations. Following installation of the pipeline, Enbridge will confirm that the pipe depth meets federal and state requirements through civil survey.

3.7.1 Push-Pull Method

Large wetlands with standing water can generally not be crossed with typical crossing methods. In these areas, the pipeline will be pre-assembled and positioned in the trench using the “push-pull" and/or "float" techniques (Figures 35 and 36).

Usually this fabrication requires use of ATWS adjacent to the construction workspace. A backhoe (or equivalent) supported on construction mats or equivalent low ground pressure equipment will be used to dig the trench. The prefabricated section of pipeline will then be pushed-pulled into position or floated across the wetland. When the pipeline is in position, floats, if used, will be removed and the pipeline will sink into position. The trench will then be backfilled and a backhoe or similar equipment working from construction mats or by low ground pressure equipment will be used restore the wetland.

3.7.2 Temporary Erosion and Sediment Controls

Erosion and sediment control BMPs at approaches to wetlands will be installed as previously described and in accordance with Section 3.4.

3.7.3 Buoyancy Control

Enbridge will install buoyancy control in saturated environments. Enbridge calculates the amount of buoyancy control required based on an empty pipe. Buoyancy control can be achieved by utilizing one or more of the following methods:

- Concrete coating (refer to Figure 37);
- Bag weights (also referred to as concrete weights and/or saddlebag weights) (refer to Figure 38); and/or
- Sand bags.

Enbridge will select the appropriate method(s) depending on site-specific conditions at the time of crossing. Weights will be strung along the construction workspace, where necessary, until they are placed over the pipe within the excavated ditch.

Concrete for the concrete-coated pipe or bag weights will generally be mixed off-site and transported to the construction workspace on trucks. Limited mixing and coating activities may occur on the construction workspace for coating pipe joints, concrete weight repairs, and mainline valve and pump station foundations, etc. Washing equipment used for mixing, pouring, casting, or coating will not occur within 100 feet of any wetland. Enbridge will collect and retain all the concrete washout water and solids in a leak proof containment. Wash water disposal will be limited to a defined area of the site or to an area designated for concrete washout within construction yards. The area(s) will be sufficient to contain the wash water and residual cement and will include equipment capable of reclaiming wash water during wash out (Figure 39). No concrete washing stations are allowed on MDNR-Administered Lands.

3.8 BACKFILLING

Subsequent to pipe installation, backfilling of wetland trenches will take place immediately, or as approved by EI in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. Enbridge will restore wetlands as near as practicable to pre-construction conditions. In areas where topsoil has been segregated, the subsoil will be replaced first. Subsoil that exceeds the elevation of the ground adjacent to the trench will be removed from the wetland and disposed of in an upland area or an Enbridge-approved location in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. After the trench has been backfilled with subsoil, previously segregated topsoil will be spread uniformly over the trench area from which it was removed.

3.9 CLEANUP, ROUGH/FINAL GRADING, AND TEMPORARY RESTORATION

Cleanup activities will occur as described in Section 1.16. Rough and final grading includes restoring original conditions within the disturbed areas (i.e., ditch line, spoil storage areas, and equipment travel lane). Enbridge will backfill the trench to an elevation similar to the adjacent areas outside the ditch line and will add a slight crown of approximately 3 to 6 inches (depending on soil type) over the backfilled trench to allow for subsidence. Generally, excess subsoil displaced by the pipe installation will be spread across the portion of the construction workspace where topsoil removal has occurred (see Section 1.10). Any remaining excess subsoil will be removed and disposed of at an approved off-site location as needed to ensure contours are restored to as near as practicable to pre-construction conditions. Periodic breaks in the crown will be implemented to allow for normal hydrologic flow across the backfilled trench. Crowning will not extend beyond the previously excavated trench limits. As the backfill material settles, there is potential that the original crown may not completely recede to pre-construction contours. Additional (final) grading may occur when conditions allow to ensure the disturbed area has been returned to pre-construction conditions. Enbridge will also prepare the seedbed (Section 7.1.1) and install or repair erosion and sediment control BMPs (Sections 1.9 and 1.17). Temporary slope breakers will be installed near the boundary between the wetland and adjacent sloped approaches, to prevent sediment flow into the wetland as described in Section 1.9.3.

3.9.1 Timing

Cleanup, rough, and final grading (including installation of temporary erosion and sediment control BMP measures) will proceed as soon as the trench has been backfilled in wetlands. If seasonal or other weather conditions prevent compliance with these timeframes, temporary

erosion and sediment control BMPs will be maintained until conditions allow completion of cleanup.

3.9.2 Temporary Stabilization

Where necessary, disturbed wetland areas will be seeded with a temporary seed mix as described in Section 7.1.2. No fertilizer, lime, or mulch will be applied in wetlands, except for peatlands as described in Section 7.7.3. Stabilization will be completed no later than 14 calendar days after the construction activity has ceased. Permanent seeding of wetland areas is described in Section 7.7.

4.0 HIGHWAY, ROAD, AND RAIL CROSSINGS

4.1 BORES (NON-PRESSURIZED)

Conventional bore methods are typically used to cross highway, road, and rail crossing features. Because watercourses, such as ditches, often occur parallel to these features, bores may be extended to bore under multiple features. Bore methods involve construction of a bore pit on each side of the feature (e.g., highway, road, railroad, watercourse) and thumping or boring a carrier pipe underneath the feature(s) without use of pressurized drilling fluid. The specific equipment utilized to execute the bore is dictated by the length of the bore and soil conditions. Water and bentonite clay can be introduced if soil conditions dictate in order to lubricate the drill head and carrier pipe and allow it to move through the ground more freely. With this construction practice at no time is pressurized water or drill mud being used to hold the hole open as it will during an HDD, and therefore there is no risk for an inadvertent release at these locations. If drilling mud is needed at these locations, any release will travel back along the path of the pipe and into the bore pit. Typically, the length of these crossings is limited, and the bore holes must be set up relatively close to the edge of the feature, and the depth maintained just below the depth of scour for watercourses. Figures 40 and 41 provide typical examples of a horizontal bore crossing of transportation corridors.

4.2 ADDITIONAL WORKSPACE

Additional workspaces for bored road and railroad crossings and open-cut road crossings will be determined on a site-specific basis. These workspaces will be adjacent to the road or railroad and limited to the size needed to contain spoil, stage equipment, and store supplies for the crossing.

4.3 MAINTENANCE

Roadway crossings will be maintained in a condition that will prevent tracking of mud onto the roadway.

Rock/gravel or construction mat tracking pads, as required by the applicable permits, will be installed adjacent to paved public roads to prevent or minimize the tracking of soil onto the roadway. If the roadside ditch is part of a jurisdictional waterway, a permit will be obtained prior to installing the tracking pad or culvert. Construction mat tracking pads or rock/gravel tracking pads on top of geotextile fabric will be utilized in wetlands and will be removed after construction.

4.4 TEMPORARY EROSION AND SEDIMENT CONTROLS

Temporary erosion and sediment control BMPs (e.g., silt fence and/or double-staked straw bales) will be installed on sloped approaches to road crossings where vegetation has been disturbed as described in Section 1.9.4.

5.0 CONSTRUCTION DEWATERING

5.1 TRENCH AND PIT DEWATERING

For pipeline trench and pump station pit construction dewatering, Enbridge will typically utilize portable pumps. Enbridge will vary the number and size of pumps employed in a dewatering event based on the volume of water to be removed from the trench. In addition to portable pump dewatering along the trench, Enbridge may need to employ a well point system for dewatering at some road bores, utility crossings, mainline valve excavations, and as required by site-specific conditions. A well point system will be utilized when traditional dewatering techniques cannot keep up with the rate of groundwater recharge into the excavation. This system will consist of a series of small diameter wells installed via hydro-jetting that are connected by a header pipe to a well point pump (Figure 42). The well point system will be installed within the construction workspace following topsoil segregation. Adequate temporary erosion and sediment control BMPs will be installed to prevent the migration of subsoil slurry produced during the well point installation process.

Prior to initiating dewatering activities, the EI will approve the water discharge plan to ensure that erosion and sediment control BMPs are applied in such a way as to minimize the potential for water containing sediment from reaching a wetland or waterbody. Furthermore, landowner approval is required in advance of placement of dewatering structures outside of the approved construction workspace. On lands administered by the MDNR, these discharges will be subject to the terms and conditions of a lease. The EI will consult pre-construction environmental resource survey data for lands adjacent to and outside of the construction workspace when siting the dewatering structure. Dewatering structures will be sited to avoid environmental resources that may be affected by the discharge, such as federally or state-listed species. If pre-construction environmental survey data is not available, Enbridge will consult Natural Heritage Information System data or other relevant resource data to determine if protected resources may be present in the area and/or conduct additional environmental resource surveys before initiating activities.

Enbridge will utilize the Environmental Plan Sheets accompanying the MPCA SWPPP in addition to site-specific conditions at the time of dewatering to assess each water discharge situation, including:

1. Water Discharge Setting – This includes:

    a. Soil Type – The soil type the discharged water will flow over. The management of discharged water traveling over sandy soil is more likely to soak into the ground as compared to clay soils.

    b. Ground Surface – The topography in the area that will influence the surface flow of the discharged water.

    c. Adjustable Discharge rate – The flow rate of the discharged water (which may need to vary) can be managed based on the site conditions to minimize instances of water from reaching a sensitive resource area such as a wetland or waterbody.

d. Discharge Outfall – The amount of hose and number/size of pumps needed to attempt to discharge water at a location which drains away from waterbodies or wetlands.

2. **Pump Intake** – Use floating suction hose or other similar measures to prevent sediment from being sucked from bottom of trench.

3. **Overwhelming Existing Drainage** – If the discharge (assumed to be clean) enters a stream, the flow added to the stream will not exceed 50 percent of the peak storm event flow (to prevent adding high water volumes to a small stream channel that causes erosion due to imposing high flow conditions on the stream).

4. **Filtering Mechanism** – All dewatering discharges will be directed through a filtering device as indicated below. Additional information on the different types of dewatering structures that may be used depending on site-specific conditions and discharge volume are described in the Enbridge's SWPPP. The SWPPP also describes the procedures that Enbridge Environment will utilize to identify the appropriate dewatering structure.

   a. Well-Vegetated Upland Area – Water can be directed to a well-vegetated upland area through a geotextile filter bag (Figure 43). Geotextile bags need to be sized appropriately for the discharge flow and suspended sediment particle size.

   b. Straw/Hay Bale Dewatering Structure – Where the dewatering discharge point cannot be located in an upland area due to site conditions and/or distance, the discharge should be directed into a straw or hay bale dewatering structure. The size of the straw or hay bale dewatering structure is dependent on the maximum water discharge rate (refer to Figure 44). A straw or hay bale dewatering structure will be used in conjunction with a geotextile filter bag to provide additional filtration near sensitive resource areas.

   c. Stormwater Pond – When dewatering from pump station pits, Enbridge will discharge to a stormwater pond wherever feasible and as approved by the appropriate permits.

   d. Alternative dewatering methods – Alternative methods may be approved by Enbridge on a site-specific basis (e.g., portable sand filter) in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity and as described in Enbridge's SWPPP.

5.1.1 Flow Measurement and Water Sampling

Enbridge will maintain logs of daily use totals at each water source and will provide logs for periodic reporting as required by the applicable agency. The volume may be determined using a timing device, flow meter, or equivalent method, as approved by Enbridge or specified by applicable permit conditions.

Samples of the water discharged will be sampled if required by Tribal permits and/or state-issued discharge permits.

5.1.2 Regulatory Notification and Reporting

Enbridge will notify and submit reports to appropriate Tribal, state, and federal agencies as required by all permits/authorizations.

5.2 HYDROSTATIC TEST DISCHARGES

Hydrostatic testing will be done to verify that there are no flaws in the pipe or welds. Hydrostatic testing involves filling the new pipeline segments with water acquired in accordance with applicable permits (refer to Section 6.0), raising the internal pressure level, and holding that pressure for a specific period of time per U.S. DOT Pipeline and Hazardous Materials Safety Administration ("PHMSA") specifications. The number of mainline spread segments are governed by PHMSA specifications as well as internal Enbridge specifications (e.g., elevation differences between segments require that test sections be broken up in certain areas).

Hydrostatic pre-tests will be performed on pre-built HDD sections prior to installation. HDD segments will be tested again post-installation and tie-in as part of the mainline hydrostatic test section.

Hydrostatic testing will be conducted in accordance with applicable appropriation and discharge permits and leases obtained by Enbridge. Hydrostatic test waters will not be transferred from one waterbody to another. After the hydrostatic test is complete, Enbridge Construction Management, in collaboration with Enbridge Environment will determine if discharge activities can proceed in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. Then the line will be depressurized and the water discharged according to applicable permits.

Procedures for winter hydrostatic testing are described in Enbridge's Winter Construction Plan.

5.2.1 Refueling

The operation and refueling of hydrostatic test equipment will be in accordance with the conditions outlined in Section 10.0.

5.2.2 Siting of Test Manifolds

Hydrostatic test manifolds will be installed where necessary to ensure proper test pressures and incorporate changes due to topography. Where feasible, Enbridge will incorporate minor adjustments to the test manifold locations to avoid placement in wetlands and riparian areas. However, completely avoiding the placement of a test manifold in a wetland may not always be possible. Enbridge will install appropriate erosion and sediment control BMP measures where the EI determines they are necessary.

5.2.3 Water Sampling

Water discharged from hydrostatic tests will be sampled as required by federal-, Tribal- and state-issued appropriation or discharge permits. Sampling parameters and methodology are described in the applicable permits. Enbridge will be responsible for recording water volumes and flow rates.

5.2.4 Hydrostatic Testing Procedures

5.2.4.1 Mainline Hydrostatic Testing

Prior to hydrostatic testing the pipeline, Enbridge will prepare the pipe by removing accumulated construction debris, mill scale, dirt, and dust using a cleaning pig[4] that is moved by compressed air. Cleaning water and debris removed from the pipe will be disposed of off-site in accordance with applicable permits. Once the pipe has been cleaned, hydrostatic test manifolds are welded to each end of the pipeline test section. The pipeline is then filled with test water from an approved water source (see Section 6.0). Once the pipeline test section is filled, the pipeline is pressurized to a specific pressure and maintained for a minimum of 8 hours.

Once the testing procedure is complete, the hydrostatic test section will be depressurized and the water is drained from the pipeline through a pipe/hose connected to the test header to water containment tanks known as frac tanks, which allow for the settling of residual fines that may still be present in the test water. The water will then be run through a filtration system and discharged back to the source water or discharged to a well-vegetated, upland area with an appropriate dewatering structure such as a geotextile filter bag and/or a hay bale structure that will be lined with geotextile fabric to allow for infiltration. Enbridge has screened the soil conditions, topography, and other factors to identify areas suitable for infiltration. Direct discharges to surface waters, if allowed by permit, will be directed into an energy dissipation device such as a splash pup (see Figures 45 and 46).

After dewatering the pipe, Enbridge will conduct drying runs using foam or solid cup type pigs to remove all the free (residual) water from the pipeline as practical. The incidental volume of water collected from the drying runs will be allowed to infiltrate into the trench.

At no time will the discharge rate exceed the applicable discharge rates specified in federal-, Tribal- or state-issued or other discharge permits or leases. In the event no maximum discharge rate is identified, discharges will be monitored and adjusted as necessary to avoid scouring, erosion, or sediment transport from the discharge location. Visual observations will be performed for all hydrostatic test discharge events.

To minimize the potential for introduction and/or spread of invasive and noxious species due to hydrostatic testing activities, Enbridge will follow the procedures outlined in the Invasive and Noxious Species Management Plan (Appendix B). If water is reused to test multiple test sections, it will be relayed back to the source water through the pipeline for final discharge or discharged to an upland area for infiltration in accordance with applicable permits. Test water will not be discharged to a waterbody other than the appropriation source, unless coordinated and permitted through the applicable agencies.

[4] A pipeline “pig” is the acronym for pipeline inspection gauge. Pipeline inspection gauges have a variety of applications including, but not limited to, cleaning the pipeline, dewatering and drying post hydrostatic testing to prepare the pipeline to accept product, and working as an in-line inspection tool to identify pipeline anomalies prior to and during in-service use.

5.2.4.2 HDD Hydrostatic Testing

HDD test sections are hydrostatically tested in much the same manner as detailed above. The primary differences between the procedures are that:

- cleaning pigs and rinses may not be implemented on HDD pre-tests, except where required in applicable permits; and

- HDD test sections are hydrostatically tested for a minimum of 4 hours prior to the installation or pullback of the pipe and then tested again with the mainline once they are tied-in.

Frac tanks may or may not be used for HDD discharges depending on water volumes and whether or not discharge rates need to be reduced. Infiltration areas used for HDD pre-test discharges will be constructed and operated in accordance with applicable permits and licenses.

5.2.5 Flow Measurement

The total volume of water discharged will be determined with a flow meter (or equivalent), or as required by the applicable permit. The total volume of water discharged will not exceed the volume specified in the applicable permit.

6.0 WATER APPROPRIATION

6.1 GENERAL

Water may be drawn from local sources, such as lakes, streams, and private or municipal wells, for construction activities such as fugitive dust control, HDD drilling mud, buoyancy control, trench dewatering, and hydrostatic testing. The Project will follow applicable permit conditions for the appropriation of water and will only utilize sources approved by the applicable agencies. Refer to Enbridge's Fugitive Dust Control Plan for a description of the procedures that will be utilized for dust suppression on the construction ROW and access roads.

For appropriation from surface waters, Enbridge will install a mesh screen sized as approved by the applicable agencies on the intake hose to prevent fish entrainment.[5] The intake hose will be managed to minimize sediment intake from the waterbody bed. During withdrawal, adequate waterbody flow rates and volumes will be maintained to protect aquatic life and allow for downstream uses. If the waterbody does not have adequate water flow, an alternative agency-approved source will be used. The volume and rate of withdrawal will be monitored to comply with applicable permit conditions.

6.2 WATER SOURCES

Water will only be withdrawn from agency-approved sources and in accordance with applicable permits. Water will not be transferred from one waterbody to another. No additives to the water are permitted unless written approval is received from Enbridge and applicable permits authorize such additives.

If surface water appropriation is scheduled to occur during possible periods of low flow, a backup source will be identified. Procedures for winter water appropriation are described in Enbridge's Winter Construction Plan.

6.3 FLOW MEASUREMENT

At no time will the withdrawal rate for the water source exceed the rate specified in the applicable permits.

Enbridge will measure and document the withdrawal rate and total volumes of water appropriated with a flow meter (or equivalent), as required by the applicable permits.

6.4 WATER SAMPLING

Where required by permit conditions, Enbridge will sample the water during appropriation. Sampling parameters and methodology are described in the applicable permits.

[5] Mesh screens will be sized to 3/16-inch in Minnesota, 0.25-inch in North Dakota, and 1-inch or less in Wisconsin.

6.5 REGULATORY NOTIFICATION AND REPORTING

Enbridge will notify appropriate agencies of the time of appropriations if required by the state appropriations permits. Enbridge will submit reports regarding the volume and quality of the water withdrawn if required by the applicable permits.

7.0 REVEGETATION AND MONITORING

This section was developed based on the Minnesota Board of Water & Soil Resources ("BWSR") Native Vegetation Establishment and Enhancement Guidelines (2019), and the Minnesota Wetland Restoration Guide (BWSR, 2014). Project-specific permit conditions and landowner requests (with exception to wetlands) for specific seed mixes (as indicated in the Project CLL) take precedence over the measures described in this section.

7.1 SITE PREPARATION

Site preparation involves the following steps:

- Seed bed preparation;
- Planting of temporary cover crops (if appropriate);
- Installation of permanent erosion and sediment control BMPs; and
- Mulching.

7.1.1 Seed Bed Preparation and Seeding Procedures

After final grading and before topsoil replacement, Enbridge will decompact the subsoil in actively cultivated areas and in non-agricultural areas (as directed by Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity) to relieve soil compaction and promote root penetration as described in Section 1.18. Decompaction will not be conducted in non-farmed wetlands or MDNR-Administered Lands without prior approval from the agency.

After topsoil replacement, the soil will be tilled with a disc or rolling harrow, field cultivator, or chisel plow (or equivalent) to break up large clods and to prepare the soil surface. Suitable conditions generally include a firm soil surface that is not too loose or too compacted and will be prepared to accommodate the seeding equipment and method to be used (see Section 7.4).

Tillage and equipment operations related to seeding and mulching will be performed parallel to ground contours as much as practicable. Fertilizer and other soil amendments, if required, will be incorporated into the soil during seedbed preparation as specified by Enbridge in the Project-specific CLL requirements and permits in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. No soil amendments will be applied in wetlands unless directed by the appropriate agencies.

7.1.2 Temporary Revegetation

Enbridge's temporary seed mixes (refer to Appendix C) were developed based on Minnesota BWSR seed mixes. The use of short-lived temporary cover crops (refer to Table 7.1-1) helps stabilize project sites and minimize the need for additional mulch in preparation of planning native seed mixes. Unless specifically requested by landowners or land managing agencies, Enbridge does not intend to establish temporary vegetation in actively cultivated land, standing water wetlands, and/or other standing water areas.

Table 7.1-1
Temporary Cover Crops

Seed	Seeding Rate [a]
Oats	80-100 pounds/acre
Winter Wheat	75-100 pounds/acre
Soil Building Cover Crop (field pea/oats)	110 pounds/acre

[a] Seed rates are based on drill seed application and will vary based on site-specific conditions.
Source: BWSR, 2019.

If temporary cover crops are being used to stabilize slopes between 5 to 10 percent, the seeding rate should be increased by 35 pounds/acre. If slopes are greater than 10 percent, the seeding rate should be increased by 56 pounds/acre.

7.1.2.1 Timing for Temporary Vegetation

Generally, oats will be used for spring or summer revegetation, and winter wheat will be used in the fall. Temporary vegetation should be established at any time between **April 1 and October 15 or frozen soil**. Attempts at temporary revegetation after this date should be assessed on a site-specific basis and with approval from Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity (refer to Section 7.3.1). Refer to Section 1.9.1 for temporary stabilization timing requirements.

7.1.3 Permanent Erosion and Sediment Control Best Management Practices

Permanent erosion and sediment control BMP measures will be installed as described in Section 1.17. These controls will be left in place permanently and will not be removed following restoration.

7.1.4 Mulch

Mulch will be applied as described in Section 1.9.2.

7.1.5 Soil Amendments

Soil amendments may be applied to agricultural, pasture, and/or residential lands if requested by landowners and/or land managing agencies. Enbridge will apply phosphate-free fertilizers to areas within 100 feet of a waterway if soil amendments are required.

7.2 PROJECT SEED SPECIFICATIONS

Seed used will be purchased on a “Pure Live Seed” (“PLS”) basis for seeding (both temporary and permanent) revegetation areas. Proposed seed sources will be submitted to Enbridge for review and approval prior to seed purchase in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. Enbridge will arrange for the appropriate storage of the seed. Enbridge will utilize yellow tag seed, which is certified by the Minnesota Crop Improvement Association, when it is available. Seed tags will identify:

- name of mixture;
- lot number;

- weed seed percentage;
- other crop percentage;
- inert matter percentage;
- noxious weeds by name and number per pound;
- net weight; and
- labeler's name and address.

In addition, for each component in the mix the following information must be included on the label:

- kind;
- variety;
- pure seed percentage;
- germination percentage;
- hard seed percentage;
- dormant seed percentage;
- total viable percentage;
- origin; and
- test date.

Seed will be used within 5, 12, or 15 months of testing as required by applicable federal, Tribal, and state laws and regulations. The seed tags on the seed sacks will also certify that the seed is "Noxious Weed: None Found." The label must show any noxious weed seed by name and number per pound. If none were found in testing, then the label should state "Noxious Weeds: None Found." Any *Amaranthus* seeds found in the purity and/or noxious exam must be tested using a genetic test to determine if Palmer amaranth is present. If Palmer amaranth is identified in testing, the seed is not legal for sale in Minnesota. Seed rates used on the Project will be based on PLS rate, not actual weight basis. Therefore, to determine the correct application rate if not indicated on the seed tag, a correction calculation will be performed based the purity and total germination.[6] For example, a seed mix that has a specified 10 pounds PLS per acre, 95 percent total germination rate, and is 80 percent pure needs to be applied at the following rate:

(95% total germination × 80% purity)/100 = 76% PLS
10 pounds PLS per acre/.76% PLS = 13.2 pounds per acre actual seeding rate

The species components of individual mixes are subject to availability at the time of purchase. Grass species may be substituted with alternative native or non-invasive species that are included in the Natural Resources Conservation Service guidelines and subject to approval by Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity. Any seed substitution must meet all the Project requirements as outlined. The seed tag must always reflect the species in the container and reflect any substitutions.

Seed tags will be collected during seeding activities. The tags will be reviewed by the EI prior to installation to ensure that the seed mix complies with regulatory and Enbridge specifications and

[6] Percent total germination = (germination + hard seed + dormant).

that it is being applied to the correct location. Seed tags will be maintained for a minimum of 2 years after seeding along with planting records for each specific location. If bulk delivery of seed is made, the above information will still be made available to Enbridge. Off-loading/on-loading of seed will not be performed in a designated wetland area. Enbridge will notify the Minnesota Department of Agriculture, Minnesota Seed Regulatory Program Coordinator so that seed lots may be sampled and tested to confirm compliance with Minnesota Seed Law, as necessary.

Legume seed (if used) will be treated with an inoculant specific to the species and in accordance with the manufacturer's recommended rate of inoculant appropriate for the seeding method (broadcast, drill, or hydroseeding).

7.3 SEEDING PERIODS

Recommended seeding dates in Table 7.3-1 are based on the Minnesota BWSR Planting Date Guidance (2019). The dates below describe the conditions that favor establishment of various seed types.

Table 7.3-1
Recommended Seeding Dates

Species Type and Season of Planting	Spring/Early Summer (see date below)	Mid-Summer Jun 30-Aug 1	Early Fall Aug 1-Sept 10	Mid-Fall Sept 10-Oct 15	Late Fall (Dormant Seeding) Oct 15-Frozen Soil	Frost Seeding Feb 15-Apr 7
Cool-season Prairie Grasses	Apr 1-Jun 15	Not Recommended				
Warm-season Prairie Grasses	May 15-Jun 30		*	*		
Prairie Sedges and Forbs	May 15-Jun 30		*	*		
Wetland Grasses	Apr 1-Jun 30	Not Recommended		*		
Wetland Sedges and Forbs	Apr 1-June 30	Not Recommended		*		
State Native Construction Mix	Apr 1-Jun 15		*	*		
Oats Temporary Cover	Apr 1-Jun 15			*	*	*
Winter Wheat Temporary Cover	Not Recommended	*			*	*

Source: BWSR, 2019

Legend

High Success	Notes: Late fall dormant planting can be conducted earlier if National Weather Service soil temperature data is showing a consistent soil temperature below 40 degrees Fahrenheit for cool-season grasses and legumes or below 50 degrees Fahrenheit for native warm season grasses, forbs, and legume.
Medium Success	
Not Recommended without Watering or Favorable Weather Conditions	
*Low Success	

Enbridge will delay seeding during frozen ground conditions until the applicable spring seeding period or will complete dormant seeding where conditions allow (refer to Section 7.3.1). Enbridge will install temporary erosion and sediment control BMPs during frozen conditions.

7.3.1 Dormant/Winter Seeding

Dormant seeding is a method used after soil temperatures have cooled to 40 degrees Fahrenheit or cooler to prevent seed germination of cool-season grasses and legumes, and 50 degrees Fahrenheit or below for native warm season grasses, forbs, and legumes (BWSR, 2019). Dormant seeding is only practicable if the soil is not frozen and is preferably done before the first snowfall as the snow cover will prevent loss of seeds from wind and birds (BWSR, 2014). Procedures for applying soil amendments, seedbed preparation, seeding, and mulching are the same as outlined for permanent revegetation in Sections 7.1, and 7.2.

Winter or snow seeding can be implemented during early or late winter when there is less than 1 foot of snow and on a sunny day when seed can move into the soil surface (BWSR, 2019). The freeze/thaw action helps to set the seed firmly in the soil to prepare for spring growth. The seed bed must have been previously prepared for winter seeding to be successful, and it is not recommended for areas prone to spring flooding or running water (BWSR, 2014).

Where dormant or winter seeding is conducted, one or more of the following temporary erosion and sediment control BMPs will be put in place over the freshly seeded area unless the local soil conservation authority, landowner, or land managing agency specifies otherwise. The temporary measures will be in place within 48 hours of seeding, and are as follows:

- certified weed-free straw or hay mulch, at 90 percent cover, anchored;
- hydromulch, according to supplier specifications; and/or
- erosion control blanket.

Additional erosion and sediment control BMPs will be applied as requested by the EI.

7.4 SEEDING METHODS

Seed will be applied uniformly at specified rates across the prepared construction workspace by drilling, broadcasting, hydroseeding, or air seeding. The EI will suspend seeding activities if conditions are such that equipment will cause rutting of the surface in the designated seeding areas. Enbridge will continue to monitor construction workspace conditions to resume seeding activities as site conditions improve and according to the general seeding timing restrictions listed in Section 7.3.

7.4.1 Drill Seeding

The seeding rates provided with the seed mixes in Appendix C are based on seed drill application. Seed drills are commonly used, particularly where additional soil disturbance may cause erosion or weed germination. Advantages of this method include:

- more predictable results when correctly calibrated;
- seed placement below the surface protects the seed resulting in high germination rates;
- tilling prior to seeding is not required; and
- no disturbance of the existing vegetation.

However, there are limitations to where seed drills can be used, very clean seed is needed to avoid clogging the drill, and drills cannot be used for winter seeding. Seed drills also tend to favor the germination of grasses over forbs (BWSR, 2014).

A smooth, firm seedbed is required for this method. Recently tilled sites may require additional treatment such as disc harrowing and rolling to prepare an adequate seedbed and prevent seed from being buried too deep (BWSR, 2014 and 2019). Seeding equipment will be capable of uniformly distributing the seed and sowing it at the required depth. Drills will be equipped with a feeding mechanism that will provide a uniform flow of seed at the desired application rate. Double-disc furrow openers equipped with depth bands and packer wheels to firm the soil over the seed will be used where practicable.

7.4.2 Broadcast Seeding

Broadcast seeding can be applied to a wide range of surfaces and is the most common method of seeding wetlands. Broadcast seeding rate will increase the drill-seeding rate by approximately 10 to 20 percent depending on site-specific conditions. Seed will be uniformly distributed by a mechanical or hand operated seeder by making two or three passes at right angles to ensure the entire site has been seeded. Following seeding, cultipacking, harrowing, rolling, mulching, or hand raking will be used where conditions allow to keep the seeds in place, except when late fall or winter seeding and snow will promote seed to soil contact. Seed will not be buried deeper than one-half inch and small seed will be at the surface. Enbridge will allow the soil to settle after disking or cultipacking the site to smooth the seedbed. Winter broadcast seeding may be conducted if site conditions are appropriate to ensure adequate soil moisture and minimize loss from wind, birds and rodents (BWSR, 2014 and 2019) (see Section 7.3.1).

7.4.3 Hydroseeding

Hydroseeding is a preferred option for situations where hydrology conditions do not allow for the use of broadcast seeding equipment and seed can be directed on to a site with a hydroseeder. The seedbed must be loosened to allow spaces for seed to make good contact with the soil to prevent washing. Hydroseeding rate will increase the drill seeding rate by 10 to 20 percent depending on site-specific conditions, or the same as broadcast seeding rate. Seed will be applied alone or in a seed, fertilizer, and/or hydromulch slurry. If seeding is applied alone, the amount of hydromulch material will be adjusted to the seed slurry to show where seeding has taken place, providing a means to identify uniform cover of the construction workspace. Hydroseeders will provide continuous agitation and be capable of supplying a continuous, non-fluctuating flow of slurry. Enbridge will pre-approve all hydromulch products, which must be on the applicable state DOT product list. Hydromulch and liquid tackifier products containing plastic/polypropylene fiber additives and Malachite Green (colorant) will not be utilized on this Project.

7.5 PERMANENT REVEGETATION

Permanent vegetation will be established in areas disturbed within the construction work area (permanent easement, TWS, and ATWS) except in actively cultivated areas and standing water wetlands. The seed mixes for permanent seeding include Minnesota state seed mixes that have been developed for a variety of habitats with the intent to increase diversity, create competition for invasive species, and promote plant community resiliency (BWSR, 2019). Enbridge's seed mixes (refer to Appendix C) were selected to augment revegetation via natural recruitment from

native seed stock in the topsoil and are not intended to change the natural species composition. Rates provided are assumed for a drill application and will be adjusted based on the selected application described in Section 7.4 and site-specific conditions (e.g., slope).

7.5.1 Timing of Final Seeding and Stabilization

Upon final grading of the construction workspace, and upon the restoration of wetland and waterways, seeding and restoration/stabilization will occur according to the timelines presented in Section 1.16.1, if weather and soils conditions allow.

7.6 UPLAND CONSTRUCTION AREAS

Appendix C includes upland seed mixes for restoring disturbed woodland and prairie (grassland) areas affected by the Project. These mixes include species that will provide for effective erosion control and revegetation of the project area. These seed mixes will be used by Enbridge as the standard upland mixes unless an alternate seed mix is specified by a landowner or land managing agency.

7.7 PERMANENT SEEDING OF WETLAND AREAS

Enbridge will utilize the results of pre-construction wetland field delineations to identify the wetland type and associated plant communities, in addition to hydrological characteristics of the site. This information, along with site-specific conditions, will be utilized to determine the appropriate seed mix to install. No fertilizer, lime, or mulch will be applied in most wetlands, except peatlands as described in Section 7.7.3.

7.7.1 Sedge Meadows Fresh (Wet) Meadows, Wet to Wet-Mesic Prairies

These communities are generally saturated up to 1 foot of the surface and transition upslope into upland plant communities or downslope into other wetland types. Remnant seed banks can sometimes be relied upon for some species in these communities. The natural revegetation process will be encouraged by the seeds and rhizomes in the topsoil spread back over the construction workspace after pipe installation. Non-standing water wetlands in Minnesota will be seeded with the appropriate Emergent Wetland, Wet Meadow, or Wet Prairie seed mixes provided in Appendix C.

7.7.2 Shallow and Deep Marsh, and Shallow, Open Water Communities

Shallow marshes, deep marshes, and open water communities occur in areas with permanent to seasonal shallow water. The dominant vegetation type is emergent aquatic plants in shallow marshes with a transition to floating-leaved and submergent plants with increasing water depths (BWSR, 2019). Enbridge does not propose to seed standing water wetland areas. It is widely accepted that the reestablishment of vegetation within standing water wetlands occurs best through natural process without supplemental seeding, except where there is repeated disturbance or sediment accumulation (BWSR, 2019).

7.7.3 Peatland Communities

Peatlands include open and coniferous bogs that consist of water-saturated soils composed of partly decayed remains of plants. As discussed in Sections 3.5 and 3.6 and presented in

Figures 32 and 33, construction equipment will operate off of construction mats and topsoil removal will be limited to the trench line. Enbridge will separate approximately 1 foot of organic material or Sphagnum moss and store it separately from the subsoil. Once the trench has been backfilled, Enbridge will uniformly spread the previously segregated organic material or Sphagnum moss over the trench area. The application of straw mulch has been shown to improve Sphagnum moss establishment and survival by providing humid conditions. Enbridge will apply certified weed-free straw or hay at a rate of 1.5 tons/acre on top of the reintroduced Sphagnum moss where conditions allow (BWSR, 2014 and 2019).

7.7.4 Shrub and Forested Wetland Communities

Other than where applicable permits issued for the Project require specific restoration procedures, Enbridge proposes to allow natural reforestation of the TWS area within forested wetlands via stump sprouting, root sprouting, and natural recruitment.

7.8 PERMANENT SEEDING OF WATERBODY BANKS

Enbridge will reestablish stream bank vegetation using the BWSR Riparian seed mixes for the northeast or south and west regions unless an alternate seed mix is requested by applicable agencies. Additional vegetation requirements may also be contained within Project-specific permits. Where a waterbody is located within a wetland, Enbridge will re-seed the banks with the applicable wetland seed mix described in Section 7.7. Refer to Section 2.6 for permanent stabilization timing requirements of waterbodies.

7.9 SPECIALIZED SEED MIXES

Specialized seed mixes will be utilized for restoring areas discussed in the following sections.

7.9.1 Agricultural Ditches

Enbridge will utilize the BWSR Native Construction seed mix to restore the sides of agricultural ditches where appropriate based on site-specific conditions.

7.9.2 Eroding Bank Stabilization

Enbridge will utilize the BWSR Eroding Bank Stabilization pilot seed mix to restore and stabilize steep eroding slopes with early and late successional species where appropriate based on site-specific conditions.

7.9.3 Landowner Requests

Enbridge will provide other specialized seed mixes upon landowner request on a site-specific basis for agricultural and residential areas, which will be identified in the CLL:

- BWSR Conservation Grazing pilot seed mix for native prairie conservation grazing in the south and west Minnesota region;
- BWSR Native Forage Buffer pilot seed mix for haying once or twice per year;

- BWSR Beneficial Insects pilot seed mix to establish diverse vegetation for beneficial insects in agricultural areas for the south and west Minnesota region;

- Lawn mixes to reestablish residential lawns or other types of “turf-type” land cover; or

- Food plot mixes to provide a desirable food source for wildlife, specifically deer.

7.10 CONSERVATION RESERVE PROGRAM PROPERTIES

Enbridge’s Land Agents will contact landowners where the construction workspace crosses land enrolled in Conservation Reserve Program (“CRP”). Enbridge will work with the respective landowners to identify the parcel-specific CRP seed mixes. CRP lands will be seeded at the direction of the landowner per the site-specific landowner CRP requirements for that parcel and no non-CRP approved seed mix will be planted on CRP lands. CRP parcels will also be seeded with Enbridge’s temporary cover seed mix. Seed for CRP seeding will meet the same criteria as other seed described in Section 7.2.

7.11 MANAGEMENT AND MONITORING

Enbridge will monitor and address all areas where stabilization techniques have been implemented in accordance with conditions identified in the applicable Project permits and/or licenses, and Enbridge’s Post-Construction Monitoring Plan.

As described in Enbridge’s Invasive and Noxious Species Management Plan (Appendix B), Enbridge will take all necessary steps to ensure that invasive and noxious species and their propagating parts are not transferred from one location to another.

8.0 WINTER CONSTRUCTION

Enbridge has prepared a Winter Construction Plan that describes the construction procedures that will differ from the procedures outlined in this EPP during frozen conditions. The Winter Construction Plan describes procedures for the following:

- Identifying “winter” or “frozen” conditions;
- Construction of frost/ice roads;
- Snow removal;
- Bridges;
- Trenching and Topsoil Segregation;
- Backfilling;
- Waterbody Crossing Techniques (open cut, dry crossings, and HDDs);
- Trench Excavation, Lowering-In, and Backfill;
- Construction Dewatering;
- Hydrostatic Testing and Discharges;
- Drilling Fluid Response, Containment, and Notification Procedures; and
- Site Stabilization and Restoration.

9.0 WASTE MANAGEMENT

Enbridge will ensure proper handling, storage, and disposal of all solid and hazardous materials and wastes that are used or generated as a result of the Project. Enbridge will ensure that the materials and wastes associated with the Project are properly classified as hazardous materials and/or wastes in accordance with applicable federal and/or state criteria. Enbridge will ensure documentation is maintained to substantiate findings of the regulatory status of materials and/or wastes used and/or generated as a result of the Project.

Enbridge will ensure that all waste materials, including oil or other waste liquids generated as a result of Project work, are collected and placed into suitable DOT specification containers (i.e., labeled and meeting any relevant regulatory requirements). Enbridge will recycle wastes, such as motor oil, where there is an established recycling program available. Wastes such as grease or oily rags will be disposed of in accordance with state requirements. Throughout the duration of the Project, Enbridge will ensure areas are cleaned up and proper off-site disposal of all wastes generated during the Project within the time allowed by the regulations. No wastes will be left on Enbridge property, along the construction workspace, or buried in an excavation or otherwise disposed of on Enbridge property or ROW.

9.1 HAZARDOUS WASTES

Enbridge is responsible for ensuring that all workers are properly trained in the proper storage, handling and disposal of hazardous wastes generated during construction. Enbridge will ensure that any hazardous waste generated from materials brought on-site (e.g., paint cleanup solvents, waste paints) are properly collected, stored, and disposed of in accordance with all applicable regulations. Enbridge will ensure that wastes are properly classified per the federal and state hazardous waste regulations and are properly containerized, marked with start accumulate dates, labeled and, if liquid, stored on-site with secondary containment and otherwise managed in accordance with all U.S. Environmental Protection Agency and DOT regulatory requirements. Enbridge will ensure proper handling, storage, and disposal of the hazardous waste. Personnel will be prohibited from placing, spilling, or pouring wastes onto the ground. Any release of the hazardous waste, hazardous materials, or hazardous substances as a result of the improper handling, storage, or disposal will be rectified to the satisfaction of Enbridge and all applicable regulatory agencies. Enbridge is responsible for immediately reporting the spill as described in Section 10.8.

9.2 ABRASIVE BLAST DEBRIS

Enbridge will ensure that as much spent abrasive blast materials (sandblasting material) are contained and collected as practical and placed into appropriate containers. Enbridge will ensure containers are covered with appropriate means to prevent stormwater from entering the container or impacting stormwater runoff. Enbridge will ensure disposal of the spent abrasive in accordance with applicable federal, Tribal, state, and local regulatory requirements. Enbridge will ensure that spent abrasive is classified as a “hazardous” or “special” waste as defined by applicable federal and state regulations. If the spent abrasive is determined to be hazardous waste as a direct result of constituents of an Enbridge facility or equipment, Enbridge will coordinate proper disposal as previously discussed.

10.0 SPILL PREVENTION, CONTAINMENT, AND CONTROL MEASURES

This section describes planning, prevention, and control measures to minimize impacts resulting from spills of fuels, petroleum products, or other regulated substances as a result of construction.

In the event of a suspected Enbridge pipeline release (or from an adjacent pipeline), Enbridge's Emergency Pipeline Control Center will be notified at 1-800-858-5253 (24-hours/day), as well as the Enbridge EI. Actions requiring emergency response will be coordinated by Enbridge.

10.1 PLANNING AND PREVENTION

Enbridge requires proper planning and preventative measures be implemented to minimize the likelihood of spills, and to quickly and successfully clean up a spill should one occur.

This section sets forth minimum standards for handling and storing regulated substances and cleaning up spills. If the aggregate volume of petroleum stored in tanks and containers greater than or equal to 55 gallons will be equal to or more than 1,320 gallons for any site, Enbridge will prepare and implement a Spill Prevention, Containment, and Control ("SPCC") plan(s) that meets the requirements of 40 Code of Federal Regulations 112. This requirement also extends to any petroleum storage at Enbridge-managed construction yards.

Potential sources of construction-related spills include machinery and equipment failure, fuel handling, transfer accidents, and storage tank leaks. Enbridge will be responsible for implementing, at a minimum, the following planning and prevention measures.

10.2 ROLES AND RESPONSIBILITIES

10.2.1 Spill Coordinator

A Spill Coordinator will be designated and approved by Enbridge. For all construction related spills, the Spill Coordinator will:

- report all spills to the Enbridge Representative immediately;
- in Minnesota, pursuant to Minnesota Statute Section 115.061, report discharges ("spills") of any material that may cause pollution of state waters immediately to the Minnesota Duty Officer (1-800-422-0798 or 651-649-5451) (see Appendix D);
- within the exterior boundaries of the FdL Reservation, report spills immediately to the FdL Resource Department (1-800-424-8802) (see Appendix D);
- in North Dakota, report discharges immediately to the North Dakota Department of Health or the North Dakota Hazardous Materials Emergency Assistance and Releases Reporting (1-800-472-2121 or 1-701-328-2121) (see Appendix D);
- in Wisconsin, report spills immediately to the Wisconsin Department of Natural Resources (1-800-943-0003);

- report spills to other appropriate federal, Tribal, state, and local agencies as required and described in Appendix D;

- mobilize on-site personnel, equipment, and materials for containment and/or cleanup commensurate with the extent of the spill;

- assist the Emergency Response Contractor (refer to a list of potential contractors provided in Appendix E) and monitor containment procedures to ensure that the actions are consistent with the requirements of this section;

- in consultation with Enbridge and appropriate agencies, determine when it is necessary to evacuate spill sites to safeguard human health;

- in consultation with Enbridge, coordinate with appropriate agencies the need to contact additional parties or agencies;

- complete a Spill Report Form within 24 hours of the occurrence of a spill, regardless of the size of the spill; and

- Prepare and administer the SPCC plan(s) prepared for storage of petroleum on Enbridge sites, if applicable.

10.2.2 Environmental Inspector

The EI will monitor compliance with the provisions of this section to ensure that appropriate agency notifications are made, spill resources are allocated, and cleanup is accomplished in accordance with applicable agency requirements

10.2.3 Authorized Personnel

Authorized Personnel are designated to handle fuel, lubricants, or other regulated substances. Authorized Personnel will be familiar with the requirements of this section and the consequences of non-compliance.

10.2.4 Construction Superintendent

The Contractor's Construction Superintendent or representative will notify the EI immediately of any spill of a petroleum product or hazardous liquid, regardless of volume.

10.2.5 Construction Personnel

Construction Personnel will notify the crew foreman or Spill Coordinator immediately of any spill of a petroleum product or hazardous liquid, regardless of volume.

10.3 TRAINING

Enbridge will train all employees handling fuels and other regulated substances to follow spill prevention procedures. Enbridge will train all employees who handle fuels and other regulated substances to prevent spills and to quickly and effectively contain and clean up spills that may occur in accordance with applicable regulations.

10.4 SPILL AND FUELING EQUIPMENT

- Each construction crew will have adequate absorbent materials and containment booms on hand, to enable the rapid cleanup of any spill that may occur.

- Enbridge will maintain spill kits containing a sufficient quantity of absorbent and barrier materials to adequately contain and recover foreseeable spills. These kits may include, but are not limited to, absorbent pads, straw bales, absorbent clay, sawdust, floor-drying agents, spill containment barriers, plastic sheeting, skimmer pumps, and holding tanks. This equipment will be located near fuel storage areas, near each waterbody crossing, and at other locations as necessary to be readily available to control foreseeable spills.

- Suitable plastic lining materials will be available for placement below and on top of temporarily stored contaminated soils and materials.

- All fueling vehicles, and where necessary, service vehicles, will carry materials adequate to control foreseeable spills. Such material may include, but not be limited to, absorbent pads, commercial absorbent material, plastic bags with ties, and shovels.

- The Spill Coordinator will inform the Authorized Personnel, Construction Personnel, and the EIs of the locations of spill control equipment and materials and have them readily accessible during construction activity. Spill kits should be clearly labeled for quick and easy identification in the field.

- All fuel nozzles will be equipped with functional automatic shut-offs.

- Mobile refuelers transporting fuel to on-site construction equipment will travel only on approved access roads.

10.5 SUPERVISION AND INSPECTION

Enbridge will perform a pre-construction inspection and test of all equipment to ensure that it is in good repair. During construction, Enbridge will regularly inspect hoses, pipes, valves, containers, and tanks to ensure equipment is in good condition, compatible with the substance stored, and is free of leaks, dents, or other defects. Any equipment that is found to be leaking or in need of repair or replacement will be immediately removed from service and repaired or replaced, prior to resuming work.

10.6 STORAGE AND HANDLING OF FUELS/HAZARDOUS LIQUIDS

10.6.1 Fuel Storage – General

Enbridge will follow proper fuel storage practices, including, but not limited to the following:

- Fuel storage will be at Contractor yards only or as approved by Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity.

- Proper signage at and adjacent to fuel storage areas to include “Fuel Storage Area – No Smoking within 50 feet.”

- Tools and materials needed for maintenance will be kept on-site. Such equipment may include, but not be limited to, plugs of various sizes, 3M tank patches, a hammer, assorted sizes of metal screws with rubber washers, a screwdriver, and plastic tape.

- Fuels, lubricants, waste oil, and any other regulated substances will not be stored in underground storage tanks.

- Storage tanks and containers will conform to all applicable industry codes (e.g., Steel Tank Institute, National Fire Protection Association, Unified Facilities Criteria).

- A suitable secondary containment structure or double-walled tank will be utilized at each fuel storage site. Secondary containment structures will be lined with suitable material (including plastic sheeting) and provide a minimum containment volume equal to 150 percent of the volume of the largest storage vessel.

- Secondary containment areas will not have drains. Precipitation may be drawn off as necessary. If visual inspection indicates that no spillage has occurred in the secondary containment structure, accumulated water may be drawn off and discharged in accordance with Section 5.0. If spillage has occurred in the structure or if visible sheen is present, accumulated waste will be drawn off and pumped into drum storage for appropriate off-site management.

10.6.2 Refueling

All fuel dispensing operations will be attended by Authorized Personnel at all times. Authorized Personnel will be stationed at both ends of the hose during fueling unless both ends are visible and are readily accessible by one person.

10.6.3 Refueling, Maintenance, and Fuel Storage Near Wetlands and Waterbodies

Enbridge requires that the storage of petroleum products, refueling, maintenance, and lubricating operations take place in upland areas that are more than 100 feet from wetlands, streams, and waterbodies (including drainage ditches), and water supply wells. In addition, the Contractor will store hazardous materials, chemicals, fuel, lubricating oils, and used oil, and perform concrete coating activities, outside these areas.

In certain instances, refueling or fuel storage within these areas may be unavoidable due to site-specific conditions or unique construction requirements (e.g., continuously operating pumps or equipment on barges). These locations will be approved in advance by the EI. Site-specific precautions, in addition to those practices described above, will be taken when refueling or maintenance activities are required within 100 feet of streams, wetlands, or other waterbodies. These precautions include, but are not limited to:

- adequate amounts of absorbent materials and containment booms will be kept on hand by each construction crew to enable the rapid cleanup of any spill which may occur;

- if fuel will be stored within wetlands or near streams for refueling of continuously operating pumps, secondary containment will be used;

- secondary containment structures will be lined with suitable plastic sheeting, provide a containment volume of at least 150 percent of the storage vessel, and allow for at least 1 foot of freeboard; and

- adequate lighting will be provided for these locations and activities.

10.6.4 Overnight Parking

Overnight parking of equipment (including, but not limited to, light plants, generators, pumps, and machinery) is not allowed within 100 feet of a wetland or waterbody unless special containment provisions have been implemented and approved by the EI in advance.

10.7 INITIAL SPILL MANAGEMENT

10.7.1 Immediate Response

Immediately upon discovery of any release of fuel, oil, hazardous material, or other regulated substance, or upon learning of conditions that will lead to an imminent spill, the person discovering the situation will:

- in Minnesota, pursuant to Minnesota Statute Section 115.061, report discharges ("spills") of any material that may cause pollution of state waters immediately to the Minnesota Duty Officer (1-800-422-0798 or 651-649-5451) (see Appendix D);

- within the exterior boundaries of the FdL Reservation, report spills immediately to the FdL Resource Department (1-800-424-8802) (see Appendix D);

- in North Dakota, report discharges immediately to the North Dakota Department of Health or the North Dakota Hazardous Materials Emergency Assistance and Releases Reporting (1-800-472-2121 or 1-701-328-2121) (see Appendix D);

- in Wisconsin, report spills immediately to the Wisconsin Department of Natural Resources (1-800-943-0003);

- report spills to other appropriate federal, Tribal, state, and local agencies as required and described in Appendix D;

- if safe to do so, initiate actions to contain the fluid that has spilled or is about to spill, and initiate action to eliminate the source of the spill; and

- notify the crew foreman and/or the Spill Coordinator and provide them with the following information:

    - location and cause of the spill;
    - the type of material that has spilled; and
    - whether the spill has reached or is likely to reach any surface water.

Upon learning of a spill or a potential spill the Spill Coordinator will:

- assess the situation and determine the need for further action;

- direct subsequent activities and/or further assign responsibilities to other personnel; and
- notify the EI.

10.7.2 Mobilization

The Spill Coordinator will mobilize on-site personnel, equipment, and materials for containment and/or cleanup commensurate with the extent of the spill. If the Spill Coordinator feels that a spill is beyond the scope of on-site equipment and personnel, the Spill Coordinator will immediately notify the Construction Superintendent that an Emergency Response Contractor is needed to contain and/or clean up the spill. Appendix E contains a list of potential Emergency Response Contractors. The Spill Coordinator will assist the Emergency Response Contractor and monitor containment procedures to ensure that the actions are consistent with the requirements of this section.

10.8 SPILL NOTIFICATION RESPONSIBILITIES

10.8.1 Notification Volumes

The Contractor's Construction Superintendent or representative will notify the Enbridge Representative and the EI immediately of any spill of a petroleum product or hazardous liquid, regardless of volume.

10.8.2 Spill Report Form

The Spill Coordinator will complete a Spill Report Form for each release of a regulated substance, regardless of volume. The Spill Report Form will be submitted to the EI within 24 hours of the occurrence of a spill. Follow-up written reports, associated laboratory analyses, and other documentation may also be required separately on a site-specific basis as directed by the EI.

10.8.3 Agency Notification

Enbridge will report spills to appropriate federal, Tribal, state, and local agencies immediately (or within the specific agency's required reporting thresholds if not immediate). A listing of federal, Tribal, state, and local agencies including reporting thresholds and timeframes is provided in Appendix D.

Enbridge, in coordination with the appropriate federal, Tribal, state, and local agencies will ensure that additional parties or agencies are properly notified. Additionally, Enbridge will ensure that all cleanup, monitoring, remediation, and reporting activities required by a jurisdictional agency are satisfactorily met and will maintain documentation to demonstrate this compliance.

10.9 SPILL CONTAINMENT, RESPONSE, AND REMEDIATION

In the event of a release, Enbridge will abide by all applicable federal, Tribal, state and local regulations with respect to responding to and remediating the spill. Specific cleanup measures for both upland and wetland/waterbody spills are described below.

10.9.1 Spill Control – Upland Areas

- If a spill should occur during refueling operations, STOP the operation until the spill is controlled and the situation corrected.

- The source of the spill shall be identified and contained immediately.

- For large releases that occur on land (i.e., above the reportable limits as described in Appendix D), the spilled material will be contained and recovered immediately. Enbridge or, if necessary, an Emergency Response Contractor, will excavate contaminated soil.

- The recovered material and contaminated soil and other contaminated media will be treated and/or disposed of in accordance with all applicable federal, Tribal, state, and local agency requirements and Section 9.0.

- Smaller releases on land (i.e., below the reportable limits as described in Appendix D) shall be cleaned up with absorbent materials. Contaminated soil or other materials associated with these releases shall be collected and managed in accordance with applicable regulations and Section 9.0.

- To the best of ability, flowing spills will be contained and/or absorbed before reaching surface waters or wetlands.

- Absorbent material(s) will be placed over spills to minimize spreading and to reduce penetration into the soil.

- The Spill Coordinator, in consultation with the EI and appropriate agencies, will determine when spill sites will be evacuated as necessary to safeguard human health. Evacuation parameters will include consideration for the potential of fire, explosion, and hazardous gases.

10.10 SPILL CONTROL – WETLANDS AND WATERBODIES

In addition to the above measures, the following conditions apply if a spill occurs near or into a wetland or waterbody, regardless of size:

- If a spill occurs during refueling operations, **STOP** the operation until the spill can be controlled and the situation corrected.

- Enbridge will use absorbent booms and pads to contain and recover released materials in standing water, and plastic bags for storage and disposal of used absorbent booms and pads.

- Enbridge will excavate contaminated soils from wetlands and temporarily place them on plastic sheeting in a bermed area, a minimum of 100 feet away from the wetland. Contaminated soils will be covered with plastic sheeting while being temporarily stored and properly managed as soon as possible, in accordance with Sections 9.0 and 10.11.

10.11 STORAGE AND DISPOSAL OF CONTAMINATED MATERIALS

- Appendix E lists potential treatment and disposal facilities for contaminated materials, petroleum products, and other construction-related wastes. Enbridge will recycle those wastes, such as motor oil, where there is an established recycling program available. Wastes such as grease or oily rags shall be disposed of in accordance with state requirements.

- Enbridge will store and dispose of all contaminated soils, absorbent materials, and other wastes in accordance with all applicable federal, Tribal, and state regulations.

- Only licensed carriers may be used to transport contaminated material from the site to a disposal facility.

- If it is necessary to temporarily store excavated soils on site, these materials will be placed on, and covered by, plastic sheeting, and the storage area bermed to prevent and contain runoff.

11.0 DRILLING FLUID RESPONSE, CONTAINMENT, AND NOTIFICATION PROCEDURES

Construction of a pipeline may include the use of trenchless pressurized methods known as the HDD method. Section 3.6 of the Summary of Construction Methods and Procedures (Appendix A) provides a detailed description of this method. Throughout this section, this method is also referred to as "drilling." The HDD method always includes the use of drilling fluid. The drilling fluid or water is pumped directly to the jets in the drill bit to help excavate the hole and minimize friction between the surrounding soils, creating a pressurized system. This differs from the horizontal bores described in Section 4.1 that may introduce drilling fluids but are non-pressurized and therefore will not have the potential for an inadvertent release outside of the bore pits. The HDD drilling fluids/mud consists primarily of water mixed with inert bentonite clay. Under certain conditions an additive may need to be mixed with the drilling fluids/mud for viscosity or lubricating reasons. Only agency-approved additives will be used and a Safety Data Sheet for the drilling fluid additives will be maintained on-site.

This section elaborates on measures to be implemented if an inadvertent release of drilling fluid occurs despite prevention efforts. Prior to the commencement of drilling operations, construction personnel involved will be informed as to the responsible party(ies) for release containment and response. Enbridge will ensure that the appropriate response personnel and containment equipment are on site for each drill. Enbridge will implement agency-approved Inadvertent Release Response Plans at each HDD location that describe the monitoring, containment, and recovery procedures based on site-specific conditions.

Procedures for HDD monitoring, containment, and recovery during frozen conditions are described in Enbridge's Winter Construction Plan.

11.1 ON-SITE INSPECTION DURING CONSTRUCTION

Early detection is key to minimizing the area of potential impact from an inadvertent release. During construction of a drilled crossing, Enbridge will monitor the pipeline route throughout the process, as follows:

- Enbridge will inform construction inspectors on what to watch for and will make them aware of the importance of timely detection and response actions to any release of drilling fluid.

- At least one full-time personnel will continuously monitor the drill path by inspecting land surfaces and the waterbodies for surface migration during drilling, reaming, and pipe installation procedures. The inspector will also walk the drill path to monitor for surface seepage, sinkholes, and settlement. In addition, a flowing stream shall be monitored both upstream and downstream of the drill path. If an inspector notices inadvertent return conditions, shutdown will occur immediately. Enbridge will provide adequate lighting of the drill path to allow for monitoring during 24-hour continuous operation.

- Construction inspectors will have appropriate, operational communication equipment (e.g., radio and cell phones) available at all times during installation of the HDD crossing, with the ability to communicate directly with the HDD operator.

- The HDD operator will monitor the annular drilling fluid pressures during pilot hole operations.

- If the HDD operator identifies a sustained loss in fluid pressure or loss of circulation:

    - Shutdown will occur immediately;

    - The operator will immediately notify the construction inspectors of the assumed position of the drill tool; and

    - Enbridge will visually monitor the appropriate portion of the drill path where the drill tool is located to determine if an inadvertent return occurred. Enbridge may perform this monitoring by walking or by using a boat, as appropriate.

- Construction inspectors, EI(s), or the Enbridge HDD on-site personnel have the authority to order installation of containment structures, if needed, and to require additional response measures if deemed appropriate.

- Enbridge will contact the appropriate agencies, including the Minnesota State Duty Officer, if the release occurs in the State of Minnesota, immediately of a surface inadvertent release (refer to Appendix D).

11.2 CONTAINMENT, RESPONSE, AND CLEANUP EQUIPMENT

Containment, response, and cleanup equipment will be available at both sides of an HDD crossing location prior to the commencement to assure a timely response in the event of an inadvertent release of drilling fluid. Containment and response equipment includes, but is not limited to:

- straw bales and staking;

- pre-filled sandbags;

- turbidity curtain (type to be specified in the site-specific Inadvertent Release Response Plans);

- silt fence;

- plastic sheeting and/or geotextile fabric;

- shovels, brooms, buckets, and other appropriate hand tools;

- pumps and sufficient hose;

- fluid storage tanks;

- vacuum truck on-site prior to and throughout the drill execution;

- one small boat (type/motorization to be specified in site-specific Inadvertent Release Response Plans);

- light plant/generator (only necessary where operations are conducted outside of daylight hours); and

- Any other equipment specified by Enbridge based on site visit and specified in the site-specific Inadvertent Release Response Plans.

11.3 RESPONSE

In the event an inadvertent drilling fluid release is observed, Enbridge will assess to determine the amount of fluid being released and potential for the release to reach sensitive resource areas (e.g., wetlands and waterbodies). Response measures will vary based on location of inadvertent release as discussed below. The location of the inadvertent release will be documented by the EI with the site name, size of release, initial date of release, and GPS location. The EI will photograph the release site and include with the daily inspection report. Enbridge will coordinate containment, response, cleanup and reporting activities with the applicable agencies.

If a release were to occur outside of the authorized construction workspace, Enbridge will mobilize lightweight containment materials (e.g., straw bales, silt fence, sand bags) on foot to the release location to isolate the drilling fluid immediately. Once drilling fluid has been contained, Enbridge will determine if equipment access is necessary to aid in the response, and initiate agency consultations for developing alternate access, as necessary.

11.3.1 Upland Locations

Response measures in the event of a drilling fluid release in upland locations include the following:

- The EI will evaluate the release to determine if containment structures are warranted and if they will effectively contain the release.

- If the amount of the surface release is not great enough to allow the practical physical collection from the affected area, it will be diluted with clean water and/or the fluid will be allowed to dry and dissipate naturally.

- Earthen or sandbag berms, silt fence, and/or hay bales will be installed to contain small releases and prevent migration of drilling fluid.

- Enbridge will remove excess fluid at a rate sufficient to prevent an uncontrolled release.

- If the amount of the surface release exceeds that which can be completely contained with hand-placed barriers, collection sumps may be used (with approval from Enbridge) to remove released drilling fluid by the use of portable pumps and hoses.

- Enbridge will consult with the appropriate regulatory agencies to evaluate the circumstances of the release, discuss additional containment or cleanup requirements, and determine whether and under what conditions the HDD may proceed.

11.3.2 Wetland Locations

This section also applies to areas immediately adjacent to wetlands and waterbodies, such as stream banks or steep slopes, where drilling fluid releases could quickly reach surface waters.

In the event of a drilling fluid release in wetlands or adjacent areas:

- The EI will evaluate the release, and the appropriate containment measures will be implemented.
- Enbridge will evaluate the recovery measures to determine the most effective collection method.
- If the amount of the surface release exceeds that which can be contained with hand-placed barriers, small collection sumps (less than 5 cubic yards) may be utilized to collect released drilling fluid for removal by the use of portable pumps and hoses.
- Low ground pressure equipment (e.g., UTV, argo, morooka) will conduct limited passes to assist personnel carrying containment materials to the release location.
- Temporary access will be supported by construction matting installed during clearing within the wetland areas.
- If the amount of the surface release is not great enough to allow the practical physical collection from the affected area without causing additional impacts, with approval from both Enbridge Environment and Construction Management, the drilling fluid may be diluted with clean water and/or the fluid will be allowed to dry and dissipate naturally.
- Excess fluid will be held within the containment area and removed using pumps or other appropriate measures at a rate sufficient to maintain secure containment.
- Recovered fluid will be stored in a temporary holding tank or other suitable structure out of the floodplain and/or wetland for reuse or eventual disposal in an approved off-site location (see Section 11.5).
- Enbridge will consult with the appropriate regulatory agencies to evaluate the circumstances of the release, discuss additional containment or cleanup requirements, and determine whether and under what conditions the HDD may proceed.

11.3.3 Waterbody Locations

In the event of a drilling fluid release in waterbodies:

- The EI will evaluate the release, and the appropriate containment measures will be implemented.
- Enbridge will evaluate the recovery measures to determine the most effective collection method.

- Enbridge will consult with the appropriate regulatory agencies to evaluate the circumstances of the release, discuss additional containment or cleanup requirements, and determine whether and under what conditions the HDD may proceed.

The containment methods utilized will depend on the size of release, water depth, flow velocity, and location of the release. In aquatic environments bentonite may harden, effectively sealing the inadvertent release location. In this event, response activities will be limited or unnecessary. However, if drilling mud were to enter the water column, the typical response tactic will be to erect an isolation containment environment using the materials identified in Table 11.3-1, or their equivalent, to facilitate a spill response team's ability to contain and collect excess drilling mud. Containment is not always feasible for in-stream releases, especially in waterways with significant currents.

TABLE 11.3-1
Inadvertent Return Containment Methods for Variable In-Stream Conditions

Water Conditions		Distance from Water's Edge		
Flow Velocity	**Water Depth**	**0 - 10 Feet**	**10 - 20 Feet**	**Greater Than 20 Feet**
Still/Slow (Less Than 1 ft/sec)	0 - 2 feet	Sand bag isolation structure; vertical culvert	Sand bag isolation structure; vertical culvert	Sand bag isolation and structure; vertical culvert
	2 - 5 feet	Turbidity curtain; Geotextile pipeline weights cofferdam; vertical culvert; bladder dams; jersey barriers and plastic sheeting	Turbidity curtain; Geotextile pipeline weights cofferdam; vertical culvert; bladder dams; jersey barriers and plastic sheeting	Turbidity curtain; vertical culvert; bladder dams
	Greater than 5 feet	Turbidity curtain; Geotextile pipeline weights cofferdam; vertical culvert; bladder dams; jersey barriers and plastic sheeting	Turbidity curtain; Geotextile pipeline weights cofferdam; vertical culvert; bladder dams; jersey barriers and plastic sheeting	Turbidity curtain; vertical culvert; bladder dams
Slow/Moderate (1 - 3 ft/sec)	0 - 2 feet	Sandbag cofferdam; vertical culvert	Sandbag cofferdam; vertical culvert; geotextile pipeline weights cofferdam; jersey barriers with plastic sheeting	Sandbag cofferdam; vertical culvert; geotextile pipeline weights; bladder dams
	2 - 5 feet	Turbidity curtain; Geotextile pipeline weights cofferdam; vertical culvert; bladder dams; jersey barriers and plastic sheeting	Turbidity curtain; geotextile pipeline weights cofferdam; vertical culvert; bladder dams; water gates (as upstream diversion aid)	Turbidity curtain; bladder dams; water gates (as upstream diversion aid)
	Greater than 5 feet	Turbidity curtain; Geotextile pipeline weights cofferdam; vertical culvert; bladder dams; water gates (as upstream diversion aid)	Turbidity curtain; geotextile pipeline weights; bladder dams; water gates (as upstream diversion aid)	Turbidity curtain; bladder dams; water gates (as upstream diversion aid)
Moderate/Rapid (Greater Than 3 ft/sec)	0 - 2 feet	Sandbag cofferdam; geotextile pipeline weights cofferdam; vertical culvert; jersey barriers and plastic sheeting	Sandbag cofferdam; geotextile pipeline weights cofferdam; vertical culvert; jersey barriers and plastic sheeting	Turbidity curtain; sand bags, bladder dams; water gates (as upstream diversion aid)

TABLE 11.3-1
Inadvertent Return Containment Methods for Variable In-Stream Conditions

Water Conditions		Distance from Water's Edge		
Flow Velocity	**Water Depth**	**0 - 10 Feet**	**10 - 20 Feet**	**Greater Than 20 Feet**
	2 - 5 feet	Turbidity curtain; Geotextile pipeline weights cofferdam; vertical culvert; bladder dams; jersey barriers and plastic sheeting	Turbidity curtain; geotextile pipeline weights; bladder dams; water gates (as upstream diversion aid)	Turbidity curtain; bladder dams; water gates (as upstream diversion aid)
	Greater than 5 feet	Turbidity curtain; Geotextile pipeline weights cofferdam; vertical culvert; bladder dams; water gates (as upstream diversion aid)	Turbidity curtain; geotextile pipeline weights; bladder dams; water gates (as upstream diversion aid)	Turbidity curtain; geotextile pipeline weights; bladder dams; water gates (as upstream diversion aid)

Enbridge will implement the agency-approved Inadvertent Release Response Plans that provide site-specific information regarding features crossed by each HDD and containment and recovery response tailored to site-specific conditions. Enbridge will complete a pre-construction visit at the site at least 2 weeks prior to initiating HDD setup and operations to determine if additional materials and equipment will be needed.

Drilling fluid recovery methodology in waterbodies is not as variable as containment measures. When such measures effectively isolate the release from the stream flow, pumps or other appropriate measures are used to recover drilling fluid. When the release location cannot be isolated after initial in-stream containment installation, drilling fluid that has settled from the water column typically collects in the acute upstream angle of the containment tool, and recovery efforts will be localized to that location.

11.4 NOTIFICATION AND RESUMPTION OF SUSPENDED HDD OPERATIONS

The EI will be immediately notified of all drilling fluid releases. If the EI determines the release affects wetland or waterbody areas, they will immediately notify Enbridge Environment and Construction Management and the appropriate regulatory agencies, including the Minnesota State Duty Officer for releases that occur in the State of Minnesota (refer to Appendix D).

If notifications are necessary during non-business hours, they will be done according to prior arrangements made between Enbridge and the regulatory agencies. Follow-up notifications will be made as necessary and practicable.

The conditions under which drilling operations can resume will be discussed with appropriate regulatory agencies and/or field representatives. If containment measures are functioning, and the circumstances and potential impacts of the release are understood, HDD operations will resume.

11.5 CLEANUP

The following measures are to be considered as appropriate:

- Drilling fluid will be cleaned up by hand using hand shovels, buckets, and soft-bristled brooms as possible without causing extensive ancillary damage to existing vegetation. Clean water washes may also be employed if deemed beneficial and feasible.

- Containment structures will be pumped out and the ground surface scraped to bare topsoil without causing undue loss of topsoil or ancillary damage to existing and adjacent vegetation.

- Material will be collected in containers for temporary storage prior to removal from the site to an off-site location that has the applicable landowner, agency or facility approval. Disposal locations may include landowner-approved agricultural lands for land farming, agency- and operator-approved gravel/sand mines, or landfill, or wastewater treatment facility as approved by the operators. Testing required by the landowner, applicable agency, or operator will be performed prior to disposal.

- The EI will regularly evaluate the potential for secondary impact from the cleanup process and cleanup activities will be terminated if physical damage to the site is deemed to exceed the benefits of removal activities. This decision will be made in consultation with the appropriate regulatory agencies and/or Enbridge in conformance with the required regulatory authorizations and all applicable federal, state and local regulations governing this activity.

11.6 RESTORATION AND POST-CONSTRUCTION MONITORING

Following cleanup activities, restoration and revegetation of affected areas will be completed in accordance with all applicable local, state, Tribal, and federal permits in addition to Enbridge's EPP. Enbridge will monitor the release site as appropriate to assure adequate restoration.

11.7 REPORTING AND DOCUMENTATION

Enbridge will record the following information in the event of an inadvertent release:

- Date and time of the release;

- Name of Contractor executing the HDD and names of personnel on-site and their roles, including EIs and IEMs;

- Stage of the HDD operation (e.g., pilot hole, ream pass number, type of reamer);

- Description of site-specific conditions at release site (e.g., upland, wetland, vegetation, slope, sensitive features);

- GPS coordinates as close as possible to the center of the inadvertent release;

- Photograph of the inadvertent release location (see Section 11.3), and photographs of the release;

- Description of the size of the release (volume and area);

- Identification of any drilling mud additives present in the release;

- Description of how the release was contained, including how access was achieved;

- Description of how the release was cleaned up, including description of how access was achieved;

- Description of corrective actions implemented to avoid additional inadvertent release (e.g., complete pilot hole, incorporation of additives); and

- Description of additional monitoring efforts taken to detect additional potential releases (e.g., additional monitor on site).

12.0 REFERENCES

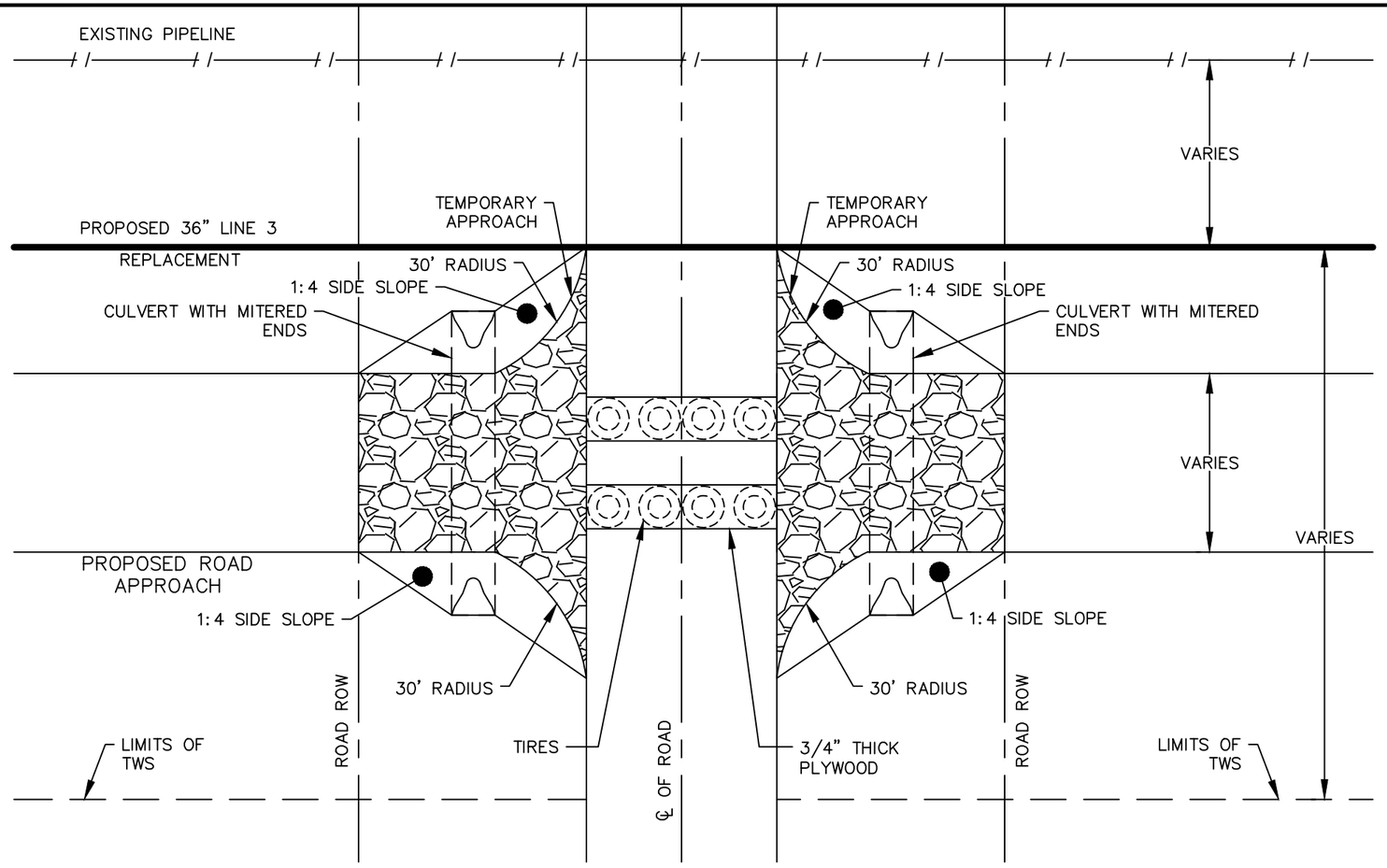
Minnesota Board of Water & Soil Resources ("BWSR"). 2014. Minnesota Wetland Restoration Guide. 2nd Edition. Available online at: https://bwsr.state.mn.us/mn-wetland-restoration-guide. Accessed August 2019.

BWSR. 2019. Native Vegetation Establishment and Enhancement Guidelines. January 2019. Available online at: https://bwsr.state.mn.us/sites/default/files/2019-07/Updated%20guidelines%20Final%2007-01-19.pdf. Accessed August 2019.

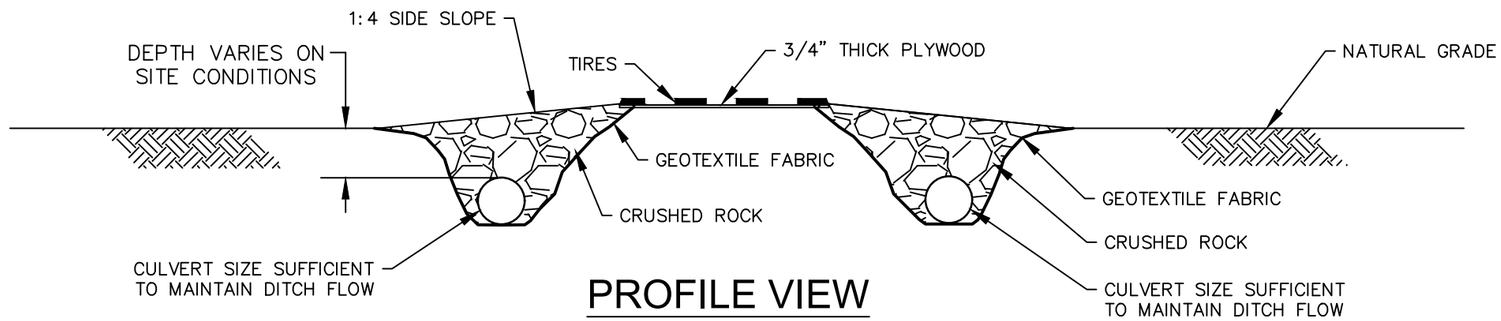
Minnesota Department of Natural Resources ("MDNR"). 2008. Natural Wild Rice in Minnesota: A Wild Rice Study document submitted to the Minnesota Legislature by the MDNR on February 15, 2008. Available online at: https://files.dnr.state.mn.us/aboutdnr/reports/legislative/20080215_wildricestudy.pdf. Accessed August 2019.

Minnesota Pollution Control Agency ("MPCA"). 2016. MPCA wild rice waters database. July 19, 2016. Available online at: https://www.pca.state.mn.us/document/wq-s6-43xxlsx. Accessed August 2019.

Figures



PLAN VIEW



PROFILE VIEW

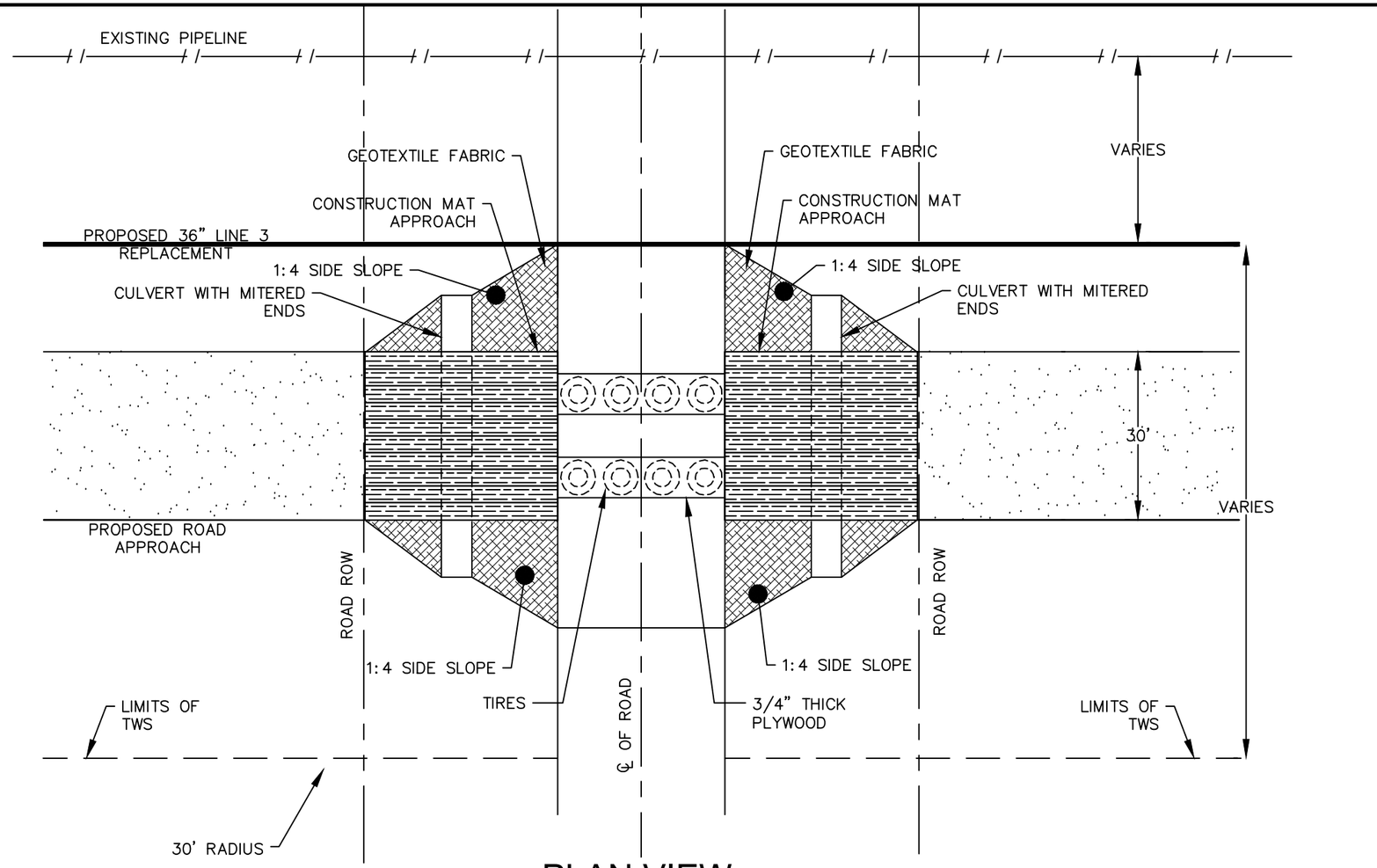
ISSUED FOR REVIEW 11/04/19

NOTES:

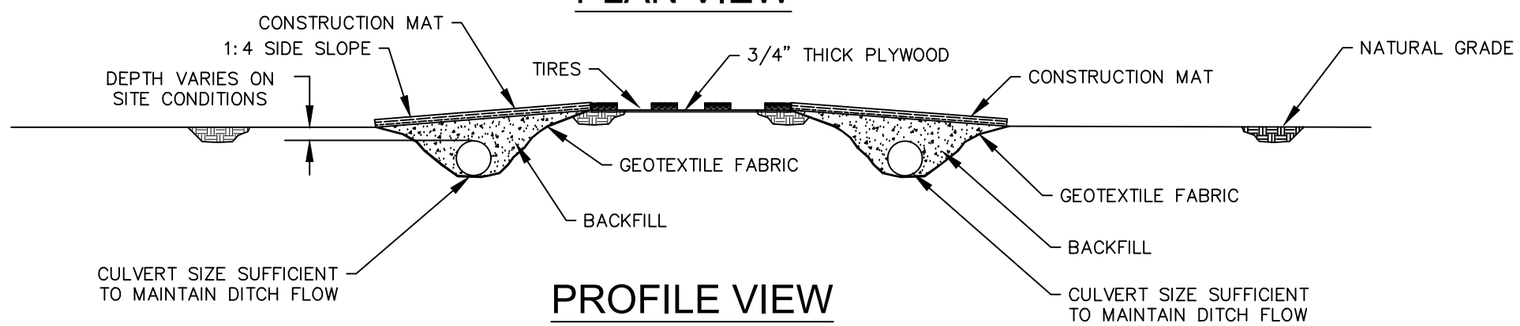
1. ALL CULVERT PIPE OR ROCK ENDS OF ROAD ACCESS PADS MUST HAVE A 60 DEGREE ANGLE ON EACH END FOR SAFETY.
2. ALL TIRES AND PLYWOOD MUST BE STORED OUTSIDE ROAD ROW.
3. CULVERTS MUST MEET REQUIREMENTS SET FORTH IN PERMITS FROM AUTHORITY WITH JURISDICTION.
4. CONTRACTORS SHALL SCRAPE OR BRUSH ANY DEBRIS FROM ROAD PER EPP.
5. ALL SLOPES MUST HAVE A MINIMUM GRADE OF 1:4

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
H	ISSUED FOR REVIEW	DWA	11/04/19	KEH	MDM

DWN. BY: YL	DATE 06/07/16	ENBRIDGE
CHK. KEH	01/11/18	LINE 3 REPLACEMENT TYPICAL TEMPORARY ROCK ACCESS APPROACH
PROJ. ENGR. MDM	01/11/18	
PROJ. MGR. BS	01/11/18	
CLIENT APP.		SCALE NTS / DWG. NO. Figure 1



PLAN VIEW



PROFILE VIEW

NOTES:

1. ALL CULVERT PIPE OR ROCK ENDS OF ROAD ACCESS PADS MUST HAVE A 60 DEGREE ANGLE ON EACH END FOR SAFETY.
2. ALL TIRES AND PLYWOOD MUST BE STORED OUTSIDE ROAD ROW.
3. CULVERTS MUST MEET REQUIREMENTS SET FORTH IN PERMITS FROM AUTHORITY WITH JURISDICTION.
4. TO BE USED ONLY WHERE APPROVED.
5. ALL SLOPES MUST HAVE A MINIMUM GRADE OF 1:4
6. USE 3"–6" DIAMETER CRUSHED ROCK AS FILL WITHIN WETLANDS.
7. CONTRACTORS SHALL SCRAPE OR BRUSH ANY DEBRIS FROM ROAD PER EPP.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
H	ISSUED FOR REVIEW	DWA	11/04/19	KEH	MDM

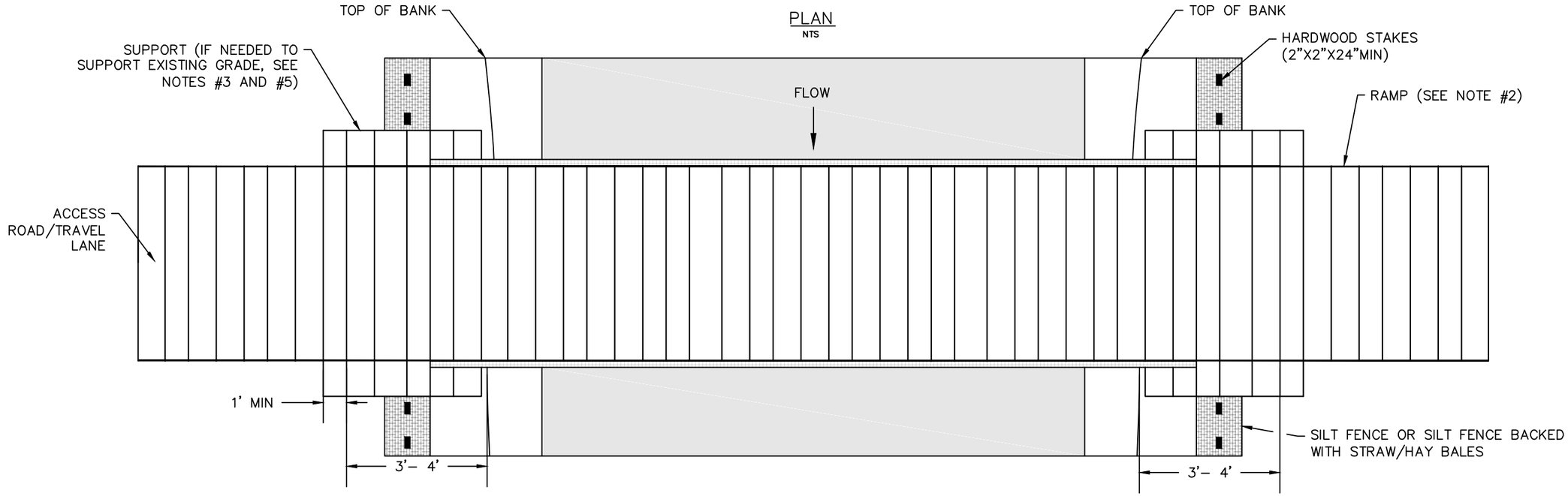
		DATE
DWN. BY:	YL	06/07/16
CHK.	KEH	01/11/18
PROJ. ENGR.	MDM	01/11/18
PROJ. MGR.	BS	01/11/18
CLIENT APP.		

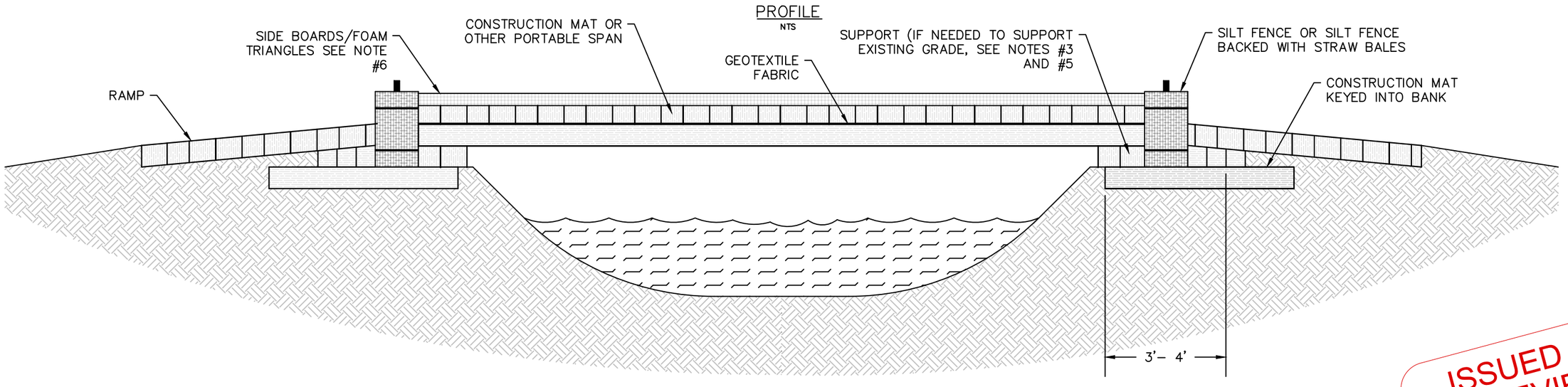
ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL
TEMPORARY CONSTRUCTION
MAT APPROACH

SCALE NTS

DWG. NO. Figure 2





NOTES:

1. INSPECT BRIDGE OPENING PERIODICALLY AND REMOVE ANY DEBRIS RESTRICTING FLOW.
2. IF PHYSICAL CIRCUMSTANCES PROHIBIT WOOD OR METAL RAMPS, EARTHEN RAMPS MAY BE USED AS APPROVED– NO TOPSOIL.
3. INSPECT BRIDGE ELEVATION SO BRIDGE REMAINS SUPPORTED ABOVE OHWM.
4. THE BRIDGE MUST SPAN ABOVE OHWM TO OHWM AND IS APPROPRIATE FOR SPANS LESS THAN 13' TOP OF BANK TO TOP OF BANK.
5. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED IN ACCORDANCE WITH THE COMPANY'S ENVIRONMENTAL PROTECTION PLAN.
6. SIDEBOARDS WILL BE INSTALLED ON TEMPORARY BRIDGES TO MINIMIZE THE POTENTIAL FOR SEDIMENT TRANSPORT, AND AFFIXED TO THE OUTERSIDE OF THE BRIDGE. GEOTEXTILE FABRIC, OR EQUIVALENT, MUST ALSO BE ADEQUATELY SECURED TO THE UNDERSIDE OF THE BRIDGE TO PREVENT MATERIAL FROM FALLING THROUGH THE BRIDGE DECK. THE GEOTEXTILE FABRIC OR AN EQUIVALENT SHOULD BE SECURED TO THE BOTTOM OF THE BRIDGE AND WRAPPED AROUND THE SIDEBOARDS IN A CONTINUOUS FASHION.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	JDW	11/04/19	KEH	NKD

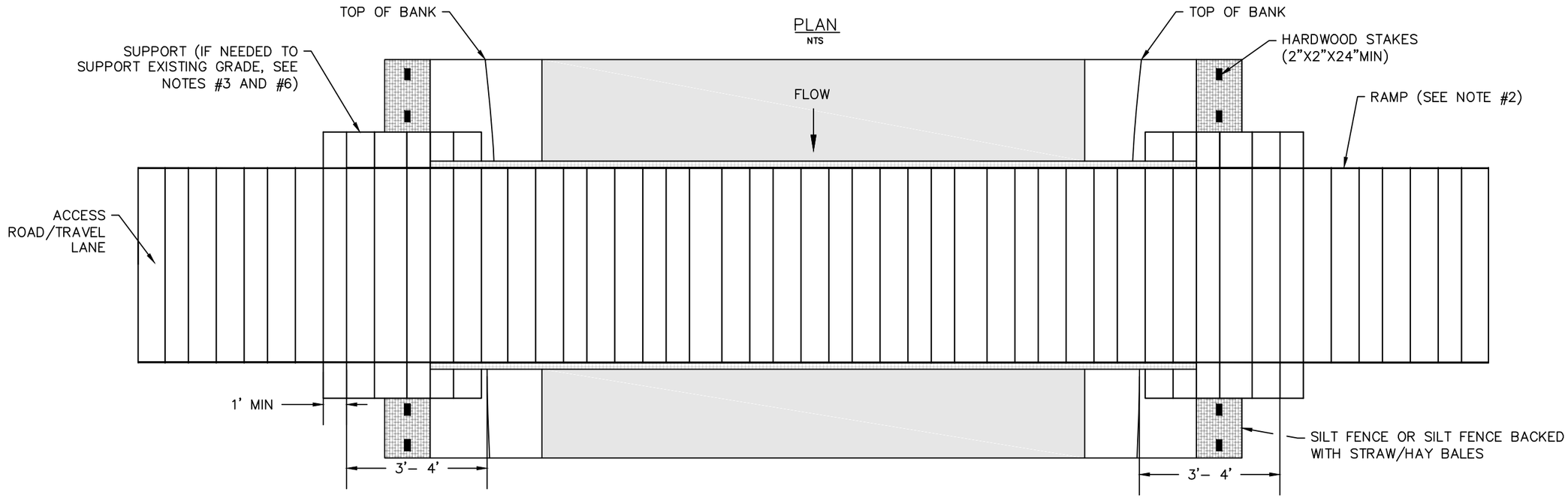
		DATE
DWN. BY:	KEH	8/16/18
CHK.	NKD	8/16/18
PROJ. ENGR.	CP	8/16/18
PROJ. MGR.	BS	8/16/18
CLIENT APP.		

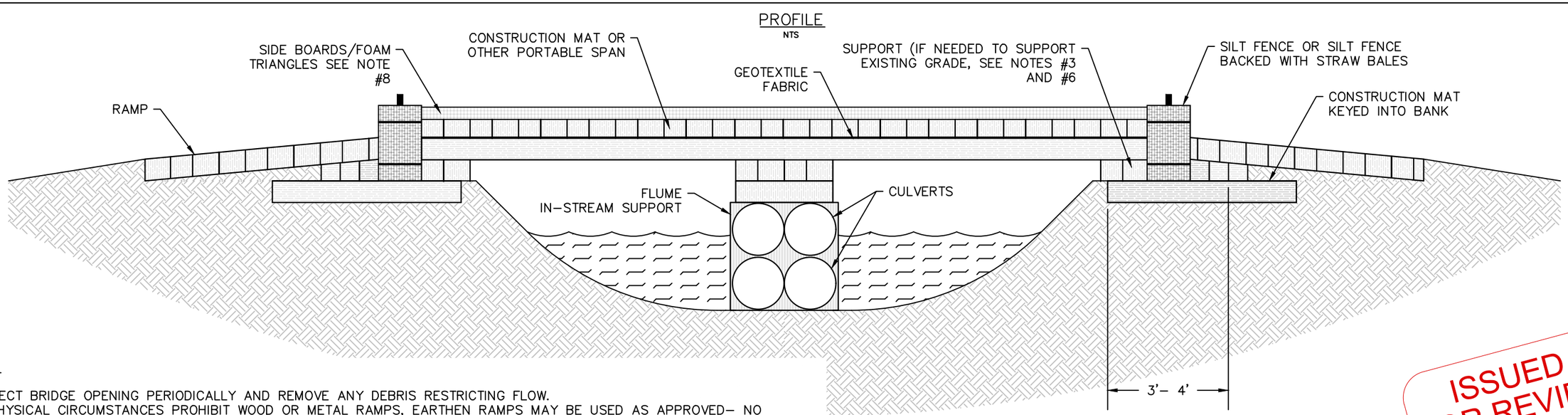
ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL
CLEAR SPAN BRIDGE

SCALE NTS

DWG. NO. Figure 3





NOTES:

1. INSPECT BRIDGE OPENING PERIODICALLY AND REMOVE ANY DEBRIS RESTRICTING FLOW.
2. IF PHYSICAL CIRCUMSTANCES PROHIBIT WOOD OR METAL RAMPS, EARTHEN RAMPS MAY BE USED AS APPROVED– NO TOPSOIL.
3. INSPECT BRIDGE ELEVATION SO BRIDGE REMAINS SUPPORTED ABOVE OHWM.
4. THE CULVERT SUPPORT MUST BE ANCHORED TO THE STREAM BOTTOM AND MAY NOT BE SUPPORTED WITH FILL.
5. THE BRIDGE MUST SPAN ABOVE OHWM TO OHWM.
6. ADDITIONAL SUPPORT MUST BE ADDED ON TOP OF BANK AND UNDER SPAN IF THE SPAN IS 13' WIDE OR GREATER, OR IF INITIAL SUPPORT STARTS TO SETTLE.
7. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED IN ACCORDANCE WITH THE COMPANY'S ENVIRONMENTAL PROTECTION PLAN.
8. SIDEBOARDS WILL BE INSTALLED ON TEMPORARY BRIDGES TO MINIMIZE THE POTENTIAL FOR SEDIMENT TRANSPORT, AND AFFIXED TO THE OUTERSIDE OF THE BRIDGE. GEOTEXTILE FABRIC, OR EQUIVALENT, MUST ALSO BE ADEQUATELY SECURED TO THE UNDERSIDE OF THE BRIDGE TO PREVENT MATERIAL FROM FALLING THROUGH THE BRIDGE DECK. THE GEOTEXTILE FABRIC OR AN EQUIVALENT SHOULD BE SECURED TO THE BOTTOM OF THE BRIDGE AND WRAPPED AROUND THE SIDEBOARDS IN A CONTINUOUS FASHION.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	JDW	11/04/19	KEH	NKD

		DATE
DWN. BY:	KEH	8/16/18
CHK.	NKD	8/16/18
PROJ. ENGR.	CP	8/16/18
PROJ. MGR.	BS	8/16/18
CLIENT APP.		

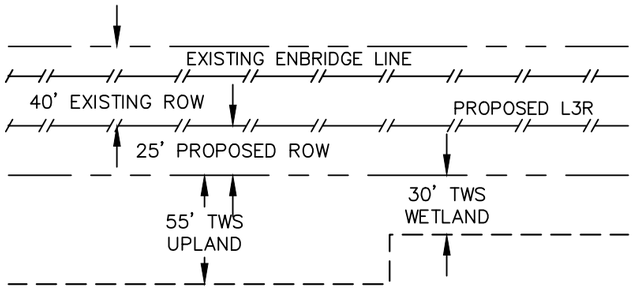
ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL
NON–CLEAR SPAN BRIDGE

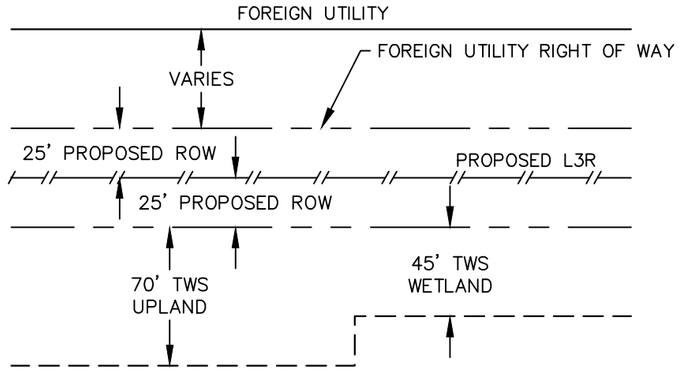
SCALE NTS

DWG. NO. Figure 4

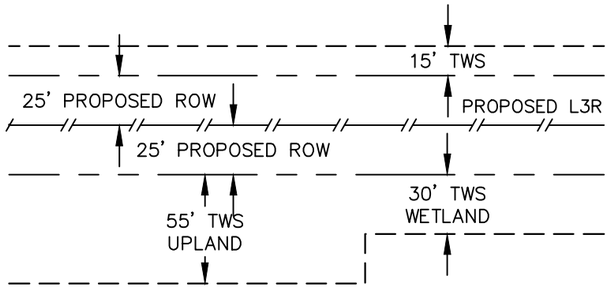
CO–LOCATED WITH ENBRIDGE LINES



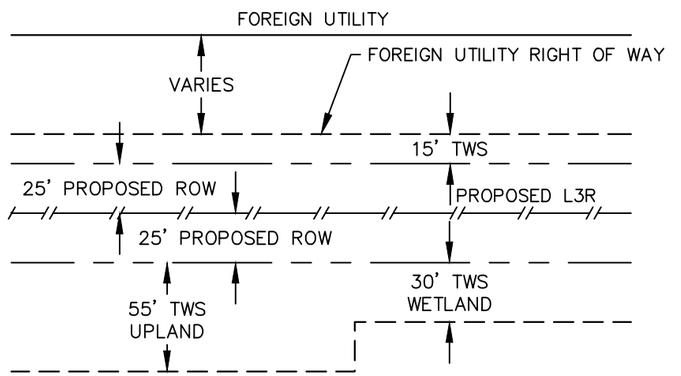
CO–LOCATED WITH FOREIGN UTILITY



GREENFIELD



CO–LOCATED WITH FOREIGN UTILITY IN SATURATED WETLANDS



ISSUED FOR REVIEW
11/04/19

NOTES:

1. WORK SPACE AND LINE SPACING SHOWN IS TYPICAL FOR MOST SITUATIONS, TYPICAL CONSTRUCTION RIGHT OF WAY LIMITS ARE 120' IN UPLANDS, 95' IN WETLANDS.
2. ADDITIONAL NECK DOWNS MAY BE REQUIRED FOR ENVIRONMENTAL, AGENCY, OR LANDOWNER CONCERNS. REFER TO CONSTRUCTION ALIGNMENT SHEETS AND LINE LIST FOR FINAL CONSTRUCTION SPACING.
3. DIMENSIONS AND LOCATIONS OF ADDITIONAL TEMPORARY WORKSPACE VARY AND ARE BASED ON SITE SPECIFIC CONDITIONS.

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
D	ISSUED FOR REVIEW	AJM	11/04/19	KEH	MDM

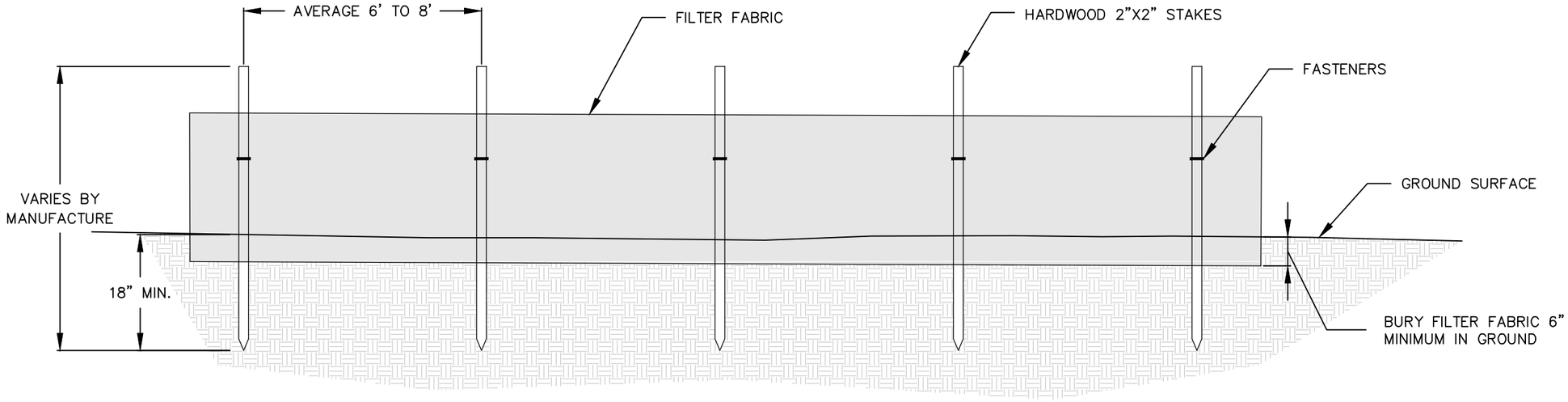
DWN. BY: JDW	DATE 07/03/17	
CHK. KEH	08/04/17	
PROJ. ENGR. MDM	08/04/17	
PROJ. MGR. BS	08/04/17	
CLIENT APP.		

ENBRIDGE

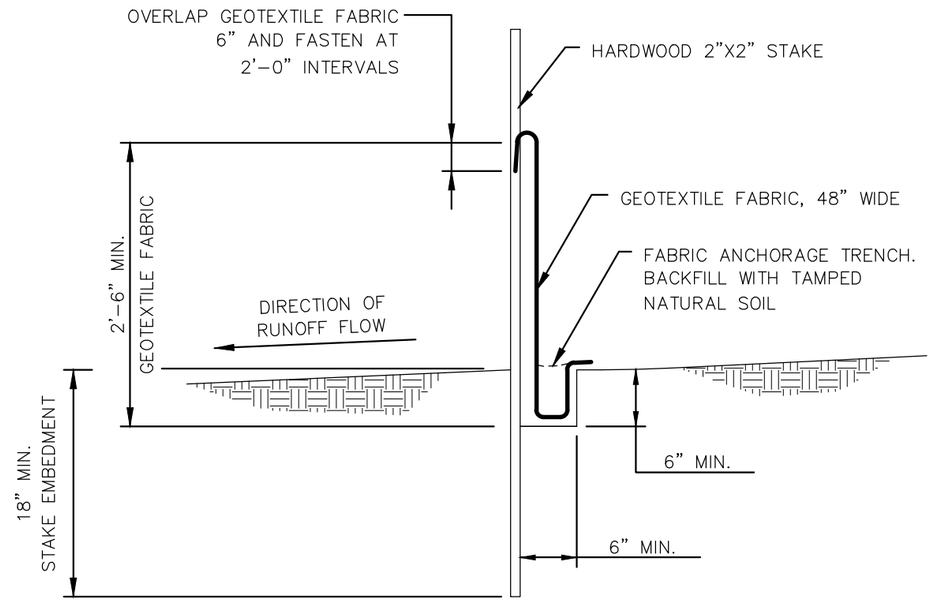
LINE 3 REPLACEMENT
TYPICAL
WORKSPACES AND PERMANENT ROW

SCALE NTS

DWG. NO. Figure 5



SILT FENCE
PLAN



SILT FENCE
PROFILE

ISSUED FOR REVIEW
11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	JDW	11/04/19	ND	RF

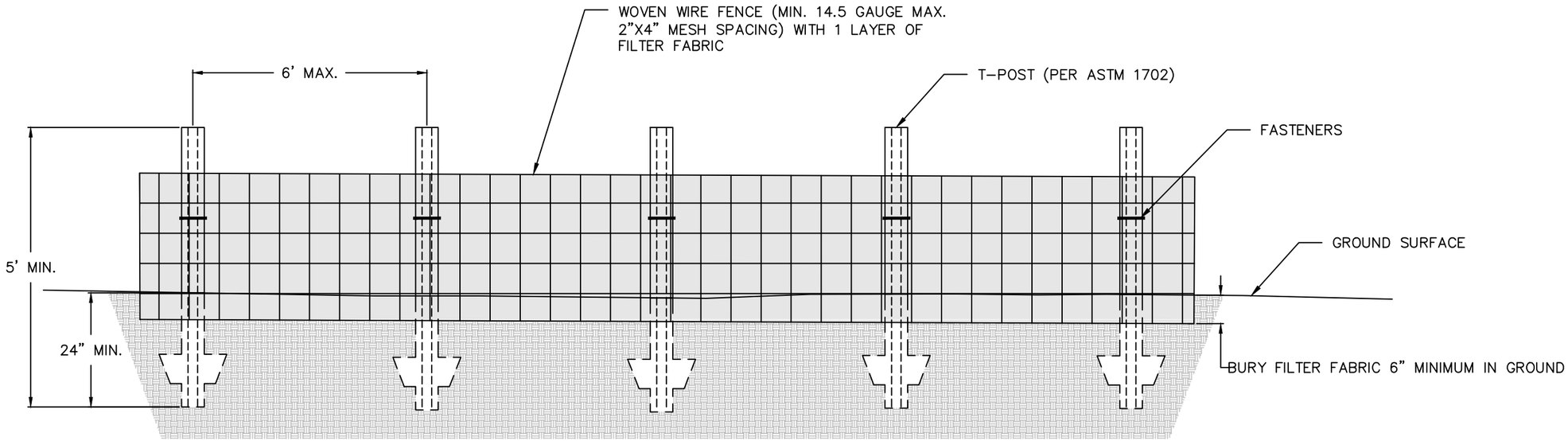
DWN. BY: KEH	DATE 7/11/19	
CHK. ND	7/11/19	
PROJ. ENGR. RF	11/01/19	
PROJ. MGR. TL	11/01/19	
CLIENT APP.		

ENBRIDGE

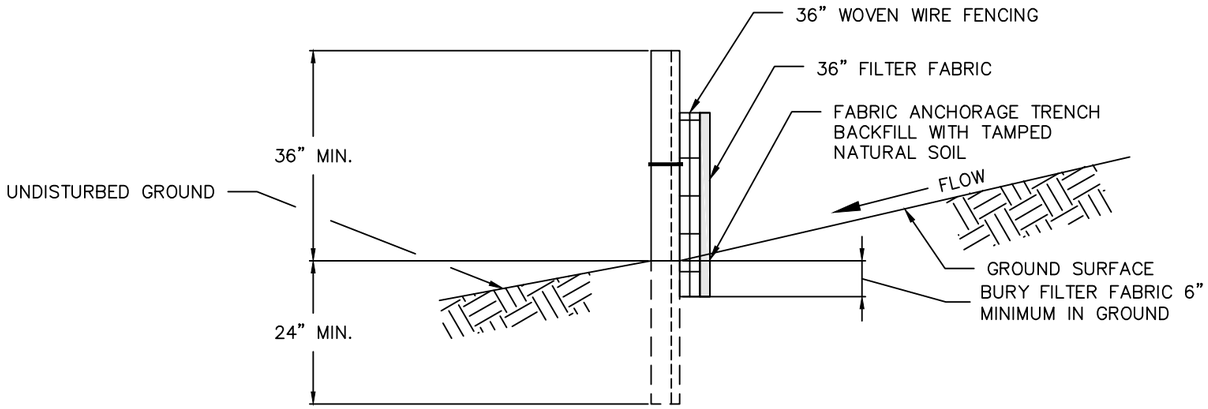
LINE 3 REPLACEMENT
TYPICAL
SILT FENCE

SCALE NTS

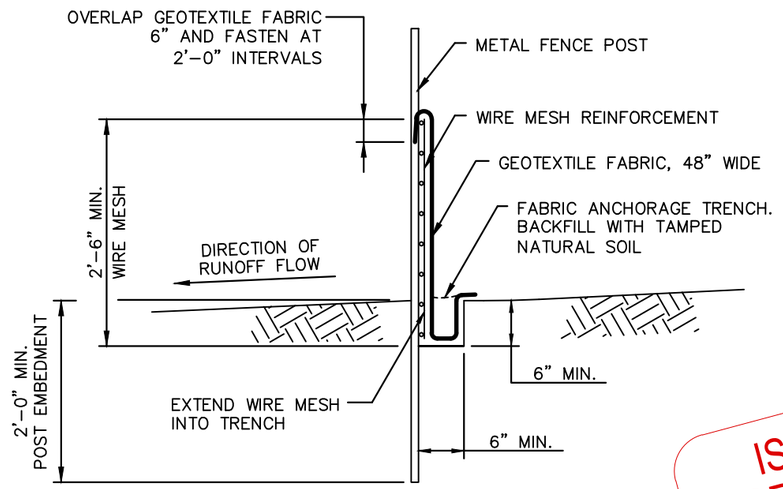
DWG. NO. Figure 6



SUPER SILT FENCE
PLAN



36" SUPER SILT FENCE
SECTION



48" SUPER SILT FENCE
SECTION

ISSUED FOR REVIEW
11/04/19

NOTES:

1. FENCE POST SPACING SHALL NOT EXCEED 6' TO CENTER.
2. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO T-POSTS WITH EITHER ZIP TIES OR WIRE TIES THAT HAVE A MINIMUM TENSILE STRENGTH OF 50 LBS.
3. FILTER FABRIC TO BE FASTENED TO WOVEN WIRE FENCE.
4. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED BY ENBRIDGE EPP.
6. ENBRIDGE WILL NOT REQUIRE SUBMITTALS AS SPECIFIED IN ASTM A702.
7. FILTER FABRIC WILL CONSIST OF SD WOVEN OR NON-WOVEN GEOTEXTILE MATERIAL THAT IS A GRAB TENSILE STRENGTH OF 100 LBS, AN APPARENT OPENING SIZE OF A NO. 30 SIEVE, A UV STABILITY 500 H AT 70%.

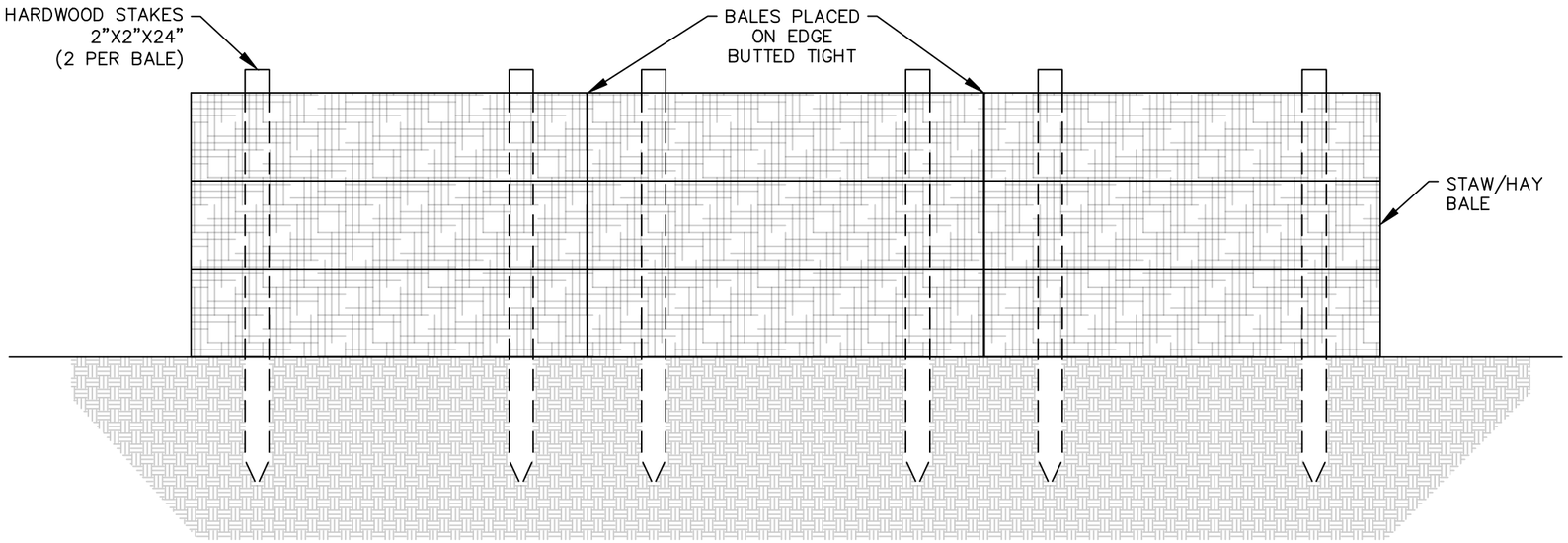
NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
D	ISSUED FOR REVIEW	AJM	11/04/19	KEH	KD

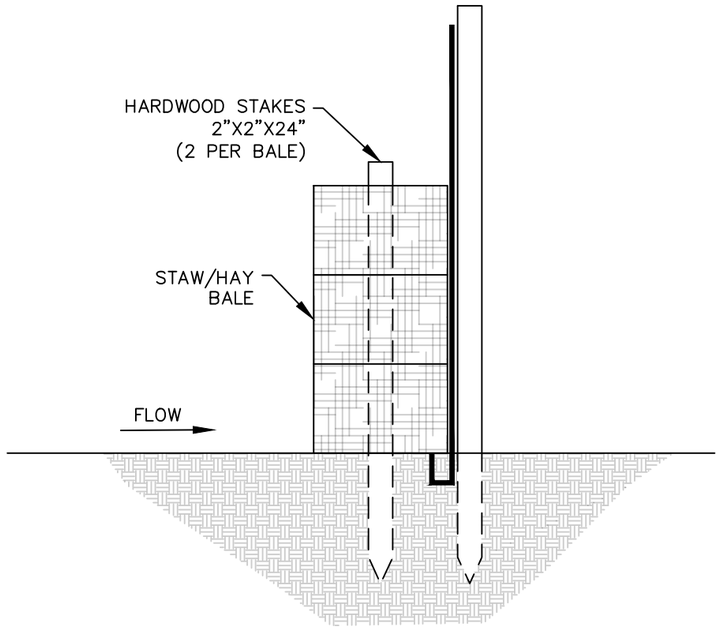
DWN. BY: JDW	DATE 04/25/19	
CHK. KEH	04/30/19	
PROJ. ENGR. DG	04/30/19	
PROJ. MGR. KD	04/30/19	
CLIENT APP.		

ENBRIDGE

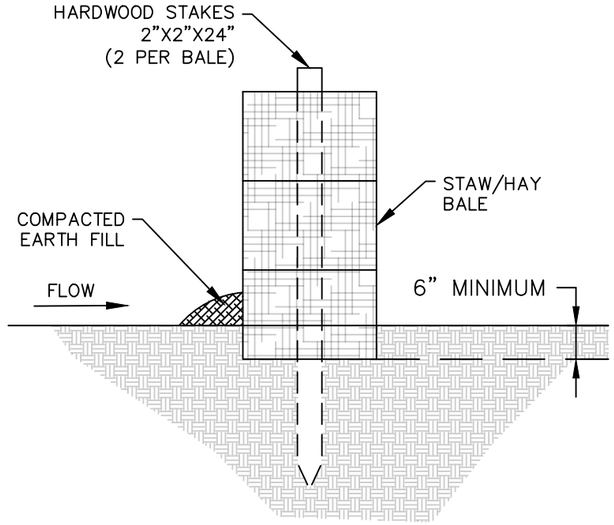
LINE 3 REPLACEMENT
TYPICAL
SUPER SILT FENCE

SCALE NTS | DWG. NO. Figure 7





STRAW/HAY BALES
& SILT FENCE
NOT TO SCALE



STRAW/HAY BALES ONLY
NOT TO SCALE

ISSUED
FOR REVIEW
11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	JDW	11/04/19	ND	KMD

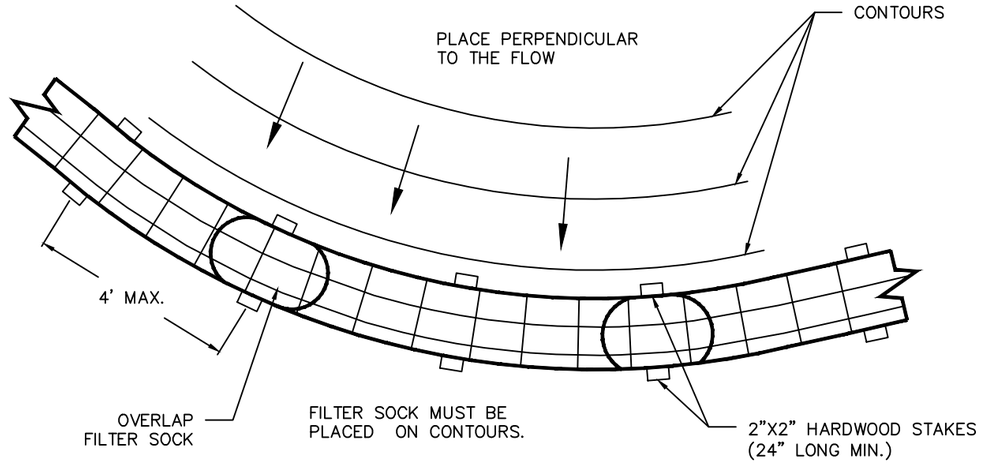
DWN. BY: JDW	DATE 04/04/19	
CHK. ND	04/04/19	
PROJ. ENGR. KMD	04/04/19	
PROJ. MGR. BS	04/04/19	
CLIENT APP.		

ENBRIDGE

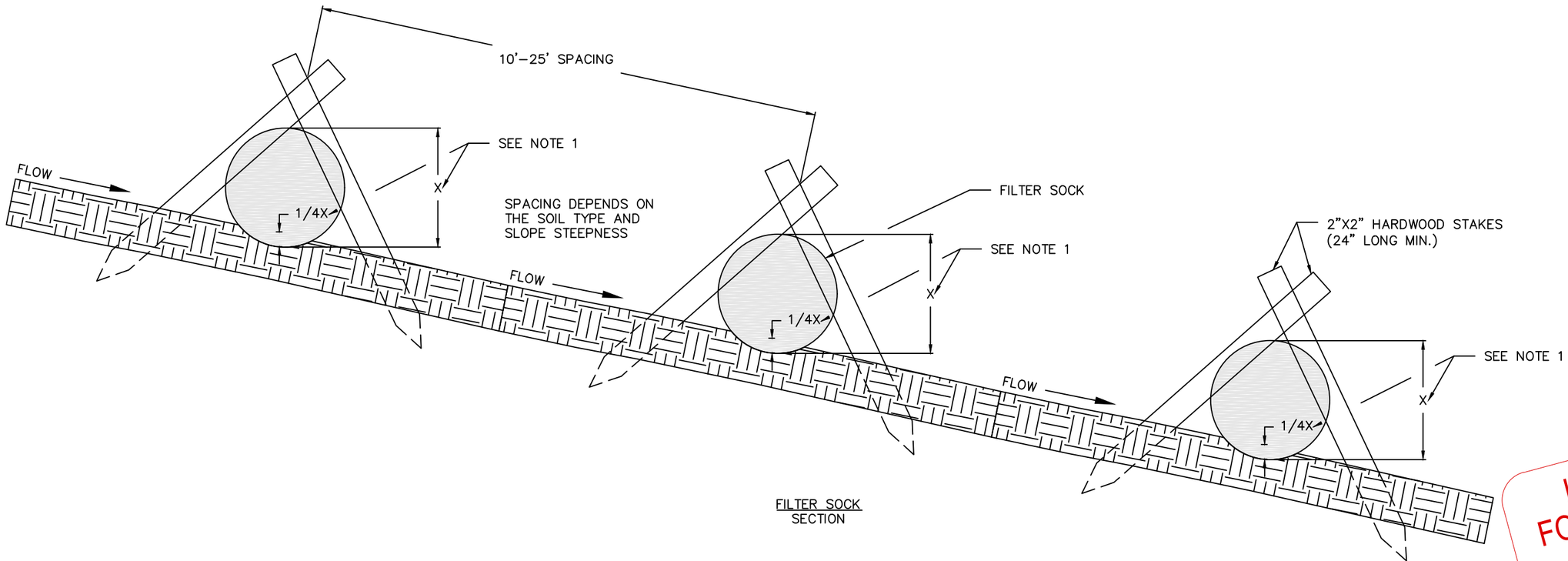
LINE 3 REPLACEMENT
TYPICAL
STRAW/HAY-BALE INSTALLATION

SCALE NTS

DWG. NO. Figure 8



FILTER SOCK
PLAN



FILTER SOCK
SECTION

ISSUED
FOR REVIEW
11/04/19

NOTES:
1. FILTER SOCKS RANGE FROM 4" TO 24" IN DIAMETER. X IS REPRESENTING THE DIAMETER OF THE SOCK. ¼X IS REPRESENTING THE DEPTH OF TRENCHING THE FILTER SOCK.

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
E	ISSUED FOR REVIEW	DWA	11/04/19	KEH	KD

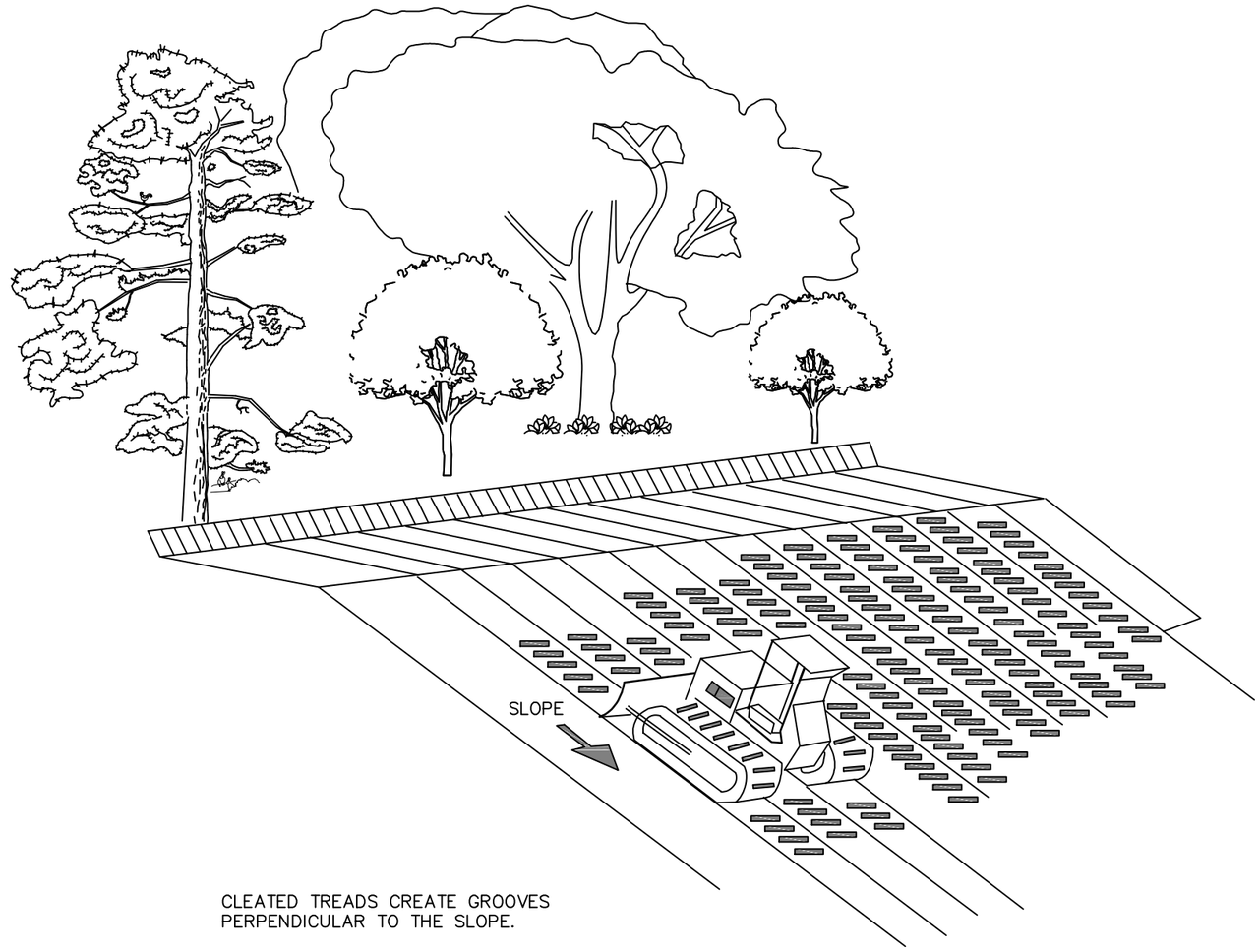
		DATE
DWN. BY:	JDW	04/25/19
CHK.	KEH	04/30/19
PROJ. ENGR.	DG	04/30/19
PROJ. MGR.	KD	04/30/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL
FILTER SOCK

SCALE: NTS

DWG. NO.: Figure 9

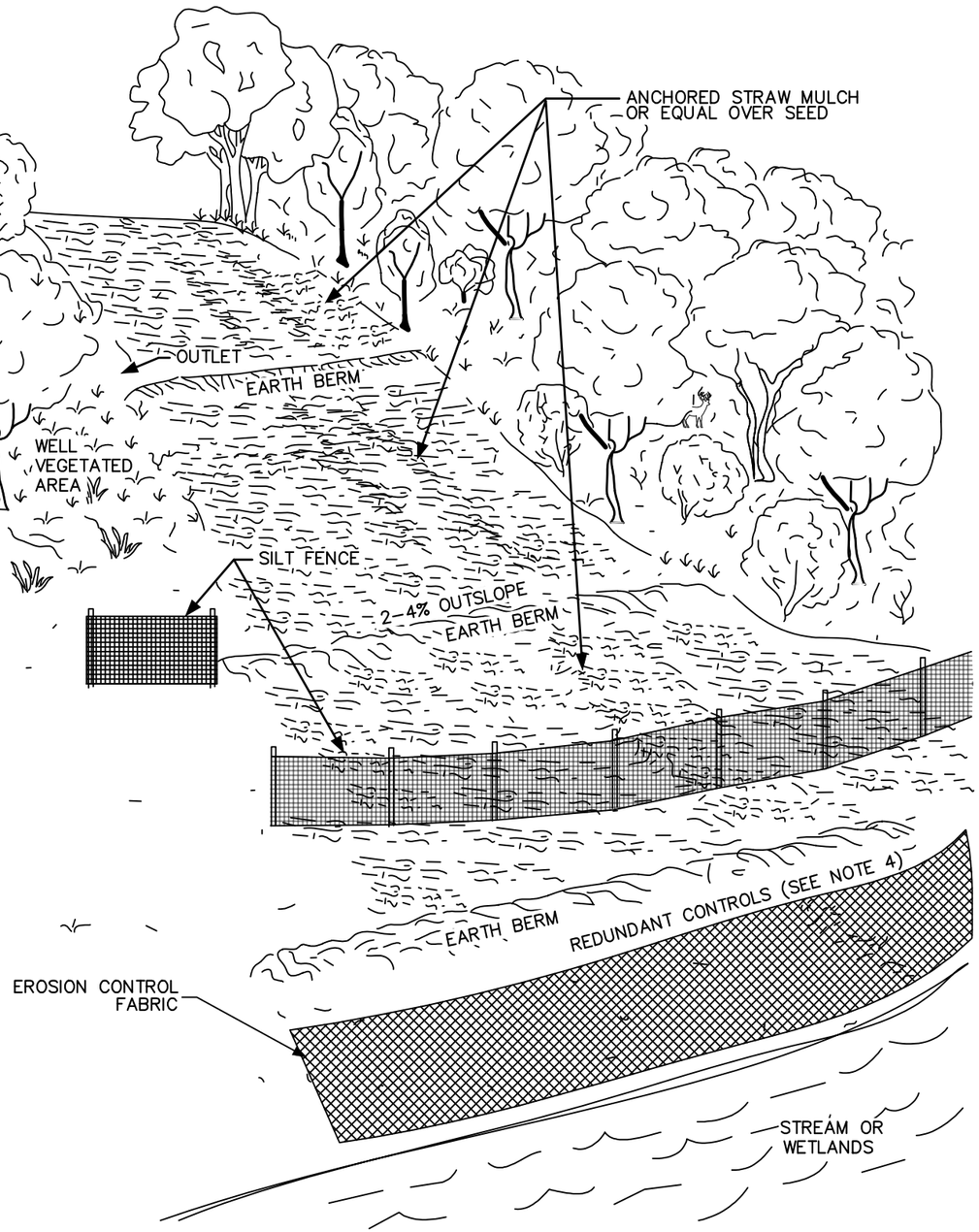


CLEATED TREADS CREATE GROOVES
PERPENDICULAR TO THE SLOPE.

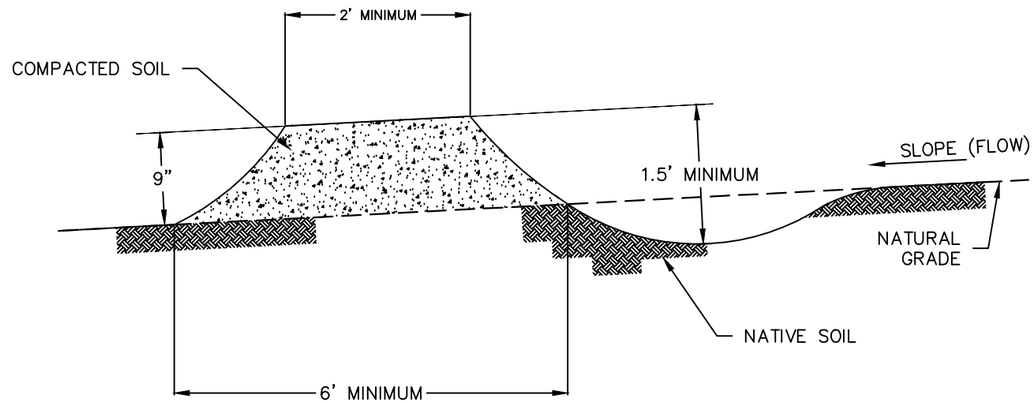
ISSUED
FOR REVIEW
11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	AJM	11/04/19	KEH	KD

DWN. BY: AJM	DATE 04/25/19	ENBRIDGE
CHK. KEH	04/30/19	LINE 3 REPLACEMENT TYPICAL CAT TRACKING
PROJ. ENGR. KN	04/30/19	
PROJ. MGR. BB	04/30/19	
CLIENT APP.		SCALE NTS / DWG. NO. Figure 10



PERSPECTIVE VIEW



EARTH BERM DETAIL

NOTES:

1. BERMS SHALL BE CONSTRUCTED WITH 2 TO 4 PERCENT OUTSLOPE.
2. BERMS SHALL BE OUTLETED TO WELL VEGETATED STABLE AREAS, FILTER SOCKS, SILT FENCES, STRAW BALES, ROCK APRONS, OR SUMPS.
3. SILT FENCE REMOVED WHEN VEGETATION ESTABLISHED.
4. LOWEST BERM MAY BE OMITTED IF SILT FENCE OR STRAW BALES ARE INSTALLED AT THAT LOCATION, SUBJECT TO APPROVAL.
5. SEE SECTION 2.2 REGARDING ECD PLACEMENT AT SURFACE WATERS.
6. BERMS SHALL BE PLACED AS LISTED BELOW:

SLOPE%	APPROXIMATE SPACING (FT)
3–5	250
5–15	200
15–25	150
>25	<100

ISSUED FOR REVIEW 11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	DWA	11/04/19	KEH	KD

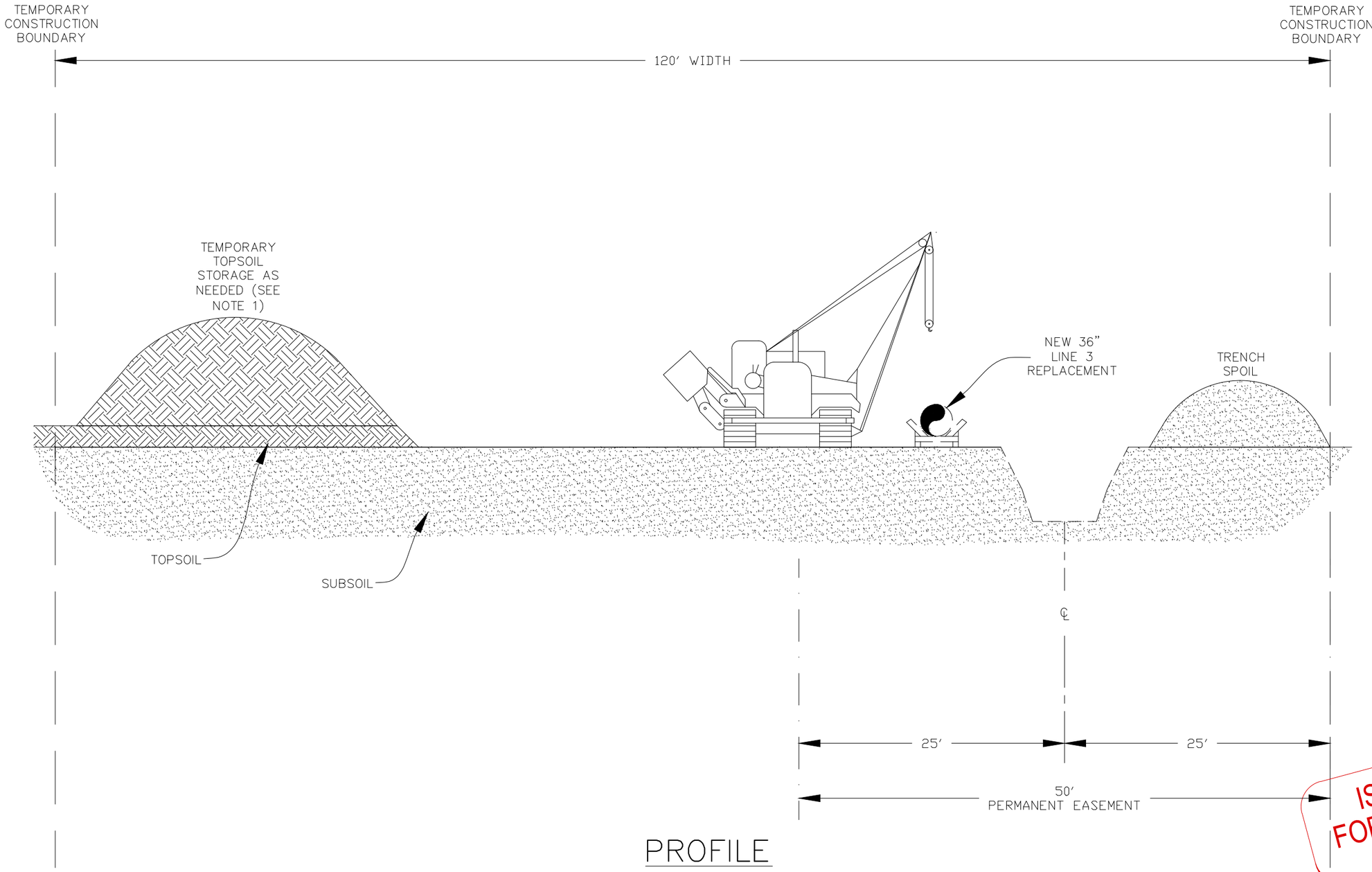
		DATE
DWN. BY: DWA		10/25/19
CHK. KEH		10/25/19
PROJ. ENGR. DG		10/25/19
PROJ. MGR. KD		10/25/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL
TEMPORARY SLOPE BREAKERS
PERSPECTIVE & ELEVATION VIEW

SCALE: NTS

DWG. NO.: Figure 11



ISSUED FOR REVIEW 11/04/19

PROFILE

NOTES:

1. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATION APPROVED BY THE COMPANY.
2. TYPICALLY USED IN AGRICULTURAL AREAS INCLUDING ACTIVE CROPLAND, PASTURE AND HAYFIELDS.

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	KEH	11/04/19	ND	TL

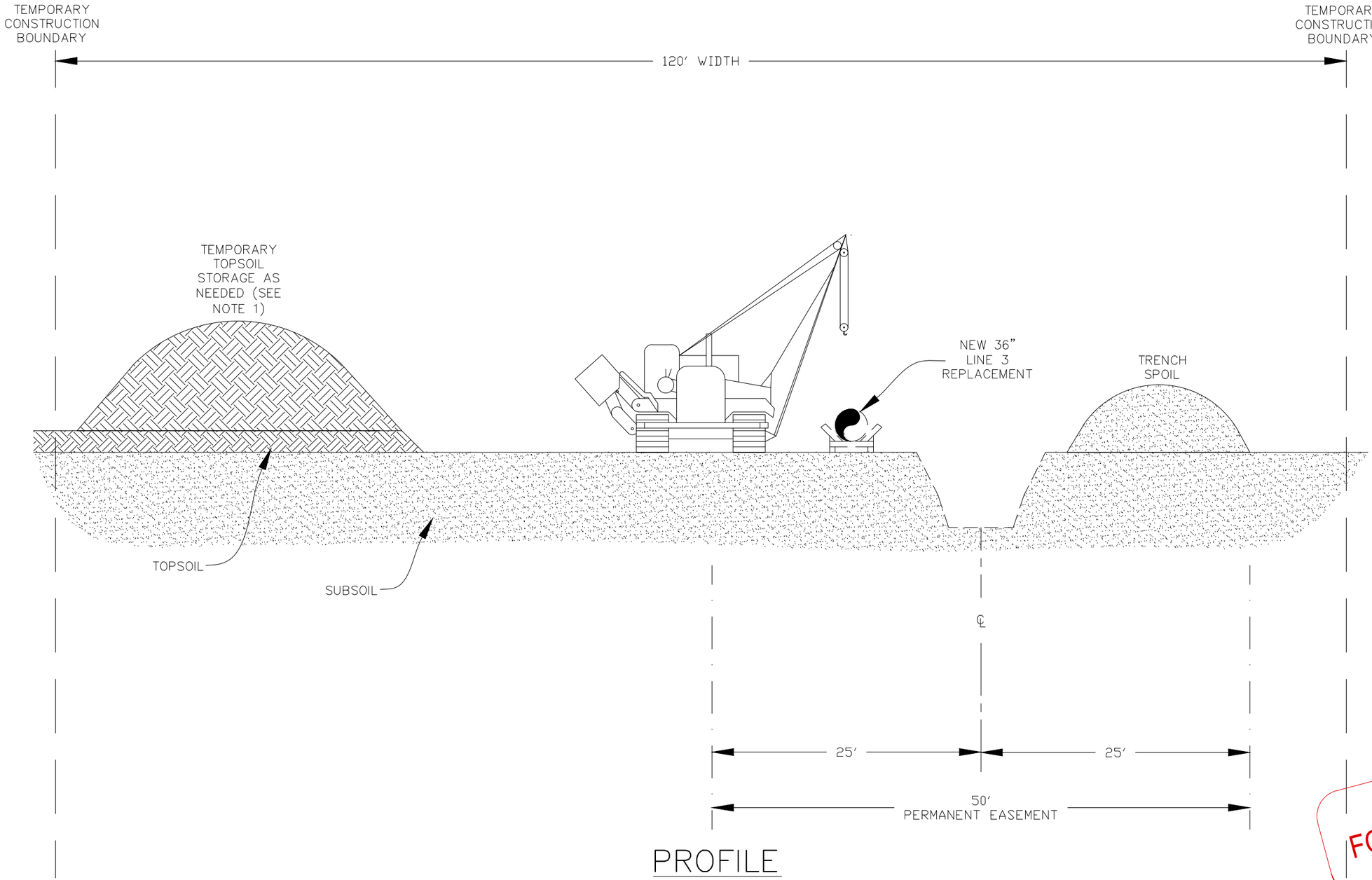
DWN. BY:	KEH	DATE 11/01/19
CHK.	ND	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL TOPSOIL SEGREGATION
FULL CONSTRUCTION WORKSPACE
(25' WORKSPACE OFFSET)

SCALE NTS

DWG. NO. Figure 12



PROFILE

ISSUED FOR REVIEW 11/04/19

NOTES:

1. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATION APPROVED BY THE COMPANY.
2. TYPICALLY USED IN AGRICULTURAL AREAS INCLUDING ACTIVE CROPLAND, PASTURE AND HAYFIELDS.

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	KEH	11/04/19	ND	TL

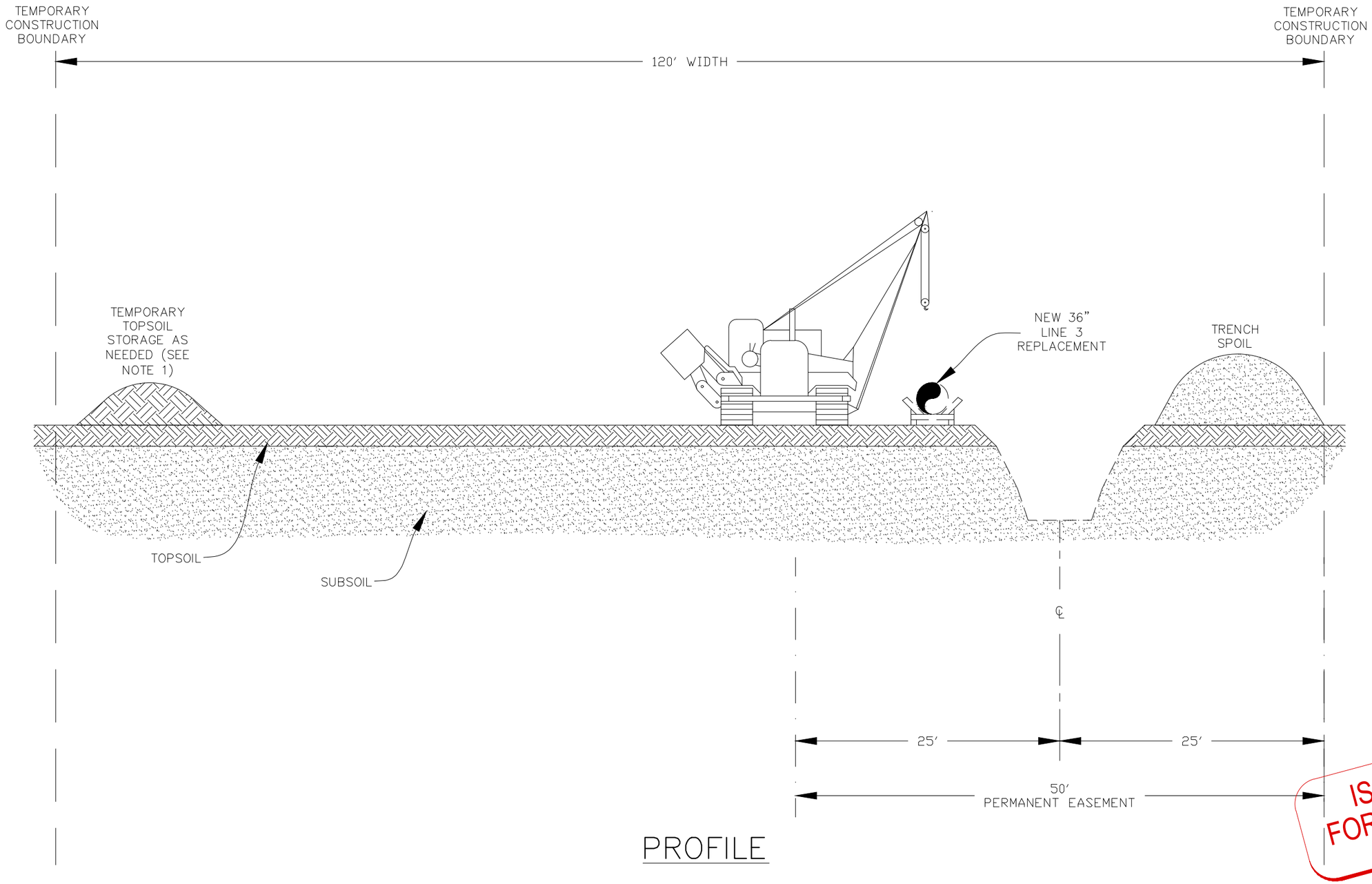
		DATE
DWN. BY:	KEH	11/01/19
CHK.	ND	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL TOPSOIL SEGREGATION
FULL CONSTRUCTION WORKSPACE
(40' WORKSPACE OFFSET)

SCALE: NTS

DWG. NO.: Figure 13



PROFILE

NOTES:

1. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATION APPROVED BY THE COMPANY.
2. TYPICALLY USED IN WETLANDS, FORESTED COMMUNITIES AND WHERE REQUESTED BY LANDOWNER OR LAND MANAGING AGENCY.
3. TOPSOIL NOT SEGREGATED IN STANDING WATER WETLANDS UNLESS SPECIFIED BY LANDOWNER OR LAND MANAGING AGENCY.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	KEH	11/04/19	ND	TL

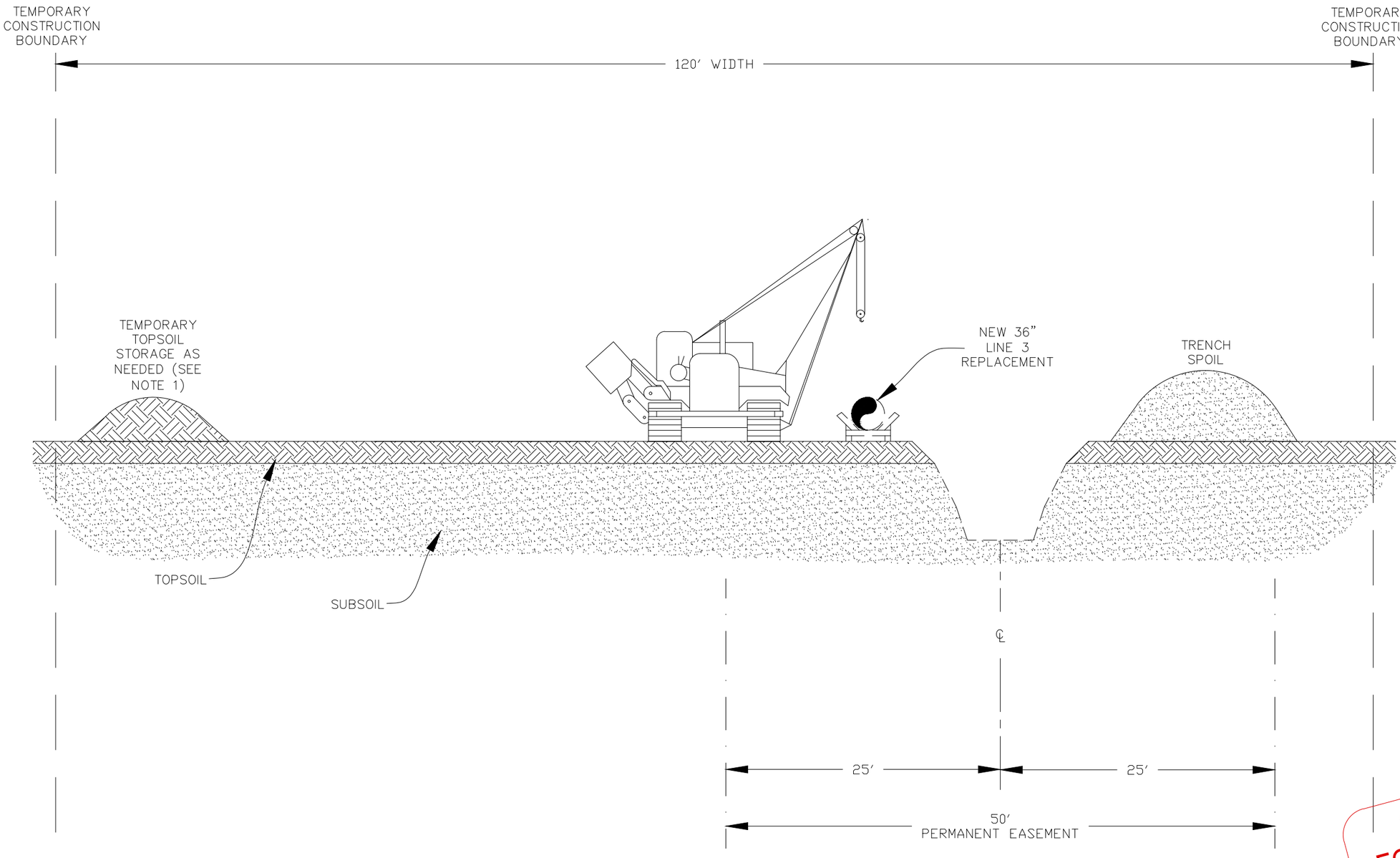
		DATE
DWN. BY:	KEH	11/01/19
CHK.	ND	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL TOPSOIL SEGREGATION
TRENCH LINE ONLY
(25' WORKSPACE OFFSET)

SCALE: NTS

DWG. NO.: Figure 14



PROFILE

ISSUED FOR REVIEW 11/04/19

NOTES:

1. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATION APPROVED BY THE COMPANY.
2. TYPICALLY USED IN WETLANDS, FORESTED COMMUNITIES AND WHERE REQUESTED BY LANDOWNER OR LAND MANAGING AGENCY.
3. TOPSOIL NOT SEGREGATED IN STANDING WATER WETLANDS UNLESS SPECIFIED BY LANDOWNER OR LAND MANAGING AGENCY.

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	KEH	11/04/19	ND	TL

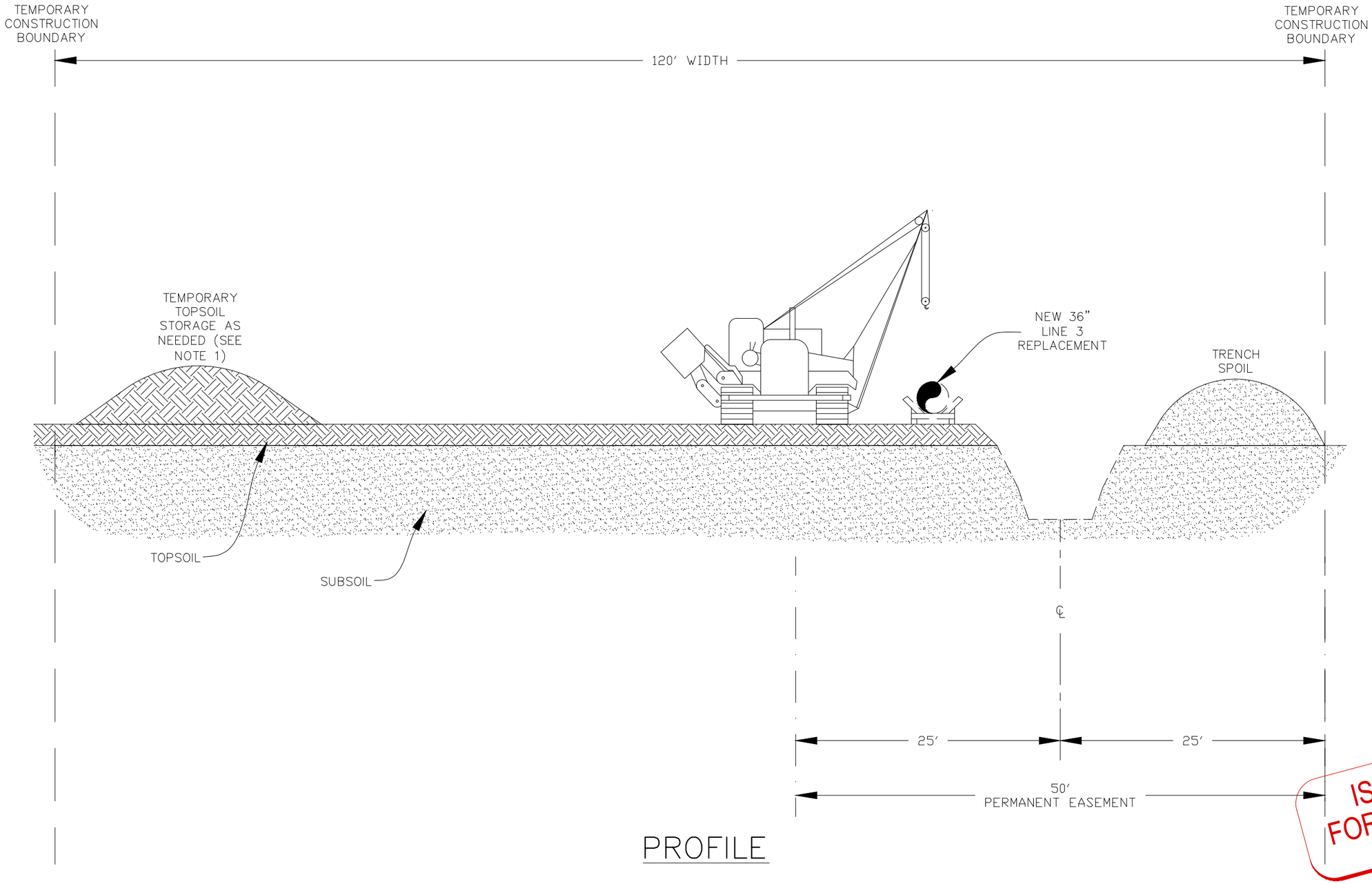
		DATE
DWN. BY:	KEH	11/01/19
CHK.	ND	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL TOPSOIL SEGREGATION
TRENCH LINE ONLY
(40' WORKSPACE OFFSET)

SCALE: NTS

DWG. NO.: Figure 15



ISSUED FOR REVIEW 11/04/19

PROFILE

NOTES:

1. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATION APPROVED BY THE COMPANY.
2. ALTERNATIVE TOPSOIL SEGREGATION METHOD USED ON SITE SPECIFIC BASIS OR AS REQUESTED BY LANDOWNER OR LAND MANAGING AGENCY.

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	KEH	11/04/19	ND	TL

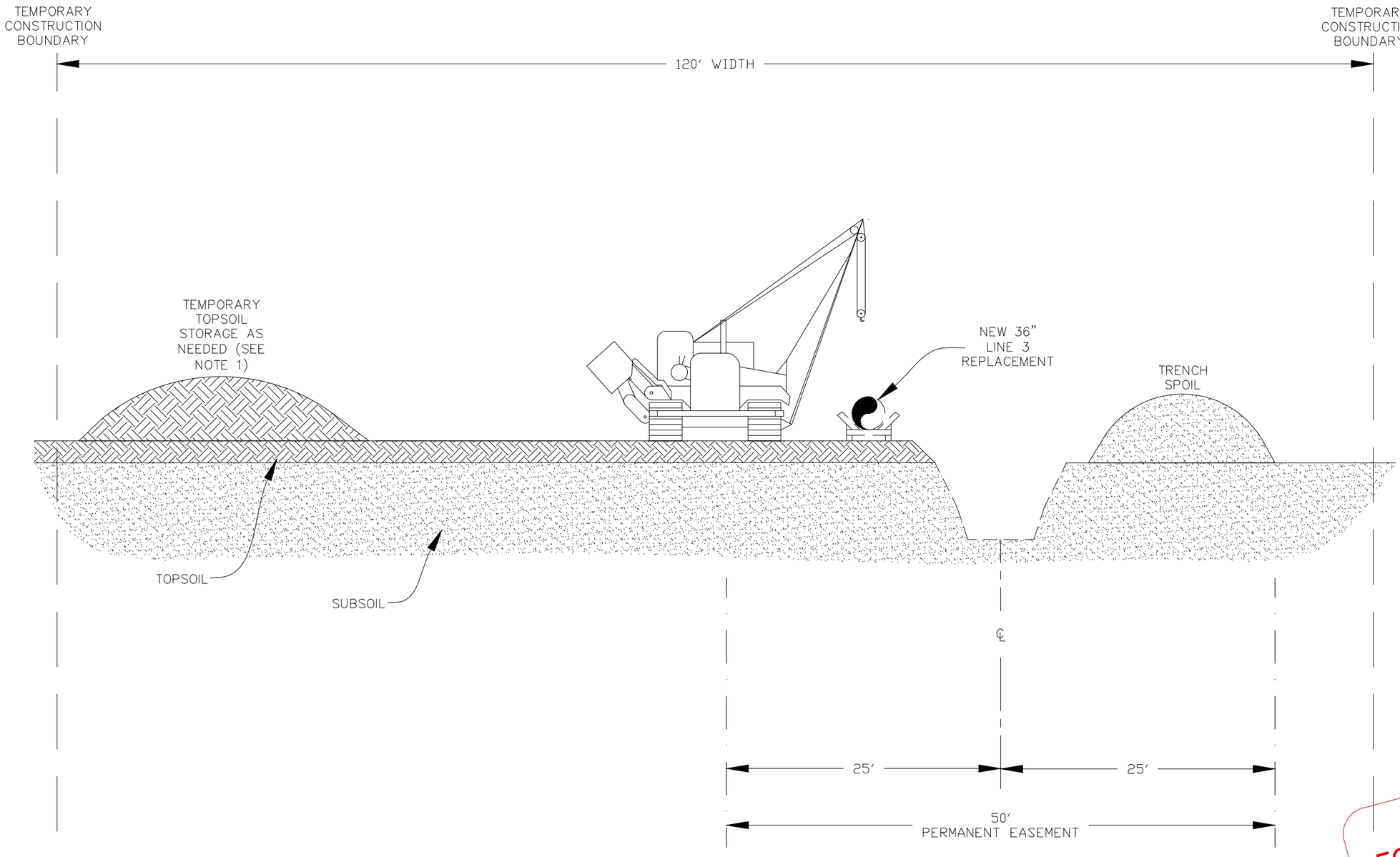
		DATE
DWN. BY:	KEH	11/01/19
CHK.	ND	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL TOPSOIL SEGREGATION
MODIFIED DITCH PLUS SPOIL SIDE
(25' WORKSPACE OFFSET)

SCALE: NTS

DWG. NO.: Figure 16



PROFILE

ISSUED FOR REVIEW 11/04/19

NOTES:

1. STOCKPILE TOPSOIL SEPARATELY FROM DITCH SPOIL AS SHOWN OR IN OTHER CONFIGURATION APPROVED BY THE COMPANY.
2. ALTERNATIVE TOPSOIL SEGREGATION METHOD USED ON SITE SPECIFIC BASIS OR AS REQUESTED BY LANDOWNER OR LAND MANAGING AGENCY.

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	KEH	11/04/19	ND	TL

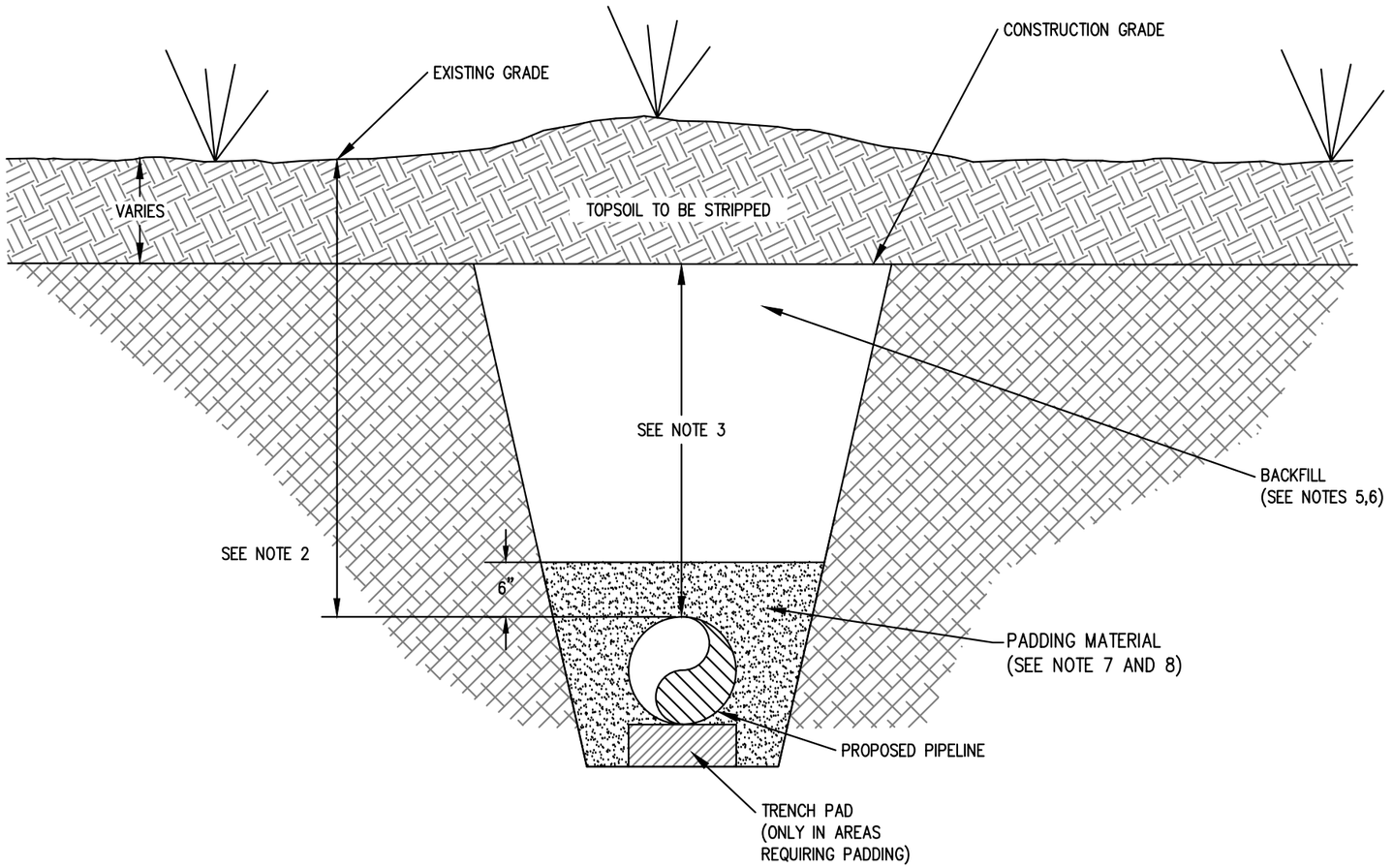
		DATE
DWN. BY:	KEH	11/01/19
CHK.	ND	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL TOPSOIL SEGREGATION
MODIFIED DITCH PLUS SPOIL SIDE
(40' WORKSPACE OFFSET)

SCALE: NTS

DWG. NO.: Figure 17



NOTES

1. DEPTH OF COVER WILL VARY DEPENDING ON LAND USE.
2. (MN ONLY) MINIMUM OF 54" FROM CONSTRUCTION GRADE.
   a. IN THE REQUISITE AREAS WHERE WE DO NOT HAVE A DEPTH OF COVER WAIVER SPECIFIC TO THE MN STATUTE 216G.07.
3. MINIMUM OF 48" FROM CONSTRUCTION GRADE UNLESS STATED OTHERWISE ON THE ALIGNMENT SHEETS OR LINE LIST.
   a. (MN ONLY) IN THOSE AREAS WHEREIN WE HAVE A WAIVER OR ARE OUTSIDE OF THOSE AREAS DEFINED IN THE MN STATUTE 216G.07.
4. DEPTH OF COVER SHALL BE MEASURED AS THE SHORTEST DIMENSION FROM THE TOP OF THE PIPE, OR BUOYANCY CONTROL DEVICE TO THE GRADED RIGHT OF WAY.
5. REFER TO CONSTRUCTION SPECIFICATIONS REGARDING ROCK IN BACKFILL.
6. SIDE OF TRENCH TO BE SLOPED IN ACCORDANCE WITH OSHA SAFETY REGULATIONS REGARDING EXCAVATIONS.
7. THE PADDING MATERIAL SHALL BE PLACED ON THE PIPE USING A PROCEDURE THAT DOES NOT DAMAGE THE COATING OR PIPE.
8. THE MATERIAL USED FOR PADDING SHALL BE WELL GRADED FROM GRANULAR MATERIAL WITH A MAXIMUM PARTICLE SIZE OF 1.5 INCHES.

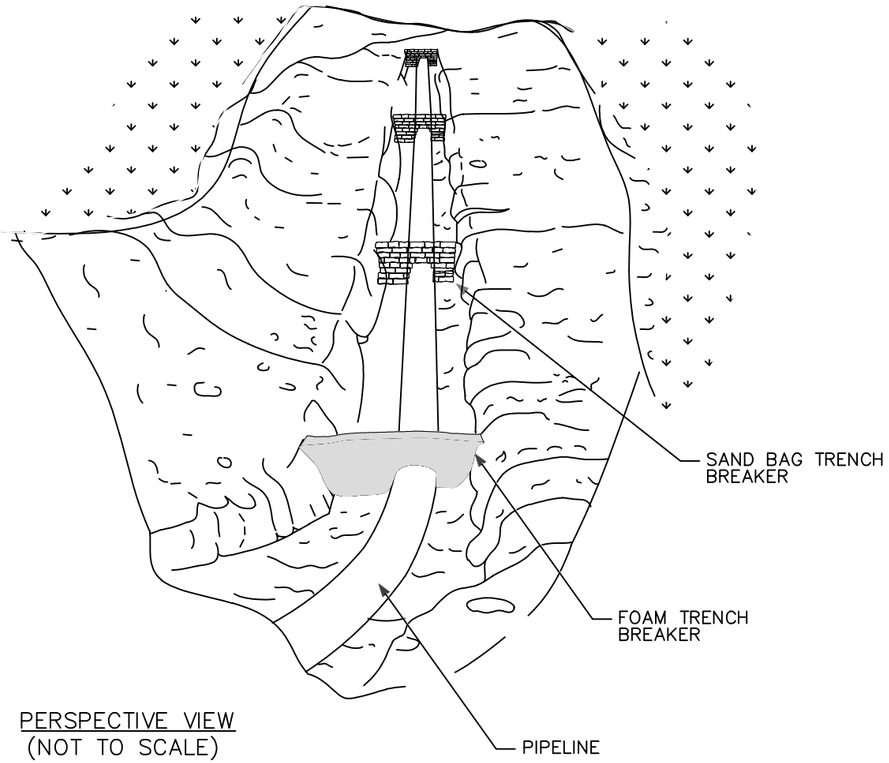
ISSUED FOR REVIEW 11/04/19

MN STATUTE 216G.07 PROTECTING PUBLIC FACILITIES AND AGRICULTURAL LAND:

SUBDIVISION 1. DEPTH OF COVER. UNLESS WAIVED IN THE MANNER PROVIDED IN SUBDIVISION 2 OR 3, ANY PIPELINE INSTALLED AFTER MAY 26, 1979, SHALL BE BURIED WITH A MINIMUM LEVEL COVER OF NOT LESS THAN 4–1/2 FEET IN ALL AREAS WHERE THE PIPELINE CROSSES THE RIGHT–OF–WAY OF ANY PUBLIC DRAINAGE FACILITY OR ANY COUNTY, TOWN OR MUNICIPAL STREET OR HIGHWAY AND WHERE THE PIPELINE CROSSES CULTIVATED AGRICULTURAL LAND. WHERE THE PIPELINE CROSSES THE RIGHT–OF–WAY OF ANY DRAINAGE DITCH, THE PIPELINE SHALL BE AT LEAST 4–1/2 FEET BELOW THE AUTHORIZED DEPTH OF THE DITCH, UNLESS WAIVED IN THE MANNER PROVIDED IN SUBDIVISION 2 AND 3.

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
D	ISSUED FOR REVIEW	AJM	11/04/19	KEH	RF

DWN. BY: JDW	DATE 06/13/16	ENBRIDGE
CHK. KEH	08/04/17	LINE 3 REPLACEMENT TYPICAL TRENCH AND BACKFILL REQUIREMENTS
PROJ. ENGR. MDM	08/04/17	
PROJ. MGR. BS	08/04/17	
CLIENT APP.		SCALE NTS / DWG. NO. Figure 18

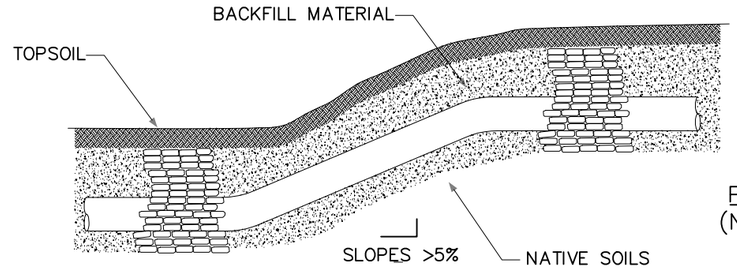


PERSPECTIVE VIEW
(NOT TO SCALE)

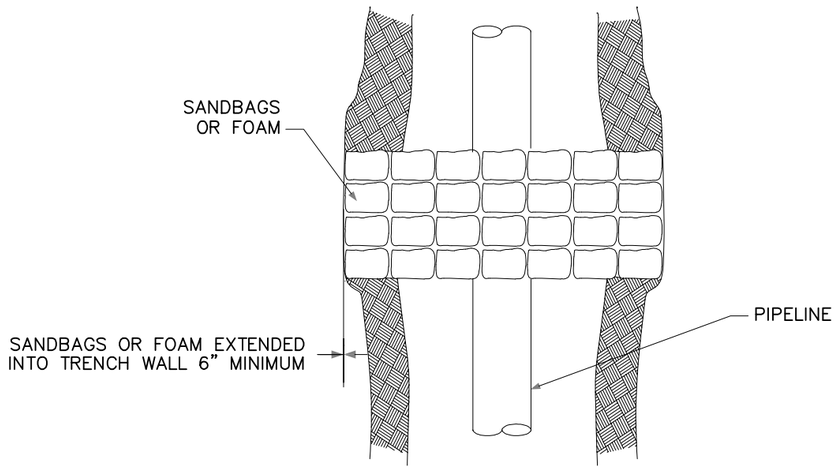
NOTES:

1. BAGS WILL NOT BE FILLED WITH TOPSOIL.
2. ADDITIONAL INFORMATION INCLUDED ON OTHER DRAWINGS.
3. TRENCH BREAKERS SHALL BE PLACED AS LISTED BELOW:

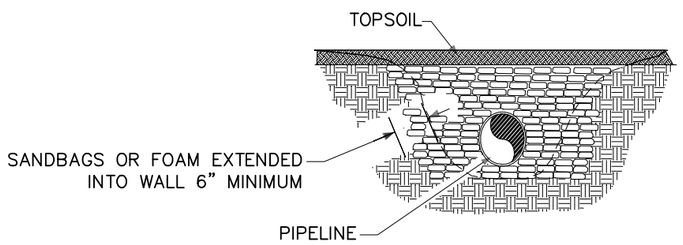
SLOPE%	APPROXIMATE SPACING (FT)
3–5	250
5–15	200
15–25	150
>25	<100



PROFILE VIEW
(NOT TO SCALE)



PLAN VIEW
(NOT TO SCALE)



FACE VIEW
(NOT TO SCALE)

NOTES
1. BAGS WILL NOT BE FILLED WITH TOPSOIL
2. ADDITIONAL INFORMATION INCLUDED ON OTHER DRAWINGS

ISSUED FOR REVIEW
11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	DWA	11/04/19	KEH	KD

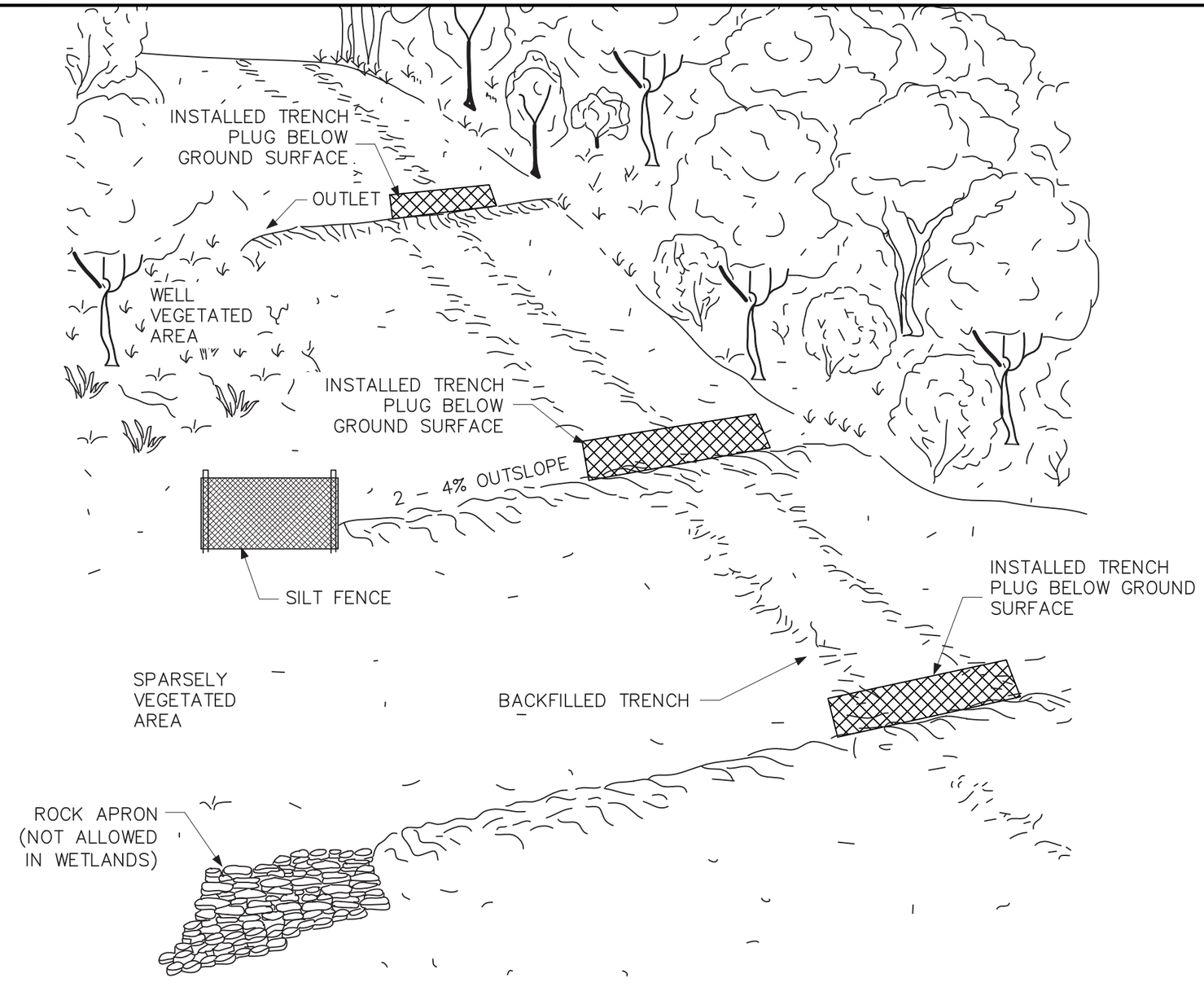
ENBRIDGE

		DATE
DWN. BY:	DWA	10/30/19
CHK.	KEH	10/30/19
PROJ. ENGR.	DG	10/30/19
PROJ. MGR.	KD	10/30/19
CLIENT APP.		

LINE 3 REPLACEMENT
TYPICAL TRENCH BREAKERS–
MULTIPLE VIEWS

SCALE: NTS

DWG. NO.: Figure 19



PERSPECTIVE VIEW
(NOT TO SCALE)

NOTES:

1. BERMS ARE PERMANENT.
2. SILT FENCE REMOVED WHEN VEGETATION ESTABLISHED.
3. LOWEST BERM MAY BE OMITTED IF SILT FENCE OR STRAW BALES ARE INSTALLED AT THAT LOCATION, SUBJECT TO APPROVAL.
4. BERMS SHALL BE OUTLETED TO WELL VEGETATED STABLE AREAS, FILTER SOCKS, SILT FENCES, STRAW BALES, ROCK APRONS, OR SUMPS.
5. BERMS SHALL BE PLACED AS LISTED BELOW.

SLOPE%	APPROXIMATE SPACING (FT)
5	250
>5–15	200
15–25	150
>25	<100

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	JDW	11/04/19	KEH	NKD

		DATE
DWN. BY: KEH		8/16/18
CHK. NKD		8/16/18
PROJ. ENGR. CP		8/16/18
PROJ. MGR. BS		8/16/18
CLIENT APP.		

ENBRIDGE

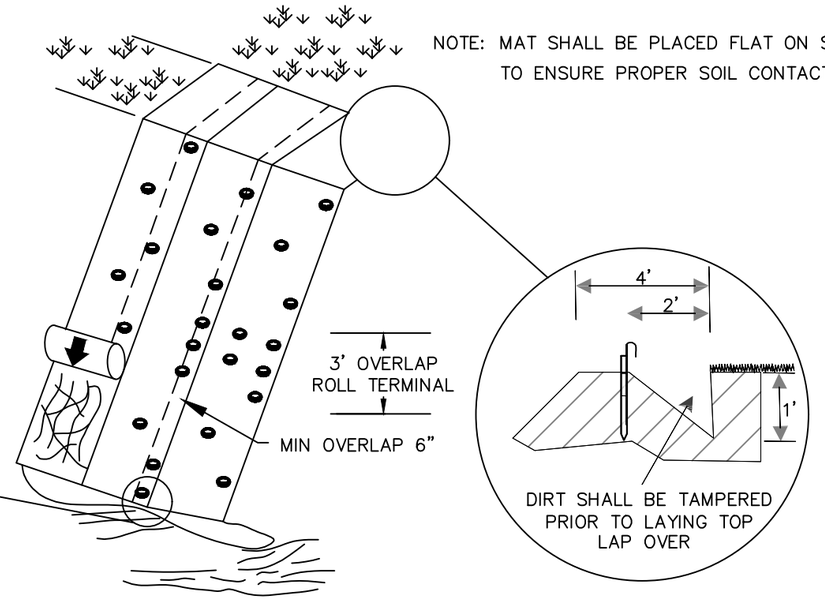
LINE 3 REPLACEMENT
TYPICAL
PERMANENT SLOPE BREAKERS

SCALE NTS

DWG. NO. Figure 20

FILL SLOPE SECTION

EROSION CONTROL BLANKETS SHOULD BE INSTALED VERTICALLY DOWNSLOPE.



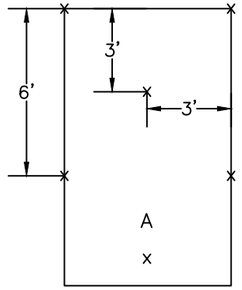
TOE

MAINTAIN SLOPE ANGLE

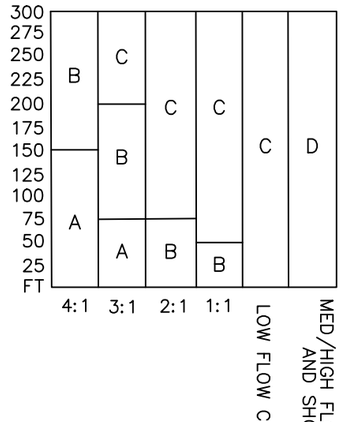
NOTE: MAT SHALL BE PLACED FLAT ON SURFACE TO ENSURE PROPER SOIL CONTACT.

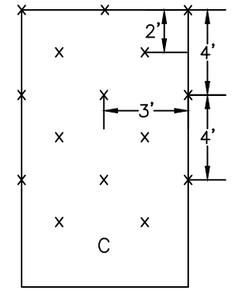
BERM

TRENCH INTO BERM AND PROGRESS DOWNSLOPE



1 STAPLE PER SQ. YD

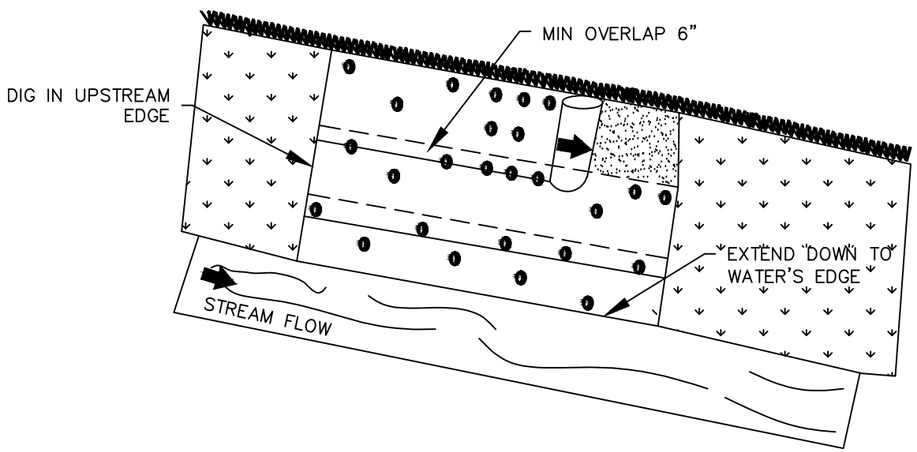


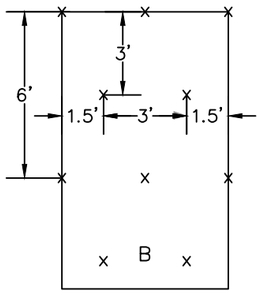


2 STAPLES PER SQ. YD

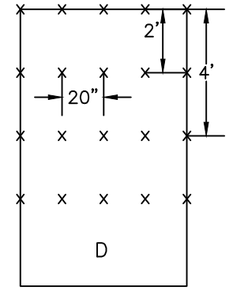
STREAM CHANNEL

EROSION CONTROL BLANKETS SHOULD BE INSTALLED HORIZONTALLY WITH STREAM FLOW.





1 ½ STAPLES PER SQ. YD



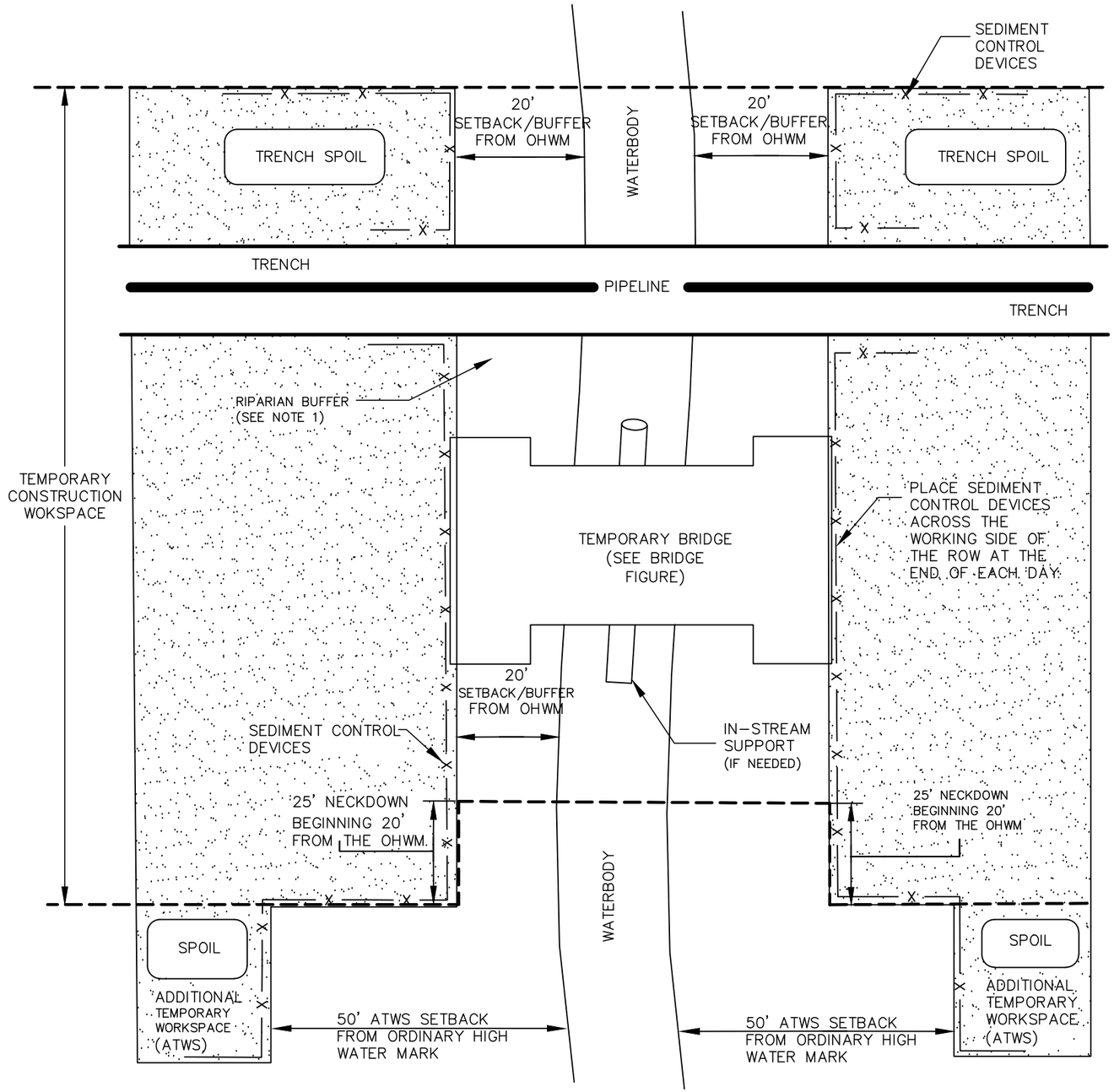
3 1/2 STAPLES PER SQ. YD

FOR OPTIMUM RESULTS, THESE RECOMMENDED STAPLE PATTERN GUIDES MUST BE FOLLOWED. SUGGESTED ANCHORING METHODS VARY ACCORDING TO THE MANUFACTURER. THIS CHART SHOWS HOW TO SLOPE LENGTHS AND HOW GRADIENTS AFFECT SAMPLING PATTERNS.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	DWA	11/04/19	KEH	KD

DWN. BY: DWA	DATE 10/30/19	ENBRIDGE
CHK. KEH	10/30/19	LINE 3 REPLACEMENT TYPICAL EROSION CONTROL BLANKET INSTALLATION & STAPLE PATTERNS
PROJ. ENGR. DG	10/30/19	
PROJ. MGR. KD	10/30/19	
CLIENT APP.		SCALE NTS / DWG. NO. Figure 21



NOTES:

1. REFER TO 2.2 OF EPP FOR EROSION CONTROL REQUIREMENTS.
2. 50' ATWS SETBACK FROM ORDINARY HIGH WATER MARK (OHWM), AS CONDITIONS ALLOW, EXCEPT IN UPLAND AREAS OF CULTIVATED OR ROTATED CROPLAND OR OTHER DISTURBED LAND.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	AJM	11/04/19	KEH	KD

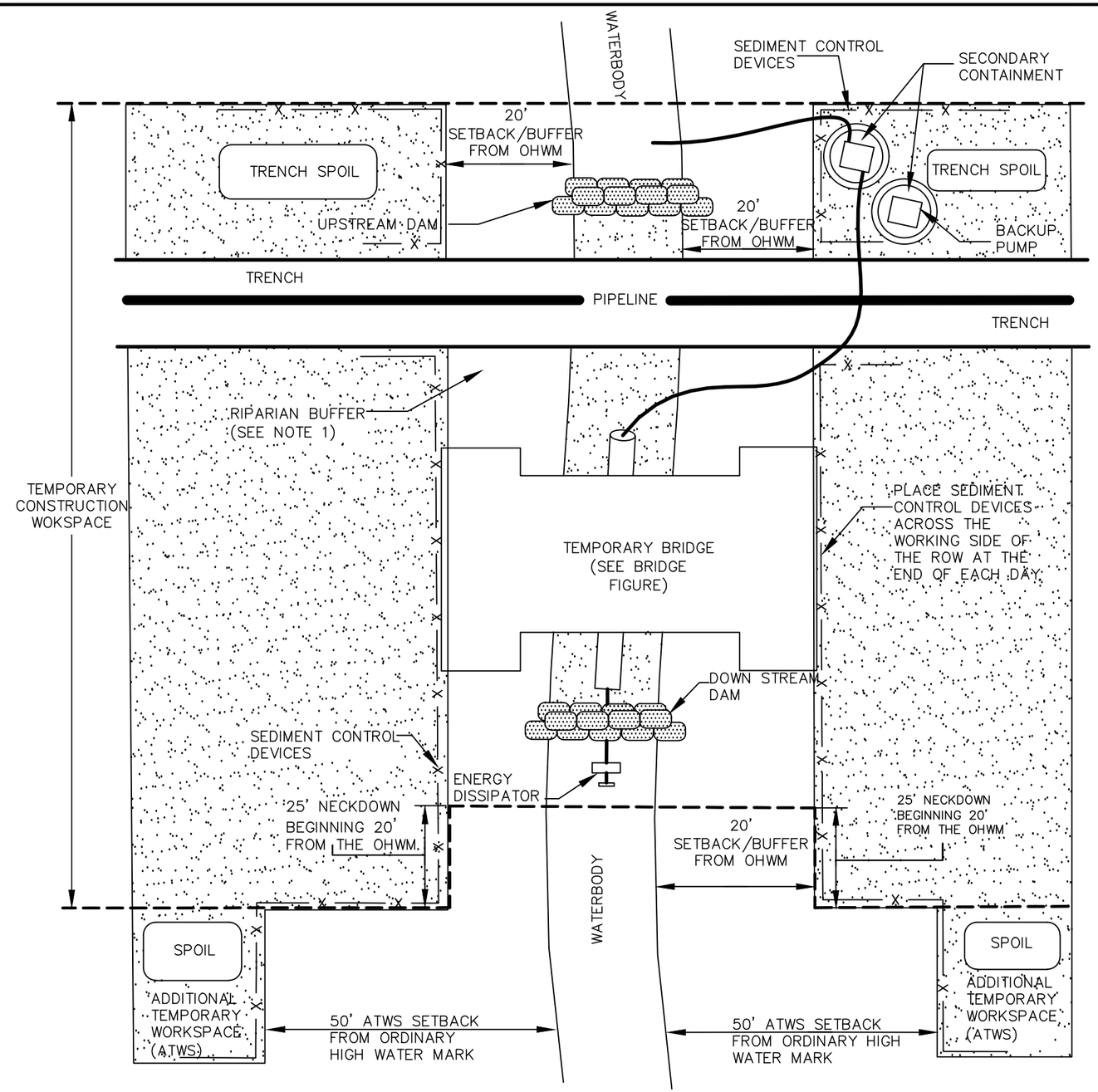
ENBRIDGE

		DATE
DWN. BY:	AJM	10/25/19
CHK.	KEH	10/25/19
PROJ. ENGR.	DG	10/25/19
PROJ. MGR.	KD	10/25/19
CLIENT APP.		

LINE 3 REPLACEMENT
TYPICAL
WATERBODY CROSSING
OPEN CUT TRENCH METHOD

SCALE: NTS

DWG. NO.: Figure 22



NOTES:

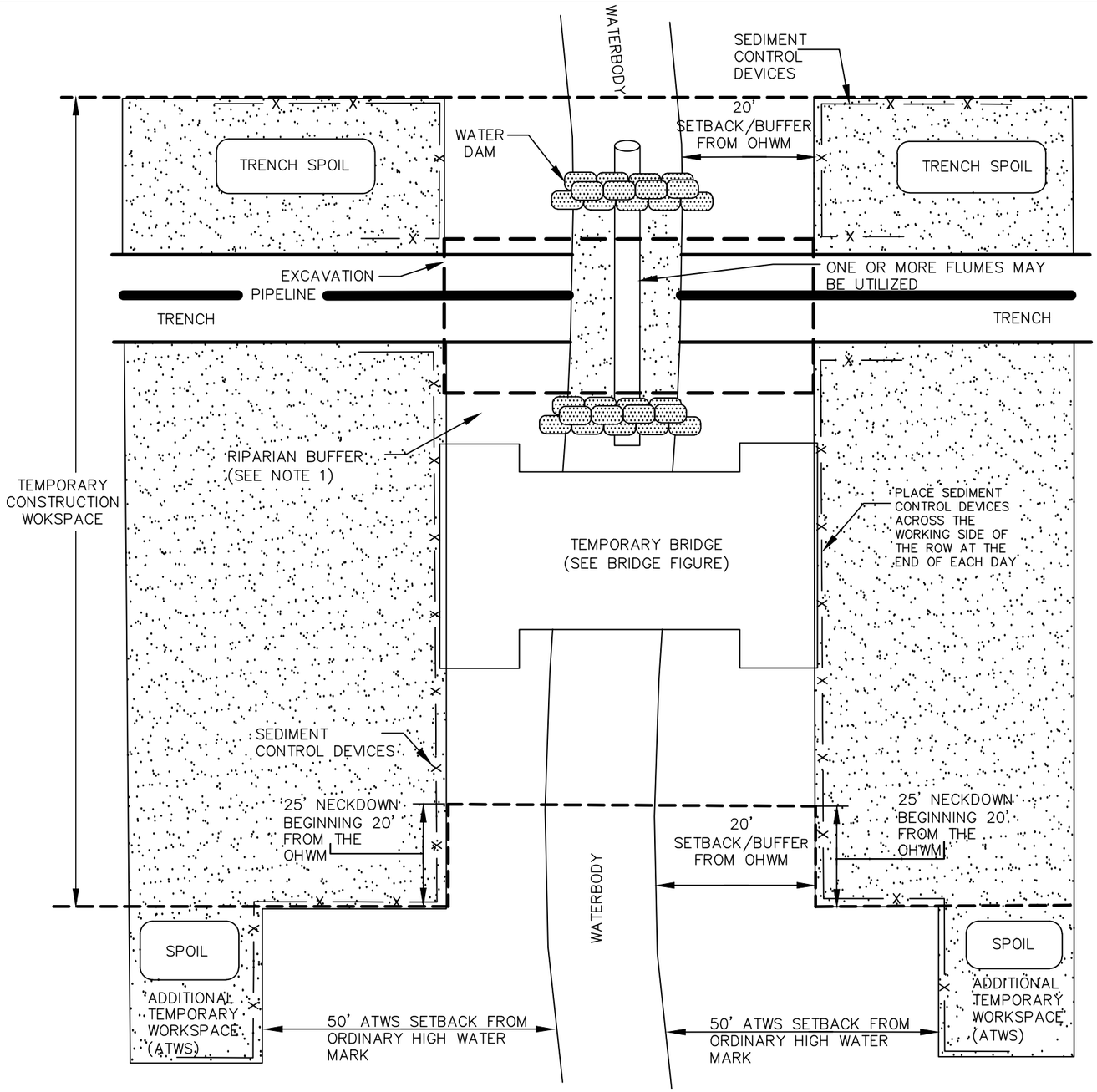
1. REFER TO 2.2 OF EPP FOR EROSION CONTROL REQUIREMENTS.
2. 50' ATWS SETBACK FROM ORDINARY HIGH WATER MARK (OHWM), AS CONDITIONS ALLOW, EXCEPT IN UPLAND AREAS OF CULTIVATED OR ROTATED CROPLAND OR OTHER DISTURBED LAND.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
B	ISSUED FOR REVIEW	AJM	11/04/19	KEH	KD

ENBRIDGE

DWN. BY: AJM	DATE 04/25/19	LINE 3 REPLACEMENT TYPICAL WATERBODY CROSSING DRY CROSSING–DAM AND PUMP METHOD
CHK. KEH	04/30/19	
PROJ. ENGR. DG	04/30/19	
PROJ. MGR. KD	04/30/19	
CLIENT APP.		SCALE NTS / DWG. NO. Figure 23



NOTES:

1. REFER TO 2.2 OF EPP FOR EROSION CONTROL REQUIREMENTS.
2. 50' ATWS SETBACK FROM ORDINARY HIGH WATER MARK (OHWM), AS CONDITIONS ALLOW, EXCEPT IN UPLAND AREAS OF CULTIVATED OR ROTATED CROPLAND OR OTHER DISTURBED LAND.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
B	ISSUED FOR REVIEW	AJM	11/04/19	KEH	KD

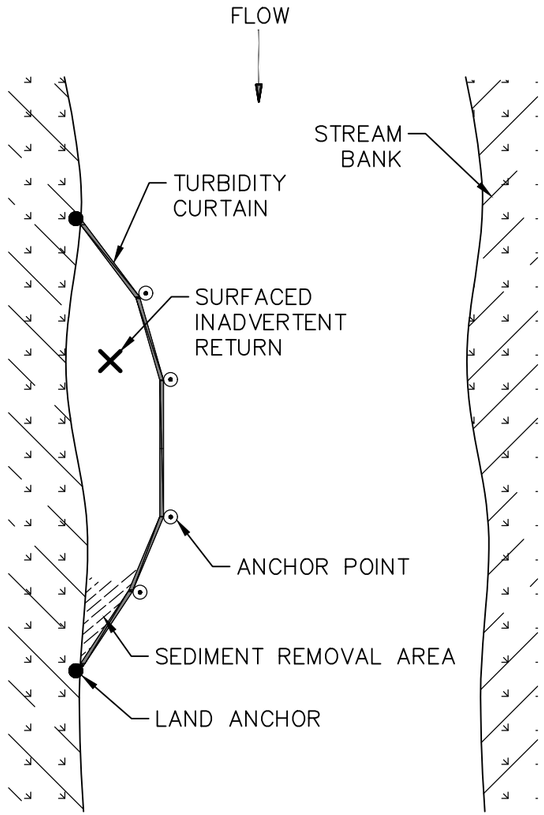
		DATE
DWN. BY:	AJM	04/25/19
CHK.	KEH	04/30/19
PROJ. ENGR.	DG	04/30/19
PROJ. MGR.	KD	04/30/19
CLIENT APP.		

ENBRIDGE

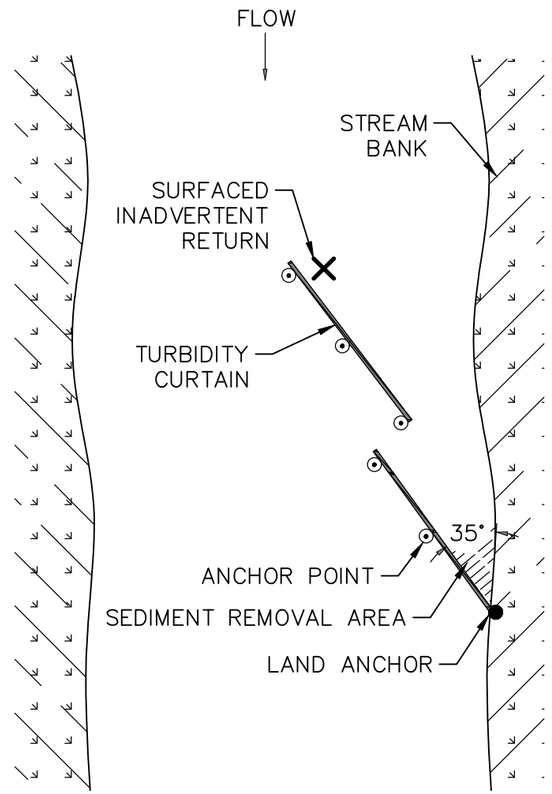
LINE 3 REPLACEMENT
TYPICAL
WATERBODY CROSSING
DRY CROSSING–FLUME METHOD

SCALE: NTS

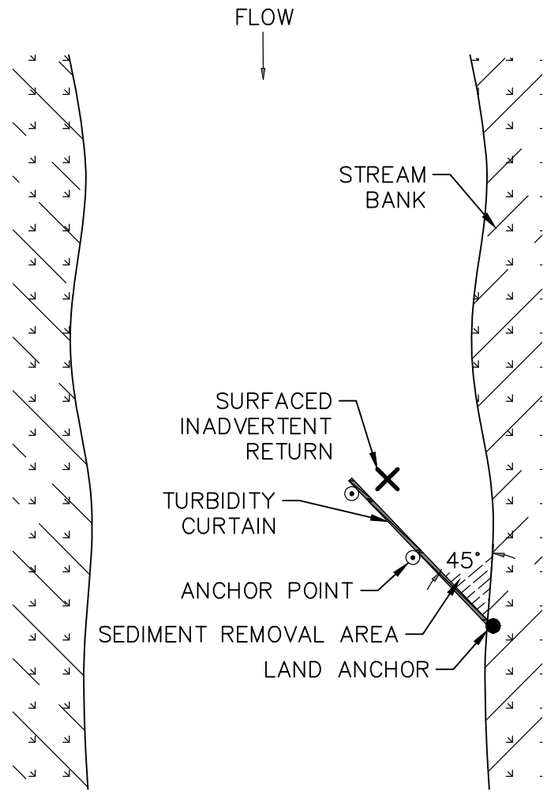
DWG. NO.: Figure 24



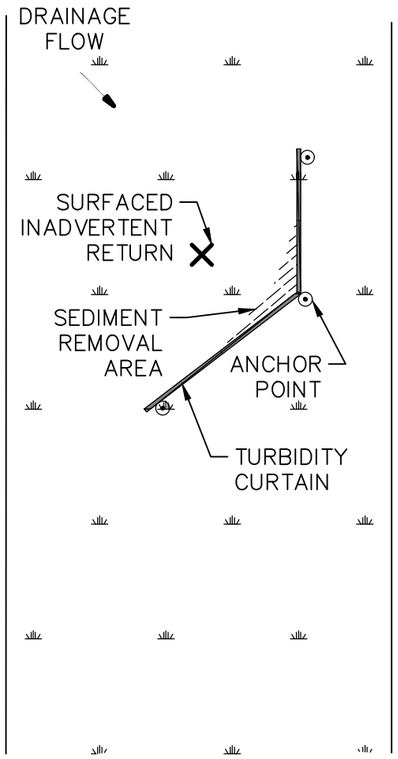
1 NEAR–SHORE
PLAN VIEW



2 RAPID/MID–CHANNEL
PLAN VIEW



3 MODERATE FLOW/SIDE–CHANNEL
PLAN VIEW



3 STANDING/STILL WATER
PLAN VIEW

ISSUED FOR REVIEW
11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	JDW	11/04/19	KEH	NKD

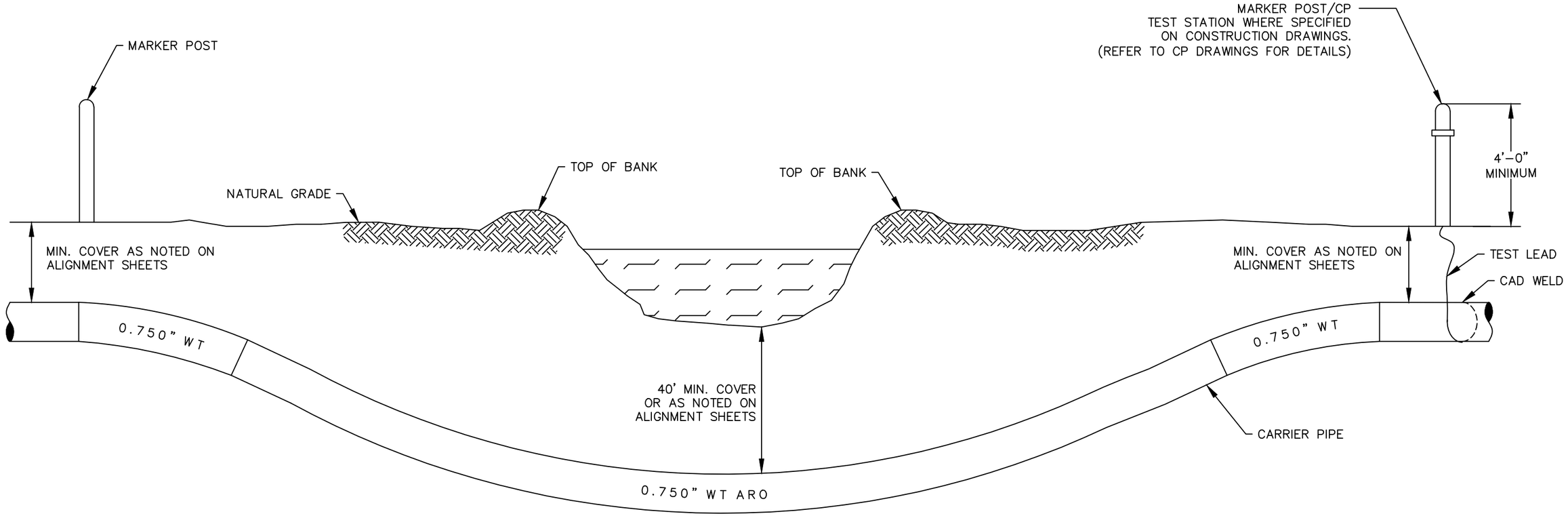
		DATE
DWN. BY:	KEH	10/25/19
CHK.	NKD	10/25/19
PROJ. ENGR.	CP	10/25/19
PROJ. MGR.	BS	10/25/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL
TURBIDITY CURTAIN INSTALLATIONS

SCALE NTS

DWG. NO. Figure 25



NOTES:

1. PIPE WALL THICKNESS AND GRADE AS SPECIFIED ON ALIGNMENT SHEETS, UNLESS NOTED OTHERWISE.
2. LOCATION, LENGTH OF CROSSING, MATERIAL AND TESTING REQUIREMENTS SHALL BE AS STATED ON THE ALIGNMENT SHEETS.
3. APPROPRIATE BUOYANCY CONTROL SHALL BE INSTALLED TO PROVIDE NEGATIVE BUOYANCY, AS SPECIFIED ON ALIGNMENT SHEETS OR SITE SPECIFIC DRAWING.
4. AS A MINIMUM, THE DEPTH OF COVER UNDER HDD CROSSING FEATURES SHALL BE 40', UNLESS OTHERWISE SPECIFIED IN APPLICABLE ENVIRONMENTAL PERMITS OR OTHER CONSTRUCTION DOCUMENTS.
5. CROSSING TIMING AND CONSTRUCTION WINDOW AS SPECIFIED IN ENVIRONMENTAL PERMITS AND/OR SITE SPECIFIC DRAWINGS AND TYPICAL CROSSING DETAILS.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
C	ISSUED FOR REVIEW	JWH	11/04/19	NKD	RF

DWN. BY: JWH	DATE 03/15/19	
CHK. NKD	11/04/19	
PROJ. ENGR. RF	11/04/19	
PROJ. MGR. TL	11/04/19	
CLIENT APP.		

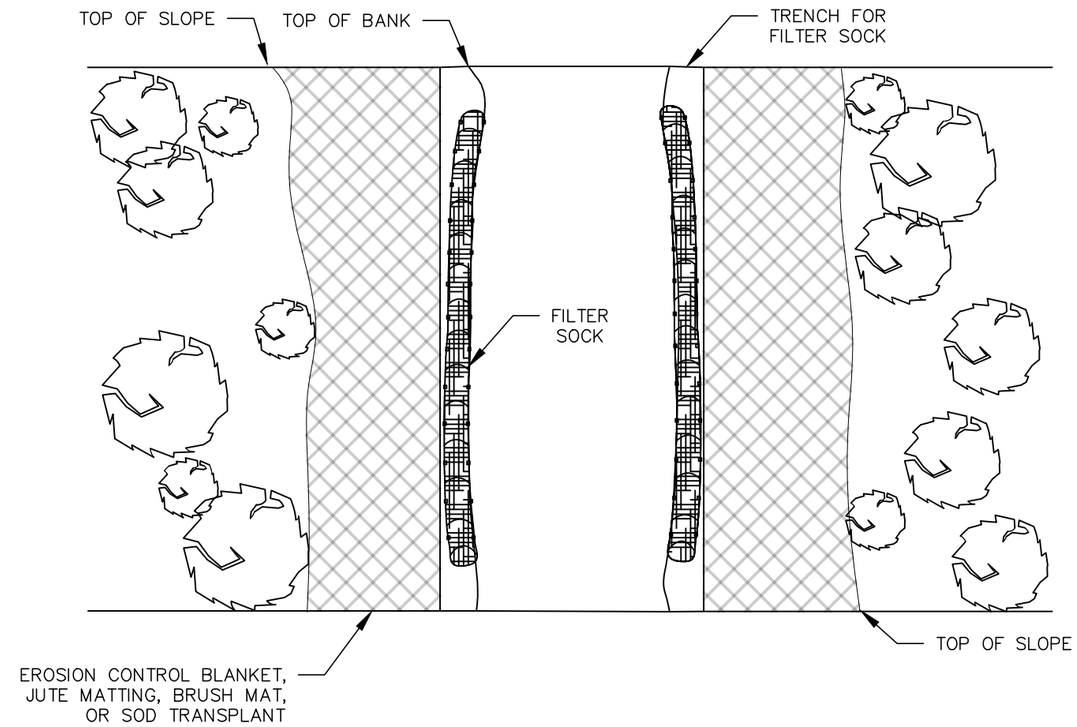
ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL HDD ENTRY AND EXIT

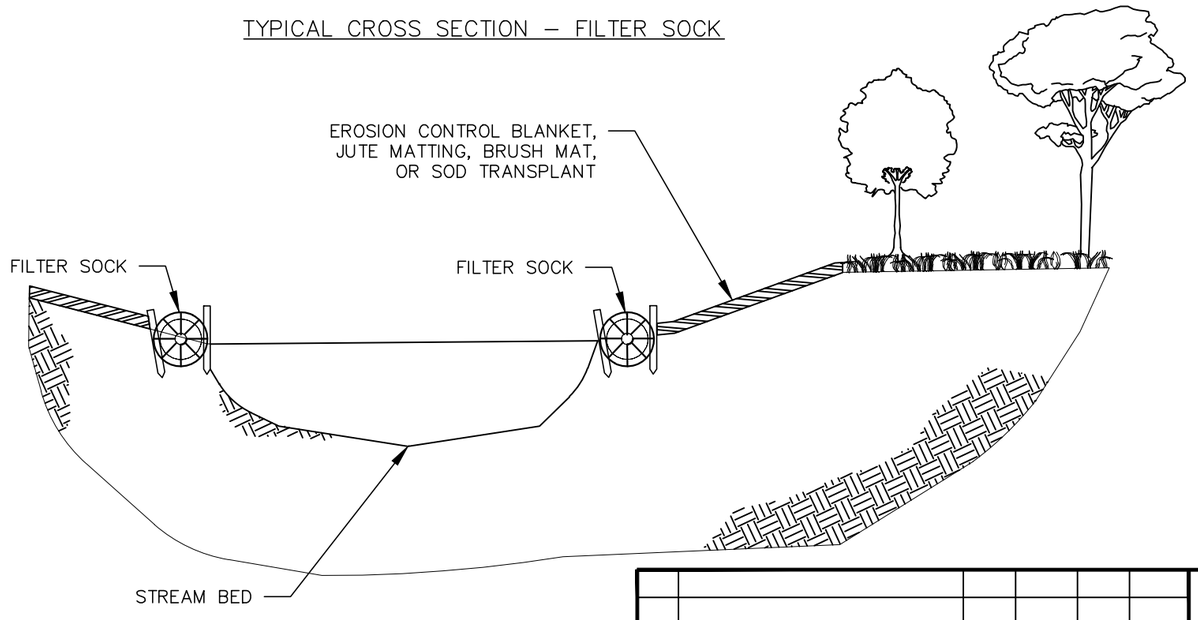
SCALE NTS

DWG. NO. Figure 26

TYPICAL PLAN VIEW – FILTER SOCK



TYPICAL CROSS SECTION – FILTER SOCK



ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	AJM	11/04/19	KEH	KD

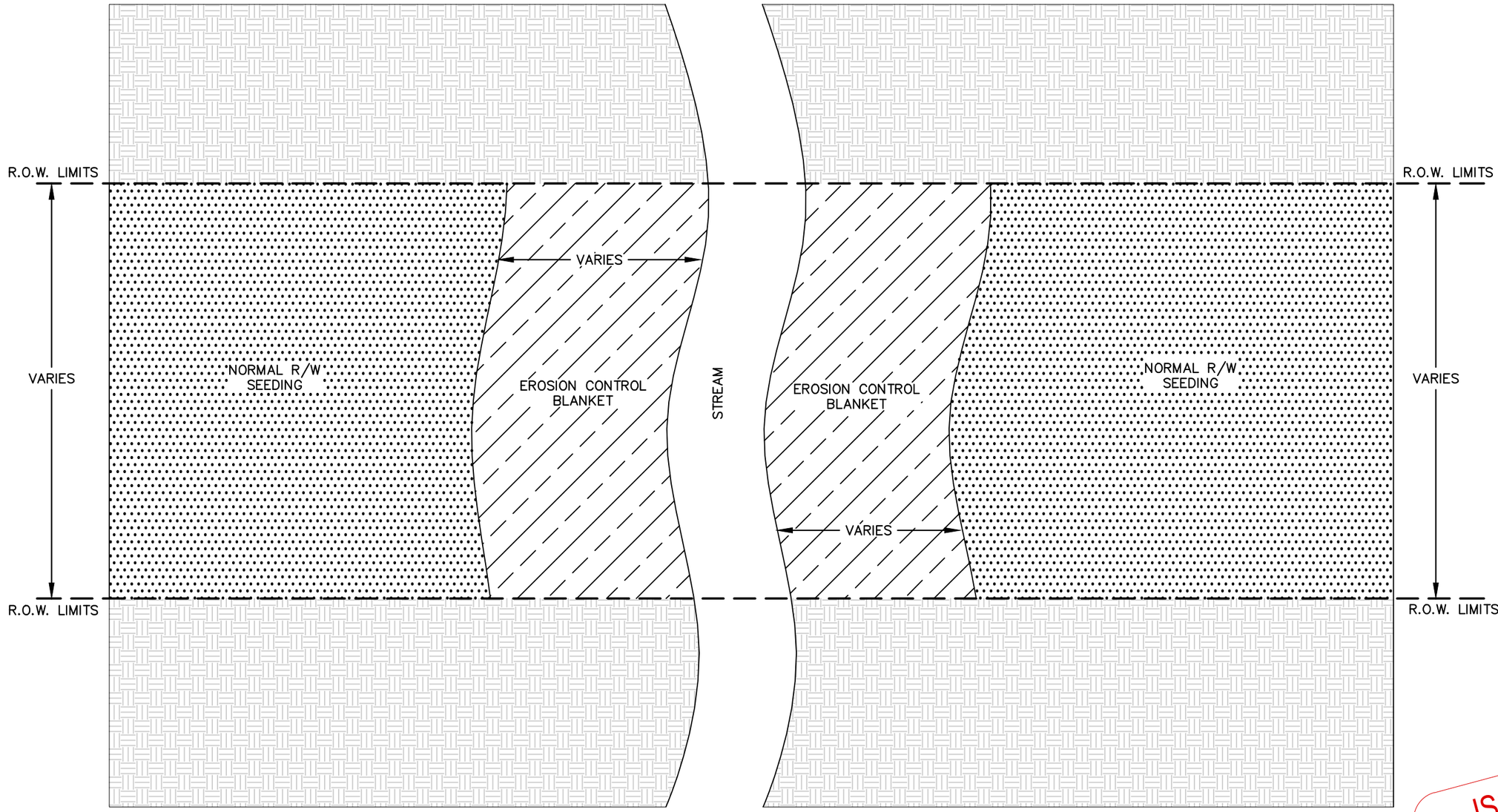
ENBRIDGE

DWN. BY: AJM	DATE 10/25/19
CHK. KEH	10/25/19
PROJ. ENGR. DG	10/25/19
PROJ. MGR. KD	10/25/19
CLIENT APP.	

LINE 3 REPLACEMENT
TYPICAL
STREAM BANK STABILIZATION FILTER SOCK

SCALE NTS

DWG. NO. Figure 27



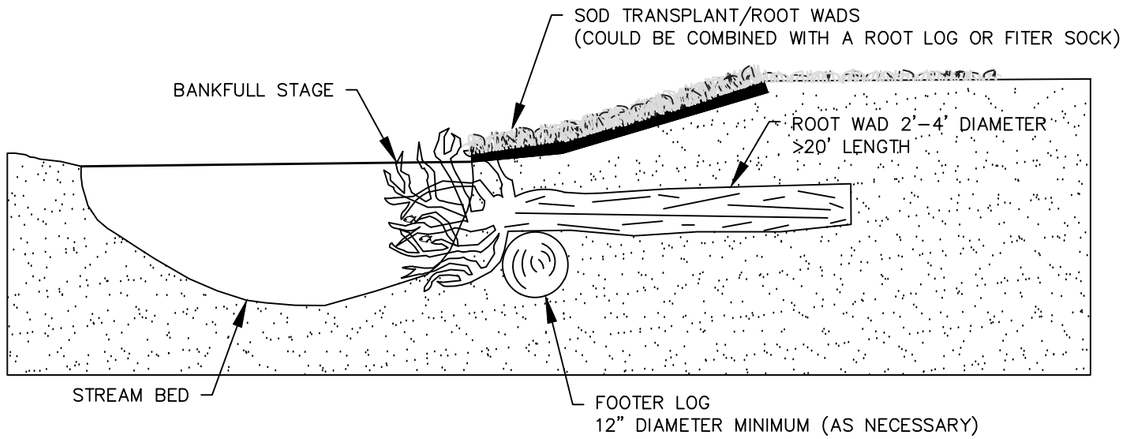
NOTE:
EXTEND EROSION CONTROL FROM MEAN HIGH WATER LEVEL TO SEVERAL FEET BEHIND HIGH BANK

ISSUED FOR REVIEW
11/04/19

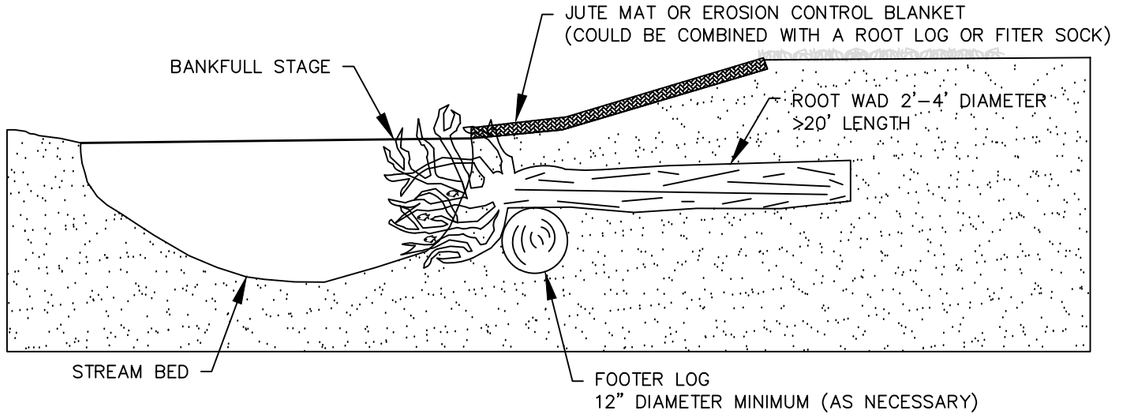
NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	AJM	11/04/19	KEH	KD

DWN. BY: AJM	DATE 10/25/19	ENBRIDGE
CHK. KEH	10/25/19	LINE 3 REPLACEMENT TYPICAL FINAL STREAM BANK STABILIZATION & EROSION CONTROL
PROJ. ENGR. DG	10/25/19	
PROJ. MGR. KD	10/25/19	
CLIENT APP.		SCALE NTS / DWG. NO. Figure 28

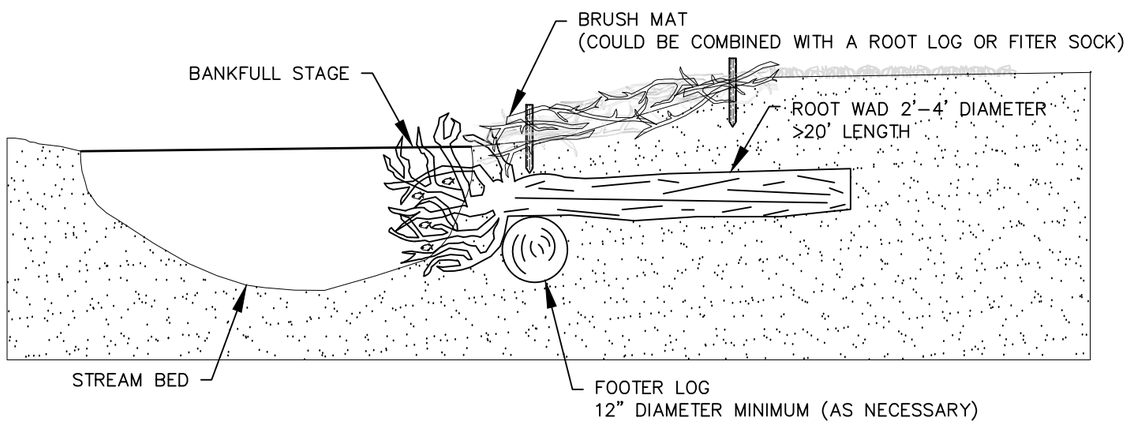
TYPICAL CROSS SECTION – SOD TRANSPLANT



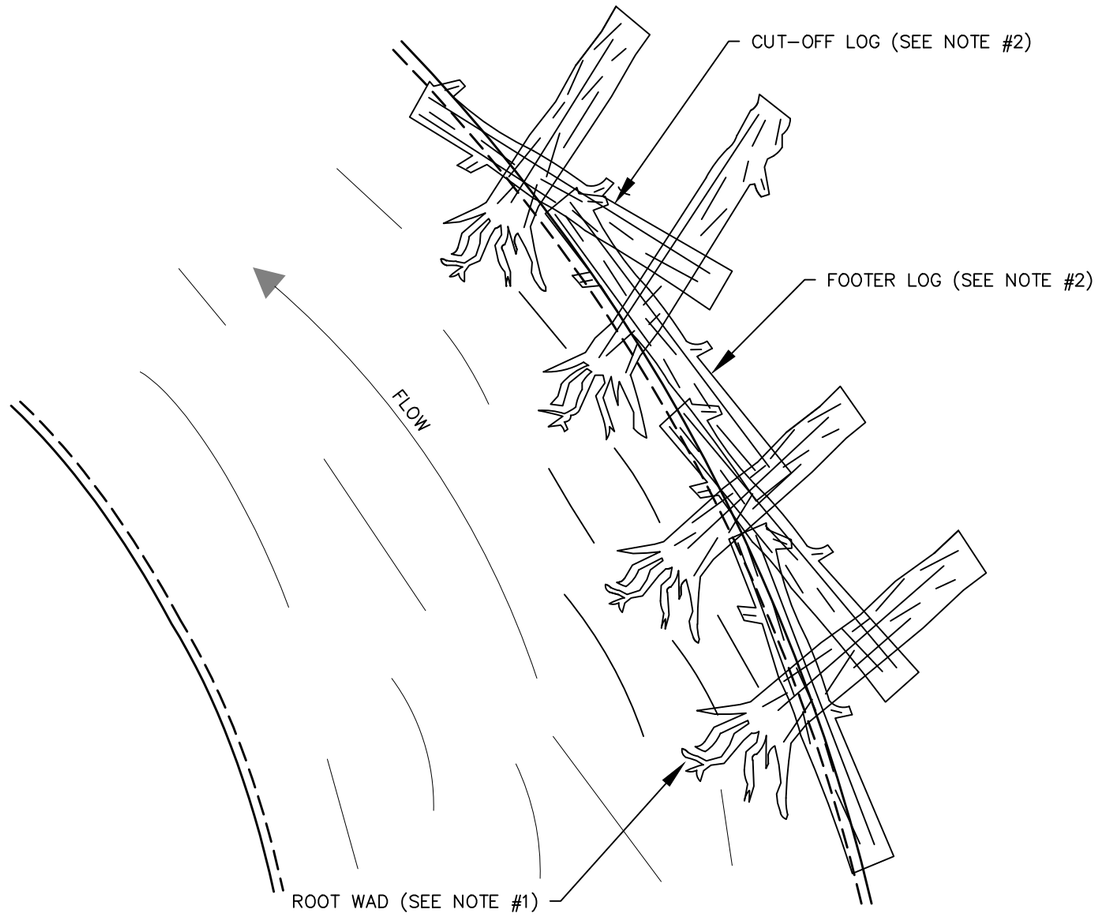
TYPICAL CROSS SECTION – JUTE MAT OR EROSION CONTROL BLANKET



TYPICAL CROSS SECTION – BRUSH MAT



TYPICAL PLAN VIEW – NATURAL MATERIAL REVETMENT



NOTES:

#1 – ROOT WAD LOGS TO BE USED ON STEEP BANKS OR BASED ON AGENCY RECOMMENDATIONS.

#2 – ROOT WAD LOGS TO BE ANCHORED APPROPRIATELY BASED ON SITE–SPECIFIC CONDITIONS OR AGENCY RECOMMENDATIONS.

ISSUED FOR REVIEW
11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	DWA	11/04/19	KEH	KD

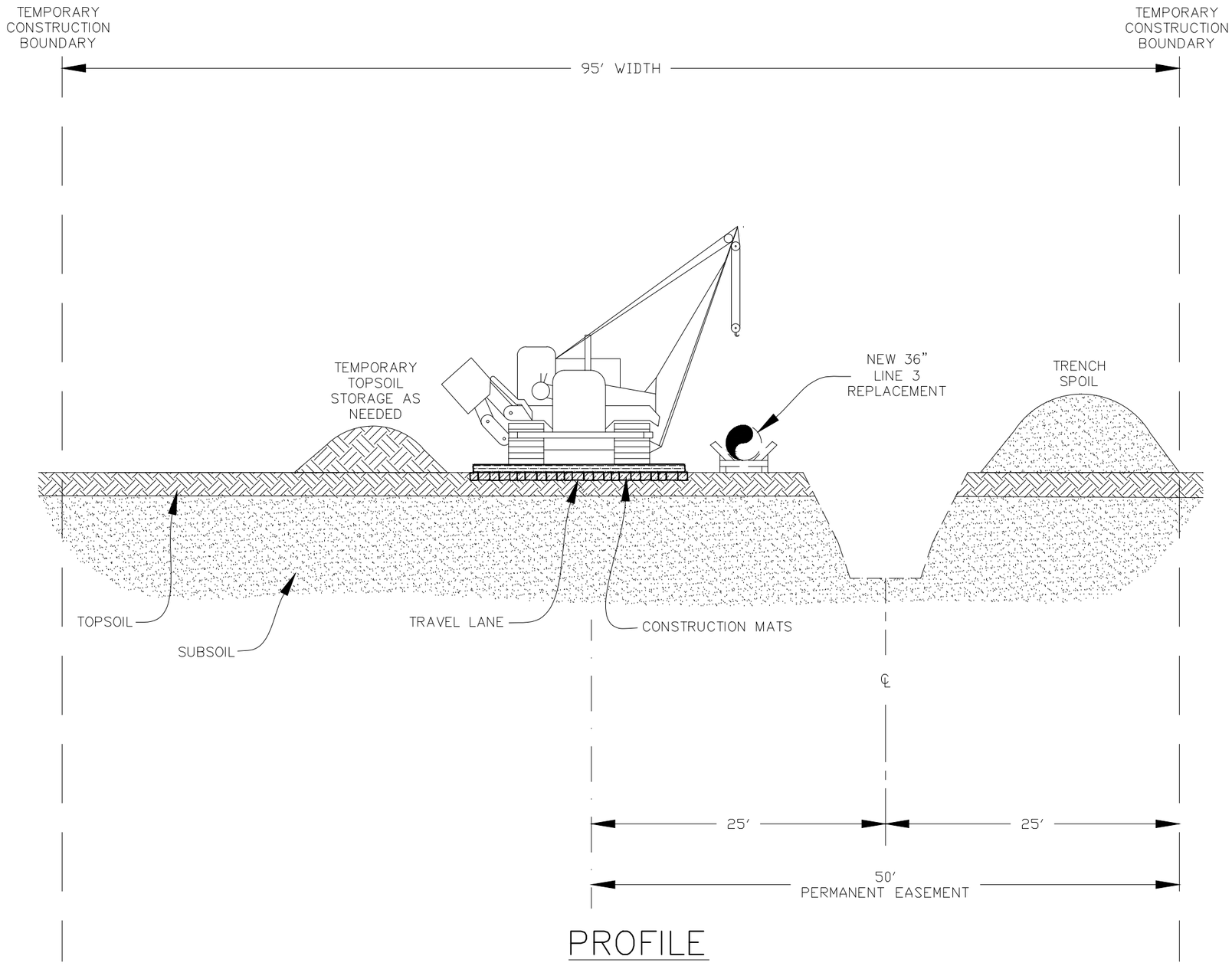
		DATE
DWN. BY:	DWA	10/30/19
CHK.	KEH	10/30/19
PROJ. ENGR.	DG	10/30/19
PROJ. MGR.	KD	10/30/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL ROOT WAD –
NATURAL MATERIAL REVETMENT

SCALE: NTS

DWG. NO.: Figure 29



PROFILE

NOTE:

1. TRENCH LINE ONLY SEGREGATION.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	KEH	11/04/19	ND	RF

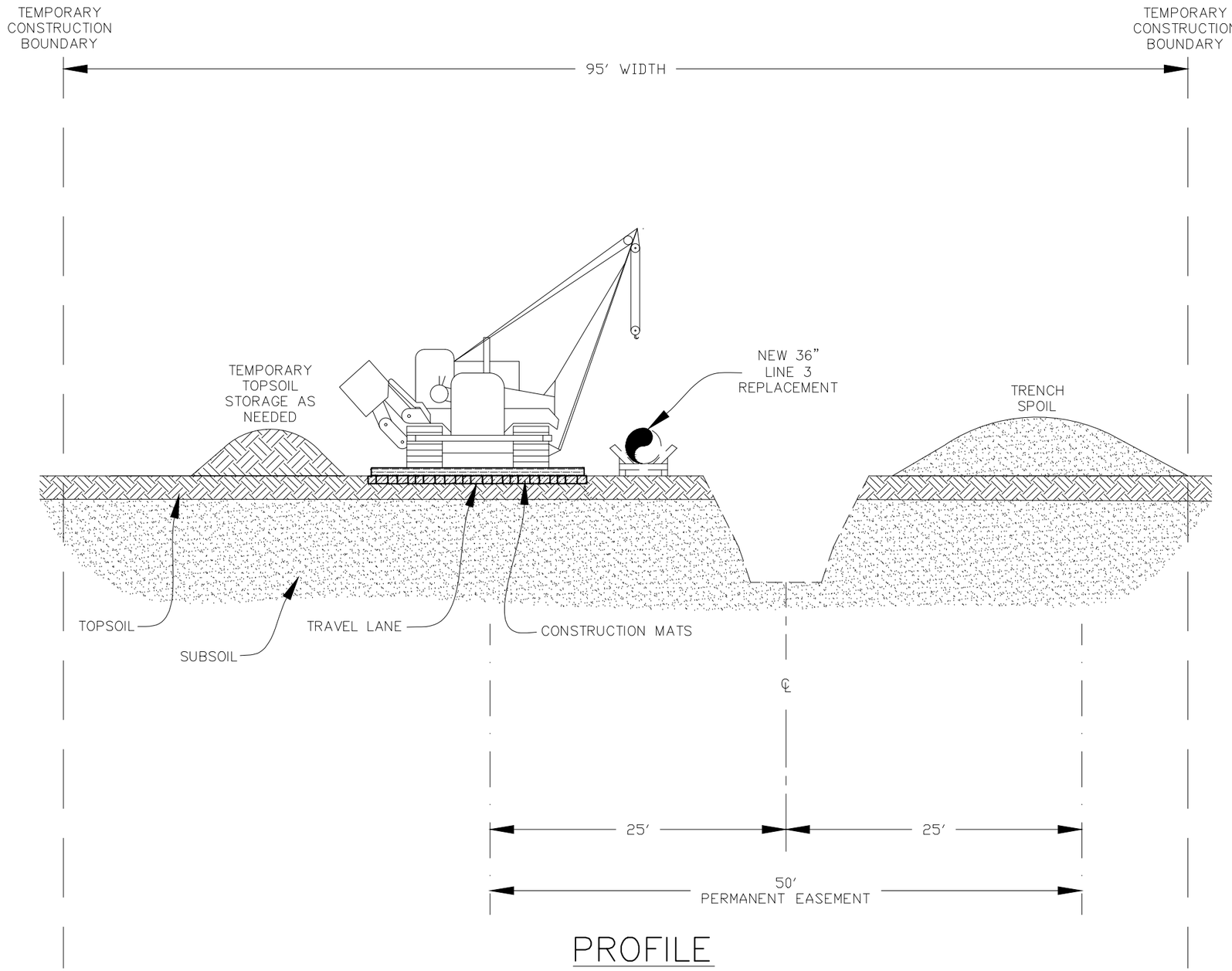
		DATE
DWN. BY:	KEH	11/01/19
CHK.	ND	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT TYPICAL UNSATURATED WETLAND CROSSING PROFILE (25' WORKSPACE OFFSET)

SCALE: NTS

DWG. NO.: Figure 30



PROFILE

NOTE:

1. TRENCH LINE ONLY SEGREGATION.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	KEH	11/04/19	ND	RF

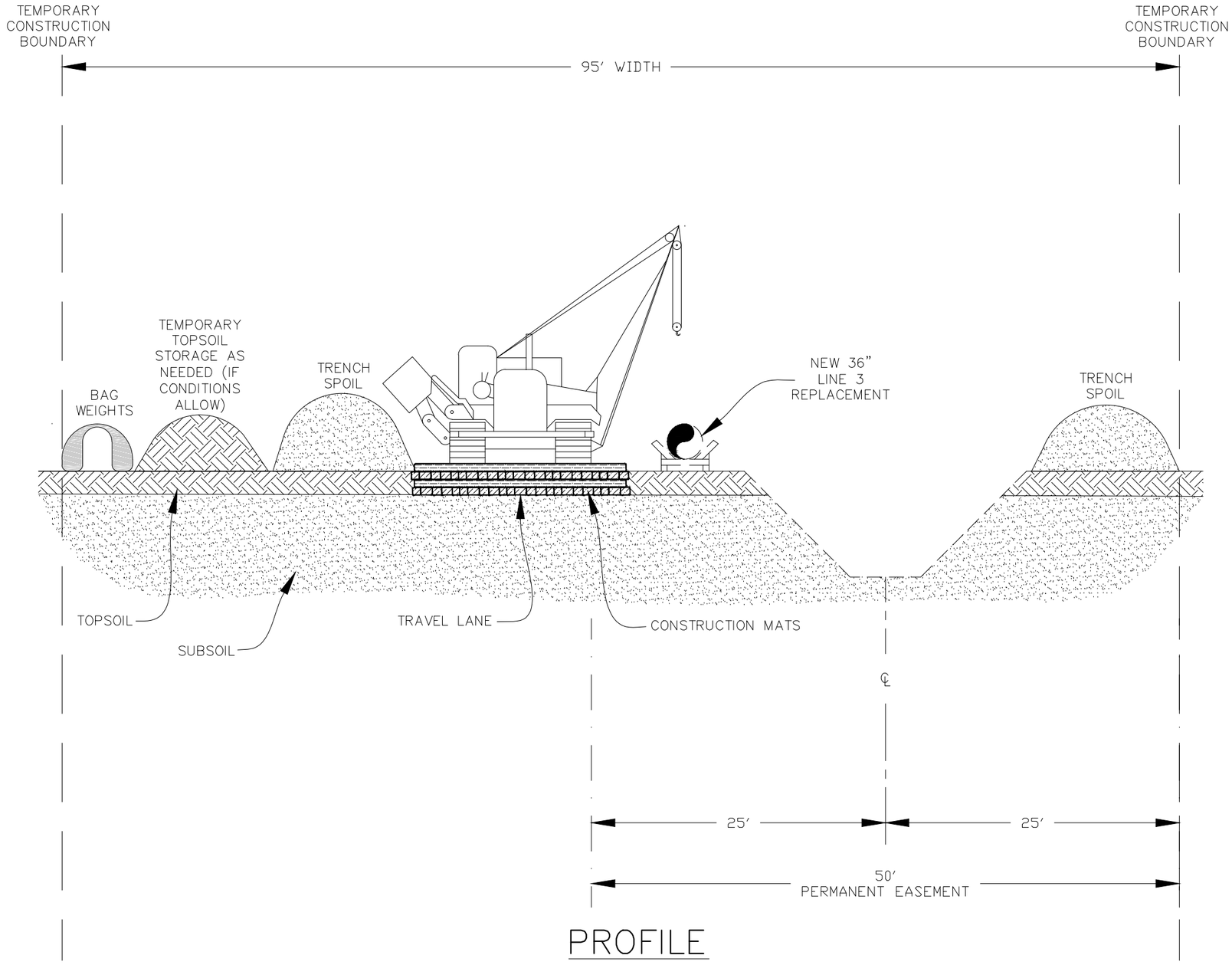
		DATE
DWN. BY:	KEH	11/01/19
CHK.	ND	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT TYPICAL UNSATURATED WETLAND CROSSING PROFILE (40' WORKSPACE OFFSET)

SCALE: NTS

DWG. NO.: Figure 31



PROFILE

NOTE:

1. TRENCH LINE ONLY SEGREGATION.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	KEH	11/04/19	ND	TL

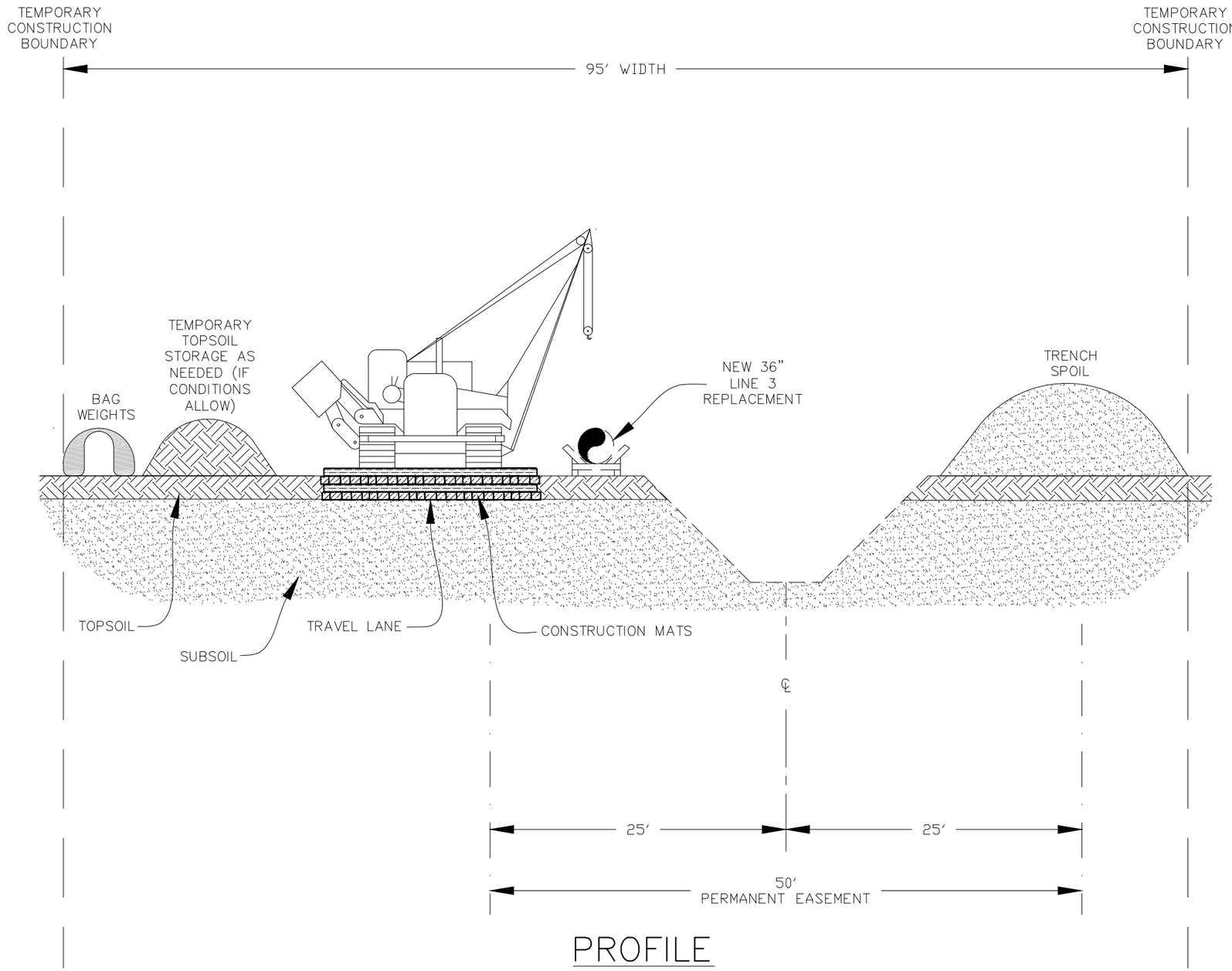
		DATE
DWN. BY:	KEH	11/01/19
CHK.	ND	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT TYPICAL SATURATED WETLAND CROSSING PROFILE (25' WORKSPACE OFFSET)

SCALE: NTS

DWG. NO.: Figure 32



PROFILE

NOTE:

1. TRENCH LINE ONLY SEGREGATION.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	KEH	11/04/19	ND	TL

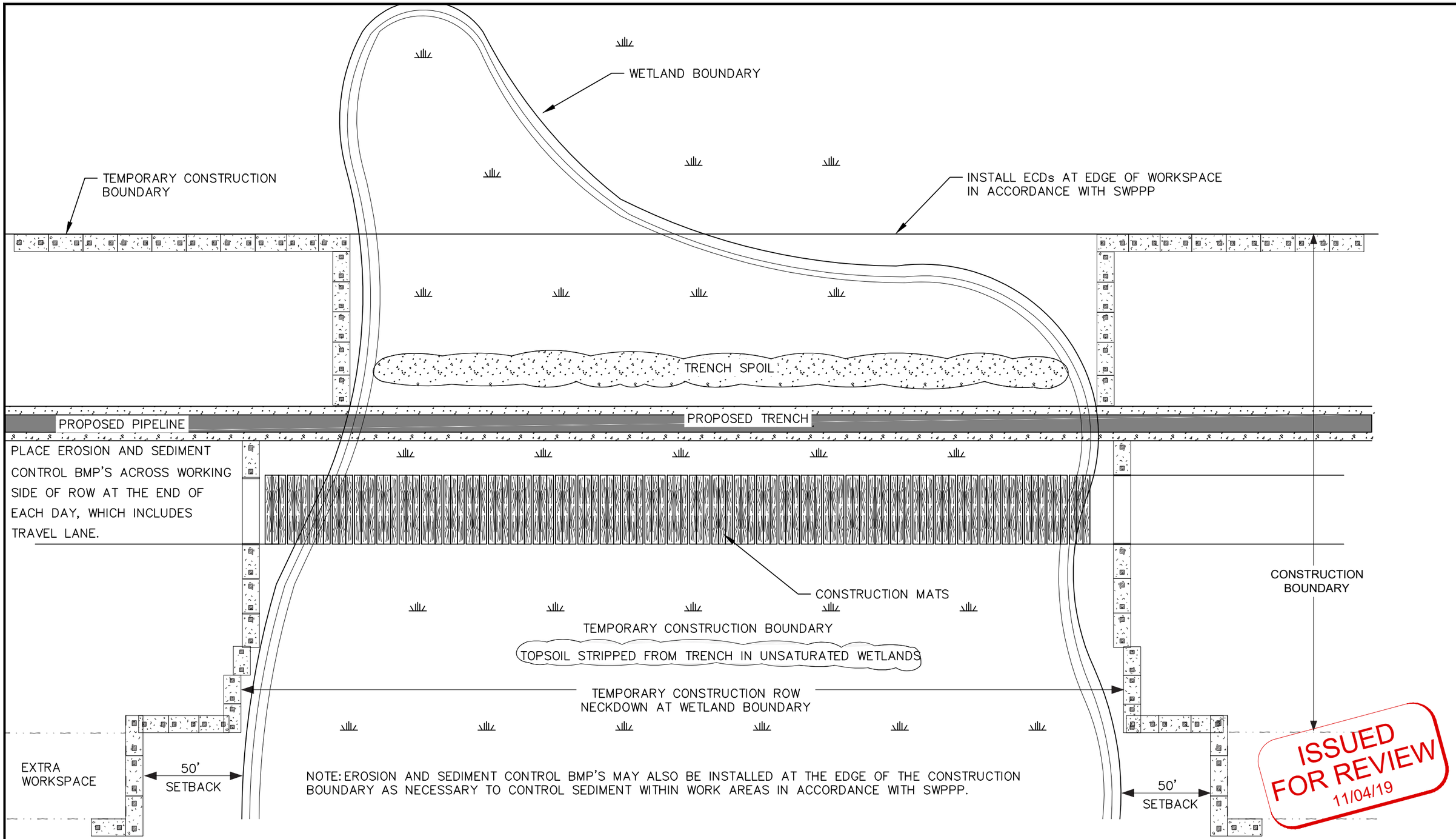
		DATE
DWN. BY:	KEH	11/01/19
CHK.	ND	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT TYPICAL SATURATED WETLAND CROSSING PROFILE (40' WORKSPACE OFFSET)

SCALE: NTS

DWG. NO.: Figure 33



NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	JDW	11/04/19	KEH	NKD

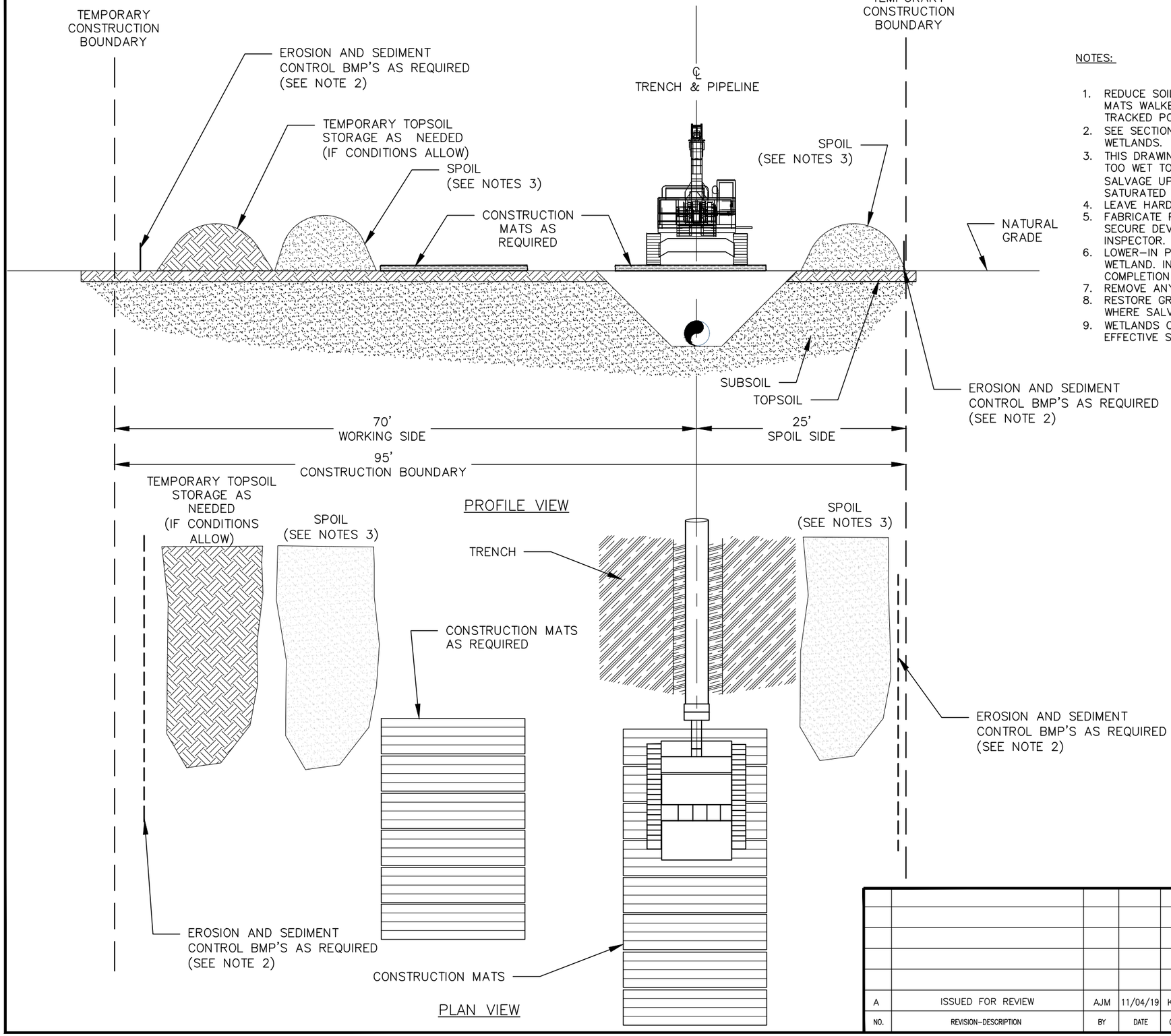
		DATE
DWN. BY:	KEH	8/16/18
CHK.	NKD	8/16/18
PROJ. ENGR.	CP	8/16/18
PROJ. MGR.	BS	8/16/18
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL
WETLAND CROSSING METHOD
PLAN VIEW

SCALE: NTS

DWG. NO. Figure 34



NOTES:

1. REDUCE SOIL COMPACTION BY UTILIZING BACKHOE OR EQUIVALENT FROM CONSTRUCTION MATS WALKED DOWN THE TRENCH, OR A BACKHOE OR EQUIVALENT MOUNTED ON TRACKED PONTOONS OPERATING ALONG TRENCH.
2. SEE SECTION 3.4 OF THE EPP REGARDING SEDIMENT AND EROSION CONTROL BMP'S IN WETLANDS.
3. THIS DRAWING REFLECTS A PUSH/PULL SECTION WHERE GROUND CONDITIONS ARE OFTEN TOO WET TO SALVAGE TOPSOIL. IF CONDITIONS ALLOW AT THE TIME OF CONSTRUCTION, SALVAGE UP TO 12" OF TOPSOIL OVER THE TRENCH, EXCEPT WHERE STANDING WATER OR SATURATED SOILS ARE PRESENT.
4. LEAVE HARD PLUGS AT THE EDGE OF WETLAND UNTIL JUST PRIOR TO LOWERING IN.
5. FABRICATE PIPE AT A STAGING AREA. ALL FLOATATION DEVICES AND BANDS USED TO SECURE DEVICES TO PIPE WILL BE INSPECTED AND APPROVED BY THE ENBRIDGE INSPECTOR.
6. LOWER-IN PIPE, RECOVER AND REMOVE ALL FLOATATION DEVICES AND BANDS FROM WETLAND. INSTALL TRENCH BREAKERS AT WETLAND EDGES AND BACKFILL IMMEDIATELY ON COMPLETION OF CONSTRUCTION.
7. REMOVE ANY CONSTRUCTION MATS FROM WETLANDS UPON COMPLETION OF CONSTRUCTION.
8. RESTORE GRADE TO NEAR PRE-CONSRUCTION TOPOGRAPHY AND REPLACE TOPSOIL, WHERE SALVAGED.
9. WETLANDS CROSSED USING THE PUSH/PULL METHOD TEND TO BE TOO WET FOR EFFECTIVE SEEDING. IF STANDING WATER IS NOT PRESENT, SEED DURING FINAL CLEANUP.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	AJM	11/04/19	KEH	RF

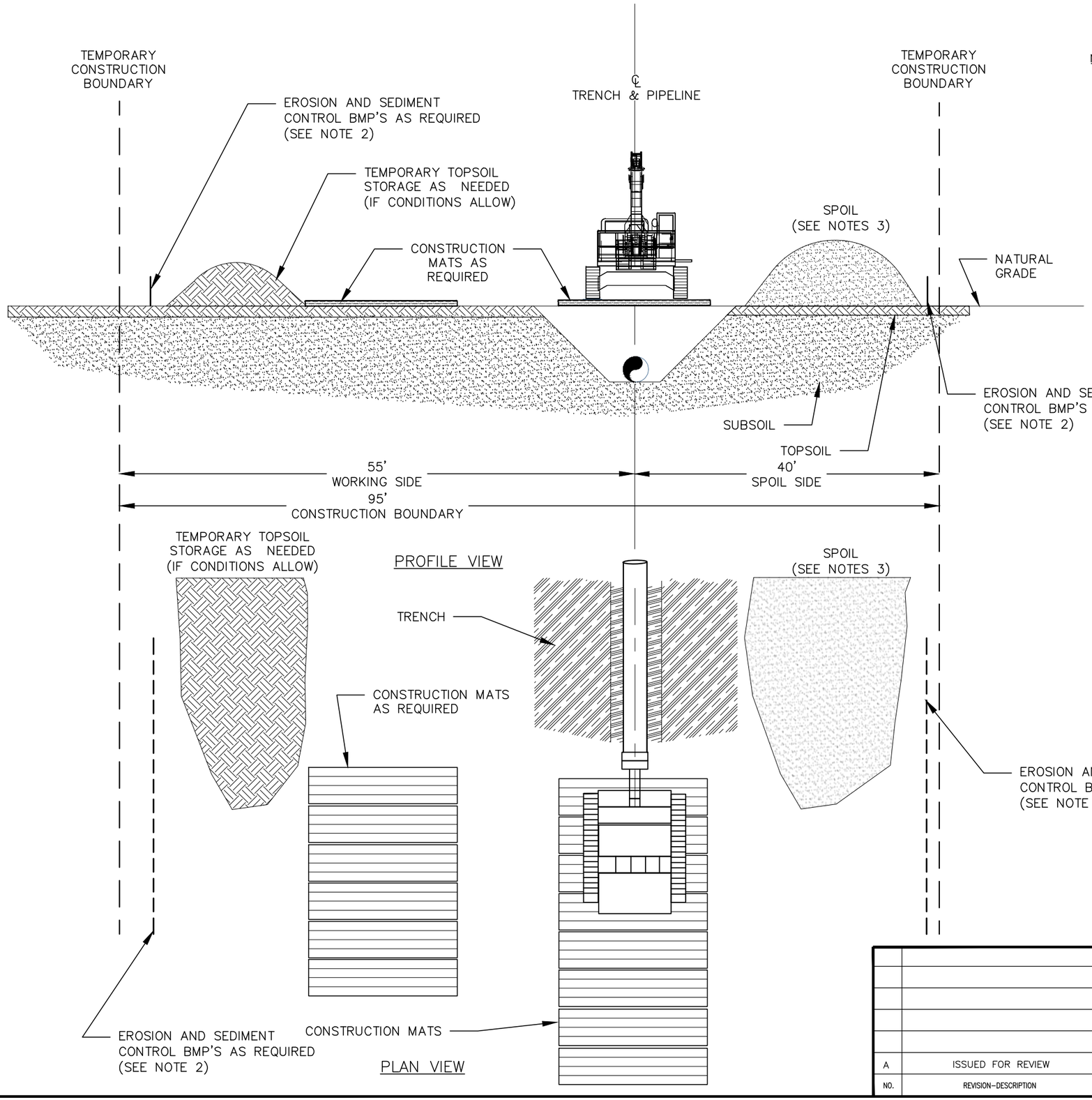
		DATE
DWN. BY:	AJM	11/01/19
CHK.	KEH	11/01/19
PROJ. ENGR.	RF	11/01/19
PROJ. MGR.	TL	11/01/19
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL
PUSH-PULL METHOD-SATURATED WETLAND
(25' WORKSPACE OFFSET)

SCALE: NTS

DWG. NO.: Figure 35



NOTES:

1. REDUCE SOIL COMPACTION BY UTILIZING BACKHOE OR EQUIVALENT FROM CONSTRUCTION MATS WALKED DOWN THE TRENCH, OR A BACKHOE OR EQUIVALENT MOUNTED ON TRACKED PONTOONS OPERATING ALONG TRENCH.
2. SEE SECTION 3.4 OF THE EPP REGARDING SEDIMENT AND EROSION CONTROL BMP'S IN WETLANDS.
3. THIS DRAWING REFLECTS A PUSH/PULL SECTION WHERE GROUND CONDITIONS ARE OFTEN TOO WET TO SALVAGE TOPSOIL. IF CONDITIONS ALLOW AT THE TIME OF CONSTRUCTION, SALVAGE UP TO 12" OF TOPSOIL OVER THE TRENCH, EXCEPT WHERE STANDING WATER OR SATURATED SOILS ARE PRESENT.
4. LEAVE HARD PLUGS AT THE EDGE OF WETLAND UNTIL JUST PRIOR TO LOWERING IN.
5. FABRICATE PIPE AT A STAGING AREA. ALL FLOATATION DEVICES AND BANDS USED TO SECURE DEVICES TO PIPE WILL BE INSPECTED AND APPROVED BY THE ENBRIDGE INSPECTOR.
6. LOWER-IN PIPE, RECOVER AND REMOVE ALL FLOATATION DEVICES AND BANDS FROM WETLAND. INSTALL TRENCH BREAKERS AT WETLAND EDGES AND BACKFILL IMMEDIATELY ON COMPLETION OF CONSTRUCTION.
7. REMOVE ANY CONSTRUCTION MATS FROM WETLANDS UPON COMPLETION OF CONSTRUCTION.
8. RESTORE GRADE TO NEAR PRE-CONSRUCTION TOPOGRAPHY AND REPLACE TOPSOIL, WHERE SALVAGED.
9. WETLANDS CROSSED USING THE PUSH/PULL METHOD TEND TO BE TOO WET FOR EFFECTIVE SEEDING. IF STANDING WATER IS NOT PRESENT, SEED DURING FINAL CLEANUP.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	AJM	11/04/19	KEH	RF

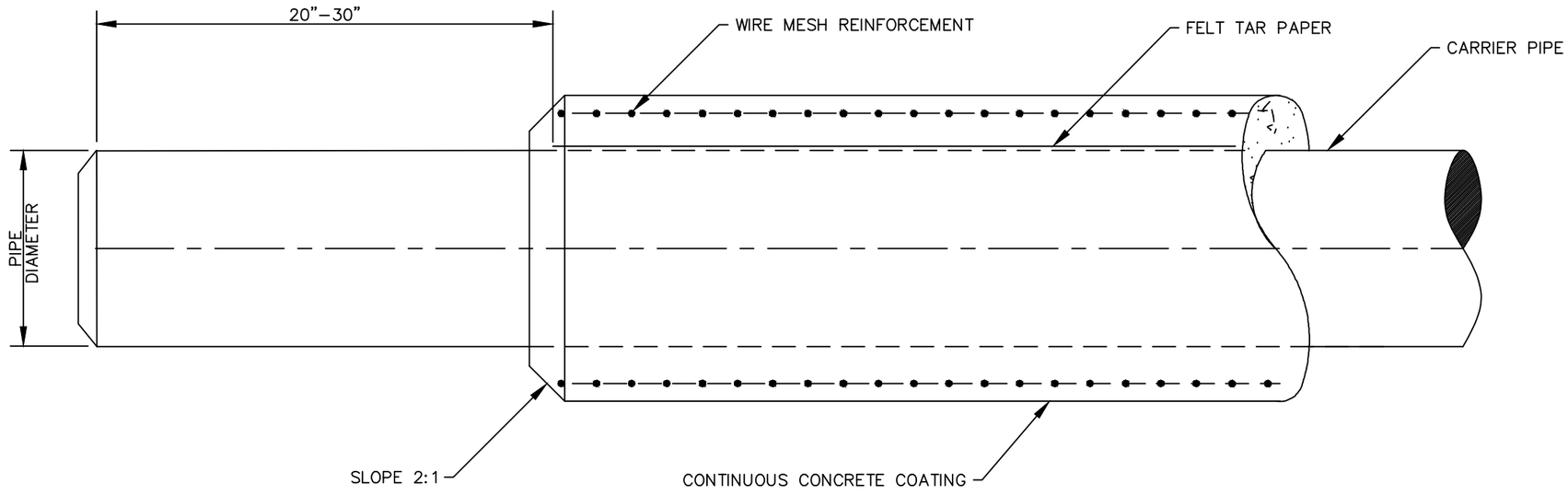
DWN. BY: AJM	DATE 11/01/19
CHK. KEH	11/01/19
PROJ. ENGR. RF	11/01/19
PROJ. MGR. TL	11/01/19
CLIENT APP.	

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL
PUSH-PULL METHOD-SATURATED WETLAND
(40' WORKSPACE OFFSET)

SCALE NTS

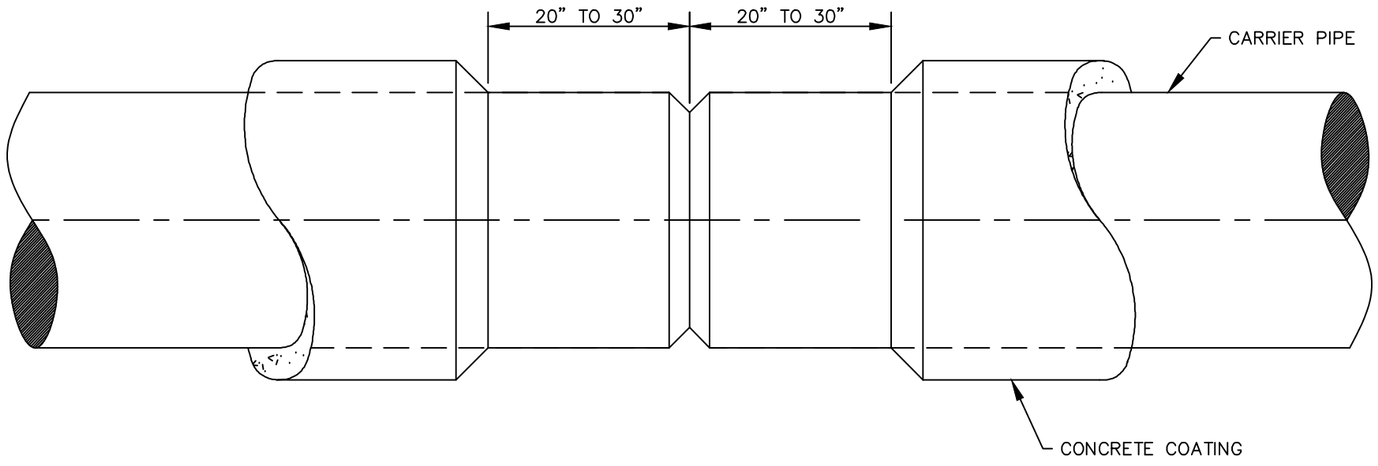
DWG. NO. Figure 36



CONTINUOUS CONCRETE COATING

NOTES:

1. MINIMUM CONCRETE DENSITY SHALL BE 150 LB/FT.^{3}
2. CONCRETE COATING CUTBACK SHALL BE 20"–30".
3. CONCRETE COATING THICKNESS TO PROVIDE A MINIMUM NEGATIVE BUOYANCY OF 10% IN FLUID TO BE DISPLACED.
4. MINIMUM ALLOWABLE COMPRESSION STRENTH OF 3,000 PSI @28 DAYS.
5. ONE LAYER OF FELT TAR PAPER SHALL BE PLACE ALONG TOP OF PIPE TO PROTECT DURING CONCRETE POURING.
6. THE APPLICATION OF CONTINUOUS CONCRETE COATING SHALL ADHERE TO USPCS–SPEC–CCC–009 REV 1.
7. MESH REINFORCEMENT MATERIAL TO BE APPROVED BY COMPANY PRIOR TO USE.
8. REFER TO ALIGNMENT SHEETS, SITE SPECIFIC DRAWINGS, OR CONSTRUCTION STANDARDS FOR MINIMUM COATING THICKNESS.



DETAIL AT PIPE JOINT

SEE NOTE 4

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
D	ISSUED FOR REVIEW	DWA	11/04/19	NKD	RF

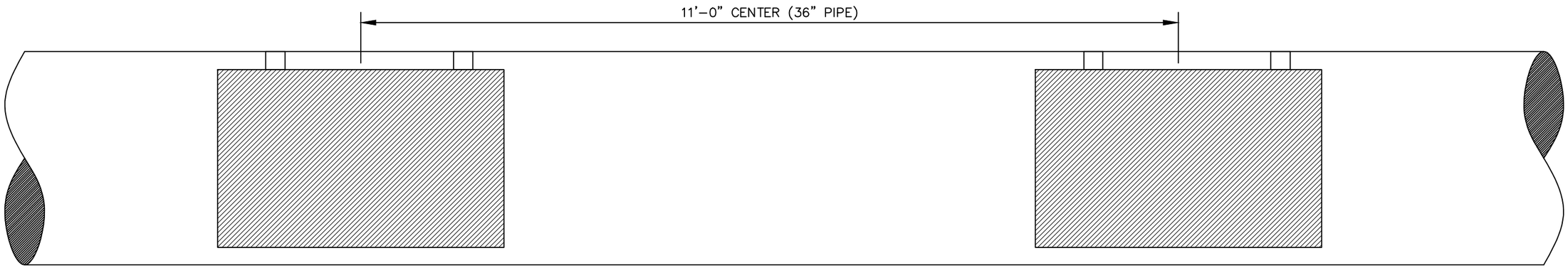
DWN. BY: YL	DATE 06/13/16	
CHK. KEH	08/04/17	
PROJ. ENGR. MDM	08/04/17	
PROJ. MGR. BS	08/04/17	
CLIENT APP.		

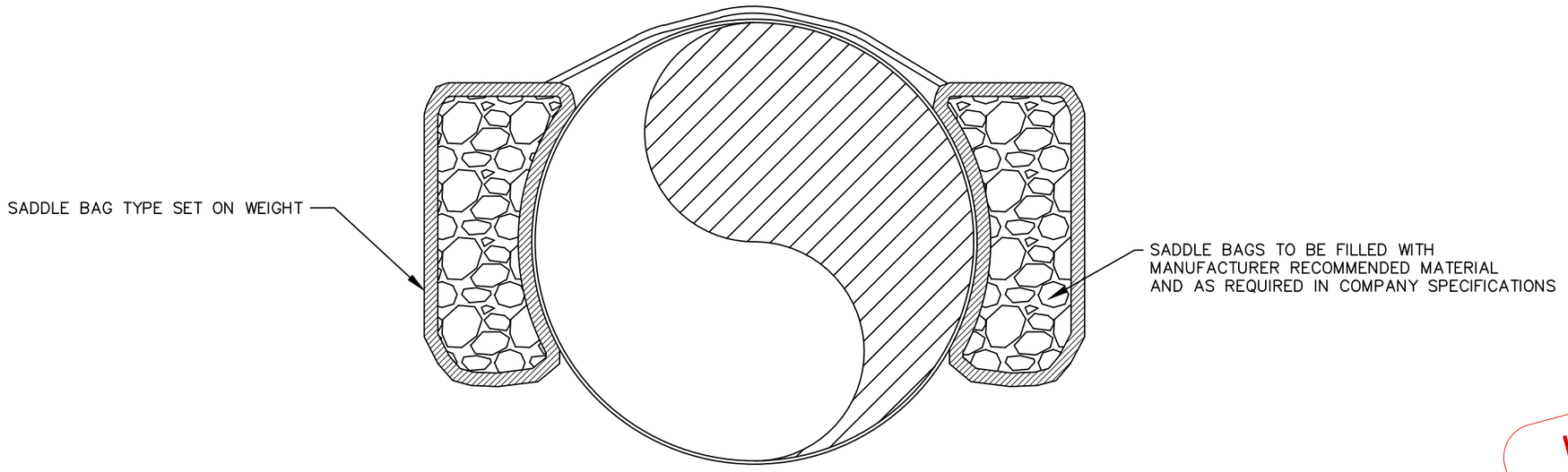
ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL
CONCRETE COATING

SCALE NTS

DWG. NO. Figure 37





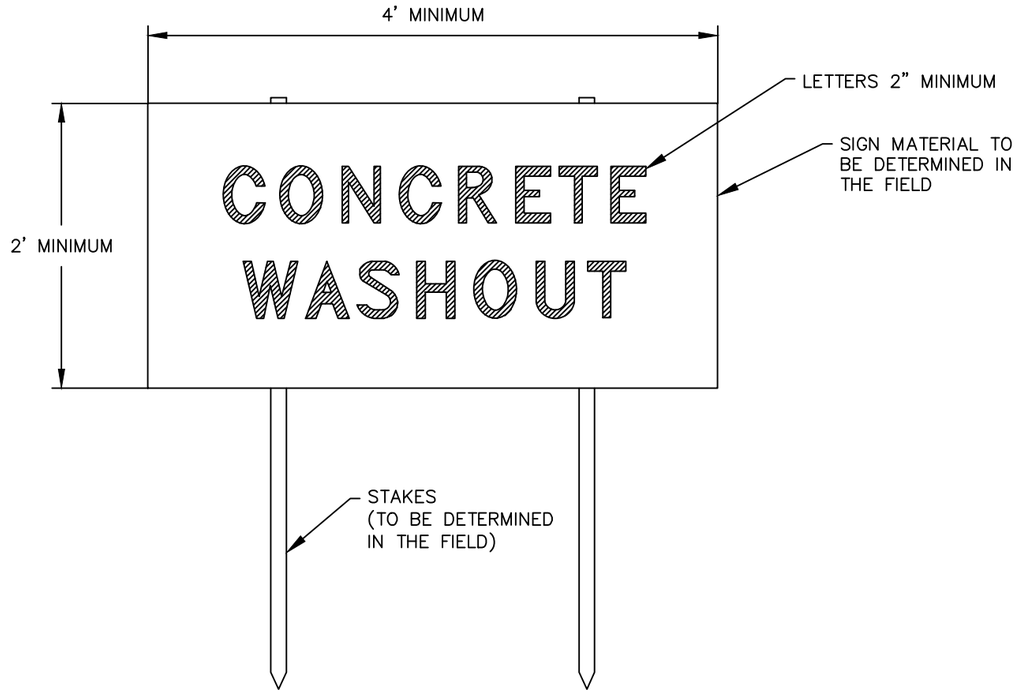
ISSUED FOR REVIEW 11/04/19

NOTES:

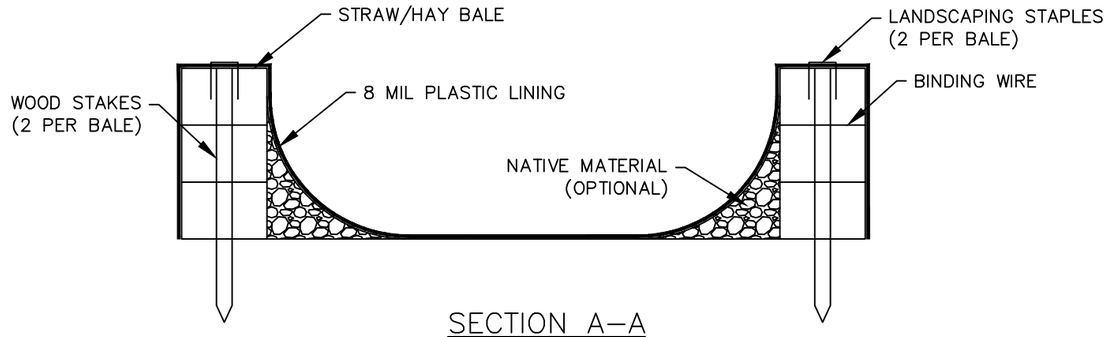
1. BAG WEIGHT TYPE AND MANUFACTURER TO BE APPROVED BY COMPANY REPRESENTATIVE.
2. USE IN WETLANDS ACCORDING TO ALIGNMENT SHEETS AND COMPANY REPRESENTATIVE.
3. WEIGHT TO BE 9000 LBS AT 11'–0" SPACING FOR 36" DIAMETER PIPELINE.
4. REFER TO USPCS–SPEC–PIPELINE–001 REV3 FOR ADDITIONAL REQUIREMENTS.

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
D	ISSUED FOR REVIEW	AJM	11/04/19	NKD	RF

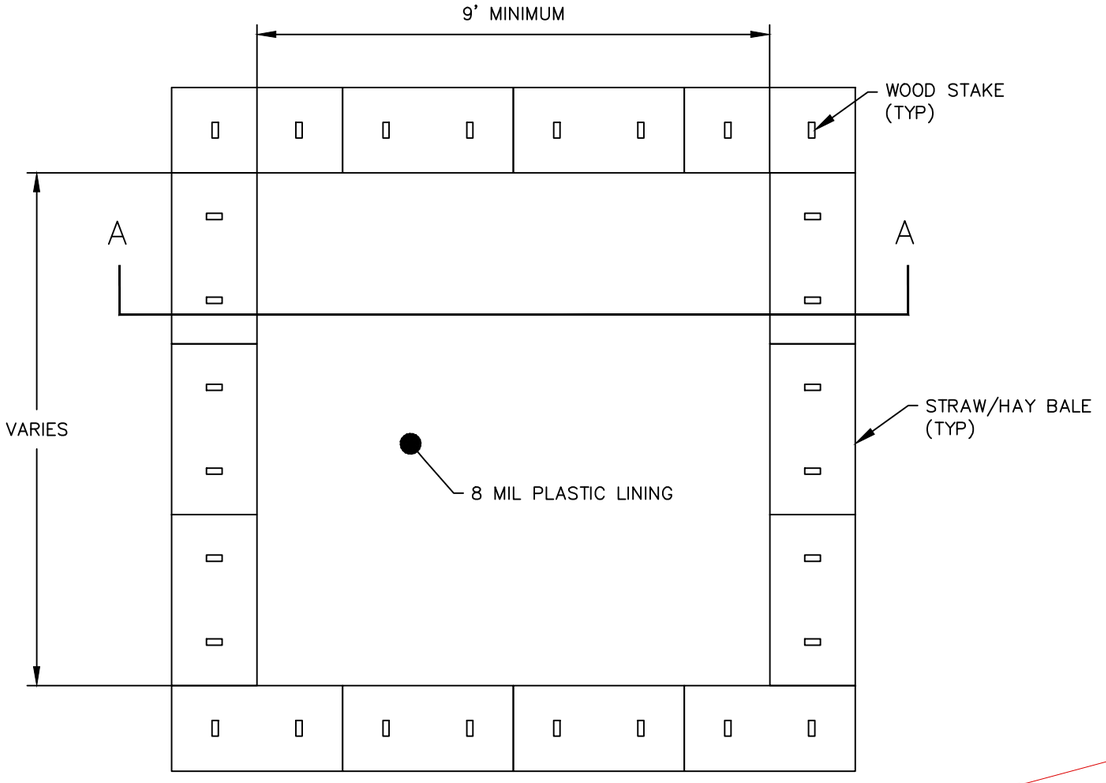
DWN. BY: YL	DATE 06/13/16	ENBRIDGE
CHK. KEH	08/04/17	LINE 3 REPLACEMENT BUOYANCY CONTROL SADDLE–BAG WEIGHTS
PROJ. ENGR. MDM	08/04/17	
PROJ. MGR. BS	08/04/17	
CLIENT APP.		SCALE NTS / DWG. NO. Figure 38



SIGN
NOT TO SCALE



SECTION A–A
NOT TO SCALE



PLAN
NOT TO SCALE

TYPE "ABOVE GRADE"
WITH STRAW/HAY BALES

ISSUED FOR REVIEW
11/04/19

NOTES:

1. ACTUAL LAYOUT DETERMINED IN THE FIELD.
2. SIGN LOCATION DETERMINED IN THE FIELD.

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
B	ISSUED FOR REVIEW	DWA	11/04/19	NKD	RF

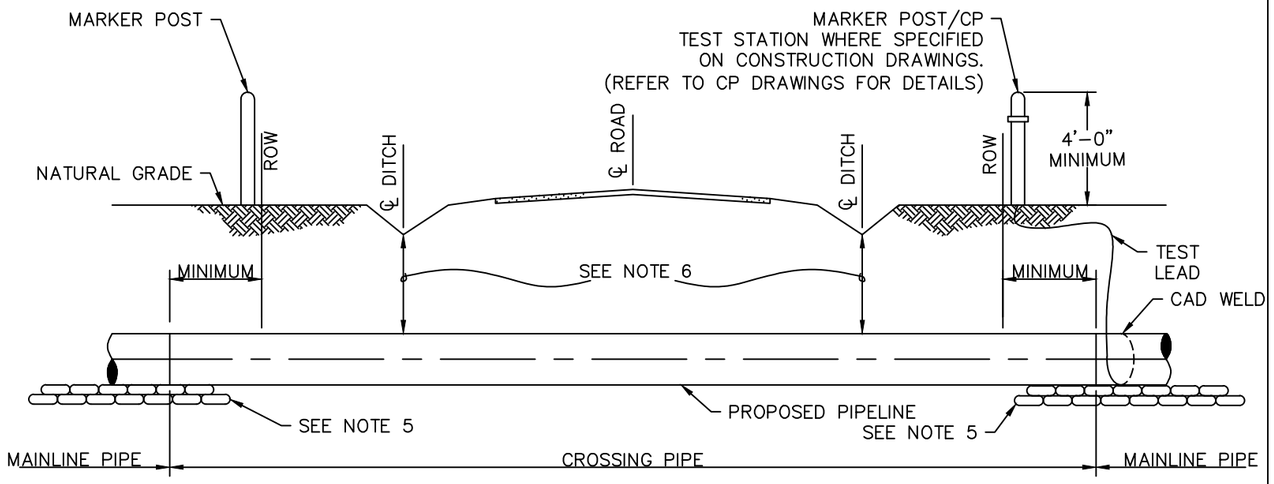
DWN. BY: JDW	DATE 04/04/19
CHK. ND	04/04/19
PROJ. ENGR. KMD	04/04/19
PROJ. MGR. BS	04/04/19
CLIENT APP.	

ENBRIDGE

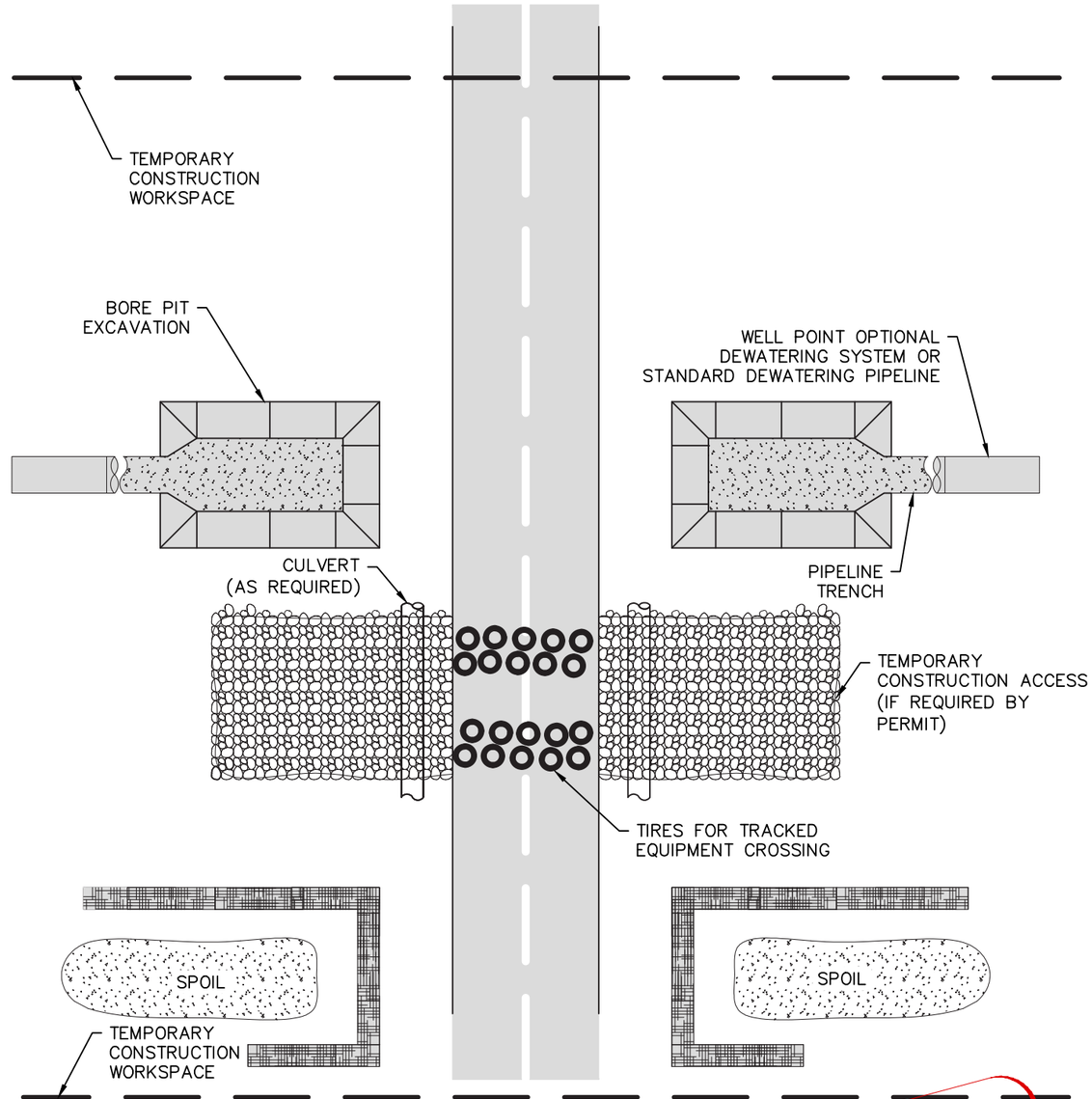
LINE 3 REPLACEMENT
TYPICAL
CONCRETE WASHOUT

SCALE NTS

DWG. NO. Figure 39



PROFILE VIEW



PLAN VIEW

NOTES:

1. CROSSING INSTALLATION SHALL BE IN ACCORDANCE WITH APPLICABLE ROAD PERMIT REQUIREMENTS.
2. LOCATION, LENGTH OF CROSSING, MATERIALS, AND TESTING REQUIREMENTS SHALL BE AS STATED ON THE ALIGNMENT SHEETS.
3. COUNTER BORE AND TAPER HEAVY WALL PIPE ENDS PER DWG B–TYP–CBORE–TAPER.
4. SUPPORT MATERIAL TO BE SAND BAGS OR OTHER ENBRIDGE APPROVED MATERIAL.
5. CONTRACTOR SHALL FIRMLY SUPPORT HEAVY WALL AND LINE PIPE WITH CONTINUOUS SUPPORT MATERIALS. SUPPORT MATERIAL SHALL EXTEND ACROSS TRANSITION WELD AND EXTEND A MINIMUM OF 3' OR UNTIL PIPE RESTS ON UNDISTURBED GROUND.
6. AS A MINIMUM, THE DEPTH OF COVER UNDER ROAD DITCHES SHALL BE 48", AND UNDER THE ROAD SURFACE SHALL BE 60", UNLESS OTHERWISE REQUIRED BY THE ROAD CROSSING PERMIT. THE PIPELINE SHALL BE BURIED AT LEAST 54" BELOW THE AUTHORIZED DEPTH OF ANY PUBLIC DRAINAGE FACILITY.
7. HEAVY WALL PIPE SHALL EXTEND BEYOND ROW LIMITS, INSTALLED LENGTH MAY VARY.

NOTES:

1. PROCEDURES SHOWN IN THIS DRAWING APPLY TO IMPROVED ROADS.
2. ROADS MUST BE CLEANED AFTER EQUIPMENT CROSSES AND DIRT PLACED IN SPOIL CONTAINMENT AREAS.
3. TEMPORARY ACCESS MATERIALS MUST BE REMOVED UPON PROJECT COMPLETION.
4. ADDITIONAL INFORMATION INCLUDED ON OTHER DRAWINGS OR PERMITS.
5. CONSTRUCTION AREAS LOCATED OUTSIDE ROAD ROW.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	JDW	11/04/19	NKD	RF

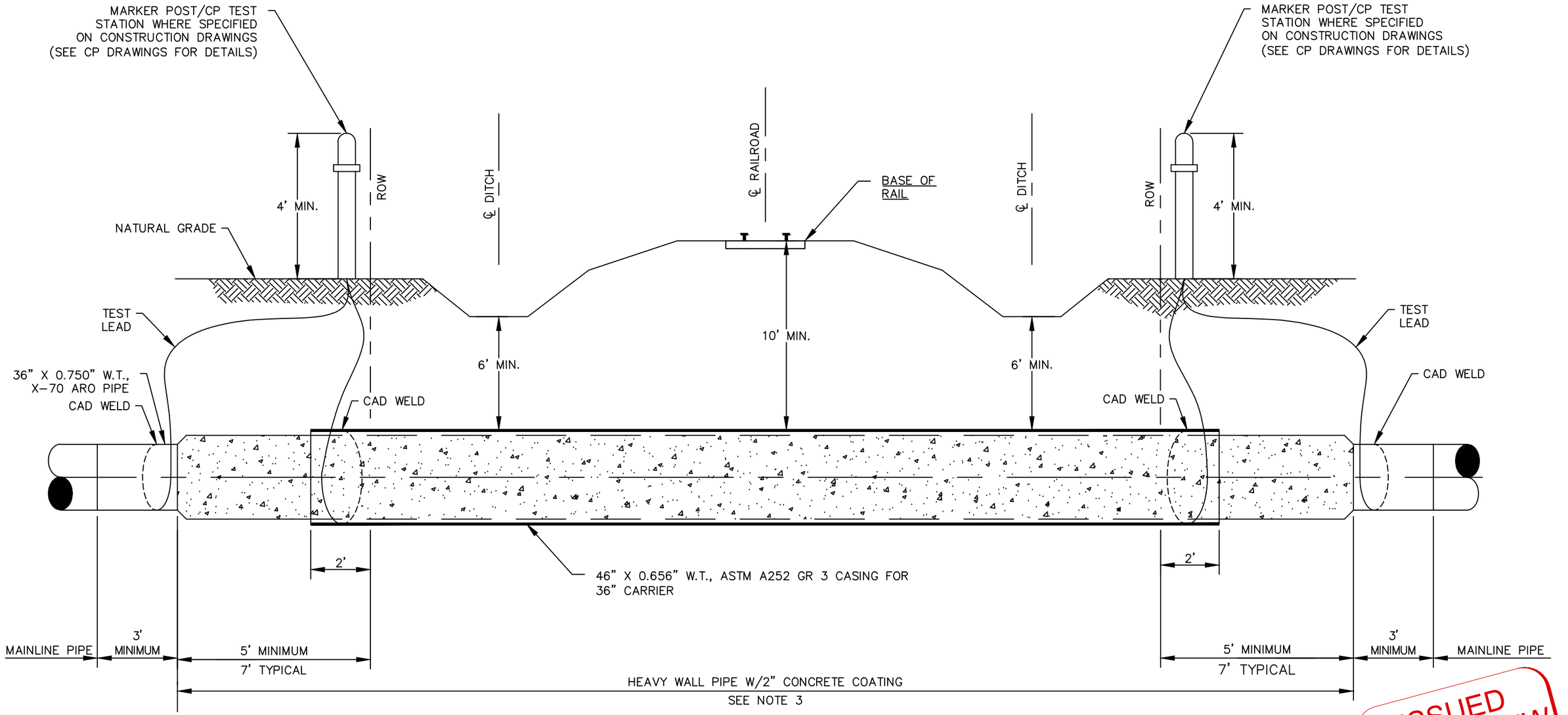
DWN. BY: YL	DATE 06/13/16
CHK. KEH	08/04/17
PROJ. ENGR. MDM	08/04/17
PROJ. MGR. BS	08/04/17
CLIENT APP.	

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL HORIZONTAL DIRECTIONAL BORE METHOD–UNCASED SLICK BORED ROAD CROSSING WITH SUPPORT

SCALE NTS

DWG. NO. Figure 40



PROFILE VIEW

ISSUED FOR REVIEW 11/04/19

NOTES:

1. CROSSING INSTALLATION SHALL BE IN ACCORDANCE WITH APPLICABLE ROAD PERMIT REQUIREMENTS.
2. LOCATION, LENGTH OF CROSSING, MATERIALS, AND TESTING REQUIREMENTS SHALL BE AS STATED ON THE ALIGNMENT SHEETS.
3. CASING PIPE SHALL EXTEND BEYOND THE EDGE OF THE ROW. CONCRETE COATING SHALL EXTEND BEYOND THE EDGE OF THE CASING PIPE. HEAVY WALL PIPE SHALL EXTEND BEYOND THE EDGE OF THE CONCRETE COATING.
4. CONCRETE COATING SHALL BE APPLIED IN ACCORDANCE WITH COMPANY SPECIFICATIONS. CONCRETE COATING, DWG B-TYP-CONC-COATING

NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	JDW	11/04/19	KEH	MDM

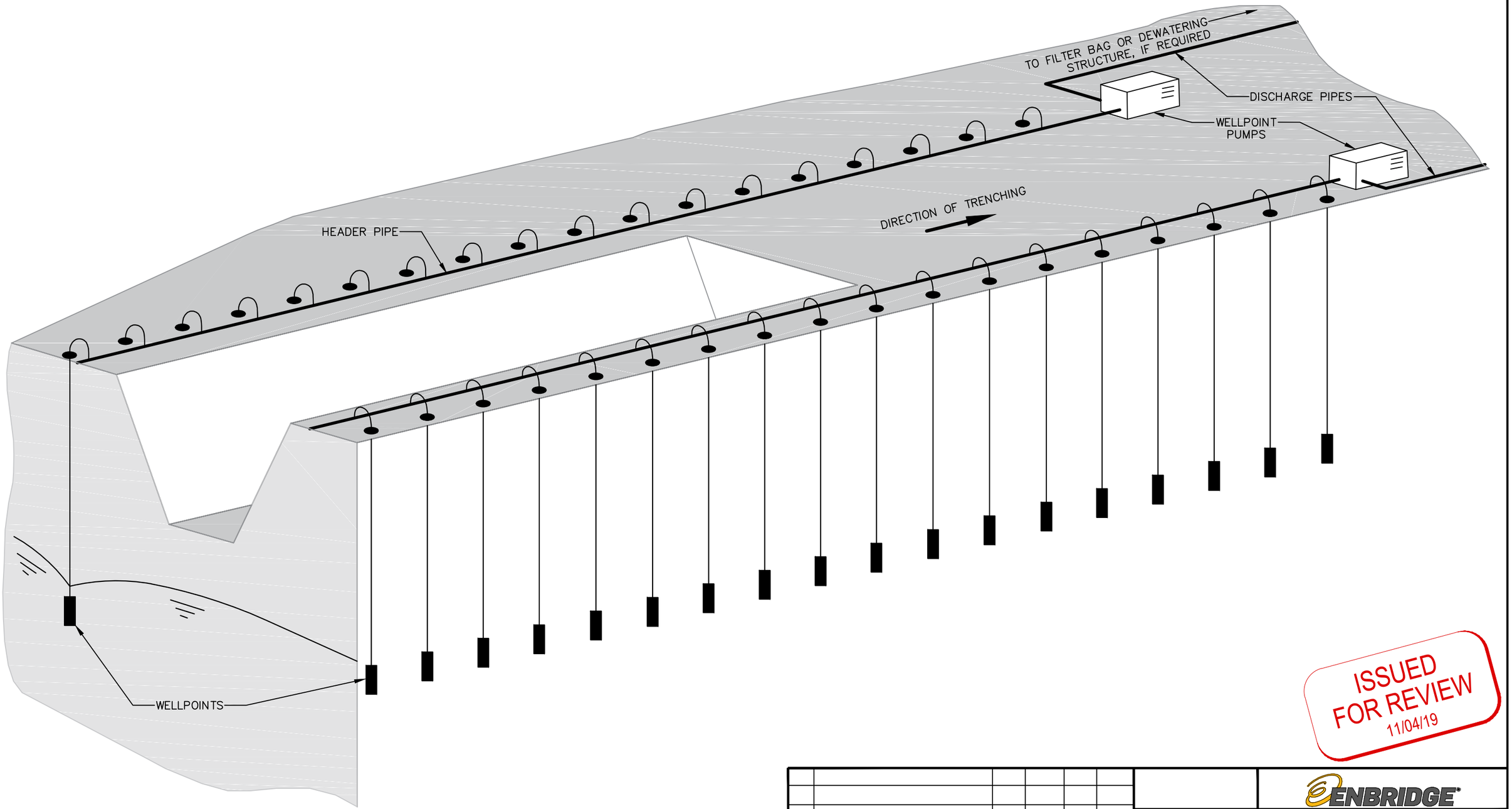
DWN. BY: YL	DATE 06/13/16	
CHK. KEH	08/04/17	
PROJ. ENGR. MDM	08/04/17	
PROJ. MGR. BS	08/04/17	
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL HORIZONTAL DIRECTIONAL BORE METHOD-CASED SLICK BORE RAILROAD CROSSING

SCALE NTS

DWG. NO. Figure 41



ISSUED FOR REVIEW
11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	DWA	11/04/19	NKD	RF

DWN. BY: DWA	DATE 10/25/19	
CHK. KEH	10/25/19	
PROJ. ENGR. DG	10/25/19	
PROJ. MGR. KD	10/25/19	
CLIENT APP.		

ENBRIDGE

LINE 3 REPLACEMENT
TYPICAL WELLPOINT
DEWATERING SYSTEM

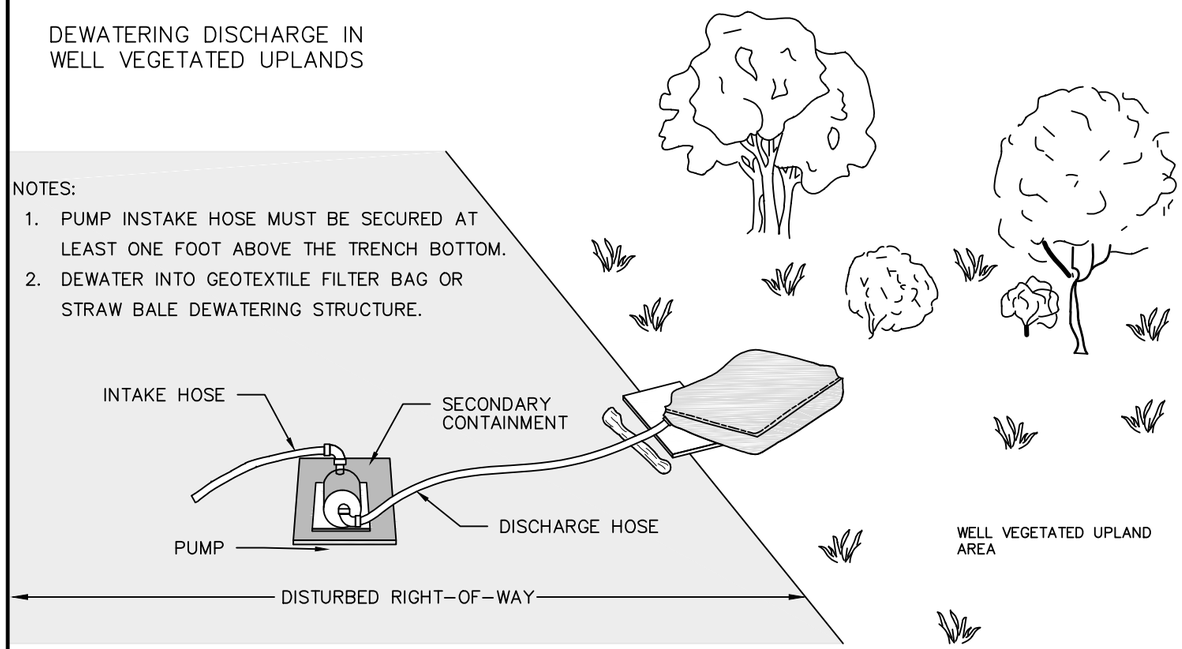
SCALE NTS

DWG. NO. Figure 42

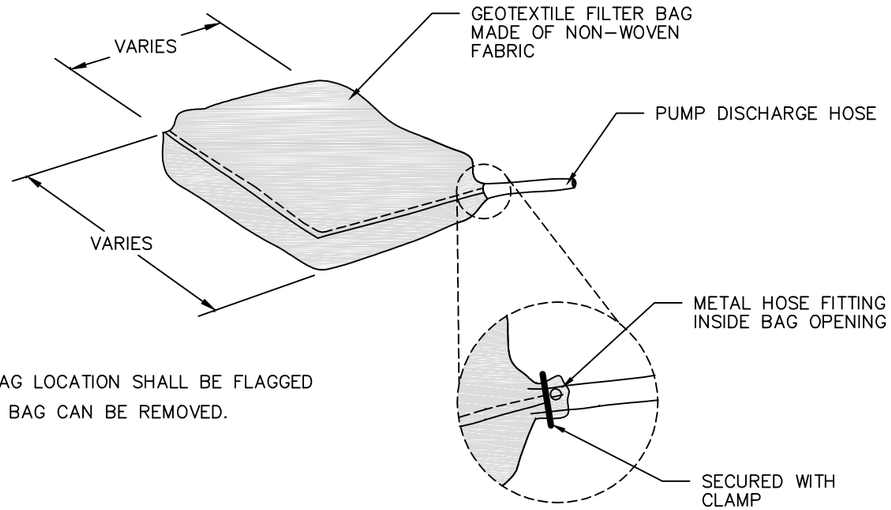
DEWATERING DISCHARGE IN WELL VEGETATED UPLANDS

NOTES:

1. PUMP INTAKE HOSE MUST BE SECURED AT LEAST ONE FOOT ABOVE THE TRENCH BOTTOM.
2. DEWATER INTO GEOTEXTILE FILTER BAG OR STRAW BALE DEWATERING STRUCTURE.



GEOTEXTILE FILTER BAG



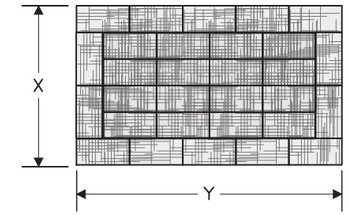
NOTE:

1. FILTER BAG LOCATION SHALL BE FLAGGED SO THAT BAG CAN BE REMOVED.

ISSUED FOR REVIEW 11/04/19

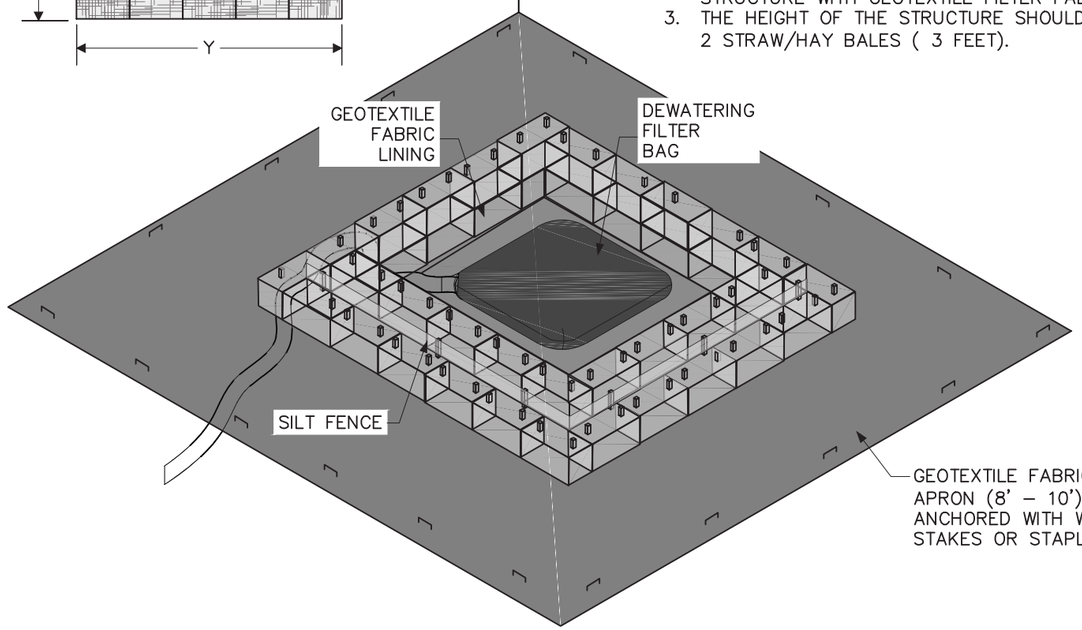
NO.	REVISION-DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	DWA	11/04/19	NKD	RF

DWN. BY: DWA	DATE 10/25/19	ENBRIDGE
CHK. KEH	10/25/19	LINE 3 REPLACEMENT TYPICAL GEOTEXTILE FILTER BAG DEWATERING-UPLAND
PROJ. ENGR. DG	10/25/19	
PROJ. MGR. KD	10/25/19	
CLIENT APP.		SCALE NTS / DWG. NO. Figure 43

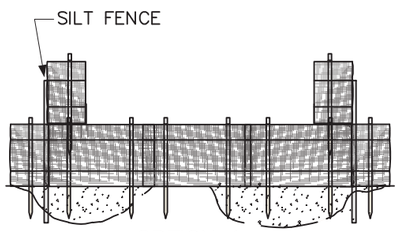


NOTES:

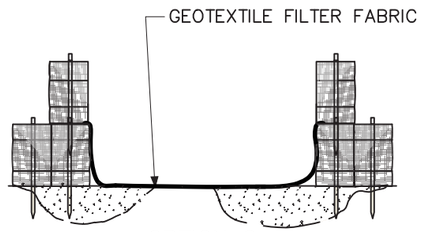
1. ARRANGE THE STRAW BALES TO THE X AND Y DIMENSIONS AS SPECIFICIED BELOW.
2. IF BOTTOM OF STRUCTURE IS NOT LINED WITH STRAW BALES (OPTION 1), LINE ENTIRE STRUCTURE WITH GEOTEXTILE FILTER FABRIC.
3. THE HEIGHT OF THE STRUCTURE SHOULD BE 2 STRAW/HAY BALES (3 FEET).



PERSPECTIVE VIEW



OPTION 1

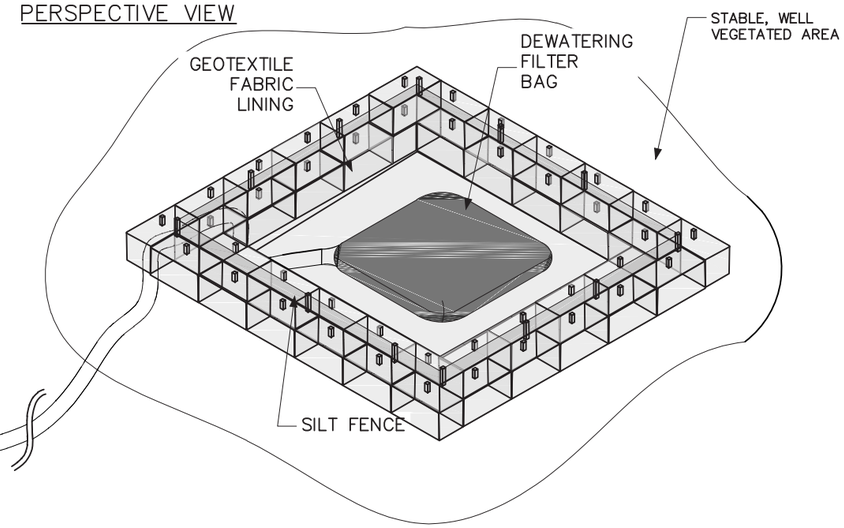


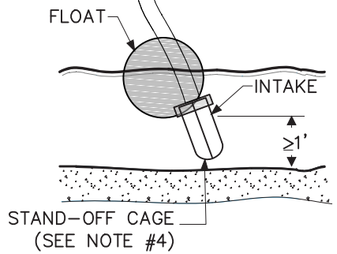
OPTION 2

NOTE: TYPICAL DIMENSIONS AND MAXIMUM PUMPING RATES ARE BASED ON INDUSTRY EXPERIENCE, BEST MANAGEMENT PRACTICES, AND PUMP SIZE (4"–8").

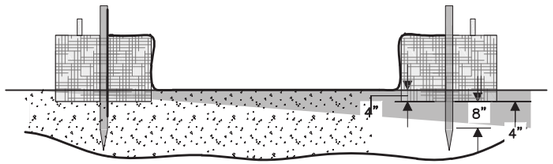
TYPICAL MINIMUM SUMP DIMENSIONS (FEET)		MAXIMUM PUMPING RATE
X	Y	GALLONS PER MINUTE
10	20	300
15	20	350
20	20	400
20	25	450
25	25	500
25	30	550
30	30	660

PERSPECTIVE VIEW





PUMP INLET



NOTE: 1–BALE HEIGHT & SIZE IS USED IF ADEQUATE AREA IS AVAILABLE.

CROSS–SECTION OF STRUCTURE

NOTES:

1. SILT FENCE ENDS MUST BE WRAPPED TO JOIN TWO SECTIONS.
2. SILT FENCE SHALL BE ABOVE TOP OF BALES AND ANCHORED 6" BELOW GRADE.
3. SILT FENCE POST STAKING MUST BE 4 FEET OR LESS.
4. DEWATERING INTAKE HOSE SUPPORTED AT LEAST 1 FOOT FROM BOTTOM OF TRENCH BEING DEWATERED.
5. USE A FILTER BAG AT THE DISCHARGE HOSE END.
6. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED AS NEEDED TO MAINTAIN EFFICACY PER INDUSTRY STANDARDS.
7. MAINLINE HYDROSTATIC TEST DEWATERING STRUCTURES WILL BE REINFORCED USING INDUSTRY STANDARD OPTIONS TO PREVENT BALE MOVEMENT DURING DISCHARGE (e.g.,CINCH STRAPS, WIRE, CATTLE GUARD FENCING).

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED FOR REVIEW	JDW	11/04/19	KEH	NKD

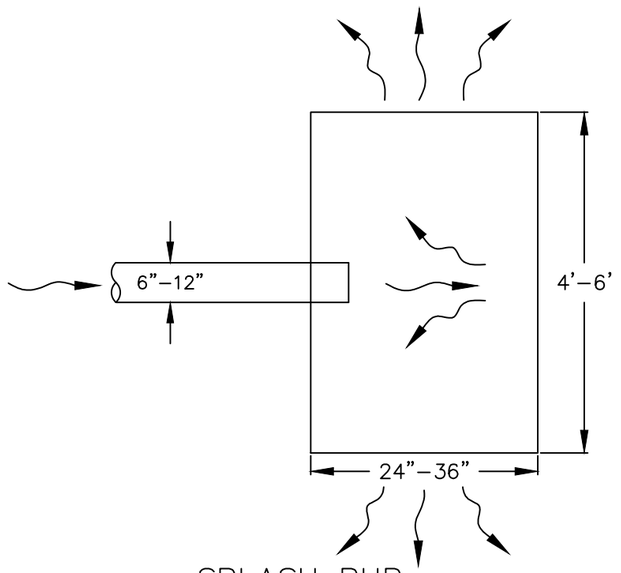
		DATE
DWN. BY:	JDW	10/24/19
CHK.	NKD	10/24/19
PROJ. ENGR.	RF	10/24/19
PROJ. MGR.	TL	10/24/19
CLIENT APP.		

ENBRIDGE

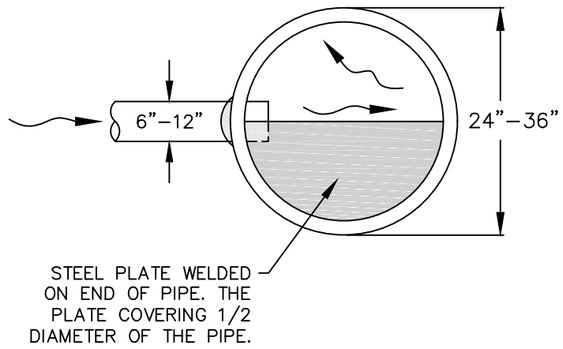
LINE 3 REPLACEMENT
TYPICAL
STRAW/HAY BALE
DEWATERING STRUCTURE

SCALE NTS

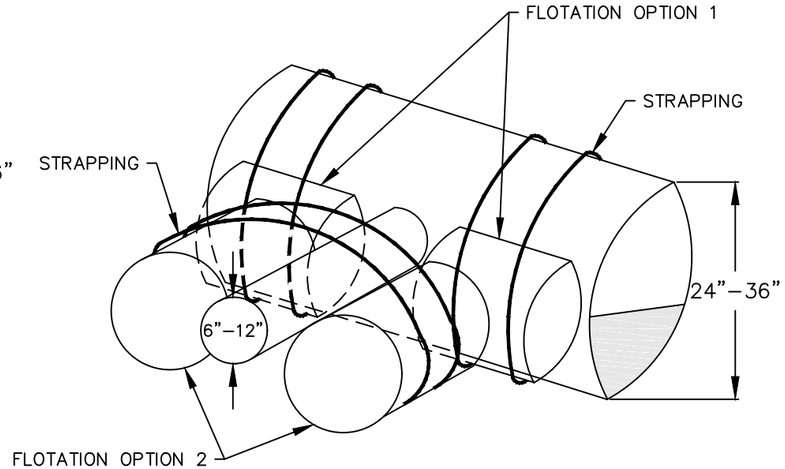
DWG. NO. Figure 44



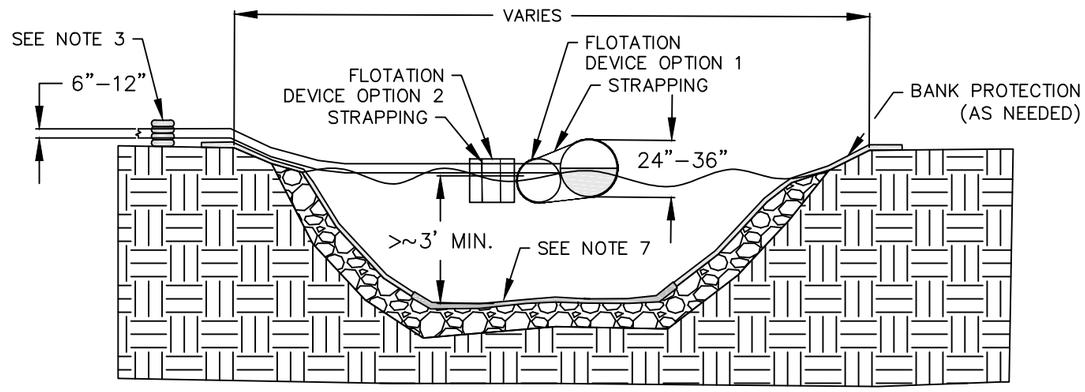
SPLASH PUP
PLAN



SPLASH PUP
PROFILE



SPLASH PUP
ISOMETRIC VIEW



SPLASH PUP
FLOTATION

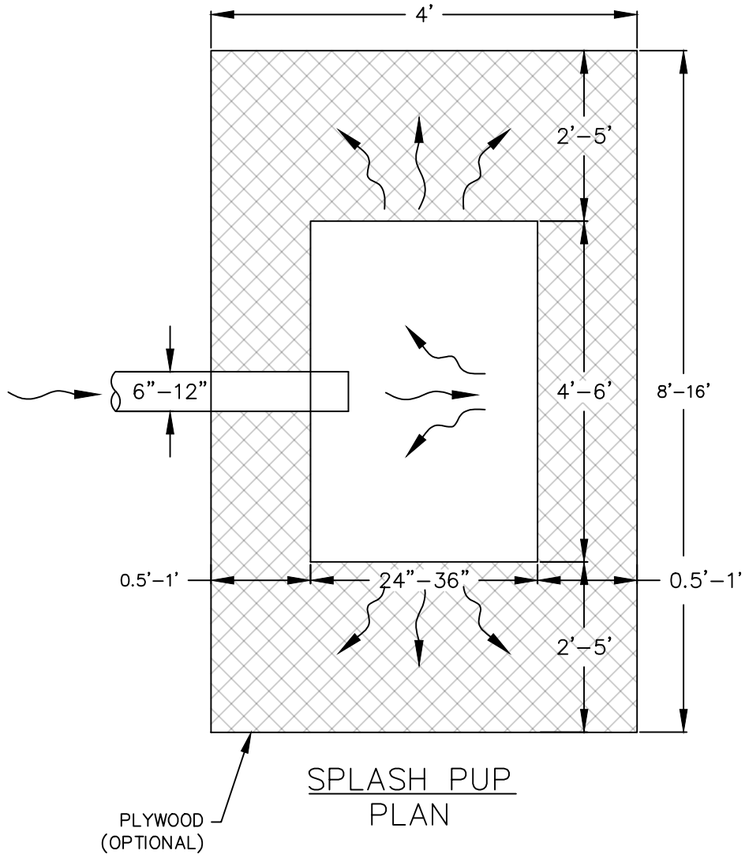
NOTES:

1. AN ENERGY DISSIPATER SHALL BE UTILIZED FOR ALL DISCHARGES (OR THE LIKE).
2. ENERGY DISSIPATERS ARE UTILIZED IN CONJUNCTION WITH PERMIT REQUIRED TREATMENT.
3. DISCHARGE PIPING WILL BE SECURED TO PREVENT MOVEMENT ON SURFACE APPROACHING WATERBODY AS NEEDED.
4. FLOTATION DEVICE AND SPACING DEVICE TBD IN FIELD USING INDUSTRY STANDARD MATERIALS (eg. CLEAN PLASTIC BARREL).
5. BANK PROTECTION TBD (eg. PLASTIC SHEETING, TARP, OR PLYWOOD) AS NEEDED.
6. IF OPTIONAL PLYWOOD PROTECTION IS USED AND COMES INTO CONTACT WITH INFESTED WATERS, IT WILL BE DISPOSED OF AFTER DISCHARGE IS COMPLETED. OTHER MATERIALS WOULD BE DECONTAMINATED PER APPLICABLE PERMIT REQUIREMENTS IF PLANNED FOR REUSE.
7. INDUSTRY STANDARD MATERIAL (eg. PLYWOOD, GEOTEXTILE, ETC.) AS NEEDED TBD AT PRE DISCHARGE SITE MEETING.

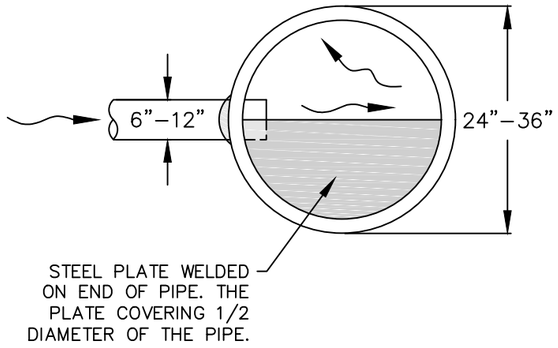
ISSUED FOR REVIEW
11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
E	ISSUED FOR REVIEW	AJM	11/04/19	KEH	RF

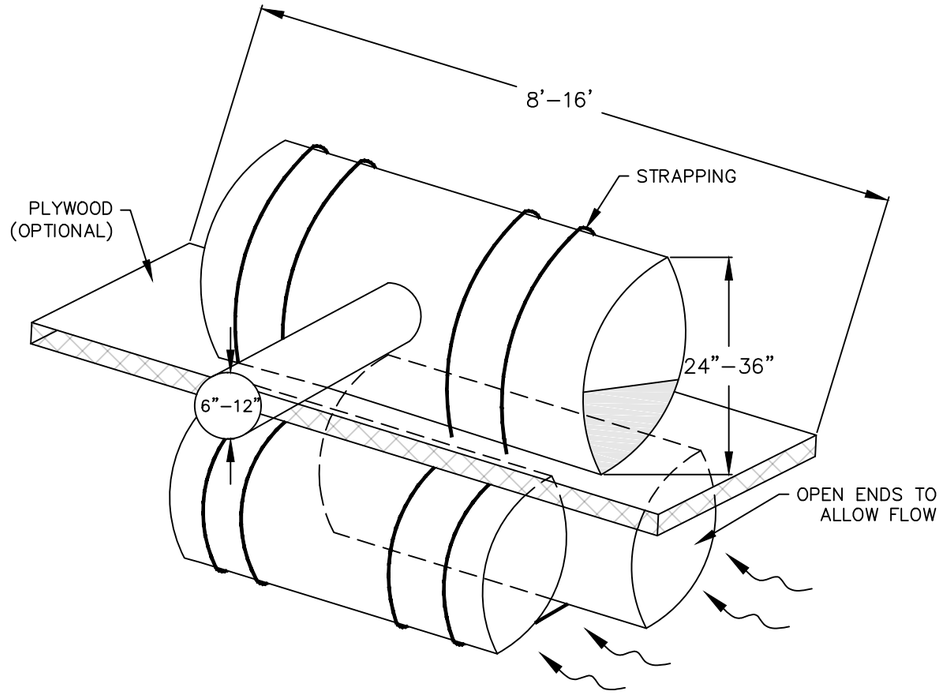
DWN. BY: JDW	DATE 04/25/19	ENBRIDGE
CHK. KEH	04/30/19	LINE 3 REPLACEMENT TYPICAL SPLASH PUP FLOTATION
PROJ. ENGR. DG	04/30/19	
PROJ. MGR. KD	04/30/19	
CLIENT APP.		SCALE NTS
		DWG. NO. Figure 45



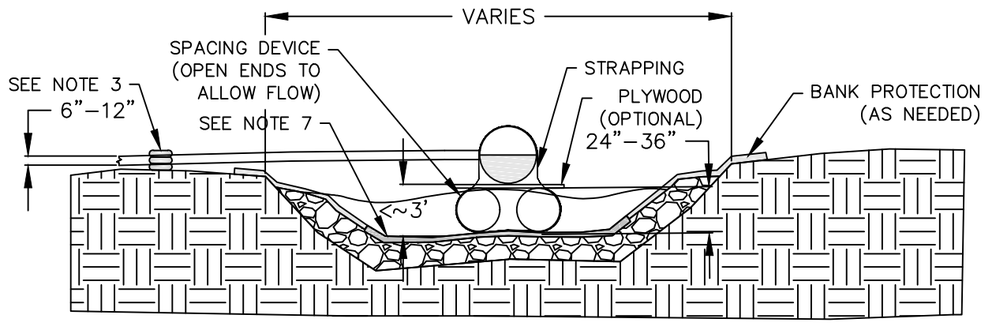
SPLASH PUP
PLAN



SPLASH PUP
PROFILE



SPLASH PUP
ISOMETRIC VIEW



SPLASH PUP
SCOUR PREVENTION

NOTES:
1. AN ENERGY DISSIPATER SHALL BE UTILIZED FOR ALL DISCHARGES (OR THE LIKE).
2. ENERGY DISSIPATERS ARE UTILIZED IN CONJUNCTION WITH PERMIT REQUIRED TREATMENT.
3. DISCHARGE PIPING WILL BE SECURED TO PREVENT MOVEMENT ON SURFACE APPROACHING WATERBODY AS NEEDED.
4. FLOTATION DEVICE AND SPACING DEVICE TBD IN FIELD USING INDUSTRY STANDARD MATERIALS (eg. CLEAN PLASTIC BARREL).
5. BANK PROTECTION TBD (eg. PLASTIC SHEETING, TARP, OR PLYWOOD) AS NEEDED.
6. IF OPTIONAL PLYWOOD PROTECTION IS USED AND COMES INTO CONTACT WITH INFESTED WATERS, IT WILL BE DISPOSED OF AFTER DISCHARGE IS COMPLETED. OTHER MATERIALS WOULD BE DECONTAMINATED PER APPLICABLE PERMIT REQUIREMENTS IF PLANNED FOR REUSE.
7. INDUSTRY STANDARD MATERIAL (eg. PLYWOOD, GEOTEXTILE, ETC.) AS NEEDED TBD AT PRE DISCHARGE SITE MEETING.

* USE 1 OR 2 4'X8' PLYWOOD SHEETS AS NEEDED TBD AT PRE DISCHARGE SITE MEETING.

ISSUED FOR REVIEW 11/04/19

NO.	REVISION–DESCRIPTION	BY	DATE	CHK'D	APP'D
E	ISSUED FOR REVIEW	AJM	11/04/19	KEH	RF

DWN. BY: JDW	DATE 04/25/19	ENBRIDGE
CHK. KEH	04/30/19	LINE 3 REPLACEMENT TYPICAL SPLASH PUP SCOUR PREVENTION
PROJ. ENGR. DG	04/30/19	
PROJ. MGR. KD	04/30/19	
CLIENT APP.		SCALE NTS / DWG. NO. Figure 46