Prepared for:
TransCanada Keystone Pipeline, LP
Houston, Texas

Keystone XL Pipeline Project

Preliminary Pre-Construction Notification to the U.S. Army Corps of Engineers Omaha District – South Dakota

July 2013

July, 2013

Jeff Breckenridge
U.S. Army Corps of Engineers
28563 Powerhouse Road
Room 120
Pierre, South Dakota 57501

Dear Mr. Breckenridge:

Please find attached the TransCanada Keystone Pipeline, LP (Keystone) Nationwide Permit (NWP) 12 Pre-Construction Notification (PCN) package for portions of the proposed Keystone XL Pipeline Project (Project) located within the USACE Omaha District in South Dakota.

The U.S. Department of State (DOS), as the lead federal agency, is in the process of supplementing the Final Environmental Impact Statement (FEIS) that was issued in August of 2011. The draft Supplemental EIS (SEIS) was released for public comment in the 1st quarter of 2013, and is expected to be finalized in the 4th quarter of 2013. The SEIS addresses Project changes since the August 2011 FEIS, most notably the route change implemented in Nebraska.

Attached is a preliminary draft of Keystone's PCN package for USACE review. Keystone expects to file the final PCN package after the SEIS is finalized and issued.

Please find enclosed the following documents for your review:

- Standard Form 4345. The Standard Form 4345 and additional information required for the form is included at the front of this package. Wetland and waterbody crossing tables are attached with estimates of temporary and permanent wetland and waterbody impacts, the applicable PCN criteria, and the anticipated construction method for each wetland and waterbody crossing. Keystone has adopted the USACE Regulatory Guidance Letter 08-02, dated June 26, 2008 on jurisdiction and has assumed all waters identified are waters of the U.S. and does not request formal jurisdictional concurrence. All mitigation proposed is also based upon all waters identified, not just waters of the U.S.
- Wetland and Waterbody PCN Mapbook. Wetland and waterbody crossings requiring PCN are illustrated on a U.S. Geological Survey (USGS) topographic base at a scale of 1:6,000, as well as on an aerial photographic base at the same scale. The pipeline mileposts and anticipated construction work spaces are included. The aerial photographic base was produced by the National Agricultural Imagery Program (NAIP) from aerial imagery acquired in 2010.
- Wetland Delineation Report.
- The Keystone XL Pipeline Project Construction Mitigation and Reclamation Plan (CMRP). This document provides typical wetland and waterbody crossing procedures, as well as upland construction methods.
- Horizontal Directional Drill Frac-out Contingency Plan.

- Horizontal directional drill site-specific drawings.

Upon completion of your review, Keystone would like to conduct a meeting with you to review and discuss your comments on this permit package. Thank you again for your assistance, should you require additional information or have questions with respect to this submittal, please do not hesitate to contact me at 713-693-6467.

Sincerely,

Steve Craycroft, Keystone XL Pipeline Project
Contract Environmental Compliance Manager

Cc:
Sandra Barnet TransCanada
Steve Marr, TransCanada
Jon Schmidt, exp

Prepared for:
TransCanada Keystone Pipeline, LP
Houston, Texas

Keystone XL Pipeline Project

Preliminary Pre-Construction Notification to the U.S. Army Corps of Engineers Omaha District – South Dakota

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Keystone XL Pipeline Project

Preliminary Pre-Construction Notification Package

South Dakota

Submitted to the United States Army Corps of Engineers
Omaha District - South Dakota State Office

July 2013

U.S. ARMY CORPS OF ENGINEERS

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

OMB APPROVAL NO. 0710-0003
EXPIRES: 28 FEBRUARY 2013

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Sandra Middle - Last - Barnett	First - Steve Middle - Last - Craycroft
Company - TransCanada Keystone Pipeline, LP	Company - TransCanada Keystone Pipeline, LP
E-mail Address -	E-mail Address - stephen_craycroft@transcanada.com
6. APPLICANT'S ADDRESS:	**9. AGENT'S ADDRESS:**
Address- 2700 Post Oak Blvd, Suite 400	Address- 2700 Post Oak Blvd, Suite 400
City - Houston State - Texas Zip - 77056 Country - U.S.	City - Houston State - Texas Zip - 77056 Country - U.S.
7. APPLICANT'S PHONE NOs. w/AREA CODE	**10. AGENTS PHONE NOs. w/AREA CODE**
a. Residence b. Business c. Fax	a. Residence b. Business c. Fax
713-693-6443	713-693-6467

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Steve Craycroft to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Keystone XL Pipeline Project

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
See attached Block 13	Address See attached Block 14
15. LOCATION OF PROJECT Latitude: ◦N see attached block 15 Longitude: ◦W	City - State- Zip-

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)
State Tax Parcel ID see attached block 16 Municipality see attached block 14
Section - attached block 16 Township - see attached block 16 Range - see attached block 16

17. DIRECTIONS TO THE SITE
See attached Block 17

18. Nature of Activity (Description of project, include all features)
See attached Block 18

19. Project Purpose (Describe the reason or purpose of the project, see instructions)
See attached Block 19

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge
See attached Block 20

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type	Type	Type
Amount in Cubic Yards	Amount in Cubic Yards	Amount in Cubic Yards

See attached Block 21

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres

or

Linear Feet See attached Block 22

23. Description of Avoidance, Minimization, and Compensation (see instructions)
See attached Block 18

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- See attached Block 25

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
See attached Block 26					

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

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Support Information for the Keystone XL Pipeline Project Preliminary Pre-Construction Notification

Figures

Tables

Attachments

Pre-Construction Notification for NWP 12
Department of the Army Permit Form 4345

To supplement the attached United States Army Corps of Engineers' (USACE) Application for Department of the Army Permit, Form 4345, additional information necessary for the Pre-Construction Notification (PCN) requirements is included in the following sections. The Blocks in Form 4345 are referenced below and the tables and figures are presented after the Block text.

Blocks 5 through 10. Applicant's Name and Address.

Applicant
TransCanada Keystone Pipeline, LP
Sandra Barnett – Manager, Environmental
Keystone Pipeline Projects
2700 Post Oak Boulevard, Suite 400
Houston, Texas 77056
(713) 693-6443

Authorized Agent
Steve Craycroft
Contract Environmental Compliance Manager
Keystone XL Pipeline Project
2700 Post Oak Boulevard, Suite 400
Houston, Texas 77056
(713) 693-6467

Block 12. Project Name or Title. Keystone XL Pipeline Project (Project).

Block 13. Name of Waterbody. The Project crosses numerous wetlands and waterbodies through the USACE Omaha District in South Dakota. A subset of the wetlands and waterbodies crossed by the Project require PCN to the USACE based on Nationwide Permit 12 Conditions, the Nationwide Permit program General Conditions, and/or Regional Condition requirements. The PCN requirements evaluated for the Project in South Dakota are provided in **Table 1**. The locations, names (if available), hydrologic unit code (HUC), and other information related to the wetlands and waterbodies crossed by the Project and requiring PCN are provided in **Table 2**. The individual PCN waterbody and wetland crossings are illustrated on the maps contained in the Map Volume PCN Wetland and Stream Features (**Attachment A**) at a scale of 1:6,000. All wetlands and waterbodies found within the Environmental Study Area[1] are included in the Wetland Delineation Report provided in **Attachment B**. As indicated in **Attachment B**, TransCanada Keystone Pipeline, LP (Keystone) is electing to use a preliminary jurisdictional determination (preliminary JD) for the Project, in accordance with USACE Regulatory Guidance Letter 08-02, dated June 26, 2008. To support the USACE's preliminary JD evaluation for the Project, a completed Jurisdictional Determination Form is included as **Attachment D** of the Wetland Delineation Report.

Block 14. Project Address. Not Applicable. The Project is a linear pipeline through the USACE Omaha District and across the State of South Dakota.

[1] The width of the Environmental Study Area (ESA) for the pipeline is 300 feet total, 150 feet on either side of the centerline. For the access roads, the ESA is 100 feet total, 50 feet on either side of the centerline. The entire area within the boundary of the pump stations and auxiliary facilities was included in the ESA.

Block 15. Location of Project. Figure 1 provides an overview of the Project within the State of South Dakota. Within this jurisdiction, the Project will cross Harding, Butte, Perkins, Meade, Pennington, Haakon, Jones, Lyman and Tripp counties.

Block 16. Other Location Descriptions. Table 2 provides PCN wetland and waterbody crossing locations by pipeline milepost and by latitude/longitude coordinates. None of the wetlands and waterbodies crossed by the Project's access roads or located within the boundary of the auxiliary facilities require PCN to the USACE based on the Nationwide Permit 12 Conditions, the Nationwide Permit program General Conditions, and/or Regional Condition triggers.

Block 17. Directions to Site. See Block 15 for map (**Figure 1**) depicting an overview of the Project.

Block 18. Nature of Activity. The primary activities within the jurisdiction of the USACE Omaha District in South Dakota will be: 1) the installation of a 36-inch mainline steel pipeline within a standard 110-foot wide construction right-of-way (ROW); 2) construction of seven pump stations; and 3) installation of 15 mainline isolation valves at intervals along the pipeline route in South Dakota. These segments within South Dakota are part of the larger pipeline project that will deliver crude oil from Canada to the United States (U.S.).

ENVIRONMENTAL IMPACTS AND MITIGATION

The Department of State (DOS) is conducting a supplemental National Environmental Policy Act (NEPA) analysis of the Final Environmental Impact Statement (FEIS) issued in August 2011 for the Project, including evaluation of impacts to wetlands, streams, rivers, and other waters of the U.S.; historic properties; and biological resources. The DOS's initial Biological Assessment (BA) was finalized on May 19, 2011 and the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion (BiOp) was finalized on September 23, 2011. To accompany the development of the SEIS, the DOS updated the BA with the USFWS and issued the revised BA with the draft SEIS (1st quarter 2013). The final updated BiOP was issued by USFWS on May 15, 2013. The DOS, the Advisory Council on Historic Preservation, the State Historic Preservation Officers, and other parties developed a Programmatic Agreement for compliance with Section 106 of the National Historic Preservation Act that was included in the FEIS. The DOS may amend the existing Programmatic Agreement in conjunction with the findings of the final SEIS.

Keystone is committed to protecting waterbodies, wetlands, and their associated resources. Throughout the planning phase of the Project, engineers and environmental staff designed the pipeline route, construction procedures, and a compliance program that will minimize environmental impacts during construction and restoration of the Project.

The pipeline route has been refined several times to reduce waterbody and wetland impacts through:

- Avoiding waterbody and wetland crossings where feasible;
- Minimizing the number of times a single waterbody is crossed; and
- Crossing waterbodies perpendicularly whenever possible.

During consultation activities with federal and state agencies and local stakeholders, additional reroutes were incorporated to avoid or minimize impacts to significant resources or concerns identified. In addition, timing windows were established in the Project schedule to protect biological resources, such as spawning fish and threatened/endangered species. Additional mitigation measures are discussed in greater detail in the Project's Construction Mitigation and Reclamation Plan (CMRP) (**Attachment C**), and include:

- Erosion and sediment controls implemented during and after construction;
- Environmental training of all Project workers and supervisors;
- Best management practices incorporated into the Project design and construction;
- Stream and wetland construction procedures designed to minimize impacts during construction and reclamation of the crossings;
- Spill prevention and clean-up procedures;
- Hazardous materials handling guidelines; and
- Clean-up, seeding and reclamation details to ensure the effective stabilization of the ROW and Project disturbances.

Keystone's CMRP provides typical procedures for wetland and waterbody crossings, as well as erosion and sediment control measures that will be installed during construction and stabilization/revegetation of the Project.

THREATENED AND ENDANGERED SPECIES

Within the jurisdiction of the USACE Omaha District in South Dakota, potential habitat exists for the following federally-listed threatened or endangered species: The whooping crane (*Grus americana*), piping plover (*Charadrius melodus*), interior least tern (*Sternula antillarum*), American burying beetle (*Nicrophorus americanus*), and western prairie fringed orchid (*Platanthere praeclara*). Potential Project impacts and survey findings (where applicable) are discussed below for each of the above-referenced species.

Whooping Crane

The Project is within the primary migration pathway of the whooping crane through the central Great Plains. Suitable whooping crane roosting and/or foraging habitats occur within the Project area at major river crossings including the Cheyenne River and the White River in South Dakota. In addition to the major river crossings, there is the potential for suitable stopover habitat within wetlands, shallow areas of reservoirs, and stockponds within the Project area in South Dakota.

No direct impacts to the whooping crane are anticipated from the construction of the proposed Project. The Cheyenne and White rivers would be crossed by horizontal directional drilling (HDD), so potential habitat loss, alteration, or fragmentation would be negligible within the delineated boundaries of the Cheyenne and White rivers. Minimal hand clearing of vegetation and limited equipment access would be required within the riparian areas of these rivers in order to use the HDD electronic guidance system that is associated with the drilling equipment and in order to access these rivers to potentially withdraw water for the proposed Project's HDD and hydrostatic tests. Any vegetation disturbance within the HDD would be allowed to completely revegetate following construction.

The primary construction-related impacts would be disturbance and potential exposure to small fuel spills and leaks from construction machinery. The chance for construction-related spills within whooping crane roosting and foraging habitat is minimal. The CMRP (**Attachment C**) includes measures to minimize the likelihood of a spill occurring and to promptly respond to and clean-up spills that may occur.

If pipeline construction–related activities were to occur in close proximity to migrating whooping cranes during spring and fall migration periods, Environmental Monitors would complete a brief survey of any wetland or riverine habitat areas potentially used by whooping cranes. The survey would be conducted in the morning before starting equipment using the Whooping Crane Survey Protocol previously developed by USFWS and Nebraska Games and Parks Commission as outlined in the *2012 Technical Assistance Letter for the TransCanada Keystone XL Pipeline* issued by the USFWS Nebraska Ecological Services Field Office. If whooping cranes are sighted during the morning surveys or any time during the day, then Keystone would immediately contact the USFWS and South Dakota Department of Game, Fish and Parks (SDGFP) for further

instruction and require that all human activity and equipment start-up would be delayed within USFWS determined distance of the cranes. Work would resume once the birds left the area. The Environmental Monitor would record the sighting, bird departure time, and work start time on the survey form. Additionally, the USFWS would notify the Compliance Manager of whooping crane migration locations during the spring and fall migrations through information gathered from the whooping crane tracking program. If the migratory sighting locations are within a USFWS approved distance from construction activities, then Environmental Monitors would conduct protocol level surveys of the appropriate portions of the Project.

Downshielding of lights would be done should HDD occur at night during the spring and fall whooping crane migratory period in areas that provide suitable stopover habitat.

Piping Plover

The Cheyenne River crossing on the border of Meade, Pennington and Haakon counties in South Dakota has historically supported breeding populations of piping plovers. During a meeting with Keystone representatives on June 10, 2008, SDGFP stated that breeding piping plovers are not located within the proposed Project area. Therefore no impacts to the piping plover or its breeding habitat would be anticipated from the construction of the Project within South Dakota.

Though the piping plover is not anticipated to occur within the Project area in South Dakota based on the result of the field surveys and consultation with SDGFP, the BiOp requires that if construction were to occur during the plover breeding season (April 15 through September 1), pre-construction surveys and daily surveys would occur in coordination with USFWS within 0.25-mile from Cheyenne River crossing to ensure that there are no nesting pairs within 0.25-mile of the construction area. If occupied piping plover nests are found, then construction within 0.25-mile of the nest would be suspended until the nest is no longer active.

Downshielding of lights would be used if night time work is necessary for the HDD crossings of the Cheyenne River if the HDD site lacks vegetative screening, and an active piping plover nest is located within 0.25 mile of the HDD site.

Interior Least Tern

The Cheyenne River crossing on the border of Meade, Pennington and Haakon counties in South Dakota has historically supported, or currently supports, breeding populations of interior least terns. During field surveys conducted in July 2008 and June 2011, no interior least terns were observed at the proposed crossing location.

No direct impacts to least tern breeding habitat would be anticipated at these locations, since pipeline placement across the Cheyenne River will be completed by the HDD method. Minimal hand clearing of vegetation and limited human access would be required within the riparian areas of these rivers in order to use HDD electronic guidance system that is associated with the drilling equipment and in order for equipment to access these rivers to potentially withdraw water for the Project's HDD and hydrostatic tests.

The primary construction-related impacts would be disturbance and potential exposure to small fuel spills and leaks from construction machinery. The chance of construction-related spills within least tern habitat is minimal because all hazardous materials such as fuels and oils would be stored at least 100 feet away from surface waters and these types of spills or leaks generally are small in volume and are cleaned up quickly. Additionally, Keystone's CMRP (**Attachment C**) provides the best management practices that will be implemented to reduce the potential for impacts due to construction-related spills as previously briefly described in the impact evaluation for the whooping crane. Indirect impacts could result from increased noise and human presence at work site locations if breeding terns are located within 0.25-mile of the Project.

If construction occurs within a 0.25-mile of the Cheyenne River crossing during the breeding season (May 1 to September 1 inclusive), then pre-construction surveys would occur in coordination with USFWS within 0.25-mile from the Cheyenne River crossing to ensure that there are no nesting pairs within 0.25-mile of the construction area. If active nest sites are identified, the USFWS would be notified and appropriate protection measures would be implemented on a site-specific basis in coordination with the USFWS. These protection measures may include: temporarily delaying work until the nest is no longer active.

Downshielding of lights would be used if night time work is necessary for the HDD crossings of the Cheyenne River if the HDD site lacks vegetative screening, and an active tern nest is located within 0.25 mile from the HDD site.

American Burying Beetle

Suitable American burying beetle (ABB) habitat is located along the proposed Project route south of Highway 18 in Tripp County, South Dakota. A windshield survey to assess potential ABB habitat was conducted along the proposed Project route in Tripp County in 2012.

Direct impacts to ABB as a result of construction during vegetation clearing, site grading and trench excavation would result in temporary habitat loss, potential alteration of suitable habitat to unsuitable habitat, temporary habitat fragmentation where the pipeline is not already collocated with other utilities, and the potential mortality to eggs, larvae and adults through construction vehicle traffic and exposure during excavation. Artificial lighting has the potential to disrupt foraging and increase predation on the American burying beetle. Most normal construction would take place during daylight hours and construction areas would not generally use artificial lighting. Activities that could potentially require lighting could include critical pipeline tie-ins, HDD crossings, and certain work required after sunset due to weather, safety or other Project requirements. HDD crossings would require 24-hour operation until the crossing is completed. Localized fuel spills may occur during construction, however, Keystone would develop and implement a Spill Prevention Control and Countermeasures Plan for potential construction-related fuel spills which would mitigate and avoid any short-term impacts.

Burying beetles, including the ABB, are sensitive to soil moisture and die quickly when desiccated (Bedick et al. 2006). Under laboratory conditions, American burying beetles seek soils containing high moisture levels during periods when they are inactive. During construction, soil moisture may be reduced across the ROW as the site is prepared by removing vegetation and topsoil and grading. Equipment operations within the ROW would compact the substrate. During reclamation, sub-soil and soil would be de-compacted and vegetation cover would be re-established within both the temporary and permanent ROW. Native vegetation seed would generally be used, unless otherwise directed by the landowner. As stated in the Project CMRP (**Attachment C**) the objectives of reclamation and revegetation are to return the disturbed areas to approximate pre-construction vegetation, use, and capability. This involves treatment of soil as necessary to preserve approximate pre-construction capability and stability in a manner consistent with the original vegetation cover and land use

In addition to the preveously described best management practices, Keystone has committed to incorporating the following conservation measures as part of the proposed Project to prevent potential direct or indirect impacts to the ABB:

- Vehicle traffic used in support of preconstruction activites will be confined to approved access roads.
- Construction methods will be used involving sequential replacement of topsoil and reestablishment of natural vegetation to restore natural soil hydrology within the construction ROW and avoid long-term impacts to ABB habitat.
- Keystone will train all workers operating in ABB habitat and would include discussion of habitat, biology, reasons for their decline, and responsibilities of all workers for the

protection of the species (including removing food wastes from the ROW each day, reporting any ABB sightings to an environmental inspector, and avoiding bringing dogs and cats to the ROW). Keystone will produce a full color Endangered Species Card with a picture of the ABB and all of this information summarized on the card. The card will be handed out to all construction workers operating in ABB habitat.

- Signs will be posted at all access points to the ROW highlighting the areas as ABB habitat and reminding workers to follow special restrictions in the area.
- Keystone will down-shield lighting and install sodium vapor-type lights or equivalent in coordination with USFWS in instances when construction activities would occur in suitable habitat areas in Tripp Country to avoid attracting the species to the construction site.
- Keystone will down-shield lighting and install sodium vapor-type lights or equivalent in coordination with USFWS at auxiliary facilities within areas occupied by the ABB.
- Keystone will provide compensation for temporary construction and permanent operations impacts to the ABB as part of a Habitat Conservation Trust in areas southwest of Highway 18 in Tripp County, South Dakota.
- Keystone will provide funding for compliance monitoring. The DOS will designate USFWS or an agreed-upon third-party, such as a nongovernmental organization, that would work with USFWS to ensure that vegetation restoration efforts were successful for ABB habitat, as agreed between the DOS, USFWS, and Keystone.
- Keystone will reseed disturbed areas in prime, good, fair, and marginal ABB habitats with a seed mix that corresponds to the appropriate Construction/Reclamation (Con/Rec) unit for that property. Should a landowner-directed seed mix be determined to not result in full restoration as stipulated in the Reclamation Performance Bond then the subject acreage amount reseeded will be debited from temporary ABB habitat impacts and credited to permanent ABB habitat impacts and the total donation amount to the ABB Trust will be recalculated.
- Keystone will set aside funds for a restoration performance bond upon issuance of a Presidential Permit and prior to initiating Project construction in South Dakota. The bond would be applied to supplemental vegetation restoration that could be necessary if restoration for ABB beetle habitat failed, as agreed between the DOS, USFWS, and Keystone.

Western Prairie Fringed Orchid

The known distribution of the western prairie fringed orchid includes the Project area south of Highway 18 in Tripp County, South Dakota. Populations in South Dakota are possibly extirpated but factors that indicate the species could still be present include: 1) incomplete surveys in areas of suitable habitat crossed by the Project route on private lands, and 2) erratic flowering patterns with long dormancies that make detection difficult. Surveys to assess habitat suitability and occurrence of the species were completed in June 2009 and May and June 2011 and 2012 in Tripp County. No western prairie fringed orchids were observed in the surveyed areas in South Dakota.

Construction of the Project could potentially disturb western prairie fringed orchid communities when vegetation is cleared and graded. Construction of permanent auxiliary facilities also could displace plant communities for the lifetime of the Project. Revegetation of the pipeline could introduce or expand invasive plant species, especially leafy spurge, Kentucky bluegrass, and Canada thistle into the Project area, potentially contributing to the decline of western prairie fringed orchid. Keystone has developed weed and vegetation monitoring plans to prevent the spread of invasive plant species as a consequence of the proposed Project construction and operation. These plans are in the CMRP (**Attachment C**), and would be updated prior to construction.

Keystone commits to implementation of the following conservation measures for identified populations and for areas that provide suitable habitat but could either not be surveyed or surveyor could not be done when the plant is flowering:

- Complete habitat suitability surveys prior to construction. Survey results will be submitted to the USFWS for review.
- Keystone will re-route the pipeline around individual plants or populations within the proposed Project footprint to the extent practicable and/or allowed by the landowner. Compensation through a Habitat Conservation Trust will be provided in areas that cannot be avoided. Keystone will transplant individual plants that would be affected by construction activities to other locations where suitable habitat is available, when feasible and/or when approved by the land owner if on private land. This action will be done in coordination with USFWS.
- Keystone will reduce the width of the construction ROW, the amount of reduction dependent on the circumstances, in areas where orchid populations have been identified. This will be done in coordination with USFWS. Keystone will salvage and segregate topsoil appropriately where populations have been identified to preserve native seed sources in the soil for use in revegetation efforts in the ROW.
- Keystone will provide compensation for impacts to the western prairie fringed orchid as part of a Habitat Conservation Trust in areas where the species is likely to be impacted southwest of Highway 18 in Tripp County, South Dakota. Compensation will be based on total acres impacted where western prairie fringed orchid presence was confirmed and in areas with suitable habitat that were not surveyed during the blooming period. Compensation will not be provided for habitat in areas where surveys were completed for western prairie fringed orchids and they were not found.
- Keystone will restore and monitor construction-related impacts to wet meadow habitats identified as suitable for the western prairie fringed orchid consistent with USACE guidelines as follows. The disturbed areas shall be reseeded concurrent with the project or immediately upon completion. Revegetation shall be acceptable when ground cover of desirable species reaches 75%. If this seeding cannot be accomplished by September 15 the year of project completion, then an erosion blanket shall be placed on the disturbed areas. The erosion blanket shall remain in place until ground cover of desirable species reaches 75%. If the seeding can be accomplished by September 15, all seeded areas shall be properly mulched to prevent additional erosion.

PERMANENT FACILITIES

Pipeline Facilities

Construction of the pipeline facilities will require trees and vegetation to be cleared from the ROW. Grading of the work area will establish a stable and safer work surface for pipe installation. Once grading is complete, a trench will be excavated to a depth sufficient to provide approximately four feet of soil cover over the buried pipeline in wetland and upland areas and a minimum of five feet of cover for stream crossings. Where wetland conditions permit topsoil salvage during excavation, soil conservation will be conducted through salvaging topsoil from the reduced 85-foot construction corridor and temporarily storing the topsoil within the ROW limits. After the welded pipeline is installed in the trench, the subsoil will be backfilled into the trench and the topsoil will be replaced on top of the subsoil. Standard industry boring techniques will be employed to cross under significant highway and railroad crossings.

To install pipelines under watercourses, Keystone will adopt the standard open cut (wet or dry) crossing methods or use the HDD crossing method. During open cut crossing installations, material excavated from the trench line at stream crossings less than 30 feet wide will be stored on the banks of the streams. For waterbodies greater than 30 feet in width, excavated trench materials may be temporarily stored in-stream (without blocking stream flow) while the trench is

being excavated and the pipeline carried into place and installed in the trench. Immediately following installation of the pipeline at stream crossings, the trench will be backfilled, and original stream contours will be re-established to the extent practicable.

Keystone will use HDD crossing methods under select rivers. Disturbance will be limited to the temporary deployment of telemetry cable and placement of a hose and limited equipment access to carry a pump to draw water from the waterbody for drilling mud makeup and hydrostatic testing of the pull section. Additional minor disturbance may be required for equipment to carry and place water withdrawal pumps and dewatering lines to support the mainline hydrostatic testing operations. Within the USACE Omaha District in South Dakota, the following water of the U.S. are planned to be crossed with the HDD crossings method; the Little Missouri River in Harding County, the Cheyenne River in Meade and Pennington counties, the Bridger Creek in Haakon County, the Bad River in Haakon County, and the White River in Lyman County. In the event that inadvertent returns of drilling mud occur to the surface of the ground, Keystone will implement the measures outlined in the attached HDD Frac-Out Contingency Plan (**Attachment D**). HDD drawings for these crossings are provided in **Attachment E**.

Auxiliary Facilities

As proposed, construction of the Project's auxiliary facilities would not result in permanent impacts to any waters of the U.S. within the Omaha District in South Dakota.

Pump Stations

Seven pump stations will be constructed in South Dakota adjacent to the pipeline ROW and will vary from 7 to 12 acres in size. Pump station locations are provided in **Table 3**.

Pump stations will require electrical power that will be supplied by regional power utilities suppliers. Power lines will be constructed and operated by electrical power utilities and all relevant construction and operational permits will be obtained by these utilities through their applicable approval process.

Valves

Pipeline valves will be located within pump station facilities and at intervals along the pipeline ROW within fenced enclosures. Keystone will not impact any waters of the U.S. with valve placement. Valves will generally be located near existing roads to allow easy access.

Access Roads

Permanent access roads will be required for pump stations and certain valve locations. In general, these access roads will be routed to avoid permanent impacts to wetlands greater than 0.10 of an acre. There is one permanent access road proposed. Construction of this permanent access road will not result in the permanent impact greater than 0.10 of an acre on each of the waterbodies that the access road crosses.

TEMPORARY FACILITIES

Construction of the Project will require the use of a number of temporary facilities not adjacent to the pipeline mainline. These facilities include contractor yards, contractor camps, pipe storage yards, rail sidings, and access roads, discussed in more detail below. These areas will be restored during clean-up after pipeline construction is completed. As with the pipeline ROW, temporary fills of wetlands and waterbodies may be required to provide stable access. Examples of possible temporary fills include but are not limited to temporary crossing of streams and rivers that are not Section 10 waters. Keystone will remove all temporary fill and restore the original contours of wetlands and waterbodies during clean-up. There will be no permanent filling of waters of the U.S. associated with the temporary facilities.

Contractor Yards

Each pipeline construction segment (spread) will have at least one contractor yard, generally 30 acres in area. Contractor yards would be used as muster points, for equipment and personnel mobilization, equipment storage and maintenance, training, and other pipeline construction support activities.

Pipe Storage Yards

Pipe storage yards will be required to stage pipe along the proposed pipeline route to reduce haul times and facilitate efficient transport to the ROW. Pipe storage yards would be approximately 30 acres in area.

Railroad Sidings

A number of railroad sidings will be used to facilitate the unloading of pipe from railcars. Railroad sidings would generally be greater than 100 acres in area.

Contractor Camps

Contractor Camps would be established to minimize the effects of the pipeline work force on communities with limited housing resources. Each spread will have approximately 1,000 members in the total workforce, including contractors, inspection and construction management staff. The contractor camps would be approximately 80 acres in area. In some locations, contractor camps may be collocated with contractor yards.

Access Roads

Temporary access roads will be necessary to provide ingress and egress for vehicles and equipment at regular intervals along the pipeline route. At the crossing of the Cheyenne River, Keystone will install and use a temporary equipment access bridge for the transfer of construction equipment across the waterbody. No permanent fill will occur as a result of the installation and use of the temporary bridge.

Block 19. Project Purpose. The purpose of the Project is to provide the infrastructure necessary to transport crude oil production from the Western Canadian Sedimentary Basin and the Bakken supply basin in Montana and North Dakota to delivery points in Petroleum Administration Defense District (PADD) III in response to the market demand of refineries in PADD III for heavy crude oil. This market demand is driven by the need of refiners in PADD III to replace current feed stocks of heavy crude oil obtained from other foreign sources with crude from more stable and reliable sources. The Project will transport crude oil from the oil supply hub near Hardisty, Alberta, Canada to an interconnection with the existing Keystone mainline in Steele City, Nebraska.

Block 20. Reason for Discharge. Excavation of the pipeline trench will require the temporary placement of fill (trench spoils, rock, etc.) within the ROW in wetlands and in some waterbodies. These trench materials will then be returned to the pipeline trench, and the original contours and elevations will be re-established to the extent practical. In addition, to provide a stable access and reduce rutting, compaction, erosion, and sedimentation, temporary access across wetlands and streams may require the temporary placement of fill, as described below and in the Project's CMRP (**Attachment C**).

Block 21. Types of Material Being Discharged. Spoil (soil, sand, rocks, etc.) will be excavated from the pipeline trench in wetlands and within stream channels. Excavated materials will be returned to the trench in wetlands and waterbodies immediately after the pipeline is installed in the trench. In addition, timber mats, timber rip-rap or clean rock and flumes may be used to provide stable temporary access across streams and wetlands. Materials used to provide access through wetlands will likely remain in place for longer than 90 days before being removed during final cleanup activities. All of these materials will be removed from within wetlands and waterbodies at the completion of construction.

Block 22. Surface Areas in Acres of Wetlands or Other Waters Filled. The surface areas of wetlands and other waters crossed by the pipeline have been divided into watersheds defined by USGS HUCs (see **Figure 2** for the watershed boundaries within South Dakota. **Table 2** list the waters of the U.S. crossed by the Project requiring a PCN, the reason for the PCN, and the temporary and permanent acreage calculations for each wetland or waterbody. **Table 4** provides the overall summaries of the acreages of temporary and permanent disturbances to waters of the U.S. requiring a PCN, by wetland type (e.g. palustrine emergent marsh) or stream within each HUC watershed.

Temporary access crossing materials (timber mats, timber riprap and rock and flume crossing materials) will be completely removed from wetlands and waterbodies at the completion of construction. Disturbances associated with temporary equipment access methods will be restored and stabilized after the bridging equipment access materials are removed.

Block 23. Description of Avoidance, Minimization, and Compensation. See Block 18 above.

Block 24. Is Any Portion of the Work Already Complete? No.

Block 25. Addresses of Adjoining Property Owners, Lessees, etc., Whose Property Adjoins the Waterbody. Not applicable.

Block 26. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application. Table 5 provides a summary of other Project permits and approvals.

Figure 1 Route through South Dakota Counties

Figure 2 Route through HUCs

Each of the Pre-Construction Notification (PCN) criteria provided in **Table 1** was evaluated for applicability to the Project. Waters of the U.S. found to meet these criteria are listed in **Table 2** and include a code for the applicable PCN criteria. The codes are listed below. **Attachment F** contains the list of USACE Regional Conditions for South Dakota.

Table 1. Keystone XL Pipeline Project – Pre-Construction Notification Requirement Analysis Omaha District, South Dakota

Nationwide Permit 12 PCN Conditions/ Criteria	Source	Applicability to Keystone Project in South Dakota
Waters of the U.S. where activity may affect a federally listed species or designated critical habitat or if the project is located in – or in the vicinity of – designated critical habitat.	General Conditions	**Applicable**
Waters of the U.S. where activity has the potential to affect historic properties listed, eligible for listing, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties.	General Conditions	Not applicable
Mechanized land clearing in a forested wetland for the ROW.	NWP 12	Not Applicable
Section 10 Permit required.	NWP 12	Not Applicable
Utility line in waters of the U.S. exceeds 500 feet	NWP 12	**Applicable**
Utility line is placed within a jurisdictional area and it runs parallel to a stream bed within that jurisdictional area	NWP 12	Not Applicable
Permanent loss of > 0.10 acre.	NWP 12	Not Applicable
Permanent access roads constructed above-grade for >500 feet.	NWP 12	Not Applicable
Permanent access roads constructed of impervious materials.	NWP 12	Not Applicable
Regulated activities located within 100 feet of the water source in natural spring areas.	Regional Condition, South Dakota	Not Applicable
Regulated activities between October 15 and April 1 involving the discharge of dredged or fill material into cold water streams when water flow is present.	Regional Condition, South Dakota	Not Applicable
Prohibits the use of unsuitable materials including the discharge of unsuitable materials in waters of the U.S.	Regional Condition, South Dakota	Not Applicable
Regulated activities within wetlands classified as peatlands.	Regional Condition, South Dakota	Not Applicable

Nationwide Permit 12 PCN Conditions/ Criteria	Source	Applicability to Keystone Project in South Dakota
The use of a borrow site in conjunction with any regulated activities.	Regional Condition, South Dakota	Not Applicable

Table 2. Keystone XL Pipeline Project – Mainline Wetland and Waterbody Crossings within the USACE Omaha District Requiring Pre-Construction Notification – South Dakota

Feature ID	MP[1]	Crossing Distance[2] (Feet)	Type[3]	Name	Crossing Method[4]	HUC Sub Basin[5]	Temporary Disturbance (Acres)	Permanent Disturbance (Acres)	Latitude (WGS84)	Longitude (WGS84)
S312ME012	429.85	123	PER	Cheyenne River	HDD	Lower Cheyenne	0.1414[6]	0.0000	44.508492	-102.0136
S312ME011	429.89	102	INT	Cheyenne River	HDD	Lower Cheyenne	0.1174[6]	0.0000	44.508031	-102.01321
S312ME010	430.00	169	PER	Cheyenne River	HDD	Lower Cheyenne	0.1933[6]	0.0000	44.506721	-102.0121
S312PN002	430.03	12	PER	Cheyenne River	HDD	Lower Cheyenne	0.0139[6]	0.0000	44.506291	-102.01172
S7ALY001	541.30	488	PER	White River	HDD	Lower White	0.5575[7]	0.0000	43.705588	-100.1702
W_UTM14_08449	541.36	137	PSS	N/A	HDD	Lower White	0.1568[7]	0.0000	43.704742	-100.17011

[1] MP = milepost

[2] Crossing distance measured at proposed pipeline centerline.

[3] INT = Intermittent Waterbody; PER = Perennial Waterbody; PSS = Palustrine Scrub Shrub Wetland

[4] HDD = Horizontal directional drill method. The final crossing technique will be determined at the time of construction, based on the field conditions at the time of construction. The HDD construction technique is described in the Project's CMRP.

[5] HUC Sub Basin = Name of 8-digit USGS Hydrologic Unit Code

[6] Temporary impacts is based on a 110-foot wide temporary construction right-of-way.

[7] Temporary impacts is based on a 50-foot wide temporary construction right-of-way.

Table 3. Keystone XL Pipeline Project – Pump Station Locations – South Dakota

Pump Station ID	Milepost	County	Acres
PS-15	288.65	Harding	9.20
PS-16	337.32	Harding	11.30
PS-17	391.54	Meade	11.00
PS-18	444.63	Haakon	8.50
PS-19	500.50	Jones	9.10
PS-20	550.93	Tripp	7.80
PS-21	598.95	Tripp	8.40

Table 4. Keystone XL Pipeline Project – Summary of Wetland and Waterbody Acreage Crossed by the Mainline in the USACE Omaha District Requiring Pre-Construction Notification, by HUC Sub Basin[1] – South Dakota

Water Feature Type[2]	Boxelder		South Fort Grand		Upper Moreau		South Fork Moreau	
	Temp[3] Impacts (Acres)	Perm[4] Impacts (Acres)	Temp Impacts (Acres)	Perm Impacts (Acres)	Temp Impacts (Acres)	Perm Impacts (Acres)	Temp Impact (Acres)	Perm Impacts (Acres)
PEM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PSS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Stream	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Water Feature Type[2]	Cherry		Lower Cheyenne		Bad		Medicine	
	Temp Impacts (Acres)	Perm Impacts (Acres)	Temp Impacts (Acres)	Perm Impacts (Acres)	Temp Impacts (Acres)	Perm Impacts (Acres)	Temp Impacts (Acres)	Perm Impacts (Acres)
PEM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PSS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Stream	0.0000	0.0000	0.4660[5]	0.0000	0.0000	0.0000	0.0000	0.0000

Water Feature Type[2]	Lowe White		Ponca		Keya Paha		Total	
	Temp Impacts (Acres)	Perm Impacts (Acres)	Temp Impacts (Acres)	Perm Impacts (Acres)	Temp Impacts (Acres)	Perm Impacts (Acres)	**Temp Impacts (Acres)**	**Perm Impacts (Acres)**
PEM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0000**	**0.0000**
PSS	0.1568[6]	0.0000	0.0000	0.0000	0.0000	0.0000	**0.1568**	**0.0000**
Stream	0.5575[6]	0.0000	0.0000	0.0000	0.0000	0.0000	**1.0235**	**0.0000**

[1] HUC Sub Basin = Name of 8-digit USGS Hydrologic Unit Code.

[2] PEM = Palustrine Emergent Marsh, PSS = Palustrine Scrub Shrub Wetland, Stream = Includes intermittent waterbodies and perennial waterbodies.

[3] Temp = Temporary

[4] Perm = Permanent

[5] Calculations of temporary impacts are based on a 110-foot wide temporary construction right-of-way.

[6] Calculations of temporary impacts are based on a 50-foot wide temporary construction right-of-way.

Table 5. Keystone XL Pipeline Project – Permits, Licenses, Approvals, and Consultation Requirements

Agency	Permit or Consultation/Authority	Agency Action
Federal		
U.S. Department of State (DOS)	Presidential Permit, Executive Order 13337 of April 30, 2004 (69 Fed. Reg. 25299, et seq.)	Considers approval of cross-border facilities.
	National Environmental Policy Act (NEPA)	Lead federal agency for the environmental review in connection with consideration of Presidential Permit application
	Section 106 of the National Historic Preservation Act (NHPA)	Supervises and coordinates compliance with Section 106 of NHPA and consultation with interested Tribal agencies
	Section 7 of the Endangered Species Act (ESA)	Coordinates ESA consultation with the United States Fish and Wildlife Service (USFWS)
Bureau of Land Management (BLM)	Right-of-way (ROW) grant(s) and short-term ROWs under the Federal Land Policy and Management Act of 1976 as amended (FLPMA) and Temporary Use Permit under Section 28 (MLA)	Considers approval of ROW grant and temporary use permits for the portions of the Project that would encroach on public lands
	Archeological Resources Protection Act (ARPA) Permit	Considers issuance of cultural resource use permit to survey, excavate or remove cultural resources on federal lands
	Notice to Proceed	Following issuance of a ROW grant and approval of the Project's POD, considers the issuance of a Notice to Proceed with Project development and mitigation activities for federal lands
	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
U.S. Corps of Engineers (USACE) – Omaha	Section 404, Clean Water Act (CWA)	Considers issuance of Section 404 permits for the placement of dredge or fill material in waters of the U.S., including wetlands
	Section 10 Permit (Rivers and Harbors Act of 1899)	Considers issuance of Section 10 permits for pipeline crossings of navigable waters
	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
U.S. Fish and Wildlife Service (USFWS)	ESA Section 7 Consultation, Biological Opinion	Biological Opinion issued May 15, 2013
U.S. Bureau of Reclamation (Reclamation)	ROW Grant and Temporary Use Permit under Section 28 of the MLA	Determines if ROW grant issued under MLA by BLM is in compliance with Reclamation standards
	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
Federal Highway Administration (FHA)	Crossing Permit	Considers issuance of permits for the crossing of federally funded highways
U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety (OPS)	49 CFR Part 195 – Transportation of Hazardous Liquids by Pipeline	Reviews design, construction, operations, maintenance, and emergency operations plan (termed Emergency Response Plan [ERP]), inspection of pipeline projects, including Integrity Management Programs and identifying high consequence areas prior to installation

Table 5. Keystone XL Pipeline Project – Permits, Licenses, Approvals, and Consultation Requirements

Agency	Permit or Consultation/Authority	Agency Action
	49 CFR Part 194 – Response Plans for Onshore Pipelines	Reviews Response Plans (termed Pipeline Spill Response Plan [PSRP]) prior to initiation of operation and within 2 years of startup approves the PSRP.
U.S. Environmental Protection Agency (EPA), Regions VII, VIII	Section 401, CWA, Water Quality Certification	Considers approval of water use and crossing permits for non-jurisdictional waters (implemented through each state's Water Quality Certification Program)
	Section 402, CWA, National Pollutant Discharge Elimination System (NPDES)	Reviews and issues NPDES permit for the discharge of hydrostatic test water (implemented through each state's Water Quality Certification Program, where required)
U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS)	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
U.S. Department of Agriculture – Farm Service Agency (FSA)	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
U.S. Department of Agriculture – Rural Utilities Services (RUS)	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
Western Area Power Administration (Western)	Section 106 (NHPA)	Responsible for compliance with Section 106 of NHPA and consultation with interested Tribal agencies
Advisory Council on Historic Preservation (ACHP)	Consultation	Advises federal agencies during the Section 106 consultation process; signator to the Programmatic Agreement
U.S. Department of Treasury – Bureau of Alcohol, Tobacco, and Firearms	Treasury Department Order No. 120-1 (former No. 221), effective 1 July 1972	Considers issuance of permit to purchase, store, and use explosives should blasting be required
South Dakota[A]		
South Dakota Historical Society[B]	Consultation under Section 106, NHPA	Reviews and comments on activities potentially affecting cultural resources
South Dakota Public Utilities Commission (SDPUC)	Energy Conversion and Transmission Facilities Act	A PUC Certificate was issued March 2010
Department of Environment and Natural Resources, Surface Water Quality Program	Section 401, CWA, Water Quality Certification	Considers issuance of permit for stream and wetland crossings; consult for Section 404 process
	Hydrostatic Testing/Dewatering & Temporary Water Use Permit (SDG070000)	Considers issuance of General Permit regulating hydrostatic test water discharge, construction dewatering to waters of the state, and Temporary Water use Permit South Dakota General Permit for Temporary Discharge Activities Issued April 2013
	SDLC 24A-18 (oil spill response plans)	Review and consider approving crude oil pipeline spill response plans
Department of Game, Fish, and Parks	Consultation	Consults regarding natural resources
Department of Transportation	Crossing Permits	Considers issuance of permits for crossing of state highways
County Road Departments	Crossing Permits	Considers issuance of permits for crossing of county roads

Table 5. Keystone XL Pipeline Project – Permits, Licenses, Approvals, and Consultation Requirements

Agency	Permit or Consultation/Authority	Agency Action
County and Local Authorities	Pump Station Zoning Approvals, where required	Reviews under county approval process
	Special or Conditional Use Permits, where required	Reviews under county approval process

[A] Permits associated with construction camps are described in the August 26, 2011 FEIS Section 2.2.7.4

[B] The SHPO has the opportunity to review federal agency decisions under Section 106 of the NHPA, but this is not a legal obligation

Discussion of Map Volume
(PCN Wetland and Stream Features – Attachment A)

The U.S. Geological Survey (USGS) topographic maps were enlarged to depict the wetlands and waterbodies crossed by the Project and requiring Pre-Construction Notification to the USACE. A legend is provided on the first page, but generally the centerline is shown in red with thin white solid lines depicting the limit of the proposed temporary construction ROW. A label on each wetland or waterbody provides the feature identification number that corresponds to the tables provided. Mileposts are also depicted along the centerline and correspond to the features listed in **Table 2**.

The 2010 NAIP aerial photography based sheets depict the same information as shown on the USGS topographic maps and both versions are provided in both color and black and white (a total of four sets of maps).

Attachment A

Map Volume
PCN Wetland and Stream Features
(bound separately)

ATTACHMENT B

Wetland Delineation Report
(bound separately)

ATTACHMENT C

Keystone XL Pipeline Project
Construction Mitigation and Reclamation Plan

ATTACHMENT D

Horizontal Directional Drill Frac-out Contingency Plan

ATTACHMENT E

Horizontal Directional Drill Site-Specific Drawings

ATTACHMENT F

2012 Nationwide Permits
Regional Conditions
Omaha District
State of South Dakota

TransCanada Keystone Pipeline, LP
Houston, Texas

Keystone XL Pipeline Project

Draft Wetland Delineation Survey Report
Omaha District – South Dakota

July 2013

Keystone XL Pipeline Project

Draft Wetland Delineation Survey Report

South Dakota

Submitted to the United States Army Corps of Engineers

Omaha District - South Dakota State Office

July 2013

Acronym Glossary

bpd	barrels per day
CWA	Clean Water Act
EPA	Environmental Protection Agency
ESA	Environmental Study Area
FAC	facultative plants
FACU	facultative upland plants
FACW	facultative wetland plants
GIS	Geographical Information System
GPS	Global Positioning System
JD	jurisdictional determination
Keystone	TransCanada Keystone Pipeline, LP
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
NWP	Nationwide Permit
OBL	wetland obligate plants
PCN	Pre-Construction Notification
PEM	palustrine emergent wetland
PFO	palustrine forested wetland
Project	Keystone XL Pipeline Project
PSS	palustrine scrub shrub wetland
ROW	right-of-way
SD DENR	South Dakota Department of Environment and Natural Resources
SD GFP	South Dakota Game, Fish and Parks
UPL	obligate upland plants
U.S.	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

Executive Summary

TransCanada Keystone Pipeline, LP (Keystone) is proposing to construct and operate a crude oil pipeline and related facilities from Hardisty, Alberta, Canada, to Steele City, Nebraska in the United States (U.S.). The project, known as the Keystone XL Pipeline Project (Project), will have a nominal capacity to deliver up to 830,000 barrels per day (bpd) of crude oil from an oil supply hub near Hardisty to an existing Keystone Pipeline system in Steele City in Fallon County, Nebraska.

In total, the Project will consist of approximately 1,202 miles of 36-inch diameter mainline pipeline, consisting of about 327 miles in Canada and 875 miles within the U.S., with 315.32 miles occurring within South Dakota. Keystone proposes to start construction in 2014.

The USACE Omaha District has jurisdiction over activities that may affect waters of the U.S. in Montana, South Dakota, and Nebraska. This report addresses only South Dakota. The primary proposed construction activities within South Dakota will be: 1) the installation of a 36-inch mainline steel pipeline (Harding County, South Dakota through Tripp County, South Dakota) within a standard 110-foot wide construction right-of-way (ROW); 2) construction of seven (7) pump stations; and 3) installation of mainline isolation valves at intervals along the pipeline. In addition to the ROW, pipeline construction will require the use of temporary and permanent access roads, construction yards, pipeline yards, temporary work camps, and other related auxiliary facilities. Route maps are located in **Attachment A**.

Keystone conducted wetlands assessment and delineation surveys in South Dakota at various times from June 2008 through May 2013. The field methodologies that were employed by trained biologists were conducted in accordance with the 1987 *U.S. Army Corps of Engineers Wetland Delineation Manual* (USACE 1987) and the *2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (*Version 2.0*; USACE 2010). A survey corridor of 300 feet was investigated on all properties along the specified pipeline corridor where access was granted by the property owner. A survey corridor width of 100 feet was investigated for proposed access roads. These widths were assessed to allow flexibility of the final alignment, associated work space, and installation techniques associated with the proposed pipeline construction activities. The survey corridor is often larger than the area proposed for construction disturbance. Therefore, some features within the survey corridor would be avoided in their entirety by the proposed construction footprint. For pump stations and temporary facilities, the acreage to be purchased and/or leased for each station/facility was surveyed and results provided in this report.

This report details the Project components under the jurisdiction of the Omaha District of the USACE in South Dakota. Environmental features, including wetlands, waterbodies, listed species, critical habitat, and land use, were assessed and documented. Field investigations identified the number of crossings of features by county.

Contents

List of Tables

1.0 Introduction

This report summarizes the results of the environmental field survey activities in South Dakota that were performed by TransCanada Keystone Pipeline, LP (Keystone) from June 2008 through May 2013 for the proposed Keystone XL Pipeline Project (Project). Specifically, this report details the results for the United States Army Corps of Engineers (USACE), Omaha District in South Dakota. The scope of work involved conducting an environmental field investigation including wetland assessments and delineations, waterbody assessments and delineations, and evaluation of land use along the Project. The wetland assessment and delineation were conducted to determine if potential jurisdictional wetlands and/or potentially jurisdictional waters of the United States (U.S.) exist within the proposed Project areas and to determine the approximate boundaries of each feature. All features that were identified within the Environmental Study Area (ESA) are summarized in this report.

Field survey methods and results are presented and discussed in this report. Project maps are included as **Attachment A**, copies of field data sheets and photographs are included on compact disc as **Attachment B**, and results are summarized in tables in **Attachment C**.

1.1 Project and Site Description

Keystone is proposing to construct and operate a crude oil pipeline and related facilities from Hardisty, Alberta, Canada, to Steele City, Nebraska, United States. The Project will have the nominal capacity to deliver 830,000 barrels per day (bpd) of crude oil from an oil supply hub near Hardisty to existing Keystone Pipeline system in Steele City, Nebraska. The length of the Project is approximately 875 miles, from the Canada/U.S. border to Steele City in Jefferson County, Nebraska. Keystone proposes to start construction in 2013. For portions of the Project falling within the jurisdiction of the USACE Omaha District in Montana and Nebraska, separate Pre-Construction Notification (PCN) packages (including wetland delineation reports) will be prepared and submitted.

The USACE Omaha District has jurisdiction over activities that may affect waters of the U.S. along the Project route in South Dakota. The Project route will include 315.32 miles of pipeline in South Dakota. **Table 1** (**Attachment C**) provides a mileage breakdown of the Project route by county for South Dakota. In addition to the pipeline, Keystone will construct permanent and temporary construction access roads, temporary facilities (including contractor yards, pipe yards, rail sidings, and construction camps) and aboveground permanent facilities, including pump stations, delivery facilities, and mainline valves. Route maps are located in **Attachment A**.

2.0 Survey Methods

The following sections describe the background information that was utilized and methods that were implemented by trained biologists. The proposed alignments and pump stations were evaluated to determine land uses and the location of wetlands and waterbodies within the Project's ESA. The ESA is further defined in Section 2.1.2.

2.1 Regulations and Definitions

The USACE regulates wetlands and special aquatic sites determined to be waters of the U.S. under Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act.

The USACE and the U.S. Environmental Protection Agency (EPA) define wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands typically include swamps, marshes, bogs, and other similar areas" (USACE 1987).This definition takes into consideration three distinct environmental parameters: hydrology, soil, and vegetation. Positive wetland indicators of all three parameters are normally present in wetlands.

The Clean Water Act (1977) defines the term "Waters of the U.S." as:

a. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

b. All interstate waters including interstate wetlands;

c. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:

    1. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

    2. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

    3. Which are used or could be used for industrial purpose by industries in interstate commerce;

d. All impoundments of waters otherwise defined as waters of the U.S. under the definition;

e. Tributaries of waters identified in paragraphs (a) through (d) above;

f. The territorial seas;

g. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (g).

    1. Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA (other than cooling ponds as defined in 40 Code of Federal Regulations 123.11(m), which also meet the criteria of this definition) are not waters of the U.S.

h. Waters of the U.S. do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the EPA.

Depending on individual circumstances, when the USACE declines jurisdiction over a wetland in South Dakota, jurisdiction may fall to the state agencies responsible for regulating wetlands under Section 401 of the CWA. In South Dakota, jurisdiction would fall to the U.S. Fish and Wildlife Service (USFWS), the South Dakota Department of Environment and Natural Resources (SD DENR), or the South Dakota Game, Fish and Parks (SD GFP).

2.1.1 Desktop Analysis

Prior to conducting the environmental field activities, staff completed a desktop analysis of the following sources:

- USFWS National Wetlands Inventory (NWI) Maps;
- US Geological Survey (USGS) 7.5-minute Topographic Quadrangle Maps;
- Aerial Photography (2008 through 2012);
- Natural Resources Conservation Service (NRCS) Soil Surveys;
- USGS Land Use and Land Cover Data;
- SD GFP state lists and USFWS federal lists of threatened and endangered species.

Habitats associated with the proposed alignment were evaluated using field observations, interpretation of aerial photography, and interpretation of USGS 7.5-minute topographic maps. The objectives of this data review were to identify wetlands and other waters of the U.S. intersected by the proposed pipeline route, including intermittent and ephemeral streams, and to identify specific wetlands and other waters of the U.S. that will require field evaluation to confirm their status and to identify potential habitat suitable for threatened and endangered species. Areas identified for field verification included:

1) NWI-mapped wetlands intercepted by the pipeline route that are not farmed;

2) Areas that appear to meet the USACE's three-parameter criteria for wetlands (discussed below), but are not mapped on NWI maps; and

3) Forested areas where wetland boundaries could not be estimated from aerial photographs.

Additional areas to be field verified were included as recommended by the USACE Omaha District. Areas identified on the NWI maps as farmed wetlands or agricultural or roadway drainage ditches were eliminated from field delineations.

2.1.2 Field Survey

Areas selected for field verification were surveyed by trained biologists along the proposed alignment. The survey corridor (also referred to as the Environmental Study Area or ESA) along the proposed alignment was 300 feet in width centered on the centerline of the proposed pipeline. In areas where the Project is collocated with existing pipelines, the survey width was adjusted to 100 feet on the collocated portion of the proposed centerline and 200 feet on the non-collocated side. Access roads were surveyed 100 feet in width centered on the centerline of each proposed access road. Pump stations and temporary facilities were surveyed in their entirety. Land parcels were only surveyed if landowner permission for access was granted. Using common

wetland survey tools such as shovels and soil augers, the Munsell Soil Color Chart, USACE field data sheets, plant indicator lists, and visual observation for plant identification, the biological survey crews implemented the three parameter approach set forth in the 1987 *U.S. Army Corps of Engineers Wetland Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (*2.0*; USACE 2010). As identified in the *USACE Wetland Delineation Manual*, a "three-parameter" approach was used for the delineation of the selected wetlands in the field. Biologists determined whether the hydrology, wetland vegetation, and hydric soil conditions characteristic of wetlands existed within the surveyed area. Evaluation of these parameters is discussed below.

2.2 Wetlands

2.2.1 Vegetation

Dominant vegetation was identified to species (occasionally to genus) and then classified according to the *National List of Plant Species that Occur in Wetlands: North Plains Region 4* (USFWS 1988). The indicator status identifies a range of probabilities that an individual species would be found in wetland or upland areas in a defined region (USACE 1987). Obligate (OBL) plants are those found within wetlands more than 99 percent of the time. Facultative wetland (FACW) plants are found in wetlands 67 to 99 percent of the time. Facultative (FAC) plants are found in wetlands 33 to 66 percent of the time. Facultative upland (FACU) plants are found in wetlands 1 to 33 percent of the time. Obligate upland (UPL) plants are found in wetlands less than 1 percent of the time. The indicator status is further defined by a plus sign (+) or a minus sign (–), indicating the species preference for areas on the wetter or drier end of the probability range. If more than 50 percent of the dominant species in a community are found to have wetland indicator status of OBL, FACW, or FAC (excluding FAC–), the plant community is determined to be hydrophytic or wetland.

2.2.2 Hydric Soils

Hydric soils are soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation. Hydric soil indicators relate to color, structure, organic content, and the presence of reducing conditions. Initially, soils were identified using the respective county soil surveys. Soils were then examined in the field by hand excavating test pits ranging from 6 to 12 inches in diameter and 12 to 20 inches deep in areas exhibiting different plant communities. Typically, soil observations were focused on the area immediately below the 'A' horizon (topmost mineral horizon) or 10 inches, whichever is shallower. Color characteristics (hue, value, and chroma) were recorded using Munsell Soil Color Charts (Kollmorgen Corporation 1992). Subsequently, soils were assessed as to type and whether they met the criteria for hydric (wetland) or non-hydric (non-wetland) per criteria outlined in the *USACE Wetland Delineation Manual* (USACE 1987).

2.2.3 Hydrology

Hydrological characteristics were determined by field observation as well as examining aerial photographs, USGS topographic maps, Federal Emergency Management Agency Flood Hazard Maps, and NWI maps to identify distinct features that are typically associated with wetlands and wetland habitats. Field observations were made to determine if primary and secondary indicators of hydrology, as outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (*2.0*; USACE 2010), were present. Primary indicators for wetland hydrology in the Great Plains Region include: surface water, soil saturation within 12 inches of the soil surface, water marks on vegetation, drift lines, water-borne drift deposits, and oxidized rhizospheres (root channels) associated with living roots. Secondary indicators for wetland hydrology include: drainage patterns, moss trim lines, saturation visible on aerial imagery, geomorphic position, and a positive FAC-Neutral test (comparative dominance of FACW and OBL vegetative species versus FACU and UPL vegetative species). During field examinations, hydrological wetland indicators were

assessed, including saturated soil, the presence of standing water, and visible drainage patterns at each sampling point.

2.2.4 Documentation

As described in the *USACE Wetland Delineation Manual* (USACE 1987), areas where all three parameters met the wetland criteria were labeled as wetlands. Vegetation, soil, and hydrology data were collected at each sample point within the wetlands and in immediately adjacent uplands and were then entered onto a standardized wetland delineation field data form. The form also included a field sketch, which illustrated the wetlands and uplands. Photographs were taken showing a representative view of each wetland visited.

Trimble® GPS Pathfinder™ PRO-XRS and Trimble GeoXT™ Global Positioning System (GPS) units were used to record wetland and waterbody locations identified by biologists. The Trimble PRO-XRS uses the "Rover" data collection system, which is supported by differential corrections input from community base stations proximate to the project area. Trimble GeoXT receivers are equipped with EVEREST™ multipath rejection technology to provide submeter accuracy. Multipath rejection technology accomplishes a high level of accuracy by filtering satellite signals that are reflected by neighboring objects. The result is a clearer signal from satellites and a more accurate reading.

Identified features along the survey corridor were distinctly named in order to distinguish each feature. Features were labeled in the following manner: F-N-CC-000, where:

F = Feature Type (stream, wetland habitat, etc.)

N = team number

CC = two-letter County abbreviation

000 = number of feature within each county, representative to each team

Alternatively, some features were labeled with additional symbols where desktop delineation was conducted and/or extensions of previously-identified features were delineated during subsequent surveys. In addition to the nomenclature described above, these features were labeled using one of the following systems:

F_UTM_000, where

UTM = Universal Transverse Mercator

or

F_TROW_000, where

TROW = company name

or

F0000, where

0000 = number of feature within county, representative to each team

or

SOADD 00, where

SOADD = desktop stream feature

After collection, GPS / Geographical Information System (GIS) data were added to a GIS database that was created using ESRI ArcMap™ 9.3.1 software. Maps were created in GIS to illustrate the locations of surveyed features within the ESA (**Attachment A**). Additionally, field data sheets, photographs and GPS survey data were compiled and maintained by Keystone. Field data sheets and photographs are provided in digital format (compact disc) in **Attachment B.**

2.2.5 Wetland Characterization

Wetlands were classified according to the Cowardin System, as described in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin 1979). This hierarchical system aids resource managers and others by providing uniformity of concepts and terms used to define wetlands using hydrologic, geomorphic, chemical, and biological factors.

2.3 Waterbodies

Waterbodies include linear water features (i.e., streams, rivers, and man-made ditches) as well as open water features (i.e., ponds, lakes). Linear waterbodies were classified by use as observed in the field and/or as determined from reviewing available data (e.g., maps) and include man-made ditches, streams, and rivers. Open waterbody features were classified as ponds or lakes. Applicable data were gathered for each waterbody feature including: bank height, bank slope, stream flow direction and type, water appearance, stream substrate, aquatic habitats, channel conditions, and disturbances, and were documented on Waterbody Data Sheets, which are provided digitally in **Attachment B**. Waterbody Data Sheets were completed for surveyed stream crossings whether or not they supported adjunct wetland plant communities. If both wetlands and other waters of the U.S. were present, a Waterbody Data Sheet and a Routine Wetland Determination Form were completed for the survey site.

Identified waterbodies were surveyed using GPS technologies as described above in Section 2.2.4. Data points were collected along the upper banks or edges of the features within the ESA.

2.4 Uplands

Upland communities were characterized according to their proximity to adjacent wetlands (i.e., a distinguishable transition from wetland communities to upland [non-wetland] communities) and for total coverage for the proposed pipeline alignment. Characterization included significant habitat changes, species composition, and sensitive or critical habitats. Vegetation identified in upland areas associated with wetlands is identified on data sheets in **Attachment B**.

3.0 Results

The results of the wetland and waterbody field surveys for the Project are presented in the following sections. General descriptions of the soils, hydrology, and vegetation are discussed by feature type and summarized in applicable sections. Pertinent attachments include the following: **Attachment B**, field data sheets and photographs; and **Attachment C**, results tables. The results presented in this report are based on a review of available information, desktop analysis, and formal wetland delineations.

3.1 Wetlands

Within the Project ESA (as defined in Section 2.1.2) in the USACE Omaha District in South Dakota, 88 individual crossings of wetlands were identified;

- ESA: 88 total individual crossings of wetlands:
  - 84 individual crossings of palustrine emergent wetlands (PEMs);
  - 3 individual crossings of palustrine forested wetlands (PFO); and
  - 1 crossing of a palustrine shrub scrub wetland (PSS).

Tables 2, 3, and 4 (**Attachment C**) identify all wetlands found within the ESA on the Project within the USACE Omaha District in South Dakota.

3.1.1 Vegetation

The dominant vegetation types that are found in wetland communities can be found in **Attachment B** and **Table 5** (**Attachment C**). Vegetation types identified in upland areas associated with wetlands is also included in **Attachment B**. Sources used to identify plants include, but are not limited to: Harrington 1977; Hitchcock 1971; Knobel 1980; Little 1980; Mitsch and Gosselink 1993; Mohlenbrock 2002; Niering and Olmstead 1992; and Reed 1988.

3.1.2 Soils

Soil associations crossed by the Project in the USACE Omaha District in South Dakota can be found in **Table 6** (**Attachment C**). Sources used to determine the soil types include: USDA; NRCS, Soil Survey Geographic (STATSGO) Database, 2000 and 2002; and Kollmorgen Instrument Corporation, 1992.

3.1.3 Hydrology

The hydrological indicators that are associated with identified wetlands can vary due to wetland location and wetland development. Primary indicators of wetland hydrology observed for delineated wetlands include: inundation, soil saturation within 12 inches of the soil surface, water marks on vegetation, drift lines, water-borne drift deposits, and oxidized rhizospheres (root channels) associated with living roots. Secondary indicators observed for wetland hydrology include: drainage patterns, moss trim lines, saturation visible on aerial imagery, geomorphic position, and a positive FAC-Neutral test (comparative dominance of FACW and OBL vegetative species versus FACU and UPL vegetative species).

Project location maps provided in **Attachment A** show waters of the U.S. identified within the Project ESA. Field crews found that wetlands identified and classified during the field surveys were not always illustrated on the NWI maps. In addition, some areas illustrated on the NWI maps as wetlands did not meet the criteria to be

designated as wetlands. Detailed information on each feature surveyed in the field is provided on the USACE Wetland Data Sheets that can be found in **Attachment B**.

3.2 Waterbodies

The majority of waterbodies that were identified consist of intermittent/ephemeral washes with well to poorly defined bed and bank structures. Perennial waterbodies were identified within the ESA as well. These perennial features generally hold water year round and contain a well-defined bed and bank with channelized structure. In total, within the Project ESA in the USACE Omaha District in South Dakota 312 individual crossings of waterbodies were identified;

- ESA: 312 total individual crossings of waterbodies:
    - 35 individual crossings of perennial waterbodies;
    - 119 individual crossings of intermittent waterbodies;
    - 133 individual crossings of ephemeral waterbodies;
    - 11 individual crossings of man-made waterbodies;
    - 8 individual crossings of open waterbodies; and
    - 6 individual crossings of seasonal waterbodies.

Tables 2, 3, and 4 (**Attachment C**) list all waterbodies identified within the ESA in the USACE Omaha District in South Dakota.

4.0 Preliminary Jurisdictional Determination

As outlined in USACE Regulatory Guidance Letter No. 08-02 dated June 26, 2008, Keystone has elected to use a preliminary jurisdictional determination (JD) to voluntarily waive or set aside questions regarding Section 404 of the CWA and Sections 9 and 10 of the River and Harbors Act of 1899 jurisdiction for the Project. Keystone is requesting USACE authorization of the Project under Nationwide Permit (NWP) 12 (PCN bound separately) and understands that the following conditions apply when not requesting an approved JD:

- Keystone has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters;
- Keystone has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions;
- Keystone has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization;
- Keystone can accept a permit authorization and thereby agree to comply with all terms and conditions of that permit, including whatever mitigation requirements the USACE has determined to be necessary;
- That undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes Keystone's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as practicable;
- Keystone accepting a permit authorization (e.g. signing a proffered individual permit) or undertaking any activity in reliance on any form of USACE permit authorization based on preliminary JD constitutes agreement that all wetlands and other waterbodies on the site affected in any way by that activity are jurisdictional waters of the U.S., and precludes any challenge to such jurisdiction in any administrative appeal or in Federal Court; and
- Whether Keystone elects to use either an approved JD or preliminary JD, that JD will be processed as soon as practicable.

To support the USACE's preliminary JD evaluation for the Project, a completed Preliminary Jurisdictional Determination Form is included in **Attachment D**.

5.0 Summary and Conclusions

In total, the Project will consist of approximately 1,202 miles of 36-inch diameter mainline pipeline, consisting of about 327 miles in Canada and 875 miles within the U.S., and 315.32 miles within South Dakota. It will interconnect with an existing Keystone Pipeline system in Steele City, Nebraska that will allow for the delivery of product to existing refinery markets on the Texas Gulf Coast. Keystone proposes to start construction in 2013. Within the jurisdiction of the Omaha District in South Dakota, the Project will cross Harding, Butte, Perkins, Meade, Pennington, Haakon, Jones, Lyman, and Tripp counties. For portions of the Project falling within the jurisdiction of the USACE Omaha District in Montana and Nebraska, separate PCN packages (including delineation reports) will be prepared and submitted.

This report summarizes information from 2008, 2009, 2010, 2011, 2012, and 2013 field survey activities conducted within the Omaha District in South Dakota. Environmental features, including wetlands, waterbodies, listed species, critical habitat, and land use, were assessed and documented. The following number of individual crossings of features have been identified within the ESA in the Omaha District in South Dakota:

- 88 total individual crossings of wetlands including 84 of PEMs, 3 of PFOs, and 1 of a PSS.
- 312 total individual crossings of waterbodies including 35 of perennial waterbodies, 119 of intermittent waterbodies, 133 of ephemeral waterbodies, 11 of man-made waterbodies, 8 of open waterbodies, and 6 of seasonal waterbodies.

Habitats associated with the proposed alignment were assigned using field observations and interpretation of aerial photography. These habitats were observed to be dominated by range and agricultural lands, but also included open spaces, wetlands, developed (commercial/industrial, and residential), ROW, and open water.

6.0 References

6.1 Reference Documents

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Attachment A

Figures – Wetland and Waterbody Map Book

(Submitted in a separate 11x17 binder, Book 2 of 2)

Attachment B

Field Data Sheets, Photographs and Data Upload Tables

(Provided on compact disc)

Attachment C

Tables

Table 1 – Keystone XL Pipeline Project – South Dakota State and County Crossing Lengths – Mainline

State	County / County Abbreviation	Distance (miles)
South Dakota	Harding (HA)	72.74
	Butte (BU)	3.79
	Perkins (PE)	15.28
	Meade (ME)	52.63
	Pennington (PN)	0.77
	Haakon (HK)	58.70
	Jones (JO)	39.94
	Lyman (LY)	11.78
	Tripp (TR)	59.69
	Total	315.32

Table 2 - Keystone XL Pipeline Project - Wetland and Waterbody Crossings within the ESA – Mainline, USACE Omaha District, South Dakota

Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
S275HA001	286.63	27	EPH	UNNAMED TRIBUTARY TO BOXELDER CREEK	Boxelder	0.2042	45.882886	-104.027466
S_UTM13_07772	288.17	-	MABO	UNNAMED TRIBUTARY TO BOXELDER CREEK	Boxelder	0.2161	45.867311	-104.006290
W104HA001	292.35	195	PEM	N/A	Upper Little Missouri	0.6081	45.835643	-103.932768
W0002	292.64	19	PEM	N/A	Upper Little Missouri	0.2427	45.833740	-103.927795
S29HA001	292.64	24	INT	SHAW CREEK	Upper Little Missouri	0.0736	45.833714	-103.927666
W0002	292.65	62	PEM	N/A	Upper Little Missouri	0.2878	45.833668	-103.927563
W0003	293.61	21	PEM	N/A	Upper Little Missouri	0.1558	45.826842	-103.910192
S_UTM13_04433	293.61	16	EPH	UNNAMED TRIBUTARY TO LITTLE MISSOURI RIVER	Upper Little Missouri	0.0960	45.826814	-103.910124
W0003	293.62	25	PEM	N/A	Upper Little Missouri	0.1495	45.826758	-103.910050
W567HA001	293.62	-	PEM	N/A	Upper Little Missouri	0.0817	45.826909	-103.909877
W_UTM13_04445	295.04	64	PEM	N/A	Upper Little Missouri	0.5426	45.815809	-103.885304
S312HA001	295.06	93	PER	LITTLE MISSOURI RIVER	Upper Little Missouri	0.6009	45.815720	-103.884850
S29HA002	295.07	-	PER	LITTLE MISSOURI RIVER	Upper Little Missouri	0.0001	45.815803	-103.884456
W567HA002	295.11	67	PEM	N/A	Upper Little Missouri	0.2602	45.815295	-103.884406
S302HA001	296.89	18	EPH	UNNAMED TRIBUTARY TO KIMBLE CREEK	Upper Little Missouri	0.0668	45.800211	-103.855254
S_UTM13_04476	297.64	-	INT	UNNAMED TRIBUTARY TO KIMBLE CREEK	Upper Little Missouri	0.0043	45.797971	-103.840630
S_UTM13_04476	297.65	11	INT	UNNAMED TRIBUTARY TO KIMBLE CREEK	Upper Little Missouri	0.0616	45.797521	-103.840460
S500HA001	298.42	14	EPH	UNNAMED TRIBUTARY TO KIMBLE CREEK	Upper Little Missouri	0.0490	45.792377	-103.827587
S123HA003	300.01	17	INT	UNNAMED TRIBUTARY TO KIMBLE CREEK	Upper Little Missouri	0.2853	45.781885	-103.798976
S_UTM13_09874	300.35	-	INT	KIMBLE CREEK	Upper Little Missouri	0.0864	45.778539	-103.793653

Table 2 - Keystone XL Pipeline Project - Wetland and Waterbody Crossings within the ESA – Mainline, USACE Omaha District, South Dakota

Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
W_UTM13_04537	300.38	109	PEM	N/A	Upper Little Missouri	0.6119	45.778537	-103.792773
S_UTM13_04536	300.38	18	INT	KIMBLE CREEK	Upper Little Missouri	0.1436	45.778400	-103.792738
S_UTM13_04536	300.47	-	INT	KIMBLE CREEK	Upper Little Missouri	0.0095	45.777877	-103.791203
S_UTM13_04536	300.49	-	INT	KIMBLE CREEK	Upper Little Missouri	0.0253	45.777634	-103.790873
S123HA002	300.52	-	OW	KIMBLE CREEK	Upper Little Missouri	0.1798	45.777289	-103.790440
S_UTM13_04536	300.55	-	INT	KIMBLE CREEK	Upper Little Missouri	0.0528	45.777012	-103.789996
W0004	303.45	18	PEM	N/A	Upper Little Missouri	0.2061	45.754375	-103.740194
S_UTM13_07045	303.45	-	INT	DRY HOUSE CREEK	Upper Little Missouri	0.0136	45.754197	-103.740608
S_UTM13_07045	303.46	17	INT	DRY HOUSE CREEK	Upper Little Missouri	0.1610	45.754370	-103.739953
W0004	303.46	12	PEM	N/A	Upper Little Missouri	0.1897	45.754310	-103.739896
S0346	305.18	28	EPH	UNNAMED TRIBUTARY TO JONES CREEK	South Fork Grand	0.0951	45.742788	-103.709641
S_UTM13_04604	306.16	-	INT	UNNAMED TRIBUTARY TO JONES CREEK	South Fork Grand	0.1087	45.732522	-103.695890
S_UTM13_04604	306.31	18	INT	UNNAMED TRIBUTARY TO JONES CREEK	South Fork Grand	0.1713	45.730495	-103.694888
S_UTM13_04614	306.99	50	INT	UNNAMED TRIBUTARY TO JONES CREEK	South Fork Grand	0.2942	45.722323	-103.687176
S_UTM13_04624	307.79	27	INT	UNNAMED TRIBUTARY TO JONES CREEK	South Fork Grand	0.4760	45.713017	-103.677529
S_UTM13_04635	309.13	21	EPH	UNNAMED TRIBUTARY TO JONES CREEK	South Fork Grand	0.1822	45.695899	-103.665011
S_UTM13_04657	311.25	26	EPH	UNNAMED TRIBUTARY TO RUSH CREEK	South Fork Grand	0.1111	45.669676	-103.645880
S_UTM13_04657	311.32	19	EPH	UNNAMED TRIBUTARY TO RUSH CREEK	South Fork Grand	0.4254	45.669124	-103.645102
S_UTM13_04657	311.34	-	EPH	UNNAMED TRIBUTARY TO RUSH CREEK	South Fork Grand	0.0026	45.668318	-103.645414
S500HA011	312.70	29	INT	UNNAMED TRIBUTARY TO RUSH CREEK	South Fork	0.2015	45.649598	-103.642669

Table 2 - Keystone XL Pipeline Project - Wetland and Waterbody Crossings within the ESA – Mainline, USACE Omaha District, South Dakota

Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
					Grand			
W500HA006	312.88	-	PEM	N/A	South Fork Grand	0.2752	45.647800	-103.639825
W500HA005	313.85	-	PEM	N/A	South Fork Grand	0.1970	45.637160	-103.626899
W500HA004	314.06	279	PEM	N/A	South Fork Grand	1.2329	45.635519	-103.623332
W500HA003	314.93	-	PEM	N/A	South Fork Grand	0.0789	45.627551	-103.609152
W500HA003	314.98	-	PEM	N/A	South Fork Grand	0.0078	45.627235	-103.608211
W500HA002	316.23	32	PEM	N/A	South Fork Grand	0.4640	45.618637	-103.586582
W302HA008	320.46	-	PEM	N/A	South Fork Grand	0.2276	45.590787	-103.518739
S0359	321.38	24	EPH	UNNAMED TRIBUTARY TO SOUTH FORK GRAND RIVER	South Fork Grand	0.1262	45.578129	-103.513231
S123HA006	321.60	33	PER	SOUTH FORK GRAND RIVER	South Fork Grand	0.2895	45.574949	-103.511993
S0360	321.65	14	EPH	UNNAMED TRIBUTARY TO SOUTH FORK GRAND RIVER	South Fork Grand	0.0769	45.574454	-103.511657
W103HA001	322.32	-	PEM	N/A	South Fork Grand	0.0965	45.564853	-103.508575
S124HA008	326.39	10	PER	CLARKS FORK CREEK	South Fork Grand	0.0682	45.528006	-103.449830
S_UTM13_04896	332.27	15	INT	WEST SQUAW CREEK	South Fork Grand	0.1215	45.477364	-103.357521
W302HA002	332.39	5	PEM	N/A	South Fork Grand	0.0861	45.476115	-103.355270
S_UTM13_07391	332.40	14	PER	WEST SQUAW CREEK	South Fork Grand	0.1102	45.476077	-103.355232
S_UTM13_07396	332.60	-	EPH	UNNAMED TRIBUTARY TO WEST SQUAW CREEK	South Fork Grand	0.0230	45.473910	-103.352571
S_UTM13_07396	332.69	19	EPH	UNNAMED TRIBUTARY TO WEST SQUAW CREEK	South Fork Grand	0.1468	45.473194	-103.351739
S304HA001	333.96	13	INT	UNNAMED TRIBUTARY TO WEST SQUAW CREEK	South Fork Grand	0.2571	45.455986	-103.346654
S500HA009	338.79	21	INT	UNNAMED TRIBUTARY TO WOLF CREEK	Upper Moreau	0.3411	45.390220	-103.321708

Table 2 - Keystone XL Pipeline Project - Wetland and Waterbody Crossings within the ESA – Mainline, USACE Omaha District, South Dakota

Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
S304HA002	339.21	12	EPH	WOLF CREEK	Upper Moreau	0.0998	45.385267	-103.316017
S500HA007	340.78	38	INT	UNNAMED TRIBUTARY TO WOLF CREEK	Upper Moreau	0.3983	45.367768	-103.295469
S_UTM13_07104	343.09	74	INT	RED BUTTE CREEK	Upper Moreau	0.5814	45.348558	-103.257382
S_UTM13_07109	344.03	106	INT	GIANNONATTI CREEK	Upper Moreau	0.4974	45.340615	-103.241823
S_UTM13_07109a	344.04	-	INT	UNNAMED TRIBUTARY TO GIANNONATTI CREEK	Upper Moreau	0.0355	45.340836	-103.241659
S_UTM13_06057	345.19	55	EPH	UNNAMED TRIBUTARY TO NORTH FORK MOREAU RIVER	Upper Moreau	0.3224	45.329341	-103.224335
W302HA007	346.81	-	PEM	N/A	Upper Moreau	0.0115	45.312615	-103.201091
S0379	346.81	39	EPH	LITTLE COWBOY CREEK	Upper Moreau	0.3769	45.312986	-103.200844
S0380	347.12	25	EPH	UNNAMED TRIBUTARY TO NORTH FORK MOREAU RIVER	Upper Moreau	0.0904	45.310413	-103.195552
S123HA011	347.95	-	MABO	POND	Upper Moreau	0.1024	45.304173	-103.180969
S123HA012	350.17	-	MABO	POND	Upper Moreau	0.0651	45.288897	-103.140978
S302HA004	351.30	-	OW	LAKE	Upper Moreau	0.0848	45.278744	-103.123282
S23HA002	351.71	-	Seasonal	SPRING CREEK	Upper Moreau	0.0033	45.275914	-103.115916
W23HA002	351.76	194	PEM	N/A	Upper Moreau	1.5416	45.275204	-103.115577
S312HA002	351.78	52	INT	SPRING CREEK	Upper Moreau	0.5209	45.275155	-103.115182
S23HA002	351.80	-	Seasonal	SPRING CREEK	Upper Moreau	0.0046	45.274454	-103.115044
S_UTM13_04876	352.40	17	INT	UNNAMED TRIBUTARY TO SPRING CREEK	Upper Moreau	0.1629	45.269492	-103.104824
S_UTM13_05005	353.38	21	EPH	UNNAMED TRIBUTARY TO SPRING CREEK	Upper Moreau	0.2153	45.261236	-103.088539
S_UTM13_05016	354.91	36	INT	DRY CREEK	Upper Moreau	0.2305	45.246050	-103.066548
S_UTM13_05019	355.49	36	EPH	UNNAMED TRIBUTARY TO DRY CREEK	Upper Moreau	0.3048	45.240224	-103.058180
S302HA002	357.15	5	EPH	UNNAMED TRIBUTARY TO NORTH FORK MOREAU RIVER	Upper Moreau	0.0275	45.223643	-103.033720
exp-WB-13507	357.16	-	EPH	UNNAMED TRIBUTARY TO NORTH FORK MOREAU RIVER	Upper Moreau	0.0102	45.223833	-103.033412
W_UTM13_05228	359.15	69	PEM	N/A	Upper Moreau	0.7382	45.205402	-103.002760
S275BU001	360.99	109	PER	NORTH FORK MOREAU RIVER	Upper Moreau	0.7083	45.187413	-102.974751
S_UTM13_05257	361.62	38	INT	UNNAMED TRIBUTARY TO NORTH FORK MOREAU RIVER	Upper Moreau	0.2782	45.181689	-102.964648
W302BU001	361.88	-	PEM	N/A	Upper Moreau	0.1414	45.178501	-102.961890

Table 2 - Keystone XL Pipeline Project - Wetland and Waterbody Crossings within the ESA – Mainline, USACE Omaha District, South Dakota

Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
W302BU001	361.93	-	PEM	N/A	Upper Moreau	0.2903	45.177905	-102.961226
S275PE001	363.49	18	EPH	UNNAMED TRIBUTARY TO NORTH FORK MOREAU RIVER	Upper Moreau	0.2803	45.163791	-102.936682
S5APE001	363.65	-	MABO	POND	Upper Moreau	0.0060	45.161841	-102.934725
S_UTM13_06521	365.64	18	MABO	POND	South Fork Moreau	0.4512	45.141971	-102.905490
S567PE001	366.34	-	EPH	UNNAMED TRIBUTARY TO SOUTH FORK MOREAU RIVER	South Fork Moreau	0.0145	45.134195	-102.897065
exp-WB-13509	366.35	19	EPH	UNNAMED TRIBUTARY TO SOUTH FORK MOREAU RIVER	South Fork Moreau	0.1194	45.134175	-102.896515
S_UTM13_05506	368.24	29	EPH	UNNAMED TRIBUTARY TO SOUTH FORK MOREAU RIVER	South Fork Moreau	0.5910	45.116184	-102.868344
S5APE002	368.91	118	PER	SOUTH FORK MOREAU RIVER	South Fork Moreau	1.0271	45.109133	-102.858027
S_UTM13_05522	369.39	73	EPH	UNNAMED TRIBUTARY SOUTH FORK MOREAU RIVER	South Fork Moreau	1.4229	45.104244	-102.850455
S312PE001	370.58	19	INT	BEVERLY CREEK	South Fork Moreau	0.1310	45.091626	-102.835134
S_UTM13_05613	372.48	16	EPH	UNNAMED TRIBUTARY TO BEVERLY CREEK	South Fork Moreau	0.1502	45.074577	-102.805483
S_UTM13_05613	372.53	35	EPH	UNNAMED TRIBUTARY TO BEVERLY CREEK	South Fork Moreau	0.2761	45.074017	-102.804883
S_UTM13_05620	373.39	33	EPH	UNNAMED TRIBUTARY TO BEVERLY CREEK	South Fork Moreau	0.1469	45.064641	-102.793189
S_UTM13_05731	377.04	28	EPH	UNNAMED TRIBUTARY TO BIG CEDAR CREEK	Upper Moreau	0.2884	45.042120	-102.731596
S_UTM13_05733	377.39	25	EPH	UNNAMED TRIBUTARY TO BIG CEDAR CREEK	Upper Moreau	0.2475	45.039615	-102.725676
S_UTM13_05735	377.67	26	EPH	UNNAMED TRIBUTARY TO BIG CEDAR CREEK	Upper Moreau	0.2076	45.036678	-102.721796
S_UTM13_05738	377.77	44	EPH	UNNAMED TRIBUTARY TO BIG CEDAR CREEK	Upper Moreau	0.2069	45.035528	-102.720379
W_UTM13_0740	378.17	14	PEM	N/A	Upper Moreau	0.0848	45.031007	-102.715344
S_UTM13_05743	378.17	24	INT	UNNAMED TRIBUTARY TO CEDAR CREEK	Upper Moreau	0.2372	45.030944	-102.715296
W_UTM13_0740	378.18	26	PEM	N/A	Upper Moreau	0.1761	45.030886	-102.715230
S_UTM13_05746	378.38	18	EPH	UNNAMED TRIBUTARY TO BIG CEDAR CREEK	Upper Moreau	0.1752	45.028727	-102.712765
S_UTM13_05748	378.46	32	INT	UNNAMED TRIBUTARY TO BIG CEDAR CREEK	Upper Moreau	0.2501	45.027680	-102.711530
S567ME001	380.78	3	EPH	UNNAMED TRIBUTARY TO WEST BRANCH PINE CREEK	Cherry	0.0195	45.001710	-102.682363

Table 2 - Keystone XL Pipeline Project - Wetland and Waterbody Crossings within the ESA – Mainline, USACE Omaha District, South Dakota

Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
S_UTM13_04944	381.60	37	EPH	UNNAMED TRIBUTARY TO WEST BRANCH PINE CREEK	Cherry	0.3205	44.993104	-102.670668
S_UTM13_06001	381.67	25	EPH	UNNAMED TRIBUTARY TO WEST BRANCH PINE CREEK	Cherry	0.1305	44.992380	-102.669542
S_UTM13_04948	381.74	-	INT	UNNAMED TRIBUTARY TO WEST BRANCH PINE CREEK	Cherry	0.0882	44.991834	-102.668446
S6AME001	383.18	21	INT	WEST BRANCH PINE CREEK	Cherry	0.1651	44.976744	-102.648685
s7ame001	387.83	7	PER	MIDDLE BRANCH PINE CREEK	Cherry	0.2491	44.923601	-102.590728
W_UTM13_04983	388.08	12	PEM	N/A	Cherry	0.2330	44.921032	-102.586892
S_UTM13_08629	388.09	66	INT	UNNAMED TRIBUTARY TO MIDDLE BRANCH PINE CREEK	Cherry	0.2453	44.920993	-102.586858
W_UTM13_04983	388.11	11	PEM	N/A	Cherry	0.4776	44.921055	-102.586622
S_UTM13_07428	389.11	19	EPH	UNNAMED TRIBUTARY TO PINE CREEK	Cherry	0.1474	44.912617	-102.570582
S_UTM13_07429	389.38	-	EPH	UNNAMED TRIBUTARY TO PINE CREEK	Cherry	0.0730	44.911005	-102.565485
S_UTM13_07429	389.41	18	EPH	UNNAMED TRIBUTARY TO PINE CREEK	Cherry	0.1647	44.910474	-102.565317
W567ME001	398.52	42	PEM	N/A	Cherry	0.3210	44.819441	-102.435085
W567ME002	398.99	14	PEM	N/A	Cherry	0.1766	44.815084	-102.428204
W567ME003	399.73	37	PEM	N/A	Cherry	0.2576	44.807015	-102.417922
W567ME004	400.06	44	PEM	N/A	Cherry	0.3447	44.803419	-102.413594
S_UTM13_05156	400.06	7	INT	UNNAMED TRIBUTARY TO PINE CREEK	Cherry	0.0493	44.803315	-102.413753
S_UTM13_05156	400.08	-	INT	UNNAMED TRIBUTARY TO PINE CREEK	Cherry	0.0039	44.803459	-102.412999
S_UTM13_05156	400.18	-	INT	UNNAMED TRIBUTARY TO PINE CREEK	Cherry	0.0128	44.801862	-102.412494
S_UTM13_05156	400.26	24	INT	UNNAMED TRIBUTARY TO PINE CREEK	Cherry	0.1934	44.801351	-102.411621
W0009	400.91	-	PEM	N/A	Cherry	0.0362	44.794249	-102.402070
W0009	400.93	-	PEM	N/A	Cherry	0.0101	44.794136	-102.401822
W0009	400.93	3	PEM	N/A	Cherry	0.0008	44.793800	-102.402016
S_UTM13_05171	400.94	81	EPH	UNNAMED TRIBUTARY TO PINE CREEK	Cherry	0.6884	44.793744	-102.401944
W0009	400.96	47	PEM	N/A	Cherry	0.2473	44.793646	-102.401703
S_UTM13_05178	401.23	20	EPH	UNNAMED TRIBUTARY TO PINE CREEK	Cherry	0.1740	44.790775	-102.397710
S_UTM13_05191	402.00	26	EPH	UNNAMED TRIBUTARY TO SULPHUR CREEK	Cherry	0.3334	44.783036	-102.386156

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Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
S_UTM13_05196	402.23	18	EPH	UNNAMED TRIBUTARY TO SULPHUR CREEK	Cherry	0.2056	44.780965	-102.382966
S_UTM13_04258	402.78	15	EPH	UNNAMED TRIBUTARY TO SULPHUR CREEK	Cherry	0.1395	44.775100	-102.375652
S275ME005	403.35	62	EPH	UNNAMED TRIBUTARY TO SULPHUR CREEK	Cherry	0.5613	44.767689	-102.370246
S275ME006	404.07	69	PER	SULPHUR CREEK	Cherry	0.5311	44.758712	-102.363168
S_UTM13_05474	408.69	-	OW	POND	Cherry	0.0588	44.707159	-102.308898
S_UTM13_01124	410.08	120	EPH	UNNAMED TRIBUTARY TO CHERRY CREEK	Cherry	0.3666	44.692135	-102.290130
S_UTM13_01124	410.25	27	EPH	UNNAMED TRIBUTARY TO CHERRY CREEK	Cherry	0.2942	44.690398	-102.287868
S_UTM13_01124	410.27	-	EPH	UNNAMED TRIBUTARY TO CHERRY CREEK	Cherry	0.0100	44.690318	-102.287157
S106ME008	410.93	6	INT	UNNAMED TRIBUTARY TO SPRING CREEK	Cherry	0.0675	44.684980	-102.276972
S_UTM13_14774	411.93	21	INT	UNNAMED TRIBUTARY TO RED OWL CREEK	Cherry	0.1834	44.678605	-102.258568
S103ME006	413.06	32	PER	RED OWL CREEK	Cherry	0.1549	44.669907	-102.239152
S128ME001	413.06	-	PER	RED OWL CREEK	Cherry	0.1131	44.669508	-102.239351
S103ME007	413.10	-	EPH	UNNAMED TRIBUTARY TO RED OWL CREEK	Cherry	0.0396	44.669783	-102.238240
S_UTM13_14787	413.81	41	INT	UNNAMED TRIBUTARY TO RED OWL CREEK	Cherry	0.3005	44.664266	-102.225977
S_UTM13_14798	414.19	-	INT	UNNAMED TRIBUTARY TO RED OWL CREEK	Cherry	0.0525	44.661067	-102.220211
W500ME001	422.10	-	PEM	N/A	Lower Cheyenne	0.5223	44.578054	-102.112752
s7ame003	423.54	-	INT	WEST BRANCH NARCELLE CREEK	Lower Cheyenne	0.0652	44.562534	-102.094418
S_UTM13_05823	423.61	-	INT	WEST BRANCH NARCELLE CREEK	Lower Cheyenne	0.0664	44.562149	-102.093142
S_UTM13_05918	423.89	12	INT	NARCELLE CREEK	Lower Cheyenne	0.1062	44.561131	-102.087522
s7ame004	423.94	-	INT	NARCELLE CREEK	Lower Cheyenne	0.0294	44.560479	-102.087235
s7ame005	424.05	16	INT	NARCELLE CREEK	Lower Cheyenne	0.1369	44.559235	-102.085640
S312ME002	424.11	-	INT	NARCELLE CREEK	Lower Cheyenne	0.3100	44.558939	-102.084400
S312ME003	424.56	-	INT	NARCELLE CREEK	Lower Cheyenne	0.1942	44.552598	-102.083026
S312ME004	424.85	-	INT	NARCELLE CREEK	Lower Cheyenne	0.1895	44.548982	-102.081825
S312ME005	424.94	-	INT	NARCELLE CREEK	Lower Cheyenne	0.2899	44.547698	-102.080933
S312ME006	425.48	26	INT	UNNAMED TRIBUTARY TO NARCELLE CREEK	Lower Cheyenne	0.2042	44.541889	-102.074347
exp-WB-13502	425.61	33	INT	NARCELLE CREEK	Lower Cheyenne	0.4530	44.540171	-102.072563
S312ME001	425.75	-	INT	NARCELLE CREEK	Lower Cheyenne	0.1478	44.538592	-102.071899

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exp-WB-13503	425.75	76	INT	NARCELLE CREEK	Lower Cheyenne	0.2628	44.538939	-102.071404
S106ME006	427.31	-	OW	POND	Lower Cheyenne	0.0020	44.520825	-102.057684
S312ME007	427.73	35	EPH	UNNAMED TRIBUTARY TO NARCELLE CREEK	Lower Cheyenne	0.2234	44.515917	-102.052397
S312ME008	428.05	99	EPH	UNNAMED TRIBUTARY TO NARCELLE CREEK	Lower Cheyenne	0.7472	44.515994	-102.046229
S312ME009	428.14	49	INT	NARCELLE CREEK	Lower Cheyenne	0.3845	44.516002	-102.044398
S312ME015	429.17	63	INT	NEGRO CREEK	Lower Cheyenne	0.6754	44.513883	-102.024245
W312ME001	429.22	-	PFO	N/A	Lower Cheyenne	0.2480	44.514138	-102.022737
S312ME014	429.23	-	INT	NEGRO CREEK	Lower Cheyenne	0.1896	44.513516	-102.022688
exp-WB-13508	429.64	45	INT	NEGRO CREEK	Lower Cheyenne	0.0800	44.511281	-102.015836
S312ME013	429.64	11	INT	NEGRO CREEK	Lower Cheyenne	0.1143	44.510973	-102.016027
S312ME012	429.85	123	PER	CHEYENNE RIVER	Lower Cheyenne	0.8975	44.508500	-102.013603
S312ME011	429.89	102	INT	CHEYENNE RIVER	Lower Cheyenne	0.6936	44.508026	-102.013191
S312ME010	430.00	169	PER	CHEYENNE RIVER	Lower Cheyenne	1.1341	44.506729	-102.012108
S312PN002	430.03	12	PER	CHEYENNE RIVER	Lower Cheyenne	0.0803	44.506293	-102.011633
S312PN003	430.80	-	INT	UNNAMED TRIBUTARY TO ASH CREEK	Lower Cheyenne	0.0481	44.495925	-102.002950
S312PN001	430.83	34	INT	ASH CREEK	Lower Cheyenne	0.2558	44.497754	-102.001794
W312HK002	430.96	27	PEM	N/A	Lower Cheyenne	0.1900	44.497701	-101.999356
S8AHK003	433.59	34	PER	BRIDGER CREEK	Lower Cheyenne	0.1301	44.482504	-101.954996
S312HK001	433.59	-	INT	BRIDGER CREEK	Lower Cheyenne	0.0447	44.482218	-101.954994
S8AHK003	433.59	-	PER	BRIDGER CREEK	Lower Cheyenne	0.0910	44.482057	-101.954977
W312HK001	434.66	-	PEM	N/A	Lower Cheyenne	1.0914	44.481163	-101.933527
W_UTM14_05132	437.90	91	PEM	N/A	Lower Cheyenne	0.3069	44.456305	-101.880842
W_UTM14_05132	437.93	32	PEM	N/A	Lower Cheyenne	1.0686	44.455549	-101.879494
W8AHK001	438.75	-	PEM	N/A	Lower Cheyenne	0.7328	44.445722	-101.871443
W_UTM14_08434	439.78	-	PEM	N/A	Lower Cheyenne	0.1597	44.433139	-101.860363
S_UTM14_05123	440.12	-	OW	UNNAMED TRIBUTARY TO ELM TREE DRAW	Lower Cheyenne	0.0109	44.428751	-101.857047
S_UTM14_08952	440.44	13	EPH	UNNAMED TRIBUTARY TO ELM TREE DRAW	Lower Cheyenne	0.0954	44.425086	-101.853172
S_UTM14_04940	442.61	20	EPH	UNNAMED TRIBUTARY TO HAXBY DRAW	Lower Cheyenne	0.2764	44.398125	-101.830587

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S_UTM14_04948	443.14	24	EPH	UNNAMED TRIBUTARY TO HAXBY DRAW	Lower Cheyenne	0.1563	44.392677	-101.823114
S_UTM14_04973	445.79	17	INT	UNNAMED TRIBUTARY TO WEST PLUM CREEK	Lower Cheyenne	0.2899	44.370075	-101.780391
S308HK002	448.35	48	PER	WEST PLUM CREEK	Lower Cheyenne	0.3365	44.345210	-101.742912
S308HK001	448.47	13	INT	UNNAMED TRIBUTARY TO WEST PLUM CREEK	Lower Cheyenne	0.1915	44.343716	-101.742185
S567HK001	449.69	-	EPH	UNNAMED TRIBUTARY TO WEST PLUM CREEK	Lower Cheyenne	0.0129	44.332215	-101.724234
exp-WB-0257	449.69	19	EPH	UNNAMED TRIBUTARY TO WEST PLUM CREEK	Lower Cheyenne	0.0855	44.331791	-101.724178
W_UTM14_08431	452.87	24	PEM	N/A	Lower Cheyenne	0.1959	44.305139	-101.673109
S275HK003	452.88	82	EPH	UNNAMED TRIBUTARY TO WEST PLUM CREEK	Lower Cheyenne	0.5499	44.305157	-101.672726
W_UTM14_08431	452.90	109	PEM	N/A	Lower Cheyenne	0.7403	44.304947	-101.672689
W_UTM14_08431	452.91	-	PEM	N/A	Lower Cheyenne	0.0483	44.305120	-101.672211
S_UTM14_14347	454.49	22	EPH	UNNAMED TRIBUTARY TO WEST PLUM CREEK	Lower Cheyenne	0.1907	44.291833	-101.646404
S_UTM14_04739	459.64	29	EPH	UNNAMED TRIBUTARY TO BUZZARD CREEK	Bad	0.3125	44.246810	-101.565025
S_UTM14_04741	459.82	24	EPH	UNNAMED TRIBUTARY TO BUZZARD CREEK	Bad	0.2221	44.245257	-101.562138
W308HK001	462.01	103	PEM	N/A	Bad	0.6394	44.225477	-101.527734
S_UTM13_15946	465.32	-	INT	WITCHER HOLES CREEK	Bad	0.0673	44.198869	-101.473047
S108HK001	465.33	28	Seasonal	WITCHER HOLES CREEK	Bad	0.2040	44.198482	-101.472777
S_UTM14_08959	466.04	27	EPH	UNNAMED TRIBUTARY TO WITCHER HOLES CREEK	Bad	0.4666	44.192772	-101.461993
S_UTM14_08959	466.16	-	EPH	UNNAMED TRIBUTARY TO WITCHER HOLES CREEK	Bad	0.0930	44.191334	-101.460052
S275HK002	469.41	166	EPH	SQUAW CREEK	Bad	1.1960	44.165711	-101.404715
S275HK002	469.52	-	EPH	SQUAW CREEK	Bad	0.0076	44.164852	-101.403487
S567HK002	472.81	-	EPH	UNNAMED TRIBUTARY TO NOWLIN CREEK	Bad	0.0020	44.139633	-101.347971
S567HK002	472.82	-	EPH	UNNAMED TRIBUTARY TO NOWLIN CREEK	Bad	0.0050	44.139553	-101.347830
exp-WB-0258	472.83	19	EPH	UNNAMED TRIBUTARY TO NOWLIN CREEK	Bad	0.1108	44.139044	-101.347826
S275HK001	475.18	86	EPH	MUD CREEK	Bad	0.2773	44.123730	-101.306472
S_UTM14_05033	475.35	33	EPH	UNNAMED TRIBUTARY TO MUD CREEK	Bad	0.2496	44.123008	-101.303069
S567HK003	477.14	24	EPH	JACK DAILEY CREEK	Bad	0.2234	44.118295	-101.268199
S_UTM14_06829	478.67	25	INT	UNNAMED TRIBUTARY TO JACK DAILEY CREEK	Bad	0.4367	44.112159	-101.238657
S_UTM14_08970	479.22	29	EPH	UNNAMED TRIBUTARY TO JACK DAILEY CREEK	Bad	0.2045	44.111125	-101.227729

Table 2 - Keystone XL Pipeline Project - Wetland and Waterbody Crossings within the ESA – Mainline, USACE Omaha District, South Dakota

Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
S8AHK006	483.71	31	PER	MITCHELL CREEK	Bad	0.2543	44.088367	-101.144194
W8AHK002	485.31	-	PEM	N/A	Bad	0.2675	44.079089	-101.115669
W108HK001	485.34	84	PEM	N/A	Bad	0.4665	44.079374	-101.114788
S8AHK008	485.97	52	PER	BAD RIVER	Bad	0.3158	44.074516	-101.104587
S_UTM14_08073	486.06	-	EPH	UNNAMED TRIBUTARY TO BAD RIVER	Bad	0.0578	44.073828	-101.103016
S_UTM14_08073	486.13	-	EPH	UNNAMED TRIBUTARY TO BAD RIVER	Bad	0.0071	44.073145	-101.101906
S_UTM14_08075	486.38	20	EPH	UNNAMED TRIBUTARY TO BAD RIVER	Bad	0.2343	44.071018	-101.097870
S0320	487.36	25	EPH	UNNAMED TRIBUTARY TO BAD RIVER	Bad	0.2865	44.063041	-101.082076
S_UTM14_08077	487.46	64	EPH	UNNAMED TRIBUTARY TO BAD RIVER	Bad	0.4166	44.062391	-101.080297
S_UTM14_06745	490.12	32	INT	UNNAMED TRIBUTARY TO SOUTH CREEK	Bad	0.3801	44.040832	-101.037553
S_UTM14_06741	491.15	17	EPH	SOUTH CREEK	Bad	0.2129	44.035546	-101.017599
S_UTM14_06741	491.19	-	EPH	SOUTH CREEK	Bad	0.0385	44.035006	-101.017158
S_UTM14_88888	491.27	57	EPH	UNNAMED TRIBUTARY TO SOUTH CREEK	Bad	0.2625	44.035091	-101.015378
S_UTM14_06735	492.68	111	INT	UNNAMED TRIBUTARY TO SOUTH CREEK	Bad	0.6061	44.027588	-100.989336
S_UTM14_06735	492.86	59	INT	UNNAMED TRIBUTARY TO SOUTH CREEK	Bad	0.5847	44.026491	-100.985896
S308JO001	496.65	19	INT	UNNAMED TRIBUTARY TO DRY CREEK	Bad	0.0971	44.008264	-100.914908
W308JO001	497.24	19	PEM	N/A	Bad	0.1166	44.008017	-100.902991
S313JO001	498.35	21	INT	DRY CREEK	Bad	0.1912	44.002999	-100.882242
S108JO001	499.13	12	Seasonal	UNNAMED TRIBUTARY TO DRY CREEK	Bad	0.0972	43.998303	-100.867949
S_UTM14_08974	501.24	27	INT	UNNAMED TRIBUTARY TO ASH DRAW	Bad	0.3160	43.984041	-100.831580
S103JO001	501.85	-	PER	ASH DRAW	Bad	0.0380	43.980598	-100.819973
exp-WB-0256	501.85	11	PER	ASH DRAW	Bad	0.0668	43.980999	-100.820125
S23JO001	506.19	13	INT	WHITE CLAY CREEK	Bad	0.1233	43.977671	-100.734344
S308JO003	506.84	-	MABO	POND	Bad	0.1767	43.973387	-100.723277
W308JO002	507.38	35	PEM	N/A	Bad	0.2263	43.970685	-100.713052
S_UTM14_14161	507.39	-	EPH	UNNAMED TRIBUTARY TO WHITE CLAY CREEK	Bad	0.0469	43.970250	-100.713064
S_UTM14_14167	509.09	35	EPH	UNNAMED TRIBUTARY TO WHITE CLAY CREEK	Bad	0.3636	43.960488	-100.683283
S275JO001	509.89	9	INT	UNNAMED TRIBUTARY TO WHITE CLAY CREEK	Bad	0.0939	43.957109	-100.667729

Table 2 - Keystone XL Pipeline Project - Wetland and Waterbody Crossings within the ESA – Mainline, USACE Omaha District, South Dakota

Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
S_UTM14_14173	510.05	26	EPH	UNNAMED TRIBUTARY TO WHITE CLAY CREEK	Bad	0.2581	43.956453	-100.664942
S_UTM14_14177	511.24	57	EPH	UNNAMED TRIBUTARY TO EAST BRANCH WHITE CLAY CREEK	Bad	0.7301	43.949202	-100.643478
S_UTM14_06540	518.93	49	EPH	UNNAMED TRIBUTARY TO BULL CREEK	Lower White	0.4367	43.888018	-100.524101
S_UTM14_06534	519.56	32	INT	UNNAMED TRIBUTARY TO BULL CREEK	Lower White	0.3247	43.883900	-100.513447
W_UTM14_06521	521.74	103	PEM	N/A	Medicine	0.5976	43.868238	-100.475503
S_UTM14_08534	521.75	21	INT	UNNAMED TRIBUTARY TO MEDICINE CREEK	Medicine	0.1397	43.868320	-100.475347
W_UTM14_06521	521.76	97	PEM	N/A	Medicine	0.8534	43.868266	-100.475103
S_UTM14_06515	523.71	14	INT	UNNAMED TRIBUTARY TO WILLIAMS CREEK	Lower White	0.1351	43.855303	-100.440291
S_UTM14_06510	524.90	52	EPH	WILLIAMS CREEK	Lower White	0.3380	43.847175	-100.420090
S_UTM14_06503	526.61	85	INT	UNNAMED TRIBUTARY TO WILLIAMS CREEK	Lower White	0.3908	43.835108	-100.390203
S_UTM14_06503	526.66	-	INT	UNNAMED TRIBUTARY TO WILLIAMS CREEK	Lower White	0.0542	43.834341	-100.389469
S6ALY002	534.42	15	INT	SEDLANO CREEK	Lower White	0.0903	43.781120	-100.253960
S567LY002	534.56	-	EPH	UNNAMED TRIBUTARY TO SEDLANO CREEK	Lower White	0.0292	43.781008	-100.250914
exp-WB-0259	534.57	18	EPH	UNNAMED TRIBUTARY TO SEDLANO CREEK	Lower White	0.0831	43.780578	-100.250941
S_UTM14_06408	535.20	43	INT	UNNAMED TRIBUTARY TO SEDLANO CREEK	Lower White	0.3423	43.775122	-100.241391
S_UTM14_06399	537.50	70	INT	UNNAMED TRIBUTARY TO SEDLANO CREEK	Lower White	0.4729	43.750687	-100.210712
S567LY003	540.33	9	EPH	UNNAMED TRIBUTARY TO WHITE RIVER	Lower White	0.0469	43.715739	-100.181316
S567LY003	540.43	-	EPH	UNNAMED TRIBUTARY TO WHITE RIVER	Lower White	0.0637	43.714916	-100.180226
S567LY003	540.47	-	EPH	UNNAMED TRIBUTARY TO WHITE RIVER	Lower White	0.0000	43.714508	-100.179722
S567LY003	540.51	-	EPH	UNNAMED TRIBUTARY TO WHITE RIVER	Lower White	0.0066	43.714110	-100.179086
S567LY004	540.56	11	EPH	UNNAMED TRIBUTARY TO WHITE RIVER	Lower White	0.0813	43.713889	-100.177919
S567LY005	540.79	7	EPH	UNNAMED TRIBUTARY TO WHITE RIVER	Lower White	0.0200	43.711794	-100.174615
exp-WB-0260	540.79	-	EPH	UNNAMED TRIBUTARY TO WHITE RIVER	Lower White	0.0120	43.711583	-100.174821
S7ALY001	541.30	488	PER	WHITE RIVER	Lower White	3.3554	43.705588	-100.170197
W_UTM14_08449	541.36	137	PSS	N/A	Lower White	0.8950	43.704742	-100.170113
S567TR001	543.24	-	EPH	UNNAMED TRIBUTARY TO LITTLE DOG CREEK	Lower White	0.0434	43.680216	-100.160000
S106TR002	543.31	1	EPH	UNNAMED TRIBUTARY TO LITTLE DOG CREEK	Lower White	0.0018	43.679255	-100.159226
S567TR002	543.54	96	PER	LITTLE DOG CREEK	Lower White	0.7646	43.676728	-100.156351

Table 2 - Keystone XL Pipeline Project - Wetland and Waterbody Crossings within the ESA – Mainline, USACE Omaha District, South Dakota

Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
S567TR003	543.69	8	EPH	UNNAMED TRIBUTARY TO LITTLE DOG CREEK	Lower White	0.0582	43.674825	-100.154641
S_UTM14_06291	546.58	33	EPH	UNNAMED TRIBUTARY TO COTTONWOOD CREEK	Lower White	0.7912	43.640246	-100.127167
S_UTM14_06292	546.77	31	INT	UNNAMED TRIBUTARY TO COTTONWOOD CREEK	Lower White	0.3140	43.636421	-100.124170
S7ATR002	547.33	34	INT	COTTONWOOD CREEK	Lower White	0.2529	43.629120	-100.120486
S313TR001	547.38	-	INT	COTTONWOOD CREEK	Lower White	0.0009	43.628878	-100.119653
S313TR001	547.39	-	INT	COTTONWOOD CREEK	Lower White	0.0044	43.628767	-100.119503
S7ATR002	547.39	-	INT	COTTONWOOD CREEK	Lower White	0.0846	43.628650	-100.119433
S313TR001	547.41	-	INT	COTTONWOOD CREEK	Lower White	0.0107	43.628561	-100.119226
S7ATR001	547.44	-	INT	COTTONWOOD CREEK	Lower White	0.0188	43.627611	-100.119395
S313TR002	547.46	-	INT	UNNAMED TRIBUTARY TO COTTONWOOD CREEK	Lower White	0.0237	43.628010	-100.118377
S_UTM14_06248	550.22	35	EPH	UNNAMED TRIBUTARY TO COTTONWOOD CREEK	Lower White	0.3528	43.595441	-100.087711
S_UTM14_06248	550.35	-	EPH	UNNAMED TRIBUTARY TO COTTONWOOD CREEK	Lower White	0.2482	43.594010	-100.086197
S_UTM14_06248	550.50	-	EPH	UNNAMED TRIBUTARY TO COTTONWOOD CREEK	Lower White	0.0048	43.592037	-100.084869
S_UTM14_08552	552.37	58	EPH	UNNAMED TRIBUTARY TO OWL CREEK	Lower White	0.7144	43.567629	-100.072570
S_UTM14_08552	552.52	63	EPH	UNNAMED TRIBUTARY TO OWL CREEK	Lower White	0.3274	43.565501	-100.070813
W_UTM14_06217	553.90	99	PEM	N/A	Lower White	0.6503	43.547986	-100.057536
S_UTM14_08559	553.91	29	INT	UNNAMED TRIBUTARY TO OWL CREEK	Lower White	0.2148	43.547841	-100.057496
W_UTM14_06217	553.92	85	PEM	N/A	Lower White	0.6126	43.547714	-100.057515
S_UTM14_06212	555.69	27	INT	UNNAMED TRIBUTARY TO OWL CREEK	Lower White	0.2040	43.525801	-100.039988
S_UTM14_06206	555.89	35	EPH	UNNAMED TRIBUTARY TO OWL CREEK	Lower White	0.2595	43.523330	-100.038932
W_UTM14_06201	557.56	339	PEM	N/A	Lower White	2.4089	43.501738	-100.024907
S_UTM14_08586	557.59	34	INT	OWL CREEK	Lower White	0.2189	43.501358	-100.024483
S_UTM14_06175	561.66	-	EPH	UNNAMED TRIBUTARY TO OWL CREEK	Lower White	0.0540	43.451802	-99.981998
S_UTM14_06175	561.75	21	EPH	UNNAMED TRIBUTARY TO OWL CREEK	Lower White	0.5016	43.450348	-99.981023
S_UTM14_14369	564.64	20	INT	UNNAMED TRIBUTARY TO HOLLOW CREEK	Lower White	0.3149	43.415341	-99.951795
W104TR009	564.71	-	PEM	N/A	Lower White	0.0475	43.414754	-99.951138
S_UTM14_06163	565.06	41	EPH	UNNAMED TRIBUTARY TO DOG EAR CREEK	Lower White	0.2250	43.411109	-99.947088
S7ATR004	570.19	15	INT	DOG EAR CREEK	Lower White	0.1390	43.351430	-99.888934

Table 2 - Keystone XL Pipeline Project - Wetland and Waterbody Crossings within the ESA – Mainline, USACE Omaha District, South Dakota

Feature ID	MP [1]	Crossing Distance [2] (Feet)	Type [3]	Name	HUC SUB Basin [4]	Area Within ESA [5] (Acres)	Latitude (WGS84)	Longitude (WGS84)
S7ATR003	570.64	15	INT	MUDDY CREEK	Lower White	0.1078	43.346025	-99.883558
W_UTM14_08509	576.96	75	PEM	N/A	Lower White	0.7090	43.271329	-99.812594
S_UTM14_06121	576.97	26	INT	SAND CREEK	Lower White	0.2319	43.271121	-99.812467
W_UTM14_08509	576.98	39	PEM	N/A	Lower White	0.3142	43.271112	-99.812384
W_UTM14_06114	577.83	107	PEM	N/A	Lower White	0.7139	43.261611	-99.802426
W104TR008	578.25	-	PEM	N/A	Lower White	0.4228	43.256601	-99.797845
W_UTM14_06111	578.47	321	PEM	N/A	Lower White	1.3229	43.253407	-99.796489
W104TR001	579.18	233	PEM	N/A	Lower White	0.8548	43.247553	-99.785891
W104TR002	580.64	-	PFO	N/A	Ponca	0.1193	43.230399	-99.769328
W104TR003	580.69	-	PFO	N/A	Ponca	0.0549	43.229737	-99.768955
W_UTM14_06103	580.85	-	PEM	N/A	Ponca	0.1966	43.227460	-99.768004
S5ATR002	581.09	11	INT	PONCA CREEK	Ponca	0.0735	43.224306	-99.766268
S_UTM14_08574	584.51	26	EPH	UNNAMED TRIBUTARY TO PONCA CREEK	Ponca	0.2519	43.184949	-99.727286
S_UTM14_06042	585.37	18	EPH	UNNAMED TRIBUTARY TO PONCA CREEK	Ponca	0.1185	43.174426	-99.719088
S275TR001	595.37	6	INT	LUTE CREEK	Keya Paha	0.0608	43.061190	-99.602577
S_UTM14_05998	596.43	12	INT	UNNAMED TRIBUTARY TO LUTE CREEK	Keya Paha	0.1466	43.050992	-99.588436
S_UTM14_05994	597.08	21	EPH	UNNAMED TRIBUTARY TO BUFFALO CREEK	Keya Paha	0.1790	43.043335	-99.580889
S_UTM14_05990	597.47	-	EPH	UNNAMED TRIBUTARY TO BUFFALO CREEK	Keya Paha	0.0121	43.038596	-99.576758
W275TR001	597.47	-	PEM	N/A	Keya Paha	0.1246	43.038538	-99.576709
S_UTM14_05990	597.48	24	EPH	UNNAMED TRIBUTARY TO BUFFALO CREEK	Keya Paha	0.1150	43.038616	-99.576072
S_UTM14_05988	597.71	39	EPH	UNNAMED TRIBUTARY TO BUFFALO CREEK	Keya Paha	0.2763	43.035681	-99.574120
S_UTM14_05977	598.64	35	EPH	UNNAMED TRIBUTARY TO BUFFALO CREEK	Keya Paha	0.1917	43.025116	-99.563180
S5ATR006	599.99	-	OW	POND	Keya Paha	0.1067	43.008507	-99.549386
S5ATR005	600.03	60	Seasonal	BUFFALO CREEK	Keya Paha	0.2918	43.008338	-99.548434

[1] MP = Milepost.

[2] Crossing distance measured at proposed pipeline centerline. For features that would not be crossed by the proposed pipeline centerline, but would be within the 110-foot ROW, an en-dash (-) is indicated.

[3] PEM = Palustrine Emergent Marsh, PSS = Palustrine Scrub Shrub Wetland, PFO = Palustrine Forested Wetland, PER = Perennial Waterbody, INT = Intermittent Waterbody, EPH = Ephemeral Waterbody, MABO = Man-made Waterbody, OW = Open Water, Seasonal = Seasonal Waterbody.

[4] HUC SUB Basin = Name of 8-digit USGS Hydrologic Unit Code.

[5] Feature acreage is based on a standard 300-ft wide Environmental Study Area as discussed in Section 2.1.2.

Table 3 - Keystone XL Pipeline - Wetland and Waterbody Crossings within the ESA – Access Roads, USACE Omaha District, South Dakota

Access Road ID	Feature ID	Name	Type[1]	Crossing Distance[2] (Feet)	AREA Within ESA[3] (Acres)	HUC Sub Basin[4]	Latitude (WGS84)	Longitude (WGS84)
CAR-163	S500HA012	UNNAMED TRIBUTARY TO WAGONEER CREEK	INT	59	0.1455	Upper Little Missouri	45.863567	-103.970169
CAR-163	S128HA002	WAGONER CREEK	INT	-	0.0031	Upper Little Missouri	45.863439	-103.986480
CAR-163	S128HA002	WAGONER CREEK	INT	-	0.0100	Upper Little Missouri	45.863451	-103.988220
CAR-163	S128HA002	WAGONER CREEK	INT	-	0.0021	Upper Little Missouri	45.863692	-103.989437
CAR-163	S128HA002	WAGONER CREEK	INT	-	0.0068	Upper Little Missouri	45.863642	-103.989541
CAR-163	W109HA001	N/A	PEM	-	0.0579	Upper Little Missouri	45.863468	-103.987869
CAR-163	W109HA001	N/A	PEM	46	0.1804	Upper Little Missouri	45.863520	-103.989347
CAR-151	S109HA003	DIPPING VAT CREEK	EPH	6	0.0145	Upper Little Missouri	45.833983	-103.933646
CAR-150	S109HA002	SHAW CREEK	PER	53	0.0932	Upper Little Missouri	45.833204	-103.929432
CAR-150	W109HA002	N/A	PEM	-	0.0487	Upper Little Missouri	45.832558	-103.929053
CAR-041	S104HA004	KIMBLE CREEK	INT	-	0.0183	Upper Little Missouri	45.801264	-103.871053
CAR-041	S104HA004	KIMBLE CREEK	INT	-	0.0008	Upper Little Missouri	45.801561	-103.871490
CAR-041	S104HA004	KIMBLE CREEK	INT	29	0.0627	Upper Little Missouri	45.801500	-103.872102
CAR-041	W302HA001	N/A	PEM	57	0.1155	Upper Little Missouri	45.801501	-103.871844
CAR-173	S123HA004	COTTONWOOD CREEK	PER	16	0.0257	South Fork Grand	45.733229	-103.611060
CAR-173	exp-WB-13022	POND	OW	-	0.0021	South Fork Grand	45.733051	-103.624685
CAR-173	exp-WB-13020	UNNAMED TRIBUTARY TO COTTONWOOD CREEK	INT	-	0.0104	South Fork Grand	45.733272	-103.646724
CAR-173	exp-WB-13018	UNNAMED TRIBUTARY TO COTTONWOOD CREEK	INT	-	0.0047	South Fork Grand	45.733472	-103.646671

Table 3 - Keystone XL Pipeline - Wetland and Waterbody Crossings within the ESA – Access Roads, USACE Omaha District, South Dakota

Access Road ID	Feature ID	Name	Type[1]	Crossing Distance[2] (Feet)	AREA Within ESA[3] (Acres)	HUC Sub Basin[4]	Latitude (WGS84)	Longitude (WGS84)
CAR-173	exp-WB-13021	UNNAMED TRIBUTARY TO JONES CREEK	INT	-	0.0108	South Fork Grand	45.733491	-103.674528
CAR-173	exp-WB-13021	UNNAMED TRIBUTARY TO JONES CREEK	INT	-	0.0079	South Fork Grand	45.733500	-103.674754
CAR-173	exp-WB-13510	POND	OW	-	0.0291	South Fork Grand	45.733684	-103.674788
CAR-230	S302HA009	RUSH CREEK	PER	-	0.0095	South Fork Grand	45.630053	-103.644779
CAR-230	S302HA009	RUSH CREEK	PER	-	0.0058	South Fork Grand	45.629900	-103.644553
CAR-230	S302HA009	RUSH CREEK	PER	-	0.0179	South Fork Grand	45.630022	-103.644266
CAR-230	S302HA009	RUSH CREEK	PER	-	0.0130	South Fork Grand	45.629785	-103.644390
CAR-230	W302HA006	N/A	PEM	-	0.0179	South Fork Grand	45.630826	-103.641135
CAR-230	W302HA006	N/A	PEM	1	0.0342	South Fork Grand	45.630776	-103.640903
CAR-231	S124HA009	CLARK FORK CREEK	PER	68	0.1543	South Fork Grand	45.532336	-103.422469
CAR-231	exp-WB-13031	UNNAMED TRIBUTARY TO CLARKS FORK CREEK	INT	-	0.0360	South Fork Grand	45.521580	-103.420630
CAR-231	exp-WB-13030	UNNAMED TRIBUTARY TO CLARKS FORK CREEK	INT	-	0.0079	South Fork Grand	45.521707	-103.420828
CAR-231	exp-WL-13008	N/A	PEM	-	0.0849	South Fork Grand	45.548242	-103.422673
CAR-232	S302HA003	UNNAMED TRIBUTARY TO SQUAW CREEK	EPH	8	0.0275	South Fork Grand	45.414569	-103.278716
CAR-232	S302HA005	EAST SQUAW CREEK	INT	-	0.0001	South Fork Grand	45.408847	-103.278921
CAR-232	S302HA005	EAST SQUAW CREEK	INT	-	0.0020	South Fork Grand	45.408739	-103.278864
CAR-232	S302HA005	EAST SQUAW CREEK	INT	-	0.0023	South Fork Grand	45.408708	-103.278584
CAR-232	exp-WB-13032	UNNAMED TRIBUTARY TO RED BUTTE CREEK	PER	-	0.0155	Upper Moreau	45.357934	-103.258757
CAR-232	exp-WB-13511	UNNAMED TRIBUTARY TO RED BUTTE CREEK	PER	-	0.0464	Upper Moreau	45.358116	-103.258861

Table 3 - Keystone XL Pipeline - Wetland and Waterbody Crossings within the ESA – Access Roads, USACE Omaha District, South Dakota

Access Road ID	Feature ID	Name	Type[1]	Crossing Distance[2] (Feet)	AREA Within ESA[3] (Acres)	HUC Sub Basin[4]	Latitude (WGS84)	Longitude (WGS84)
CAR-232	exp-WB-13034	UNNAMED TRIBUTARY TO RED BUTTE CREEK	PER	-	0.0001	Upper Moreau	45.357436	-103.264360
CAR-232	exp-WB-13034	UNNAMED TRIBUTARY TO RED BUTTE CREEK	PER	16	0.1003	Upper Moreau	45.357553	-103.265105
CAR-232	W302HA003	N/A	PEM	-	0.0963	South Fork Grand	45.412048	-103.278873
CAR-233	S302HA006	UNNAMED TRIBUTARY TO SPRING CREEK	EPH	3	0.0108	Upper Moreau	45.341536	-103.175688
CAR-233	S302HA007	UNNAMED TRIBUTARY TO SPRING CREEK	EPH	6	0.0163	Upper Moreau	45.339415	-103.176855
CAR-233	S302HA008	LITTLE COWBOY CREEK	EPH	5	0.0119	Upper Moreau	45.341065	-103.196662
CAR-233	W302HA004	N/A	PEM	-	0.0127	Upper Moreau	45.340906	-103.173010
CAR-233	W302HA004	N/A	PEM	-	0.0245	Upper Moreau	45.340918	-103.173149
CAR-233	W302HA005	N/A	PEM	217	0.3847	Upper Moreau	45.329635	-103.218455
CAR-048A	S_UTM13_09963	UNNAMED TRIBUTARY TO SOUTH FORK MOREAU RIVER	EPH	-	0.0274	South Fork Moreau	45.082356	-102.887279
CAR-048A	S_UTM13_12245	UNNAMED TRIBUTARY TO SOUTH FORK MOREAU RIVER	EPH	-	0.0383	South Fork Moreau	45.082526	-102.887200
CAR-048A	S_UTM13_09965	UNNAMED TRIBUTARY TO SOUTH FORK MOREAU RIVER	EPH	-	0.0960	South Fork Moreau	45.082764	-102.882749
CAR-048A	S_UTM13_09967	UNNAMED TRIBUTARY TO SOUTH FORK MOREAU RIVER	EPH	-	0.0090	South Fork Moreau	45.082545	-102.882273
CAR-048A	exp-WB-13512	UNNAMED TRIBUTARY TO SOUTH FORK MOREAU RIVER	EPH	-	0.0443	South Fork Moreau	45.082703	-102.870287
CAR-048A	S_UTM13_09972	UNNAMED TRIBUTARY TO SOUTH FORK MOREAU RIVER	EPH	-	0.0128	South Fork Moreau	45.082530	-102.870187
CAR-048A	S_UTM13_09972	UNNAMED TRIBUTARY TO SOUTH FORK MOREAU RIVER	EPH	-	0.0006	South Fork Moreau	45.082480	-102.869716
CAR-048A	S_UTM13_09978	UNNAMED TRIBUTARY TO BEVERLY CREEK	EPH	16	0.0397	South Fork Moreau	45.089345	-102.845829
CAR-159	S275ME004	WEST BRANCH PINE CREEK	Seasonal	21	0.0625	Cherry	44.954785	-102.636895

Table 3 - Keystone XL Pipeline - Wetland and Waterbody Crossings within the ESA – Access Roads, USACE Omaha District, South Dakota

Access Road ID	Feature ID	Name	Type[1]	Crossing Distance[2] (Feet)	AREA Within ESA[3] (Acres)	HUC Sub Basin[4]	Latitude (WGS84)	Longitude (WGS84)
CAR-159	W275ME005	N/A	PEM	-	0.1232	Cherry	44.964325	-102.651775
CAR-159	W275ME004	N/A	PEM	-	0.0673	Cherry	44.963493	-102.650285
CAR-159	W275ME003	N/A	PEM	-	0.0557	Cherry	44.960522	-102.646760
CAR-159	W275ME002	N/A	PEM	-	0.0189	Cherry	44.954404	-102.631471
CAR-167	S308ME001	UNNAMED TRIBUTARY TO SULPHUR CREEK	EPH	6	0.0285	Cherry	44.748732	-102.372645
CAR-079A	S307PN001	UNNAMED TRIBUTARY TO CHEYENNE RIVER	PER	24	0.0590	Lower Cheyenne	44.501574	-102.002085
CAR-313	S307HK001	BRIDGER CREEK	EPH	21	0.0492	Lower Cheyenne	44.472830	-101.950229
CAR-052A	W275HK001	N/A	PEM	-	0.0580	Bad	44.119727	-101.247916
CAR-052A	W275HK001	N/A	PEM	-	0.0121	Bad	44.119693	-101.247646
CAR-235	S308HK003	UNNAMED TRIBUTARY TO BAD RIVER	EPH	8	0.0150	Bad	44.067313	-101.120590
CAR-235	S308HK003	UNNAMED TRIBUTARY TO BAD RIVER	EPH	-	0.1071	Bad	44.065223	-101.117894
CAR-235	S308HK003	UNNAMED TRIBUTARY TO BAD RIVER	EPH	-	0.0313	Bad	44.064177	-101.116236
CAR-236	S106TR001	LITTLE DOG CREEK	INT	22	0.0679	Lower White	43.675436	-100.152305

[1] PEM= Palustrine Emergent Wetland, PER = Perennial Waterbody, INT = Intermittent Waterbody, EPH = Ephemeral Waterbody, Seasonal = Seasonal Waterbody.
[2] Crossing distance measured at proposed access road centerline. For features that would not be crossed by the proposed access road centerline, but would be within the 30-foot ROW, an en-dash (-) is indicated.
[3] Feature acreage is based on a standard 100-foot wide Environmental Survey Area, as discussed in Section 2.1.2.
[4] HUC Sub Basin = Name of 8-digit USGS Hydrologic Unit Code.

Table 4 - Keystone XL Pipeline - Wetland and Waterbody Crossings within the ESA – Auxiliary Sites, USACE Omaha District, South Dakota

Facility Type	Facility ID	Facility Name	Facility Size (Acres)	Feature ID	Feature Name	Type [1]	Linear Feet In Proposed Facility Boundary[2]	Area Within Proposed Facility Boundary (Acres)	HUC SUB Basin[3]
Rail Siding	Harrold_14	Harrold Rail Siding	248.63	S275HU003	POND	MABO	344.27	0.5810[4]	Medicine Knoll
Rail Siding	Harrold_14	Harrold Rail Siding	248.63	S275HU002	POND	MABO	1717.24	8.5164[4]	Medicine Knoll
Rail Siding	Harrold_14	Harrold Rail Siding	248.63	S275HU002	POND	MABO	578.45	0.6299[4]	Medicine Knoll
Rail Siding	Harrold_14	Harrold Rail Siding	248.63	S275HU002	POND	MABO	569.22	0.5032[4]	Medicine Knoll
Rail Siding	Harrold_14	Harrold Rail Siding	248.63	S275HU001	POND	MABO	729.01	3.3945[4]	Medicine Knoll
Construction Camp	CC02a SITE 1	Harding Construction Camp	108.33	W312HA001	N/A	PEM	329.09	0.9967[4]	South Fork Grand

[1] PEM = Palustrine Emergent Wetland; MABO = Man-made Waterbody.

[2] Approximate length of feature (feet) measured across the feature at the widest possible linear distance.

[3] HUC Sub Basin = Name of 8-Digit USGS Hydrologic Unit Code.

[4] Wetlands will be avoided throughout construction and operation of the rail siding engineering controls.

Table 5 – Keystone XL Pipeline Project – Typical Wetland Plant Species – South Dakota

WETLAND TYPE	SCIENTIFIC NAME	COMMON NAME	STRATUM[1]	INDICATOR
PEM	*Carex rostrata*	beaked sedge	H	OBL
	Distichlis spicata	saltgrass	H	FACW
	Elymus repens	quackgrass	H	FAC
	Juncus balticus	mountain rush	H	OBL
	Juncus torreyi	Torrey's rush	H	FACW
	Panicum virgatum	switchgrass	H	FAC
	Polygonum pensylvanicum	Pennsylvania smartweed	H	FACW
	Rumex crispus	curly dock	H	FACW
	Scirpus americanus	chairmaker's bulrush	H	OBL
	Spartina pectinata	prairie cordgrass	H	FACW
	Typha latifolia	broadleaf cattail	H	OBL
PFO	*Salix amygdaloides*	peachleaf willow	T	FACW
	Solidago gigantea	giant goldenrod	H	FACW
	Sporobolus airoides	alkali sacaton	H	FAC

[1] H = herbaceous, T= tree.

Table 6 - South Dakota Soil Characterization Along the Proposed Project

COUNTY	SYMBOL	NAME	DRAINAGE CLASSIFICATION	PERCENT SLOPE	HYDRIC SOIL	TEXTURE DESCRIPTIOIN
Harding	AkA	Archin-Bullock fine sandy loams, 0 to 4 percent slopes	Archon -Well drained Bullock – Well drained	Archin - 0 to 4 Bullock – 0 to 4	No	Fine sandy loams
Harding	AtA	Assinniboine-Archin fine sandy loams, 0 to 3 percent slopes	Assiniboine – Well Drained Archin – Well drained	Assiniboine - 0 to 3 Archin – 0 to 3	No	Fine sandy loams
Harding	BoD	Bullock-Cabbart complex, 6 to 25 percent slopes	Bullock – Well drained Cabbart – Well drained	Bullock - 6 to 9 Parchin - 6 to 25	No	Sandy loams
Harding	BpB	Bullock-Parchin-Slickspots complex, 2 to 9 percent slopes	Bullock – Well drained Parchin-Slickspots – Well drained	Bullock - 2 to 9 Parchin – 2 to 9 Slickspots – 2 to 9	No	Sandy clay
Harding	CdE	Cabbart-Delridge loams, 15 to 40 percent slopes	Cabbart – Well drained Delridge – Well drained	Cabbart - 25 to 40 Delridge - 15 to 25	No	Loam
Harding	CeE	Cabbart-Rock outcrop complex, 15 to 40 percent slopes	Cabbart – Well drained Rock – Well drained	Cabbart - 15 to 40 Rock – 15 to 40	No	Sandy loams
Harding	EcA	Eapa-Archin complex, 0 to 3 percent slopes	Eapa – Well drained Archin – Well drained	Eapa - 0 to 3 Archin – 0 to 3	No	Loamy clay
Harding	GdA	Gerdrum silt loam, 0 to 4 percent slopes	Well drained	Gerdrum - 0 to 4	No	Silt loam
Harding	Ge	Glendive fine sandy loam	Well drained	Glendive - 0 to 2	No	Fine sandy loams
Harding	Ha	Hanly fine sandy loam	Somewhat excessively drained	Hanly - 0 to 1	No	Fine sandy loams
Harding	Hb	Hanly loamy fine sand	Somewhat excessively drained	Hanly - 0 to 2	No	Loamy fine sand
Harding	Hd	Hanly-Dogiecreek fine sandy loams	Hanly - Somewhat excessively drained Dogiecreek - Poorly drained	Hanly - 0 to 2 Dogiecreek - 0 to 3	Hanly - No Dogiecreek - Yes	Fine sandy loams
Harding	Hh	Havre-Harlake complex	Harve – Well drained Harlake –Well drained	Harve - 0 to 2 Harlake – 0 to 2	No	Loam
Harding	Ke	Korchea loam	Well drained	Korchea - 0 to 2	No	Loam
Harding	Kg	Korchea loam, channeled	Well drained	Korchea - 0 to 2	No	Loam
Harding	Km	Korchea-Archin complex	Korchea – Well drained Archin – Well drained	Korchea - 0 to 2 Archin – 0 to 2	No	Loamy clay
Harding	PbB	Parchin-Bullock fine sandy loams, 2 to 9 percent slopes	Parchin – Well drained Bullock – Well drained	Parchin - 2 to 9 Bullock – 2 to 9	No	Fine sandy loams

Table 6 - South Dakota Soil Characterization Along the Proposed Project

COUNTY	SYMBOL	NAME	DRAINAGE CLASSIFICATION	PERCENT SLOPE	HYDRIC SOIL	TEXTURE DESCRIPTIOIN
Harding	RhB	Rhame fine sandy loam	Well drained	Rhame - 2 to 6	No	Fine sandy loams
Harding	RmB	Rhame-Parchin fine sandy loams, 2 to 6 percent slopes	Rhame – Well drained Parchin – Well drained	Rhame - 2 to 6 Parchin – 2 to 6	No	Fine sandy loams
Harding	SaA	Sage loam	Poorly drained	Sage - 0 to 2	Yes	Loam
Harding	TvB	Trey-Parchin-Bullock complex, 2 to 9 percent slopes	Trey – Well drained Parchin – Well drained	Trey - 2 to 9 Parchin - 2 to 6 Bullock - 2 to 6	No	Sandy clay
Harding	TxE	Twilight-Blackhall fine sandy loams, 9 to 25 percent slopes	Twilight – Well drained Blackhall –Well drained	Twilight - 9 to 15 Blackhall - 15 to 25	No	Fine sandy loams
Harding	TyC	Twilight-Parchin fine sandy loams, 6 to 15 percent slopes	Twilight – Well drained Parchin – Well drained	Twilight - 9 to 15 Parchin - 6 to 9	No	Fine sandy loams
Harding	ZbC	Zeona-Blownout land complex, 2 to 15 percent slopes	Zeona – Excessively drained Blowout – Excessivley drained	Zeona - 2 to 15 Blownout – 0 to 15	No	Sands
Butte	Ha	Hanly loamy fine sand	Somewhat excessively drained	Hanly - 0 to 6	No	Loamy fine sand
Butte	ZeB	Zeona loamy fine sand, 0 to 6 percent slopes	Excessively drained	Zeona - 0 to 6	No	Loamy fine sand
Perkins	AaB	Bullock-Parchin loams, 0 to 9 percent slopes	Bullock – Well drained Parchin – Well drained	Bullock - 0 to 9 Parchin – 0 to 9	No	Loam
Perkins	AbC	Bullock-Slickspots complex, 0 to 15 percent slopes	Bullock – Well drained Slickspots – Well drained	Bullock - 0 to 15 Slickspots – 0 to 15	No	Loamy clay
Perkins	Bb	Banks loamy fine sand	Somewhat excessively drained	Banks - 0 to 2	No	Loamy fine sand
Perkins	Sd	Shambo loam, channeled	Well drained	Shambo - 0 to 2	No	Loam
Perkins	Tb	Trembles soils, channeled	Well drained	Trembles - 0 to 2	No	Loam
Meade	AsC	Assinniboine fine sandy loam, 6 to 9 percent slopes	Well drained	Assinniboine - 6 to 9	No	Fine sandy loams
Meade	BmE	Blackhall-Twilight fine sandy loams, 9 to 40 percent slopes	Blackhall – Well drained Twilight – Well drained	Blackhall - 25 to 40 Twilight - 9 to 15	No	Fine sandy loams
Meade	BpB	Bullock-Parchin fine sandy loams, 0 to 4 percent slopes	Bullock – Well drained Parchin – Well drained	Bullock - 0 to 4 Parchin – 0 to 4	No	Fine sandy loams
Meade	BsB	Bullock-Slickspots complex, 0 to 4 percent slopes	Bullock – Well drained Slickspots – Well drained	Bullock - 0 to 4 Slickspots – 0 to 4	No	Sandy clay
Meade	CaD	Cabbart loam, 9 to 40 percent slopes	Cabbart – Well drained	Cabbart - 9 to 40	No	Loam

Table 6 - South Dakota Soil Characterization Along the Proposed Project

COUNTY	SYMBOL	NAME	DRAINAGE CLASSIFICATION	PERCENT SLOPE	HYDRIC SOIL	TEXTURE DESCRIPTIOIN
Meade	DeC	Delridge-Cabbart loams, 6 to 15 percent slopes	Delridge – Well drained Cabbart – Well drained	Delridge - 6 to 14 Cabbart – 6 to 15	No	Loam
Meade	EaB	Eapa loam, 2 to 6 percent slopes	Well drained	Eapa - 2 to 6	No	Loam
Meade	EdB	Eapa-Delridge loams, 2 to 6 percent slopes	Eapa – Well drained Delridge – Well drained	Eapa - 2 to 6 Delridge – 2 to 6	No	Loam
Meade	EgB	Eapa-Grail complex, 2 to 6 percent slopes	Eapa – Well drained Grail – Well drained	Eapa - 2 to 6 Grail – 2 to 6	No	Loam
Meade	GaA	Gerdrum loam, 0 to 4 percent slopes	Well drained	Gerdrum - 0 to 4	No	Loam
Meade	Gc	Glenberg fine sandy loam	Well drained	Glenberg - 0 to 2	No	Fine sandy loams
Meade	Hb	Havre loam	Well drained	Harve - 0 to 2	No	Loam
Meade	Hc	Havre loam, channeled	Well drained	Harve - 0 to 2	No	Loam
Meade	Ld	Lohmiller silty clay loam	Well drained	Lohmiller - 0 to 2	No	Silty clay loam
Meade	Lg	Lohmiller silty clay loam, channeled	Well drained	Lohmiller - 0 to 2	No	Silty clay loam
Meade	NuB	Nunn clay loam, 2 to 6 percent slopes	Well drained	Nunn - 2 to 6	No	Clay loam
Meade	PeB	Pierre clay, 2 to 6 percent slopes	Well drained	Pierre - 2 to 6	No	Clay
Meade	SaD	Samsil clay, 6 to 25 percent slopes	Well drained	Samsil - 6 to 25 Rock – 6 to 25	No	Clay
Meade	SbE	Samsil-Rock outcrop complex, 15 to 40 percent slopes	Samsil - Well drained Rock – Well drained	Samsill - 15 to 40 Rock – 15 to 40	No	Clay
Meade	St	Stetter clay	Well drained	Stetter - 0 to 2	No	Clay
Meade	SwA	Swanboy clay	Well drained	Swanboy - 0 to 2	No	Clay
Pennington	Gb	Glenberg fine sandy loam	Well drained	Glenberg - 0 to 3	No	Fine sandy loams
Pennington	Ha	Haverson silt loam	Well drained	Haverson - 0 to 1	No	Silt loam
Pennington	Lo	Lohmiller silty clay	Well drained	Lohmiller - 0 to 2	No	Silty clay
Haakon	Ab	Albaton silty clay, depressional	Very poorly drained	Albaton - 0 to 1	Yes	Silty clay
Haakon	Bu	Bullcreek clay, 0 to 6 percent slopes	Well drained	Bullcreek - 0 to 6	No	Clay
Haakon	Ct	Capa-Wendte, channeled, complex	Capa – Moderately well drained Wendte – Moderately well drained	Capa - 0 to 4 Wendte - 0 to 2	No	Clayey loam
Haakon	Eg	Egas silty clay loam	Poorly drained	Egas - 0 to 2	Yes	Silty clay loam
Haakon	KmB	Kirley-Ottumwa complex, 2 to 6 percent slopes	Kirley – Well drained Ottumwa – Well drained	Kirley - 2 to 6 Ottumwa – 2 to 6	No	Clayey loam

Table 6 - South Dakota Soil Characterization Along the Proposed Project

COUNTY	SYMBOL	NAME	DRAINAGE CLASSIFICATION	PERCENT SLOPE	HYDRIC SOIL	TEXTURE DESCRIPTIOIN
Haakon	KnD	Kirley-Vivian complex, 6 to 15 percent slopes	Kirley - Well drained Vivian - excessively drained	Kirley - 9 to 15 Vivian - 6 to 15	No	Clayey loam
Haakon	Ko	Kolls clay	Poorly drained	Kolls - 0 to 1	Yes	Clay
Haakon	LaD	Lakoma silty clay, 6 to 15 percent slopes	Well drained	Lakoma - 6 to 15	No	Silty clay
Haakon	Lp	Lohmiller silty clay, channeled	Well drained	Lohmiller - 0 to 2	No	Silty clay
Haakon	Nb	Nimbro silty clay loam	Well drained	Nimbro - 0 to 2	No	Silty clay loam
Haakon	Nc	Nimbro silty clay loam, channeled	Moderately well drained	Nimbro - 0 to 2	No	Silty clay loam
Haakon	ObE	Okaton-Lakoma silty clays, 15 to 40 percent slopes	Okaton – Well drained Lakoma – Well drained	Okaton - 25 to 40 Lakoma - 15 to 25	No	Silty clays
Haakon	OtB	Ottumwa silty clay, 3 to 6 percent slopes	Ottumwa – Well drained	Ottumwa - 3 to 6	No	Silty clay
Haakon	OvA	Ottumwa-Capa complex, 0 to 3 percent slopes	Ottumwa - Well drained Capa - Moderately well drained	Ottumwa - 0 to 2 Capa - 0 to 3	No	Clayey loam
Haakon	OwB	Ottumwa-Lakoma silty clays, 3 to 6 percent slopes	Okaton – Well drained Lakoma – Well drained	Ottumwa - 3 to 6 Lakoma – 3 to 6	No	Silty clays
Haakon	OwC	Ottumwa-Lakoma silty clays, 6 to 9 percent slopes	Okaton – Well drained Lakoma – Well drained	Ottumwa - 6 to 9 Lakoma – 6 to 9	No	Silty clays
Haakon	SbF	Samsil clay, 25 to 60 percent slopes	Samsil – Well drained	25 to 60	No	Clay
Haakon	SoE	Sansarc-0pal clays, 9 to 40 percent slopes	Sansarc – Well drained Opal – Well drained	Sansarc - 25 to 40 Opal - 9 to 25	No	Clays
Haakon	StF	Schamber-Samsil complex, 6 to 60 percent slopes	Schamber – Well drained Samsil – Well drained	Schamber - 6 to 60 Samsil – 6 to 60	No	Loamy clay
Haakon	Wd	Wendte-Herdcamp silty clays, channeled	Wendte - Well drained Herdcamp - Very poorly drained	Wendte - 0 to 2 Herdcamp – 0 to 2	Wendte - No Herdcamp - Yes	Silty clays
Jones	Bu	Bullcreek clay, 0 to 6 percent slopes	Well drained	Bullcreek - 0 to 6	No	Clay
Jones	Hb	Herdcamp-Bullcreek complex	Herdcamp - Very poorly drained Bullcreek - Well drained	Herdcamp - 0 to 1 Bullcreek – 0 to 1	Herdcamp -Yes Bullcreek - No	Clayey loam
Jones	LaD	Lakoma silty clay, 6 to 15 percent slopes	Well drained	Lakoma - 6 to 15	No	Silty clay
Jones	ObE	Okaton-Lakoma silty clays, 15 to 40 percent slopes	Okaton – Well drained Lakoma – Well drained	Okaton - 15 to 40 Lakoma - 15 to 25	No	Silty clays

Table 6 - South Dakota Soil Characterization Along the Proposed Project

COUNTY	SYMBOL	NAME	DRAINAGE CLASSIFICATION	PERCENT SLOPE	HYDRIC SOIL	TEXTURE DESCRIPTIOIN
Jones	OkE	Okaton-Wendte-Bullcreek complex, 0 to 45 percent slopes	Okaton - Well drained Wendte - Moderately well drained Bullcreek - Well drained	Okaton - 6 to 45 Wendte - 0 to 2 Bullcreek - 0 to 6	No	Clayey loam
Jones	OpB	Opal clay, 3 to 6 percent slopes	Well drained	Opal - 3 to 6	No	Clay
Jones	OpC	Opal clay, 6 to 9 percent slopes	Well drained	Opal - 6 to 9	No	Clay
Jones	OpD	Opal clay, 6 to 15 percent slopes	Well drained	Opal - 6 to 15	No	Clay
Jones	PrC	Promise clay, 6 to 9 percent slopes	Well drained	Promise - 6 to 9	No	Clay
Jones	PsA	Promise-Bullcreek clays	Promise – Well drained Bullcreek – Well drained	Promise - 0 to 3 Bullcreek – 0 to 3	No	Clays
Jones	Wd	Wendte silty clay, channeled	Moderately well drained	Wendte - 0 to 1	No	Silty clay
Lyman	BuA	Bullcreek clay, 0 to 6 percent slopes	Well drained	Bullcreek - 0 to 6	No	Clay
Lyman	LbD	Lakoma-Okaton silty clays, 6 to 15 percent slopes	Lakoma – Well drained Okaton – Well drained	Lakoma - 9 to 15 Okaton - 6 to 15	No	Silty clays
Lyman	MnC	Millboro-Boro silty clays, 6 to 9 percent slopes	Millboro – Well drained Boro – Well drained	Millboro - 6 to 9 Boro – 6 to 9	No	Silty clays
Lyman	SbE	Sansarc-Opal clays, 9 to 40 percent slopes	Sansarc – Well drained Opal – Well drained	Sansarc - 15 to 40 Opal - 9 to 25	No	Clays
Tripp	AtD	Anselmo-Longpine fine sandy loams, 10 to 20 percent slopes	Anselmo – Well drained Longpine – Well drained	Anselmo - 10 to 17 Longpine - 10 to 20	No	Fine sandy loams
Tripp	BOD	Boyd-Okaton association, 9 to 25 percent slopes	Boyd – Well drained Okaton – Well drained	Boyd - 9 to 25 Okaton – 9 to 25	No	Clayey loam
Tripp	Bp	Bridgeport complex	Well drained	Bridgeport - 0 to 2	No	Loam
Tripp	Bt	Bridgeport complex, channeled	Well drained	Bridgeport - 0 to 2	No	Loam
Tripp	Cc	Carter silty clay loam	Well drained	Carter - 0 to 2	No	Silty clay loam
Tripp	DmA	Doger-Elsmere complex, 0 to 3 percent slopes	Doger - Well drained Elsmere - Somewhat poorly drained	Doger - 0 to 3 Elsmere – 0 to 3	No	Loamy sands
Tripp	DnC2	Dunday loamy fine sand, 3 to 9 percent slopes, eroded	Somewhat excessively drained	Dunday - 6 to 9	No	Loamy fine sand
Tripp	Em	Elsmere fine sandy loam	Somewhat poorly drained	Elsmere - 0 to 2	No	Fine sandy loam

Table 6 - South Dakota Soil Characterization Along the Proposed Project

COUNTY	SYMBOL	NAME	DRAINAGE CLASSIFICATION	PERCENT SLOPE	HYDRIC SOIL	TEXTURE DESCRIPTIOIN
Tripp	Es	Erd-Capa complex	Erd - Somewhat poorly drained Capa - Moderately well drained	Erd - 0 to 1 Capa - 0 to 2	No	Clayey loam
Tripp	Ic	Inavale complex, channeled	Excessively drained	Inavale - 0 to 2	No	Sandy loam
Tripp	LkC	Lakoma-Millboro silty clays, 5 to 9 percent slopes	Lakoma – Well drained Millboro – Well drained	Lakoma - 5 to 9 Millboro – 5 to 9	No	Clayey loam
Tripp	MfE	Manter-Anselmo fine sandy loams, 15 to 30 percent slopes	Manter – Well drained Anselmo – Well drained	Manter - 15 to 30 Anselmo - 15 to 17	No	Fine sandy loams
Tripp	MoB	Millboro silty clay, 3 to 6 percent slopes	Well drained	Millboro - 3 to 6	No	Silty clay
Tripp	Mr	Munjor fine sandy loam	Moderately well drained	Munjor - 0 to 2	No	Silt loam
Tripp	Mu	Munjor fine sandy loam	Well drained	Munjor - 0 to 2	No	Fine sandy loam
Tripp	OBE	Okaton-Lakoma association, 15 to 40 percent slopes	Okaton – Well drained Lakoma – Well drained	Okaton - 15 to 40 Lakoma - 15 to 25	No	Clayey loam
Tripp	OpC	Opal clay, 3 to 9 percent slopes	Opal – Well drained	Opal - 3 to 9	No	Clay
Tripp	ReB	Reliance silty clay loam, 3 to 6 percent slopes	Reliance – Well drained	Reliance - 3 to 6	No	Silty clay loam
Tripp	SAE	Sansarc-Opal association, 15 to 40 percent slopes	Sansarc – Well drained Opal – Well drained	Sansarc - 25 to 40 Opal - 15 to 25	No	Clayey loam
Tripp	Sw	Bullcreek clay	Bullcreek – Well drained	Bullcreek - 0 to 6	No	Clay
Tripp	VnD	Valentine-Longpine complex, 6 to 15 percent slopes	Valentine - Excessively drained Longpine - Well drained	Valentine - 6 to 15 Longpine – 6 to 15	No	Sandy loam
Tripp	Wb	Wann fine sandy loam	Somewhat poorly drained	Wann - 0 to 2	No	Fine sandy loam
Tripp	Wk	Whitelake-Lute fine sandy loams	Whitelake - Moderately well drained Lute - Somewhat poorly drained	Whitelake - 0 to 2 Lute – 0 to 2	No	Fine sandy loams

Attachment D

Preliminary Jurisdictional Determination Form

Keystone XL Pipeline Project – Pre-Jurisdictional Determination Form for Mainline Crossings in the USACE Omaha District, Montana

Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-001-S275HA001	S275HA001	286.6	27	EPH	Boxelder	0.0734	0.0000	45.882940	-104.027598	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-002-S_UTM13_07772	S_UTM13_07772	288.2	-	MABO	Boxelder	0.0080	0.0000	45.867543	-104.006359	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-003-S_UTM13_07772	S_UTM13_07772	288.2	-	MABO	Boxelder	0.0160	0.0000	45.867329	-104.005970	
NWO-2009-00305-PIE-004-W104HA001	W104HA001	292.4	195	PEM	Upper Little Missouri	0.2784	0.0000	45.835549	-103.932930	Non-Section 10; Wetland
NWO-2009-00305-PIE-005-W0002	W0002	292.6	-	PEM	Upper Little Missouri	0.0000[6]	0.0000	45.833827	-103.928244	Non-Section 10; Wetland
NWO-2009-00305-PIE-006-W0002	W0002	292.6	19	PEM	Upper Little Missouri	0.0614	0.0000	45.833724	-103.927711	
NWO-2009-00305-PIE-007-S29HA001	S29HA001	292.6	24	INT	Upper Little Missouri	0.0224	0.0000	45.833683	-103.927597	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-008-W0002	W0002	292.7	62	PEM	Upper Little Missouri	0.0832	0.0000	45.833631	-103.927544	Non-Section 10; Wetland
NWO-2009-00305-PIE-009-W0003	W0003	293.6	21	PEM	Upper Little Missouri	0.0399	0.0000	45.826877	-103.910402	Non-Section 10; Wetland
NWO-2009-00305-PIE-010-S_UTM13_04433	S_UTM13_04433	293.6	16	EPH	Upper Little Missouri	0.0224	0.0000	45.826859	-103.910333	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-011-W567HA001	W567HA001	293.6	-	PEM	Upper Little Missouri	0.0054	0.0000	45.826895	-103.910223	Non-Section 10; Wetland
NWO-2009-00305-PIE-012-W0003	W0003	293.6	25	PEM	Upper Little Missouri	0.0434	0.0000	45.826770	-103.910237	Non-Section 10; Wetland
NWO-2009-00305-PIE-013-W_UTM13_04445	W_UTM13_04445	295.0	64	PEM	Upper Little Missouri	0.0754[6]	0.0000	45.815847	-103.885177	Non-Section 10; Wetland
NWO-2009-00305-PIE-014-S312HA001	S312HA001	295.1	93	PER	Upper Little Missouri	0.1062[6]	0.0000	45.815722	-103.884886	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-015-W567HA002	W567HA002	295.1	67	PEM	Upper Little Missouri	0.0631[6]	0.0000	45.815315	-103.883978	Non-Section 10; Wetland
NWO-2009-00305-PIE-016-S302HA001	S302HA001	296.9	18	EPH	Upper Little Missouri	0.0284	0.0000	45.800169	-103.855284	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-017-S_UTM13_04476	S_UTM13_04476	297.7	11	INT	Upper Little Missouri	0.0266	0.0000	45.797525	-103.840441	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-018-S500HA001	S500HA001	298.4	14	EPH	Upper Little Missouri	0.0239	0.0000	45.792301	-103.827550	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-019-S123HA003	S123HA003	300.0	17	INT	Upper Little Missouri	0.0448	0.0000	45.781728	-103.798756	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-020-W_UTM13_04537	W_UTM13_04537	300.4	109	PEM	Upper Little Missouri	0.1611	0.0000	45.778444	-103.792880	Non-Section 10; Wetland
NWO-2009-00305-PIE-021-S_UTM13_04536	S_UTM13_04536	300.4	18	INT	Upper Little Missouri	0.0400	0.0000	45.778417	-103.792846	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-022-W0004	W0004	303.5	18	PEM	Upper Little Missouri	0.0298	0.0000	45.754506	-103.740380	Non-Section 10; Wetland
NWO-2009-00305-PIE-023-S_UTM13_07045	S_UTM13_07045	303.5	17	INT	Upper Little Missouri	0.0258	0.0000	45.754453	-103.740272	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-024-W0004	W0004	303.5	12	PEM	Upper Little Missouri	0.0317	0.0000	45.754382	-103.740209	Non-Section 10; Wetland
NWO-2009-00305-PIE-025-S_UTM13_07045	S_UTM13_07045	303.5	-	INT	Upper Little Missouri	0.0086	0.0000	45.754259	-103.740120	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-026-S_UTM13_07045	S_UTM13_07045	303.5	-	INT	Upper Little Missouri	0.0005	0.0000	45.754176	-103.740054	
NWO-2009-00305-PIE-027-S0346	S0346	305.2	28	EPH	South Fork Grand	0.0437	0.0000	45.742813	-103.709731	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-028-S_UTM13_04604	S_UTM13_04604	306.3	18	INT	South Fork Grand	0.0490	0.0000	45.730432	-103.694888	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-029-S_UTM13_04614	S_UTM13_04614	307.0	50	INT	South Fork Grand	0.1212	0.0000	45.722313	-103.687194	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-030-S_UTM13_04624	S_UTM13_04624	307.8	27	INT	South Fork Grand	0.0687	0.0000	45.712928	-103.677316	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-031-S_UTM13_04635	S_UTM13_04635	309.1	21	EPH	South Fork Grand	0.0707	0.0000	45.695878	-103.665120	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-032-S_UTM13_04657	S_UTM13_04657	311.2	26	EPH	South Fork Grand	0.0570	0.0000	45.669795	-103.645774	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-033-S_UTM13_04657	S_UTM13_04657	311.3	19	EPH	South Fork Grand	0.0703	0.0000	45.668859	-103.645292	
NWO-2009-00305-PIE-034-S500HA011	S500HA011	312.7	29	INT	South Fork Grand	0.0734	0.0000	45.649538	-103.642696	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-035-W500HA005	W500HA005	313.8	-	PEM	South Fork Grand	0.0101	0.0000	45.637270	-103.626733	Non-Section 10; Wetland
NWO-2009-00305-PIE-036-W500HA004	W500HA004	314.1	279	PEM	South Fork Grand	0.4268	0.0000	45.635364	-103.623238	Non-Section 10; Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-037-W500HA002	W500HA002	316.2	32	PEM	South Fork Grand	0.1660	0.0000	45.618634	-103.586665	Non-Section 10; Wetland
NWO-2009-00305-PIE-038-S0359	S0359	321.4	24	EPH	South Fork Grand	0.0559	0.0000	45.578092	-103.513263	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-039-S123HA006	S123HA006	321.6	33	PER	South Fork Grand	0.0808	0.0000	45.574973	-103.512002	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-040-S0360	S0360	321.6	14	EPH	South Fork Grand	0.0353	0.0000	45.574371	-103.511789	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-041-S124HA008	S124HA008	326.4	10	PER	South Fork Grand	0.0252	0.0000	45.527903	-103.449906	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-042-S_UTM13_04896	S_UTM13_04896	332.3	15	INT	South Fork Grand	0.0405	0.0000	45.477292	-103.357483	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-043-W302HA002	W302HA002	332.4	5	PEM	South Fork Grand	0.0287	0.0000	45.476118	-103.355476	Non-Section 10; Wetland
NWO-2009-00305-PIE-044-S_UTM13_07391	S_UTM13_07391	332.4	14	PER	South Fork Grand	0.0352	0.0000	45.476125	-103.355408	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-045-S_UTM13_07391	S_UTM13_07391	332.4	-	PER	South Fork Grand	0.0022	0.0000	45.476165	-103.355173	

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NWO-2009-00305-PIE-046-S_UTM13_07396	S_UTM13_07396	332.7	19	EPH	South Fork Grand	0.0488	0.0000	45.473164	-103.351739	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-047-S304HA001	S304HA001	334.0	13	INT	South Fork Grand	0.0526	0.0000	45.455697	-103.346670	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-048-S500HA009	S500HA009	338.8	21	INT	Upper Moreau	0.0640	0.0000	45.390058	-103.321480	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-049-S304HA002	S304HA002	339.2	12	EPH	Upper Moreau	0.0442	0.0000	45.385164	-103.316031	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-050-S500HA007	S500HA007	340.8	38	INT	Upper Moreau	0.1521	0.0000	45.367782	-103.295472	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-051-S_UTM13_07104	S_UTM13_07104	343.1	74	INT	Upper Moreau	0.1898	0.0000	45.348330	-103.257056	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-052-S_UTM13_07109	S_UTM13_07109	344.0	106	INT	Upper Moreau	0.2106	0.0000	45.340594	-103.242138	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-053-S_UTM13_06057	S_UTM13_06057	345.2	55	EPH	Upper Moreau	0.1227	0.0000	45.329378	-103.224353	Non-Section 10; Non-Wetland

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NWO-2009-00305-PIE-054-S0379	S0379	346.8	39	EPH	Upper Moreau	0.0940	0.0000	45.312797	-103.200856	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-055-S0380	S0380	347.1	25	EPH	Upper Moreau	0.0463	0.0000	45.310452	-103.195529	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-056-W23HA002	W23HA002	351.8	194	PEM	Upper Moreau	0.3532	0.0000	45.275068	-103.115396	Non-Section 10; Wetland
NWO-2009-00305-PIE-057-S312HA002	S312HA002	351.8	52	INT	Upper Moreau	0.0854	0.0000	45.274862	-103.115003	
NWO-2009-00305-PIE-058-S_UTM13_04876	S_UTM13_04876	352.4	17	INT	Upper Moreau	0.0530	0.0000	45.269471	-103.105076	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-059-S_UTM13_05005	S_UTM13_05005	353.4	21	EPH	Upper Moreau	0.0838	0.0000	45.261242	-103.088599	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-060-S_UTM13_05016	S_UTM13_05016	354.9	36	INT	Upper Moreau	0.0912	0.0000	45.246002	-103.066562	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-061-S_UTM13_05019	S_UTM13_05019	355.5	36	EPH	Upper Moreau	0.0824	0.0000	45.240104	-103.058218	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-062-S302HA002	S302HA002	357.2	5	EPH	Upper Moreau	0.0143	0.0000	45.223719	-103.033596	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-063-exp-WB-13507	exp-WB-13507	357.2	-	EPH	Upper Moreau	0.0077	0.0000	45.223821	-103.033423	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-064-W_UTM13_05228	W_UTM13_05228	359.2	69	PEM	Upper Moreau	0.1289	0.0000	45.205147	-103.002651	Non-Section 10; Wetland
NWO-2009-00305-PIE-065-S275BU001	S275BU001	361.0	109	PER	Upper Moreau	0.2731	0.0000	45.187384	-102.974796	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-066-S_UTM13_05257	S_UTM13_05257	361.6	38	INT	Upper Moreau	0.0913	0.0000	45.181668	-102.964848	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-067-S275PE001	S275PE001	363.5	18	EPH	Upper Moreau	0.0518	0.0000	45.163803	-102.936674	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-068-S275PE001	S275PE001	363.5	-	EPH	Upper Moreau	0.0056	0.0000	45.163779	-102.936335	
NWO-2009-00305-PIE-069-S_UTM13_06521	S_UTM13_06521	365.6	18	MABO	South Fork Moreau	0.0784	0.0000	45.142145	-102.905474	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-070-exp-WB-13509	exp-WB-13509	366.3	19	EPH	South Fork Moreau	0.0540	0.0000	45.134214	-102.896611	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-071-S_UTM13_05506	S_UTM13_05506	368.2	-	EPH	South Fork Moreau	0.0997	0.0000	45.116394	-102.868819	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-072-S_UTM13_05506	S_UTM13_05506	368.2	29	EPH	South Fork Moreau	0.1641	0.0000	45.116025	-102.868152	

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-073-S5APE002	S5APE002	368.9	118	PER	South Fork Moreau	0.3536	0.0000	45.109277	-102.858167	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-074-S_UTM13_05522	S_UTM13_05522	369.3	-	EPH	South Fork Moreau	0.0328	0.0000	45.105279	-102.852258	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-075-S_UTM13_05522	S_UTM13_05522	369.4	73	EPH	South Fork Moreau	0.0657	0.0000	45.104491	-102.851195	
NWO-2009-00305-PIE-076-S312PE001	S312PE001	370.6	19	INT	South Fork Moreau	0.0611	0.0000	45.091613	-102.835130	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-077-S_UTM13_05613	S_UTM13_05613	372.5	16	EPH	South Fork Moreau	0.0467	0.0000	45.074452	-102.805601	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-078-S_UTM13_05613	S_UTM13_05613	372.5	35	EPH	South Fork Moreau	0.0877	0.0000	45.073922	-102.804860	
NWO-2009-00305-PIE-079-S_UTM13_05620	S_UTM13_05620	373.4	33	EPH	South Fork Moreau	0.0736	0.0000	45.064611	-102.793339	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-080-S_UTM13_05731	S_UTM13_05731	377.0	28	EPH	Upper Moreau	0.0978	0.0000	45.042108	-102.731746	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-081-S_UTM13_05733	S_UTM13_05733	377.4	25	EPH	Upper Moreau	0.0604	0.0000	45.039638	-102.725591	Non-Section 10; Non-Wetland

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NWO-2009-00305-PIE-082-S_UTM13_05735	S_UTM13_05735	377.7	26	EPH	Upper Moreau	0.0867	0.0000	45.036648	-102.721774	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-083-S_UTM13_05738	S_UTM13_05738	377.8	44	EPH	Upper Moreau	0.1068	0.0000	45.035476	-102.720405	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-084-W_UTM13_0740	W_UTM13_0740	378.2	14	PEM	Upper Moreau	0.0222	0.0000	45.030998	-102.715403	Non-Section 10; Wetland
NWO-2009-00305-PIE-085-S_UTM13_05743	S_UTM13_05743	378.2	24	INT	Upper Moreau	0.0453	0.0000	45.030951	-102.715362	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-086-W_UTM13_0740	W_UTM13_0740	378.2	26	PEM	Upper Moreau	0.0546	0.0000	45.030885	-102.715295	Non-Section 10; Wetland
NWO-2009-00305-PIE-087-S_UTM13_05746	S_UTM13_05746	378.4	18	EPH	Upper Moreau	0.0542	0.0000	45.028655	-102.712784	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-088-S_UTM13_05748	S_UTM13_05748	378.5	32	INT	Upper Moreau	0.0831	0.0000	45.027725	-102.711723	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-089-S567ME001	S567ME001	380.8	3	EPH	Cherry	0.0083	0.0000	45.001714	-102.682232	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-090-S_UTM13_04944	S_UTM13_04944	381.6	37	EPH	Cherry	0.1056	0.0000	44.993086	-102.670715	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-091-S_UTM13_06001	S_UTM13_06001	381.7	25	EPH	Cherry	0.0588	0.0000	44.992304	-102.669757	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-092-S6AME001	S6AME001	383.2	21	INT	Cherry	0.0549	0.0000	44.976672	-102.648715	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-093-s7ame001	s7ame001	387.8	7	PER	Cherry	0.0774	0.0000	44.923588	-102.590742	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-094-W_UTM13_04983	W_UTM13_04983	388.1	12	PEM	Cherry	0.0603	0.0000	44.920981	-102.586857	Non-Section 10; Wetland
NWO-2009-00305-PIE-095-S_UTM13_08629	S_UTM13_08629	388.1	66	INT	Cherry	0.0551	0.0000	44.920947	-102.586841	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-096-W_UTM13_04983	W_UTM13_04983	388.1	11	PEM	Cherry	0.0790	0.0000	44.920897	-102.586862	Non-Section 10; Wetland
NWO-2009-00305-PIE-097-S_UTM13_07428	S_UTM13_07428	389.1	19	EPH	Cherry	0.0484	0.0000	44.912559	-102.570577	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-098-S_UTM13_07429	S_UTM13_07429	389.4	18	EPH	Cherry	0.0562	0.0000	44.910459	-102.565291	

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-099-W567ME001	W567ME001	398.5	42	PEM	Cherry	0.0766	0.0000	44.819492	-102.435110	Non-Section 10; Wetland
NWO-2009-00305-PIE-100-W567ME002	W567ME002	399.0	14	PEM	Cherry	0.0236	0.0000	44.815000	-102.428101	Non-Section 10; Wetland
NWO-2009-00305-PIE-101-W567ME003	W567ME003	399.7	37	PEM	Cherry	0.0671	0.0000	44.807009	-102.417971	Non-Section 10; Wetland
NWO-2009-00305-PIE-102-W567ME004	W567ME004	400.1	44	PEM	Cherry	0.0727	0.0000	44.803429	-102.413741	Non-Section 10; Wetland
NWO-2009-00305-PIE-103-S_UTM13_05156	S_UTM13_05156	400.1	7	INT	Cherry	0.0117	0.0000	44.803371	-102.413696	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-104-S_UTM13_05156	S_UTM13_05156	400.3	24	INT	Cherry	0.0730	0.0000	44.801248	-102.411234	
NWO-2009-00305-PIE-105-W0009	W0009	400.9	3	PEM	Cherry	0.0008	0.0000	44.793800	-102.402016	Non-Section 10; Wetland
NWO-2009-00305-PIE-106-S_UTM13_05171	S_UTM13_05171	400.9	81	EPH	Cherry	0.1464	0.0000	44.793670	-102.401923	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-107-W0009	W0009	401.0	47	PEM	Cherry	0.0691	0.0000	44.793561	-102.401744	Non-Section 10; Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-108-S_UTM13_05178	S_UTM13_05178	401.2	20	EPH	Cherry	0.0516	0.0000	44.790714	-102.397760	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-109-S_UTM13_05191	S_UTM13_05191	402.0	26	EPH	Cherry	0.1869	0.0000	44.782904	-102.386104	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-110-S_UTM13_05196	S_UTM13_05196	402.2	18	EPH	Cherry	0.0739	0.0000	44.780932	-102.382956	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-111-S_UTM13_04258	S_UTM13_04258	402.8	15	EPH	Cherry	0.0400	0.0000	44.774966	-102.375783	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-112-S275ME005	S275ME005	403.4	62	EPH	Cherry	0.1519	0.0000	44.767705	-102.370260	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-113-S275ME006	S275ME006	404.1	69	PER	Cherry	0.1389	0.0000	44.758684	-102.363190	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-114-S_UTM13_01124	S_UTM13_01124	410.0	-	EPH	Cherry	0.0104	0.0000	44.692569	-102.290925	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-115-S_UTM13_01124	S_UTM13_01124	410.1	120	EPH	Cherry	0.1506	0.0000	44.692102	-102.290128	
NWO-2009-00305-PIE-116-S_UTM13_01124	S_UTM13_01124	410.2	27	EPH	Cherry	0.0836	0.0000	44.690277	-102.287871	

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-117-S106ME008	S106ME008	410.9	6	INT	Cherry	0.0212	0.0000	44.684829	-102.276916	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-118-S_UTM13_14774	S_UTM13_14774	411.9	21	INT	Cherry	0.0545	0.0000	44.678479	-102.258529	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-119-S128ME001	S128ME001	413.1	-	PER	Cherry	0.0032	0.0000	44.669623	-102.239299	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-120-S103ME006	S103ME006	413.1	32	PER	Cherry	0.0722	0.0000	44.669747	-102.239188	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-121-S128ME001	S128ME001	413.1	-	PER	Cherry	0.0000	0.0000	44.669565	-102.239180	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-122-S_UTM13_14787	S_UTM13_14787	413.8	41	INT	Cherry	0.1330	0.0000	44.664189	-102.226011	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-123-W500ME001	W500ME001	422.1	-	PEM	Lower Cheyenne	0.0088	0.0000	44.578082	-102.112517	Non-Section 10; Wetland
NWO-2009-00305-PIE-124-S_UTM13_05918	S_UTM13_05918	423.9	12	INT	Lower Cheyenne	0.0385	0.0000	44.561041	-102.087671	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-125-s7ame005	s7ame005	424.1	16	INT	Lower Cheyenne	0.0517	0.0000	44.559280	-102.085565	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-126-S312ME006	S312ME006	425.5	26	INT	Lower Cheyenne	0.0642	0.0000	44.541951	-102.074357	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-127-exp-WB-13502	exp-WB-13502	425.6	33	INT	Lower Cheyenne	0.0923	0.0000	44.540386	-102.072692	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-128-exp-WB-13502	exp-WB-13502	425.7	-	INT	Lower Cheyenne	0.0000	0.0000	44.539795	-102.072237	
NWO-2009-00305-PIE-129-exp-WB-13503	exp-WB-13503	425.8	76	INT	Lower Cheyenne	0.0817	0.0000	44.538630	-102.071523	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-130-S312ME001	S312ME001	425.8	-	INT	Lower Cheyenne	0.0313	0.0000	44.538549	-102.071706	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-131-S312ME007	S312ME007	427.7	35	EPH	Lower Cheyenne	0.0996	0.0000	44.515931	-102.052359	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-132-S312ME008	S312ME008	428.1	99	EPH	Lower Cheyenne	0.2236	0.0000	44.515972	-102.046057	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-133-S312ME009	S312ME009	428.1	49	INT	Lower Cheyenne	0.1281	0.0000	44.515972	-102.044448	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-134-S312ME015	S312ME015	429.2	63	INT	Lower Cheyenne	0.1427	0.0000	44.513920	-102.023870	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-135-exp-WB-13508	exp-WB-13508	429.6	45	INT	Lower Cheyenne	0.0682[6]	0.0000	44.511204	-102.015857	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-136-S312ME013	S312ME013	429.6	11	INT	Lower Cheyenne	0.0359[6]	0.0000	44.511099	-102.015877	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-137-S312ME012	S312ME012	429.9	123	PER	Lower Cheyenne	0.1414	0.0000	44.508492	-102.013604	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-138-S312ME011	S312ME011	429.9	102	INT	Lower Cheyenne	0.1174	0.0000	44.508031	-102.013214	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-139-S312ME010	S312ME010	430.0	169	PER	Lower Cheyenne	0.1933	0.0000	44.506721	-102.012103	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-140-S312PN002	S312PN002	430.0	12	PER	Lower Cheyenne	0.0139	0.0000	44.506291	-102.011718	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-141-S312PN003	S312PN003	430.8	-	INT	Lower Cheyenne	0.0481	0.0000	44.495925	-102.002950	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-142-S312PN001	S312PN001	430.8	34	INT	Lower Cheyenne	0.1501	0.0000	44.497688	-102.001795	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-143-W312HK002	W312HK002	431.0	27	PEM	Lower Cheyenne	0.0371[6]	0.0000	44.497550	-101.999413	Non-Section 10; Wetland
NWO-2009-00305-PIE-144-S312HK001	S312HK001	433.6	-	INT	Lower Cheyenne	0.0106[6]	0.0000	44.482291	-101.955096	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-145-S8AHK003	S8AHK003	433.6	34	PER	Lower Cheyenne	0.0346[6]	0.0000	44.482335	-101.955023	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-146-W312HK001	W312HK001	434.6	-	PEM	Lower Cheyenne	0.0039	0.0000	44.480958	-101.933864	Non-Section 10; Wetland
NWO-2009-00305-PIE-147-W312HK001	W312HK001	434.7	-	PEM	Lower Cheyenne	0.3682	0.0000	44.481328	-101.933577	
NWO-2009-00305-PIE-148-W_UTM14_05132	W_UTM14_05132	437.9	-	PEM	Lower Cheyenne	5.2397E-07	0.0000	44.456281	-101.880379	Non-Section 10; Wetland
NWO-2009-00305-PIE-149-W_UTM14_05132	W_UTM14_05132	437.9	91	PEM	Lower Cheyenne	0.1291	0.0000	44.456149	-101.880521	Non-Section 10; Wetland
NWO-2009-00305-PIE-150-W_UTM14_05132	W_UTM14_05132	437.9	-	PEM	Lower Cheyenne	1.9250E-09	0.0000	44.456094	-101.880189	
NWO-2009-00305-PIE-151-W_UTM14_05132	W_UTM14_05132	437.9	32	PEM	Lower Cheyenne	0.0485	0.0000	44.455823	-101.880155	

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-152-W_UTM14_05132	W_UTM14_05132	437.9	27	PEM	Lower Cheyenne	0.0335	0.0000	44.455710	-101.879935	
NWO-2009-00305-PIE-153-W_UTM14_05132	W_UTM14_05132	438.0	-	PEM	Lower Cheyenne	0.0012	0.0000	44.455419	-101.879602	
NWO-2009-00305-PIE-154-W_UTM14_05132	W_UTM14_05132	438.0	-	PEM	Lower Cheyenne	0.0039	0.0000	44.455302	-101.879492	Non-Section 10; Wetland
NWO-2009-00305-PIE-155-W_UTM14_05132	W_UTM14_05132	438.0	-	PEM	Lower Cheyenne	1.0652E-06	0.0000	44.455192	-101.879269	
NWO-2009-00305-PIE-156-W_UTM14_08434	W_UTM14_08434	439.8	-	PEM	Lower Cheyenne	0.0238	0.0000	44.433107	-101.860090	Non-Section 10; Wetland
NWO-2009-00305-PIE-157-S_UTM14_08952	S_UTM14_08952	440.4	13	EPH	Lower Cheyenne	0.0372	0.0000	44.425119	-101.853113	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-158-S_UTM14_04940	S_UTM14_04940	442.6	20	EPH	Lower Cheyenne	0.0634	0.0000	44.398140	-101.830706	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-159-S_UTM14_04940	S_UTM14_04940	442.7	-	EPH	Lower Cheyenne	0.0022	0.0000	44.397471	-101.830310	
NWO-2009-00305-PIE-160-S_UTM14_04948	S_UTM14_04948	443.1	24	EPH	Lower Cheyenne	0.0551	0.0000	44.392634	-101.823127	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-161-S_UTM14_04973	S_UTM14_04973	445.8	17	INT	Lower Cheyenne	0.0527	0.0000	44.370012	-101.780381	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-162-S308HK002	S308HK002	448.4	48	PER	Lower Cheyenne	0.1284	0.0000	44.345171	-101.742950	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-163-S308HK001	S308HK001	448.5	13	INT	Lower Cheyenne	0.0426	0.0000	44.343708	-101.742117	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-164-S567HK001	S567HK001	449.7	-	EPH	Lower Cheyenne	2.1478E-06	0.0000	44.332063	-101.724269	
NWO-2009-00305-PIE-165-exp-WB-0257	exp-WB-0257	449.7	19	EPH	Lower Cheyenne	0.0517	0.0000	44.331895	-101.724274	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-166-W_UTM14_08431	W_UTM14_08431	452.9	24	PEM	Lower Cheyenne	0.0513	0.0000	44.305211	-101.673133	Non-Section 10; Wetland
NWO-2009-00305-PIE-167-S275HK003	S275HK003	452.9	82	EPH	Lower Cheyenne	0.1290	0.0000	44.305124	-101.672984	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-168-W_UTM14_08431	W_UTM14_08431	452.9	109	PEM	Lower Cheyenne	0.1816	0.0000	44.304937	-101.672755	Non-Section 10; Wetland
NWO-2009-00305-PIE-169-S_UTM14_14347	S_UTM14_14347	454.5	22	EPH	Lower Cheyenne	0.0646	0.0000	44.291828	-101.646476	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-170-S_UTM14_04739	S_UTM14_04739	459.6	29	EPH	Bad	0.0882	0.0000	44.246728	-101.564992	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-171-S_UTM14_04741	S_UTM14_04741	459.8	24	EPH	Bad	0.0741	0.0000	44.245232	-101.562081	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-172-W308HK001	W308HK001	462.0	103	PEM	Bad	0.1965	0.0000	44.225421	-101.527708	Non-Section 10; Wetland
NWO-2009-00305-PIE-173-S_UTM13_15946	S_UTM13_15946	465.3	-	INT	Bad	0.0100	0.0000	44.198651	-101.472943	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-174-S108HK001	S108HK001	465.3	28	Seasonal	Bad	0.1257	0.0000	44.198512	-101.472754	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-175-S_UTM14_08959	S_UTM14_08959	466.0	27	EPH	Bad	0.0692	0.0000	44.192529	-101.461730	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-176-S275HK002	S275HK002	469.4	166	EPH	Bad	0.4479	0.0000	44.165872	-101.404881	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-177-exp-WB-0258	exp-WB-0258	472.8	19	EPH	Bad	0.0385	0.0000	44.139136	-101.347877	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-178-S275HK001	S275HK001	475.2	86	EPH	Bad	0.1388	0.0000	44.123725	-101.306502	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-179-S_UTM14_05033	S_UTM14_05033	475.4	33	EPH	Bad	0.0825	0.0000	44.123006	-101.302988	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-180-S567HK003	S567HK003	477.1	24	EPH	Bad	0.0712	0.0000	44.118088	-101.268080	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-181-S_UTM14_06829	S_UTM14_06829	478.7	25	INT	Bad	0.0695	0.0000	44.112291	-101.238442	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-182-S_UTM14_08970	S_UTM14_08970	479.2	29	EPH	Bad	0.0639	0.0000	44.110969	-101.227659	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-183-S8AHK006	S8AHK006	483.7	31	PER	Bad	0.0717	0.0000	44.088301	-101.144296	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-184-W8AHK002	W8AHK002	485.3	-	PEM	Bad	0.0039	0.0000	44.079223	-101.115429	Non-Section 10; Wetland
NWO-2009-00305-PIE-185-W108HK001	W108HK001	485.3	84	PEM	Bad	0.1397	0.0000	44.079247	-101.115092	Non-Section 10; Wetland
NWO-2009-00305-PIE-186-S8AHK008	S8AHK008	486.0	52	PER	Bad	0.0597[6]	0.0000	44.074481	-101.104583	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-187-S_UTM14_08075	S_UTM14_08075	486.4	20	EPH	Bad	0.0609	0.0000	44.070983	-101.098008	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-188-S0320	S0320	487.4	25	EPH	Bad	0.0739	0.0000	44.062994	-101.082280	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-189-S0320	S0320	487.4	-	EPH	Bad	0.0055	0.0000	44.062875	-101.081647	
NWO-2009-00305-PIE-190-S_UTM14_08077	S_UTM14_08077	487.5	64	EPH	Bad	0.1501	0.0000	44.062365	-101.080356	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-191-S_UTM14_06745	S_UTM14_06745	490.1	32	INT	Bad	0.0794	0.0000	44.040802	-101.037257	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-192-S_UTM14_06741	S_UTM14_06741	491.2	17	EPH	Bad	0.0447	0.0000	44.035460	-101.017786	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-193-S_UTM14_06741	S_UTM14_06741	491.2	-	EPH	Bad	0.0015	0.0000	44.035578	-101.017537	
NWO-2009-00305-PIE-194-S_UTM14_88888	S_UTM14_88888	491.3	57	EPH	Bad	0.1074	0.0000	44.035090	-101.015443	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-195-S_UTM14_06735	S_UTM14_06735	492.7	111	INT	Bad	0.2430	0.0000	44.027475	-100.989185	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-196-S_UTM14_06735	S_UTM14_06735	492.9	59	INT	Bad	0.1795	0.0000	44.026439	-100.985806	

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-197-S308JO001	S308JO001	496.6	19	INT	Bad	0.0385	0.0000	44.008180	-100.914795	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-198-W308JO001	W308JO001	497.2	19	PEM	Bad	0.0309	0.0000	44.007989	-100.902893	
NWO-2009-00305-PIE-199-S313JO001	S313JO001	498.3	21	INT	Bad	0.0544	0.0000	44.002886	-100.882116	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-200-S108JO001	S108JO001	499.1	12	Seasonal	Bad	0.0311	0.0000	43.998202	-100.867854	
NWO-2009-00305-PIE-201-S_UTM14_08974	S_UTM14_08974	501.2	27	INT	Bad	0.0701	0.0000	43.983820	-100.831361	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-202-exp-WB-0256	exp-WB-0256	501.8	11	PER	Bad	0.0315	0.0000	43.980888	-100.819935	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-203-S23JO001	S23JO001	506.2	13	INT	Bad	0.0514	0.0000	43.977641	-100.734391	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-204-S308JO003	S308JO003	506.8	-	MABO	Bad	0.0138	0.0000	43.973181	-100.723224	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-205-W308JO002	W308JO002	507.4	35	PEM	Bad	0.0660	0.0000	43.970551	-100.713124	Non-Section 10; Wetland
NWO-2009-00305-PIE-206-S_UTM14_14167	S_UTM14_14167	509.1	35	EPH	Bad	0.1398	0.0000	43.960372	-100.683225	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-207-S275JO001	S275JO001	509.9	9	INT	Bad	0.0483	0.0000	43.957136	-100.667770	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-208-S_UTM14_14173	S_UTM14_14173	510.0	26	EPH	Bad	0.0746	0.0000	43.956419	-100.664960	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-209-S_UTM14_14177	S_UTM14_14177	511.2	57	EPH	Bad	0.3043	0.0000	43.949157	-100.643222	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-210-S_UTM14_06540	S_UTM14_06540	518.9	49	EPH	Lower White	0.1086	0.0000	43.888057	-100.524356	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-211-S_UTM14_06540	S_UTM14_06540	519.0	55	EPH	Lower White	0.0953	0.0000	43.887868	-100.523886	
NWO-2009-00305-PIE-212-S_UTM14_06534	S_UTM14_06534	519.6	32	INT	Lower White	0.1629	0.0000	43.883871	-100.513494	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-213-W_UTM14_06521	W_UTM14_06521	521.7	103	PEM	Medicine	0.1832	0.0000	43.868285	-100.475489	Non-Section 10; Wetland
NWO-2009-00305-PIE-214-S_UTM14_08534	S_UTM14_08534	521.7	21	INT	Medicine	0.0340	0.0000	43.868187	-100.475297	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-215-W_UTM14_06521	W_UTM14_06521	521.8	97	PEM	Medicine	0.1556	0.0000	43.868100	-100.475128	Non-Section 10; Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-216-S_UTM14_06515	S_UTM14_06515	523.7	14	INT	Lower White	0.0413	0.0000	43.855275	-100.440377	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-217-S_UTM14_06510	S_UTM14_06510	524.9	52	EPH	Lower White	0.1286	0.0000	43.847109	-100.420088	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-218-S_UTM14_06503	S_UTM14_06503	526.6	85	INT	Lower White	0.1652	0.0000	43.834992	-100.390105	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-219-S6ALY002	S6ALY002	534.4	15	INT	Lower White	0.0339	0.0000	43.781055	-100.253818	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-220-S567LY002	S567LY002	534.6	-	EPH	Lower White	0.0060	0.0000	43.780846	-100.250926	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-221-exp-WB-0259	exp-WB-0259	534.6	18	EPH	Lower White	0.0391	0.0000	43.780688	-100.250921	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-222-S_UTM14_06408	S_UTM14_06408	535.2	43	INT	Lower White	0.1288	0.0000	43.775080	-100.241356	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-223-S_UTM14_06399	S_UTM14_06399	537.5	70	INT	Lower White	0.1874	0.0000	43.750679	-100.210768	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-224-S567LY003	S567LY003	540.3	9	EPH	Lower White	0.0188	0.0000	43.715959	-100.181384	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-225-S567LY004	S567LY004	540.6	11	EPH	Lower White	0.0311	0.0000	43.713841	-100.177918	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-226-S567LY005	S567LY005	540.8	7	EPH	Lower White	0.0135	0.0000	43.711749	-100.174659	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-227-exp-WB-0260	exp-WB-0260	540.8	-	EPH	Lower White	0.0052	0.0000	43.711613	-100.174780	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-228-S7ALY001	S7ALY001	541.3	488	PER	Lower White	0.5575[6]	0.0000	43.705592	-100.170194	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-229-W_UTM14_08449	W_UTM14_08449	541.4	137	PSS	Lower White	0.1568[6]	0.0000	43.704739	-100.170128	Non-Section 10; Wetland
NWO-2009-00305-PIE-230-S567TR001	S567TR001	543.3	-	EPH	Lower White	0.0056	0.0000	43.679904	-100.159954	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-231-S106TR002	S106TR002	543.3	1	EPH	Lower White	0.0018	0.0000	43.679255	-100.159226	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-232-S567TR002	S567TR002	543.5	96	PER	Lower White	0.2280	0.0000	43.676721	-100.156521	

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-233-S567TR003	S567TR003	543.7	8	EPH	Lower White	0.0235	0.0000	43.674863	-100.154678	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-234-S_UTM14_06291	S_UTM14_06291	546.6	33	EPH	Lower White	0.0785	0.0000	43.639251	-100.126057	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-235-S_UTM14_06292	S_UTM14_06292	546.8	31	INT	Lower White	0.0616	0.0000	43.636691	-100.124176	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-236-S7ATR002	S7ATR002	547.3	34	INT	Lower White	0.1166	0.0000	43.629180	-100.120626	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-237-S_UTM14_06248	S_UTM14_06248	550.2	35	EPH	Lower White	0.0912	0.0000	43.595505	-100.087909	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-238-S_UTM14_08552	S_UTM14_08552	552.4	58	EPH	Lower White	0.2085	0.0000	43.567452	-100.072416	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-239-S_UTM14_08552	S_UTM14_08552	552.5	63	EPH	Lower White	0.1292	0.0000	43.565413	-100.070862	
NWO-2009-00305-PIE-240-W_UTM14_06217	W_UTM14_06217	553.9	99	PEM	Lower White	0.1665	0.0000	43.547994	-100.057717	Non-Section 10; Wetland
NWO-2009-00305-PIE-241-S_UTM14_08559	S_UTM14_08559	553.9	29	INT	Lower White	0.0468	0.0000	43.547843	-100.057595	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-242-W_UTM14_06217	W_UTM14_06217	553.9	85	PEM	Lower White	0.1538	0.0000	43.547706	-100.057510	Non-Section 10; Wetland
NWO-2009-00305-PIE-243-S_UTM14_06212	S_UTM14_06212	555.7	27	INT	Lower White	0.0661	0.0000	43.525816	-100.040053	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-244-S_UTM14_06206	S_UTM14_06206	555.9	35	EPH	Lower White	0.1329	0.0000	43.523323	-100.038944	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-245-W_UTM14_06201	W_UTM14_06201	557.6	339	PEM	Lower White	0.6110	0.0000	43.501758	-100.024920	Non-Section 10; Wetland
NWO-2009-00305-PIE-246-S_UTM14_08586	S_UTM14_08586	557.6	34	INT	Lower White	0.0561	0.0000	43.501308	-100.024543	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-247-S_UTM14_06175	S_UTM14_06175	561.8	21	EPH	Lower White	0.0526	0.0000	43.450515	-99.981197	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-248-S_UTM14_06175	S_UTM14_06175	561.8	-	EPH	Lower White	0.0012	0.0000	43.449710	-99.980539	
NWO-2009-00305-PIE-249-S_UTM14_14369	S_UTM14_14369	564.6	20	INT	Lower White	0.0735	0.0000	43.415499	-99.952094	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-250-S_UTM14_06163	S_UTM14_06163	565.1	41	EPH	Lower White	0.0949	0.0000	43.411114	-99.947148	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-251-S7ATR004	S7ATR004	570.2	15	INT	Lower White	0.0343	0.0000	43.351318	-99.888969	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-252-S7ATR003	S7ATR003	570.6	15	INT	Lower White	0.0386	0.0000	43.345993	-99.883603	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-253-W_UTM14_08509	W_UTM14_08509	577.0	75	PEM	Lower White	0.1379	0.0000	43.271369	-99.812638	Non-Section 10; Wetland
NWO-2009-00305-PIE-254-S_UTM14_06121	S_UTM14_06121	577.0	26	INT	Lower White	0.0626	0.0000	43.271189	-99.812532	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-255-W_UTM14_08509	W_UTM14_08509	577.0	39	PEM	Lower White	0.1316	0.0000	43.271028	-99.812414	Non-Section 10; Wetland
NWO-2009-00305-PIE-256-W_UTM14_06114	W_UTM14_06114	577.8	107	PEM	Lower White	0.1786	0.0000	43.261572	-99.802687	Non-Section 10; Wetland
NWO-2009-00305-PIE-257-W_UTM14_06111	W_UTM14_06111	578.5	321	PEM	Lower White	0.4254	0.0000	43.253427	-99.796730	Non-Section 10; Wetland
NWO-2009-00305-PIE-258-W104TR001	W104TR001	579.2	233	PEM	Lower White	0.3498	0.0000	43.247368	-99.785753	Non-Section 10; Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-259-W_UTM14_06103	W_UTM14_06103	580.8	-	PEM	Ponca	1.1023E-05	0.0000	43.227545	-99.767835	Non-Section 10; Wetland
NWO-2009-00305-PIE-260-S5ATR002	S5ATR002	581.1	11	INT	Ponca	0.0281	0.0000	43.224254	-99.766275	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-261-S_UTM14_08574	S_UTM14_08574	584.5	26	EPH	Ponca	0.0658	0.0000	43.185001	-99.727421	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-262-S_UTM14_06042	S_UTM14_06042	585.4	18	EPH	Ponca	0.0444	0.0000	43.174404	-99.719123	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-263-S275TR001	S275TR001	595.4	6	INT	Keya Paha	0.0182	0.0000	43.061107	-99.602641	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-264-S_UTM14_05998	S_UTM14_05998	596.4	12	INT	Keya Paha	0.0313	0.0000	43.050902	-99.588576	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-265-S_UTM14_05994	S_UTM14_05994	597.1	21	EPH	Keya Paha	0.0759	0.0000	43.043316	-99.580941	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-266-S_UTM14_05990	S_UTM14_05990	597.5	-	EPH	Keya Paha	0.0004	0.0000	43.038604	-99.576612	Non-Section 10; Non-Wetland

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Waters Name	Feature ID	Milepost	Crossing Distance[1] (Feet)	Type[2]	HUC Sub Basin[3]	Temporary Disturbance[4] (Acres)	Permanent Disturbance[5] (Acres)	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-267-W275TR001	W275TR001	597.5	-	PEM	Keya Paha	0.0150	0.0000	43.038597	-99.576509	Non-Section 10; Wetland
NWO-2009-00305-PIE-268-S_UTM14_05990	S_UTM14_05990	597.5	24	EPH	Keya Paha	0.0400	0.0000	43.038617	-99.576301	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-269-S_UTM14_05988	S_UTM14_05988	597.7	39	EPH	Keya Paha	0.1135	0.0000	43.035623	-99.574127	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-270-S_UTM14_05977	S_UTM14_05977	598.6	35	EPH	Keya Paha	0.0784	0.0000	43.025079	-99.563088	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE-271-S5ATR005	S5ATR005	600.0	60	Seasonal	Keya Paha	0.1108	0.0000	43.008285	-99.548472	Non-Section 10; Non-Wetland

[1] Crossing distance measured at proposed pipeline centerline. A dash (-) indicates the feature is within the construction right-of-way, but does not cross the pipeline centerline.

[2] EPH = Ephemeral Waterbody; INT = Intermittent Waterbody; MABO = Man-made Waterbody, PEM = Palustrine Emergent Marsh; PER = Perennial Waterbody; PSS = Palustrine Scrub Shrub Wetland; Seasonal = Seasonal Waterbody

[3] HUC Sub Basin = Name of 8-Digit USGS Hydrologic Unit Code.

[4] Temporary wetland impacts based on standard 110-foot wide temporary construction right-of-way.

[5] Permanent impacts is based on standard 50-ft wide maintained pipeline easement.

[6] Temporary impact is based on a 50-foot wide temporary construction right-of-way

Waters Name	FEATURE ID	ACCESS ROAD ID	TYPE[1]	CROSSING LENGTH (Feet)[3]	ACRES[2]	HUC SUB BASIN[4]	LATITUDE (WGS84)	LONGITUDE (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-272-S500HA012	S500HA012	CAR-163	INT	59	0.1450[5]	Upper Little Missouri	45.863566	-103.970169	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-273-S128HA002	S128HA002	CAR-163	INT	-	0.0019	Upper Little Missouri	45.863613	-103.989520	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-274-W109HA001	W109HA001	CAR-163	PEM	-	0.0011	Missouri-Little Missouri	45.863519	-103.987676	Non-Section 10; Wetland
NWO-2009-00305-PIE-275-W109HA001	W109HA001	CAR-163	PEM	46	0.0588	Missouri-Little Missouri	45.863552	-103.989438	Non-Section 10; Wetland
NWO-2009-00305-PIE-276-S109HA003	S109HA003	CAR-151	EPH	6	0.0043	Upper Little Missouri	45.833982	-103.933640	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-277-S109HA002	S109HA002	CAR-150	PER	53	0.0324	Upper Little Missouri	45.833189	-103.929441	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-278-S104HA004	S104HA004	CAR-041	INT	29	0.0203	Upper Little Missouri	45.801513	-103.872007	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-279-W302HA001	W302HA001	CAR-041	PEM	57	0.0387	Missouri-Little Missouri	45.801494	-103.871820	Non-Section 10; Wetland
NWO-2009-00305-PIE-280-S123HA004	S123HA004	CAR-173	PER	16	0.0109	South Fork Grand	45.733219	-103.611064	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-281-exp-WB-13021	exp-WB-13021	CAR-173	INT	-	0.0021	South Fork Grand	45.733544	-103.674780	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-282-exp-WB-13021	exp-WB-13021	CAR-173	INT	-	0.0011	South Fork Grand	45.733536	-103.674499	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-283-W302HA006	W302HA006	CAR-230	PEM	1	0.0082	Missouri-Oahe	45.630783	-103.640971	Non-Section 10; Wetland
NWO-2009-00305-PIE-284-S124HA009	S124HA009	CAR-231	PER	68	0.0468	South Fork Grand	45.532327	-103.422470	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-285-exp-WB-13031	exp-WB-13031	CAR-231	INT	-	0.0044	South Fork Grand	45.521617	-103.420687	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-286-exp-WL-13008	exp-WL-13008	CAR-231	PEM	-	0.0034	Missouri-Oahe	45.548246	-103.422604	Non-Section 10; Wetland
NWO-2009-00305-PIE-287-S302HA003	S302HA003	CAR-232	EPH	8	0.0053	South Fork Grand	45.414600	-103.278739	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-288-exp-WB-13034	exp-WB-13034	CAR-232	PER	16	0.0250	Upper Moreau	45.357577	-103.265116	Non-Section 10; Non- Wetland

Waters Name	FEATURE ID	ACCESS ROAD ID	TYPE[1]	CROSSING LENGTH (Feet)[3]	ACRES[2]	HUC SUB BASIN[4]	LATITUDE (WGS84)	LONGITUDE (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-289-S302HA005	S302HA005	CAR-232	INT	-	0.0001	South Fork Grand	45.408737	-103.278780	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-290-exp-WB-13032	exp-WB-13032	CAR-232	PER	-	0.0020	Upper Moreau	45.357973	-103.258790	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-291-S302HA006	S302HA006	CAR-233	EPH	3	0.0022	Upper Moreau	45.341538	-103.175692	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-292-S302HA007	S302HA007	CAR-233	EPH	6	0.0039	Upper Moreau	45.339395	-103.176870	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-293-S302HA008	S302HA008	CAR-233	EPH	5	0.0033	Upper Moreau	45.341095	-103.196669	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-294-W302HA004	W302HA004	CAR-233	PEM	-	0.0027	Missouri-Oahe	45.340889	-103.173139	Non-Section 10; Wetland
NWO-2009-00305-PIE-295-W302HA005	W302HA005	CAR-233	PEM	217	0.1474	Missouri-Oahe	45.329672	-103.218494	Non-Section 10; Wetland
NWO-2009-00305-PIE-296-S_UTM13_09978	S_UTM13_09978	CAR-048A	EPH	16	0.0109	South Fork Moreau	45.089347	-102.845819	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-297-S_UTM13_09963	S_UTM13_09963	CAR-048A	EPH	-	0.0027	South Fork Moreau	45.082407	-102.887286	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-298-S_UTM13_09972	S_UTM13_09972	CAR-048A	EPH	-	0.0007	South Fork Moreau	45.082578	-102.870217	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-299-exp-WB-13512	exp-WB-13512	CAR-048A	EPH	-	0.0044	South Fork Moreau	45.082650	-102.870210	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-300-S_UTM13_09965	S_UTM13_09965	CAR-048A	EPH	-	0.0036	South Fork Moreau	45.082697	-102.882398	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-301-S275ME004	S275ME004	CAR-159	Seasonal	21	0.0142	Cherry	44.954764	-102.636904	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-302-W275ME005	W275ME005	CAR-159	PEM	-	0.0006	Cheyenne	44.964377	-102.651781	Non-Section 10; Wetland
NWO-2009-00305-PIE-303-W275ME003	W275ME003	CAR-159	PEM	-	0.0053	Cheyenne	44.960544	-102.646835	Non-Section 10; Wetland
NWO-2009-00305-PIE-304-W275ME002	W275ME002	CAR-159	PEM	-	0.0002	Cheyenne	44.954348	-102.631473	Non-Section 10; Wetland
NWO-2009-00305-PIE-305-S308ME001	S308ME001	CAR-167	EPH	6	0.0040	Cherry	44.748819	-102.372631	Non-Section 10; Non- Wetland

Keystone XL Pipeline Project – Pre-Jurisdictional Determination Form for Access Road Crossings in the USACE Omaha District, Montana

Waters Name	FEATURE ID	ACCESS ROAD ID	TYPE[1]	CROSSING LENGTH (Feet)[3]	ACRES[2]	HUC SUB BASIN[4]	LATITUDE (WGS84)	LONGITUDE (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE-306-S307PN001	S307PN001	CAR-079A	PER	24	0.0168	Lower Cheyenne	44.501582	-102.002064	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-307-S307HK001	S307HK001	CAR-313	EPH	21	0.0142	Lower Cheyenne	44.472832	-101.950235	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-308-W275HK001	W275HK001	CAR-052A	PEM	-	0.0100	Missouri-White	44.119735	-101.247845	Non-Section 10; Wetland
NWO-2009-00305-PIE-309-S308HK003	S308HK003	CAR-235	EPH	8	0.0047	Bad	44.067309	-101.120593	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-310-S308HK003	S308HK003	CAR-235	EPH	-	0.0029	Bad	44.065178	-101.117677	Non-Section 10; Non- Wetland
NWO-2009-00305-PIE-311-S106TR001	S106TR001	CAR-236	INT	22	0.0161	Lower White	43.675418	-100.152315	Non-Section 10; Non- Wetland

[1] EPH = Ephemeral Waterbody; INT = Intermittent Waterbody; PEM = Palustrine Emergent Marsh; PER = Perennial Waterbody; Seasonal = Seasonal Waterbody.

[2] Crossing distance measured at proposed access road centerline. A dash (-) indicates the feature is within the construction right-of-way, but does not cross the access road centerline.

[3] Feature acreage based on assumed width of 30 feet for access roads.

[4] HUC Sub Basin = Name of 8-Digit USGS Hydrologic Unit Code.

[5] Permanent impacts at this crossing will be kept under 0.10 of an acre through engineering controls.

Waters Name	Facility ID	Feature ID	FACILITY NAME	Type[1]	Approximate Length Of Feature[2] (Feet)	Feature Acreage[3]	HUC Sub Basin[4]	Latitude (WGS84)	Longitude (WGS84)	Class Of Aquatic Resource
NWO-2009-00305-PIE Site 312	Harrold_14	S275HU003	Harrold Rail Siding	MABO	344.27	0.5810[5]	Medicine Knoll	44.524382	-99.759279	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE Site 313	Harrold_14	S275HU002	Harrold Rail Siding	MABO	1717.24	8.5164[5]	Medicine Knoll	44.523895	-99.754061	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE Site 314	Harrold_14	S275HU002	Harrold Rail Siding	MABO	578.45	0.6299[5]	Medicine Knoll	44.524480	-99.754345	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE Site 315	Harrold_14	S275HU002	Harrold Rail Siding	MABO	569.22	0.5032[5]	Medicine Knoll	44.524502	-99.752195	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE Site 316	Harrold_14	S275HU001	Harrold Rail Siding	MABO	729.01	3.3945[5]	Medicine Knoll	44.523579	-99.749846	Non-Section 10; Non-Wetland
NWO-2009-00305-PIE Site 317	CC02a SITE 1	W312HA001	Harding Construction Camp	PEM	329.09	0.9967[5]	South Fork Grand	45.583052	-103.695499	Non-Section 10; Wetland

1 MABO = Man-made Waterbody; PEM = Palustrine Emergent Marsh.

2 Approximate length of feature (feet) measured across the feature at the widest possible linear distance within the proposed facility boundary.

3 Feature acreage within proposed facility boundary.

4 HUC Sub Basin = Name of 8-Digit USGS Hydrologic Unit Code.

5 The waterbodies within Hardold_14 and the wetland identified within CC02a Site 1 will be avoided by construction activities; therefore there will be no temporary or permanent impact to the waterbody or wetland

APPENDIX G

Construction, Mitigation, and Reclamation Plan

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KEYSTONE XL PROJECT

CONSTRUCTION, MITIGATION, AND RECLAMATION PLAN

April 2012
Rev. 4

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9.0 DRAWINGS AND FIGURES

1.0 INTRODUCTION

The construction, mitigation, and reclamation requirements described in this Plan apply to work on all of TransCanada Keystone Pipeline, L.P.'s (Keystone's) Keystone XL Project (Project) lands, including the following;

- uplands, including agricultural (cultivated or capable of being cultivated) lands, pasture lands; range lands; grass lands; forested lands; lands in residential, commercial, or industrial areas; lands in public rights of way; and lands in private rights-of-way;
- wetlands; and
- waterbodies and riparian areas.

Keystone, during the construction, operation, and maintenance of the Project, shall implement the construction, mitigation, and reclamation actions contained in this Plan to the extent that they do not conflict with the requirements of any applicable federal, state, or local rules and regulations, or other permits or approvals that are applicable to the Project. Additionally, Keystone may deviate from specific requirements of this Plan on specific private lands as agreed to by landowners or as required to suit actual site conditions as determined and directed by Keystone. All work must be in compliance with federal, state, and local permits.

The Project will be designed, constructed, operated and maintained in a manner that meets or exceeds applicable industry standards and regulatory requirements. Keystone's Integrity Management Plan and Emergency Response Plan outlines the preventative maintenance, inspection, line patrol, leak detection systems, SCADA, and other pipeline integrity management procedures to be implemented during operation of the Project.

2.0 GENERAL CONDITIONS

2.1 Training

Experienced, well-trained personnel are essential for the successful implementation of this Plan. Keystone and its Contractors shall undergo prevention and response, as well as safety training. The program shall be designed to improve awareness of safety requirements, pollution control laws and procedures, and proper operation and maintenance of equipment.

The construction contractor (Contractor), and all of his subcontractors shall ensure that persons engaged in Project construction are informed of the construction issues and concerns and that they attend and receive training regarding these requirements as well as all laws, rules and regulations applicable to the work. Prior to construction, all Project personnel will be trained on environmental permit requirements and environmental specifications, including fuel handling and storage, cultural resource protection methods, stream and wetland crossing requirements, and sensitive species protection measures.

Different levels of training shall be required for different groups of Contractor personnel. Contractor supervisors, managers, field foremen, and other Contractor personnel designated by Keystone shall attend a comprehensive environmental training session. All other Contractor personnel shall attend a training session before the beginning of construction and during construction as environmental issues and incidents warrant. Additional training sessions shall be held for newly assigned personnel prior to commencing work on the Project.

All Contractor personnel shall attend the training session prior to entering the construction right-of-way. All Contractor personnel shall sign an acknowledgement of having attended the appropriate level of training and shall display a hard hat sticker that signifies attendance at environmental training. In order to ensure successful compliance, Contractor personnel shall attend repeat or supplemental training if compliance is not satisfactory or as new, significant new issues arise.

All visitors and any other personnel without specific work assignments shall be required to attend a safety and environmental awareness orientation.

2.2 Environmental Inspection

Keystone will use Environmental Inspectors on each construction spread. The Environmental Inspectors will review the Project activities daily for compliance with state, federal and local regulatory requirements. The Environmental Inspectors will have the authority to stop specific tasks as approved by the Chief Inspector. They can also order corrective action in the event that construction activities violate the provisions of this Plan, landowner requirements, or any applicable permit requirements.

2.3 Advance Notice of Access to Property Prior to Construction

Prior to initially accessing landowners' property, Keystone shall provide the landowner or tenant with a minimum of 24 hours prior notice unless otherwise negotiated with the landowner and as described in the Project line list). Additionally, the landowner or tenant shall be provided with Keystone contact information. Landowners may utilize contact information to inform Keystone of any concerns related to construction.

Prior notice shall consist of a personal contact, a telephone contact, or delivery of written notice to the landowner to inform the landowner of whereby the landowner or tenant is informed of Keystone's intent to initially access the land. The landowner or tenant need not acknowledge receipt of written notice before Keystone can enter the landowner's property.

Keystone will coordinate with managers of public lands to reduce conflicts between construction activities and recreational uses. Keystone will consult with land managers on state and federal lands regarding any necessary construction and maintenance restrictions consistent with management and use of such lands. Damages from disruption of recreational uses of private lands will be the subject of compensation negotiations with individual landowners.

If pipeline activities occur during the winter season Keystone will consult with the appropriate regulatory agencies to establish the appropriate protective measures to avoid or mitigate wildlife seasonal, timing or migration concerns.

2.4 Other Notifications

The Contractor shall notify, in writing, both Keystone and the authority having jurisdiction over any road, railroad, canal, drainage ditch, river, foreign pipeline, or other utility to be crossed by the pipeline at least 48 hours (excluding Saturdays, Sundays, and statutory holidays), or as specified on the applicable permit(s), prior to commencement of pipeline construction, in order that the said authority may appoint an inspector to ensure that the crossing is constructed in a satisfactory manner.

The Contractor shall notify Keystone immediately of any spill of a potentially hazardous substance that creates a sheen on a wetland or waterbody, as well as any existing soil contamination discovered during construction.

The Contractor shall immediately notify Keystone of the discovery of previously unreported historic property, other significant cultural materials, or suspected human remains uncovered during pipeline construction.

The Contractor shall immediately notify Keystone of a Project-related injury to or mortality of a threatened or endangered animal.

2.5 Damages to Private Property

Pipeline construction activities shall be confined to the construction right-of-way, temporary work space, additional temporary work space, and approved access routes.

Keystone shall reasonably compensate landowners for any construction-related damages caused by Keystone which occur on or off of the established pipeline construction right-of-way.

Keystone shall reasonably compensate landowners for damages to private property caused by Keystone beyond the initial construction and reclamation of the pipeline, to include those damages caused by Keystone during future construction, operation, maintenance, and repairs relating to the pipeline.

2.6 Appearance of Worksite

The construction right-of-way shall be maintained in a clean, neat condition at all times. At no time shall litter be allowed to accumulate at any location on the construction right-of-way. The Contractor shall provide a daily garbage detail with each major construction crew to keep the construction right-of-way clear of trash, pipe banding and spacers, waste from coating products, welding rods, timber skids, defective materials and all construction and other debris immediately behind construction operations unless otherwise approved by Keystone. Paper from wrapping or coating products or lightweight items shall not be permitted to be scattered by the wind.

The traveled surfaces of roads, streets, highways, etc. (and railroads when applicable) shall be cleaned free of mud, dirt, or any debris deposited by equipment traversing these roads or exiting from the construction right-of-way.

2.7 Access

Prior to the pipeline's installation, Keystone and the landowner shall reach a mutually acceptable agreement on the route that shall be utilized by the Contractor for entering and exiting the pipeline construction right-of-way should access to the construction right-of-way not be practicable or feasible from adjacent segments of the pipeline construction right-of-way, public road, or railroad right-of-way.

All construction vehicles and equipment traffic shall be confined to the public roads, private roads acquired for use by Keystone, and the construction right-of-way. If temporary private access roads are constructed, they shall be designed to maintain proper drainage and shall be built to minimize soil erosion.

Sufficiently sized gaps shall be left in all spoil and topsoil wind rows and a hard or soft plug shall be left in the trench at all temporary private access roads and obvious livestock or wildlife trails unless the landowner agrees prior to construction that these access points can be blocked during construction.

All construction-related private roads and access points to the right-of-way shall be marked with signs. Any private roads not to be utilized during construction shall also be marked.

2.8 Aboveground Facilities

Locations for aboveground facilities shall be selected in a manner so as to be as unobtrusive as reasonably possible to ongoing agricultural or other landowner activities occurring on the lands adjacent to the facilities. If it is not feasible, to avoid interference, such activities shall be located so as to incur the least hindrance to the adjacent agricultural operations (i.e., located in field corners or areas where at least one side is not used for cropping purposes) provided the location is consistent with the design constraints of the pipeline. Aboveground facilities shall avoid floodplains and wetlands to the maximum extent possible. Additionally, they shall be located to avoid existing drain tile systems to the extent possible. To further reduce visual impacts from aboveground pipeline facilities and structures, Keystone will comply with standard industry painting practices with respect to aboveground facilities. Keystone will address any visual aesthetics issues with landowners in individual consultations.

2.9 Minimum Depth of Cover

The pipeline shall be installed so that the top of the pipe and coating is a minimum depth of 5 feet below the bottom of waterbodies including rivers, creeks, streams, ditches, and drains. This depth shall normally be maintained

over a distance of 15 feet on each side of the waterbody measured from the top of the defined stream channel. If concrete weights or concrete coated pipe is utilized for negative buoyancy of the pipeline, the minimum depth of cover shall be measured from the top of the concrete to the original ground contour. The following table indicates standard depths that would apply to pipeline construction.

Location	Normal Excavation (inches)	For Rock Excavation (inches
Most areas	48	36
All waterbodies	60	36
Dry creeks, ditches, drains, washes, gullies, etc.	60	36
Drainage ditches at public roads and railroads	60	48

Depth of cover requirements may be modified by Keystone based on site-specific conditions. However, all depths shall be in compliance with all established codes.

2.10 Non-Hazardous Waste Disposal

Non-hazardous pipeline construction wastes include human waste, trash, pipe banding and spacers, waste from coating products, welding rods, timber skids, cleared vegetation, stumps, and rock.

All waste which contains (or at any time contained) oil, grease, solvents, or other petroleum products falls within the scope of the oil and hazardous substances control, cleanup, and disposal procedures. This material shall be segregated for handling and disposal as hazardous wastes.

The Contractor shall be responsible for ensuring that human wastes are handled and disposed of exclusively by means of portable, self-contained toilets during all construction operations. Wastes from these units shall be collected by a licensed contractor for disposal only at licensed and approved facilities.

The Contractor shall remove all trash from the construction right-of-way on a daily basis unless otherwise approved or directed by Keystone.

The Contractor shall dispose of HDD drill cuttings and drilling mud at a Keystone-approved location. Disposal options may include spreading over the construction right-of-way in an upland location approved by Keystone, or hauling to an approved licensed landfill or other site approved by Keystone.

The Contractor shall remove all extraneous vegetative, rock, and other natural debris from the construction right-of-way by the completion of cleanup

The Contractor shall remove all trash and wastes from Contractor yards, and Pipe Stockpipe Sites, and staging areas when work is completed at each location.

The Contractor shall dispose of all waste materials at licensed waste disposal facilities. Wastes shall not be disposed of in any other fashion such as un-permitted burying or burning.

2.11 Hazardous Wastes

The Contractor shall ensure that all hazardous and potentially hazardous materials are transported, stored, and handled in accordance with all applicable legislation. Workers exposed to or required to handle dangerous materials shall be trained in accordance with the applicable regulator and the manufacturer's recommendations.

The Contractor shall dispose of all hazardous materials at licensed waste disposal facilities. Hazardous wastes shall not be disposed of in any other fashion such as un-permitted burying or burning.

All transporters of oil, hazardous substances, and hazardous wastes shall be licensed and certified according to the applicable state vehicle code. Incidents on public highways shall be reported to the appropriate agencies.

All hazardous wastes being transported off-site shall be manifested. The manifest shall conform to requirements of the appropriate state agency. The transporter shall be licensed and certified to handle hazardous wastes on the public highways. The vehicles as well as the drivers must conform to all applicable vehicle codes for transporting hazardous wastes. The manifest shall conform to 49 CFR Parts 172.101, 172.202, and 172.203.

If toxic or hazardous waste materials or containers are encountered during construction, the Contractor shall stop work immediately to prevent disturbing or further disturbing the waste material and shall immediately notify Keystone. The Contractor shall not restart work until clearance is granted by Keystone.

2.12 Noise Control

The Contractor shall minimize noise during non-daylight hours and within 1 mile of residences or other noise-sensitive areas such as hospitals, motels or campgrounds. Keystone shall abide by all applicable noise regulations regarding noise near residential and commercial/industrial areas. The Contractor shall provide notice to Keystone if noise levels are expected to exceed bylaws for a short duration. Keystone will give advanced notice to landowners within 500 feet of right-of-way prior to construction, limit the hours during which construction activities with high-decibel noise levels are conducted, coordinate work schedules, and ensure that construction proceeds quickly through such areas. The Contractor shall minimize noise in the immediate vicinity of herds of livestock or poultry operations, which are particularly sensitive to noise.

Keystone will set up a toll-free telephone line for landowners to report any construction noise-related issues.

2.13 Weed Control

Keystone will prepare a weed management plan for each state crossed by the project, as required. In general, these plans will consider the following measures listed below.

Prior to mobilization for the Project, the Contractor shall thoroughly clean all construction equipment, including timber mats, prior to moving the equipment to the job site to limit the potential for the spread of noxious weeds, insects and soil-borne pests. The Contractor shall clean the equipment with high-pressure washing equipment.

Prior to construction, Keystone will mark all areas of the right-of-way which contain infestations of noxious, invasive species or soil-borne pests. Such marking will clearly indicate the limits of the infestation along the right-of-way. During construction, the Contractor shall clean the tracks, tires, and blades of equipment by hand (track shovel) or compressed air to remove excess soil prior to movement of equipment out of weed or soil-borne pest infested areas, or utilize cleaning stations to remove vegetative materials using water under high pressure (see detail Drawings 30 and 31).

In areas of isolated weed populations, the Contractor shall strip topsoil from the full width of the construction right-of-way and store the topsoil separately from other topsoil and subsoil. The Environmental Inspectors will identify these locations in the field prior to grading activities.

The Contractor shall use mulch and straw or hay bales that are free of noxious weeds for temporary erosion and sediment control.

The Contractor shall implement pre-construction treatments such as mowing prior to seed development or herbicide application to areas of noxious weed infestation prior to other clearing, grading, trenching, or other soil disturbing work at locations identified in the construction drawings.

Keystone will implement Best Management Practices (BMPs) for conducting vegetation control where necessary before and after construction. Typical agricultural herbicides, developed in consultation with county or state regulatory agencies, will be used. Herbicide types will be determined based on the weed species requiring control. The Contractor shall apply herbicides, where required, within one week, or as deemed necessary for optimum mortality success, prior to disturbing the area by clearing, grading, trenching, or other soil disturbing work. Herbicides shall be applied by applicators appropriately licensed or certified by the state in which the work is conducted. All herbicides applied prior to construction shall be non-residual or shall have a significant residual effect no longer than 30 days. Herbicides applied during construction shall be non-residual. Keystone will implement BMPs in the use of pesticides and herbicides along the pipeline corridor to reduce potential impacts to avian and wildlife species.

The Contractor shall not use herbicides in or within 100 feet of a wetland or waterbody.

After pipeline construction, on any construction right-of-way over which Keystone will retain control over the surface use of the land after construction (i.e., valve sites, metering stations, pump stations, etc.), Keystone shall provide for weed control to limit the potential for the spread of weeds onto adjacent lands used for agricultural purposes. Any weed control spraying performed by Keystone shall be done by a state-licensed pesticide applicator.

Keystone shall be responsible for reimbursing all reasonable costs incurred by owners of land adjacent to aboveground facilities when the landowners must control weeds on their land which can be reasonably determined to have spread from land occupied by Keystone's aboveground facilities.

2.14 Dust Control

The Contractor shall at all-time control airborne dust levels during construction activities to levels acceptable to Keystone. The Contractor shall employ water trucks, sprinklers or calcium chloride as necessary to reduce dust to acceptable levels. Utilization of calcium chloride is limited to roads.

Dust shall be strictly controlled where the work approaches dwellings, farm buildings, and other areas occupied by people and when the pipeline parallels an existing road or highway. This shall also apply to access roads where dust raised by construction vehicles may irritate or inconvenience local residents. The speed of all Contractor vehicles shall be controlled in these areas. Emissions from construction equipment combustion, open burning, and temporary fuel transfer systems and associated tanks will be controlled to the extent required by state and local agencies through the permit process.

The Contractor shall take appropriate precautions to prevent fugitive emissions caused by sand blasting from reaching any residence or public building. The Contractor shall place curtains of suitable material, as necessary, to prevent wind-blown particles from sand blasting operations from reaching any residence or public building.

Additional measures may be required by state regulations or local ordinances. The Contractor will comply with all applicable state regulations and local ordinances with respect to truck transportation and fugitive dust emissions.

2.15 Off Road Vehicle Control

Keystone shall offer to landowners or managers of forested lands to install and maintain measures to control unauthorized vehicle access to the construction right-of-way where appropriate. These measures may include the following unless otherwise approved or directed by Keystone based on site specific conditions or circumstances:

- signs;
- fences with locking gates;
- slash and timber barriers, pipe barriers, or boulders lined across the

construction right-of-way; and

- conifers or other appropriate trees or shrubs across the construction right-of-way.

2.16 Fire Prevention and Control

The Contractor shall comply with all federal, state, county and local fire regulations pertaining to burning permits and the prevention of uncontrolled fires. The following mitigative measures shall be implemented to prevent fire hazards and control of fires:

- A list of relevant fire authorities and their designated representative to contact shall be maintained on site by construction personnel.
- Adequate firefighting equipment shall be available on site in accordance with the applicable regulatory requirements shall be available on site.
- The level of forest fire hazard shall be posted at the construction office (where visible for workers) and workers shall be made aware of the hazard level and related implications.
- The Contractor shall provide equipment to handle any possible fire emergency. This shall include, although not be limited to, water trucks; portable water pumps; chemical fire extinguishers; hand tools such as shovels, axes, and chain saws; and heavy equipment adequate for the construction of fire breaks when needed.
- Specifically, the Contractor shall supply and maintain in working order an adequate supply of fire extinguishers for each crew engaged in potentially combustible work such as welding, cutting, grinding, and burning of brush or vegetative debris.
- In the event of a fire, the Contractor shall immediately use resources necessary to contain the fire. The Contractor shall then notify local emergency response personnel.
- All tree clearing activities are to be carried out in accordance with local rules and regulations for the prevention of forest fires.
- Burning shall be done in compliance with state, county, or local applicable regulations.
- Any burning will be done within the right-of-way. Only small piles shall be burned to avoid overheating or damage to trees or other structures along the right-of-way.
- Flammable wastes shall be removed from the construction site on a regular basis.
- Flammable materials kept on the construction site must be stored in approved containers away from ignition sources.
- Smoking shall be prohibited around flammable materials.
- Smoking shall be prohibited on the entire construction site when the fire hazard is high.

2.17 Road and Railroad Crossings

Construction across paved roads, highways, and railroads will be in accordance with the requirements of the road and railroad crossing permits and approvals obtained by Keystone. In general, all major paved roads, all primary gravel roads, highways, and railroads will be crossed by boring beneath the road or railroad. Detail drawing 21 illustrates a typical bored road or railroad crossing. Boring requires the excavation of a pit on each side of the feature, the placement of boring equipment in the pit, and boring a hole under the road at least equal to the diameter of the pipe. For long crossings, sections can be welded onto the pipe string just before being pulled through the borehole. Boring will result in minimal or no disruption to traffic at road or railroad crossings. Each boring will be expected to take 1 to 2 days for most roads and railroads and up to 10 days for long crossings such as interstate or four-lane highways.

Most smaller, unpaved roads and driveways will be crossed using the open-cut method where permitted by local authorities or private owners. The open-cut method will require temporary closure of the road to traffic and establishment of detours. If no reasonable detour is feasible, at least one lane of traffic will be kept open, except during brief periods when it is essential to close the road to install the pipeline. Most open-cut road crossings can be finished and the road resurfaced in 1 or 2 days. Keystone will take measures, such as posting signs at open-cut road crossings, to ensure safety and minimize traffic disruptions.

2.18 Adverse Weather

The Contractor shall restrict certain construction activities and work in cultivated agricultural areas in excessively wet soil conditions to minimize rutting and soil compaction. In determining when or where construction activities should be restricted or suspended during wet conditions, the Contractor shall consider the following factors:

- the extent that rutting may cause mixing of topsoil with subsoil layers or damage to tile drains;
- excessive buildup of mud on tires and cleats;
- excessive ponding of water at the soil surface; and
- the potential for excessive soil compaction.

The Contractor shall implement mitigative measures as directed by Keystone in order to minimize rutting and soil compaction in excessively wet soil conditions which may include:

- restricting work to areas on the spread where conditions allow;
- using low ground weight, wide-track equipment, or other low impact construction techniques;
- limiting work to areas that have adequately drained soils or have a cover of vegetation ,such as sod, crops or crop residues, sufficient to prevent mixing of topsoil with subsoil layers or damage to drain tiles; and

- installing geotextile material or construction mats in problem areas.

"Stop work" authority will be designated to the chief inspector but will be implemented when recommended by the Environmental Inspector.

2.19 Cultural Resources

Keystone intends to avoid cultural resources to the extent practicable by rerouting the pipeline corridor and related appurtenances, avoiding construction activities on properties listed in or eligible for listing in the National Register of Historic Places (NRHP), as well as boring or using HDD through culturally sterile soils.

The Contractor shall implement the measures outlined in any unanticipated discovery plan or any Programmatic Agreement that is adopted to minimize disturbance to cultural sites and shall take immediate action as outlined in the Programmatic Agreement if any unanticipated cultural discovery is encountered during construction.

The preferred treatment of any historical property or culturally significant site is avoidance. Where required, Keystone will monitor the construction spread using a cultural resource monitor working under the direction of a professional who meets the standards of the *Secretary of the Interior's Historic Preservation Professional Qualification Standards* (48 FR 44716, September 29, 1983).

Prior to commencing construction, Keystone also will provide an appropriate level of training to all construction personnel so that the requirements of any unanticipated discovery plan or Programmatic Agreement are understood and unanticipated discoveries quickly identified.

In the event an unanticipated cultural discovery is made, the Contractor will immediately halt all construction activities within a 100-foot radius, including traffic; notify the Keystone Environmental Inspector; and implement interim measures to protect the discovery from looting or vandalism. The appropriate federal, state, local, or tribal authorities will be notified of discovery within 48 hours of the initial find. Construction will not proceed within the 100-foot radius of discovery site until all mitigation measures defined in the Programmatic Agreement are concluded and Keystone receives approval from the appropriate agencies that construction may resume. No work or activity within the 100-foot buffer area may take place until approvals are communicated at the spread level by the lead Environmental Inspector.

3.0 SPILL PREVENTION AND CONTAINMENT

Spill prevention and containment applies to the use and management of hazardous materials on the construction right-of-way and all ancillary areas during construction. This includes the refueling or servicing of all equipment with diesel fuel, gasoline, lubricating oils, grease, and hydraulic and other fluids during normal upland applications and special applications within 100 feet of perennial streams or wetlands.

Keystone will prepare a project-specific Spill Prevention Containment and Countermeasure (SPCC) Plan. The Contractor shall provide additional information to complete the SPCC Plan for each construction spread, and shall provide site-specific data that meets the requirements of 40 CFR Part 112 for every location used for staging fuel or oil storage tanks and for every location used for bulk fuel or oil transfer. Each SPCC Plan will be prepared prior to introducing the subject fuel, oil, or hazardous material to the subject location.

3.1 Spill Prevention

3.1.1 Staging Areas

Staging areas (including Contractor yards and pipe stockpile sites) shall be set up for each construction spread. Bulk fuel and storage tanks will be placed only at Contractor yards. No bulk fuel and storage tanks will be placed in the construction ROW. Hazardous materials at staging areas shall be stored in compliance with federal and state laws. The following spill prevention measures shall be implemented by the Contractor:

- Contractor fuel trucks shall be loaded at existing bulk fuel dealerships or from bulk tanks set up for that purpose at the staging area. In the former case, the bulk dealer is responsible for preventing and controlling spills.
- The Environmental Inspector shall inspect the tank site for compliance with the 100-foot setback requirement and approve the tank site prior to installing bulk fuel or storage tanks on the construction yard.
- Fuels and lubricants shall be stored only at designated staging areas. Storage of fuel and lubricants in the staging area shall be at least 100 feet away from the water's edge. Refueling and lubrication of equipment shall be restricted to upland areas at least 100 feet away from streams and wetlands.
- Contractors shall be required to perform all routine equipment maintenance at the staging area and recover and dispose of wastes in an appropriate manner.
- Fixed fuel dispensing locations will be provided with secondary containment to capture fuel from leaks, drips, and overfills.
- Temporary liners, berms, or dikes (secondary containment) shall be constructed around the aboveground bulk tanks, providing 110 percent containment volume of the largest storage tank or trailer within the containment structure, so that potential spill materials shall be contained and collected in specified areas. Tanks shall not be placed in areas subject to periodic flooding or washout.
- Drivers of tank trucks are responsible for safety and spill prevention during tank truck unloading. Procedures for loading and unloading tank trucks shall meet the minimum requirements established by the Department of Transportation.

- Drivers of tank trucks are responsible for setting brakes and chocking wheels prior to off loading. Warning signs requiring drivers to set brakes and chock wheels shall be displayed at all tanks. Proper grounding of equipment shall be undertaken during fuel transfer operations. Drivers shall observe and control the fueling operations at all times to prevent overfilling the temporary tank.
- Prior to departure of any tank truck, all vehicle outlets shall be examined closely by the driver for leakage, tightened, adjusted or replaced to prevent leakage while in transit.
- A supply of sorbent and barrier materials sufficient to allow the rapid containment and recovery of spills shall be maintained at each construction staging area. Sorbent and barrier materials shall also be utilized to contain runoff from contaminated areas.
- Shovels and drums shall be kept at each of the individual staging areas. In the event that small quantities of soil become contaminated, shovels shall be utilized to collect the soil and the material shall be stored in 55-gallon drums. Large quantities of contaminated soil may be bio-remediated on site or disposed in an approved landfill, subject to government approval, or collected utilizing heavy equipment, and stored in drums or other suitable containers prior to disposal. Should contamination occur adjacent to staging areas as a result of runoff, shovels or heavy equipment shall be utilized to collect the contaminated material. Contaminated soil shall be disposed of in accordance with state and federal regulations.
- Temporary aboveground tanks shall be subject to visual inspection on a monthly basis and when the tank is refilled. Inspection records shall be maintained. Operators shall routinely keep tanks under close surveillance and potential leaks or spills shall be quickly detected.
- Visible fuel leaks shall be reported to the Contractors' designated representative and corrected as soon as conditions warrant. Keystone's designated representative shall be informed.
- Drain valves on temporary tanks shall be locked to prevent accidental or unauthorized discharges from the tank.
- Oil and other hazardous materials stored in 350-gallon totes, 55-gallon drums, 5-gallon pails, smaller retail-size containers or other portable containers will be staged or stored in areas with a secondary temporary containment structure. Secondary containment structures may consist of temporary earthen berms with a chemical resistant liner, or a portable containment system constructed of steel, PVC, or other suitable material. The secondary containment structure will be capable of containing 110 percent of the volume of material stored in these areas.

Keystone may allow modification of the above specifications as necessary to accommodate specific situations or procedures. Any modifications must comply with all applicable regulations and permits.

3.1.2 Construction Right-of-Way

The Contractor will ensure that all equipment is free of leaks prior to use on the Project and prior to entering or working in or near waterbodies or wetlands. Throughout construction, the Contractor will conduct regular maintenance and inspections of the equipment to reduce the potential for spills or leaks.

Rubber-tired vehicles (pickup trucks, buses) normally shall refuel at the construction staging areas or commercial gas stations. Tracked machinery (backhoes, bulldozers) shall be refueled and lubricated on the construction right-of-way. Equipment maintenance shall be conducted in staging areas when practical. When impractical, repairs to equipment can be made on the construction right-of-way when approved by Keystone's representative.

Each fuel truck that transports and dispenses fuel to construction equipment or Project vehicles along the construction ROW or within equipment staging and material areas shall carry an oil spill response kit and spill response equipment onboard at all times. In the event that response materials are depleted through use or their condition is deteriorated through age, the materials will be replenished prior to placing the fueling vehicle back into service.

The following preventive measures apply to refueling and lubricating activities on the construction right-of-way:

- Construction activities shall be conducted to allow for prompt and effective cleanup of spills of fuel and other hazardous materials. Each construction crew, including cleanup crews shall have on hand sufficient tools and material to stop leaks and supplies of absorbent and barrier materials to allow rapid containment and recovery of spilled materials. Crew members must know and follow the procedure for reporting spills.
- Refueling and lubricating of construction equipment shall be restricted to upland areas at least 100 feet away from streams and wetlands. Where this is not possible (e.g., trench dewatering pumps), the equipment shall be fueled by designated personnel with special training in refueling, spill containment, and cleanup. The Environmental Inspector shall ensure that signs are installed identifying restricted areas.
- No fuel, oil or hazardous material storage, staging, or transfer other than refueling will occur within 100 feet of any storm drain, drop inlet, or high consequence area (HCA).
- Spent oils, lubricants, filters, etc. shall be collected and disposed of at an approved location in accordance with state and federal regulations.
- Equipment shall not be washed in streams.
- Stationary equipment will be placed within a secondary containment if it will be operated or require refueling within 100 feet of a wetland or waterbody boundary.

Keystone may allow modification of the above specifications as necessary to accommodate specific situations or procedures. Any modifications must comply with all applicable regulations and permits.

3.2 Contingency Plans

The Contractor shall develop emergency response procedures for all incidents (e.g., spills, leaks, fires) involving hazardous materials which could pose a threat to human health or the environment. The procedures shall address activities in all work areas, as well as during transport to and from the construction right-of-way and to any disposal or recycling facility.

3.3 Equipment

The Contractor shall retain emergency response equipment in all areas where hazardous materials are handled or stored. This equipment shall be readily available to respond to a hazardous material emergency. Such equipment shall include, but not be limited to, the following:

- first aid supplies;
- phone or communications radio;
- protective clothing (Tyvek suit, gloves, goggles, boots);
- hand-held fire equipment;
- absorbent material and storage containers;
- non-sparking bung wrench and shovel; and
- brooms and dust pan.

Hazardous material emergency equipment shall be carried in all mechanic and supervisor vehicles. This equipment shall include, at a minimum:

- first aid supplies;
- phone or communications radio;
- 2 sets of protective clothing (Tyvek suit, gloves, goggles, boots);
- 1 non-sparking shovel;
- 6 plastic garbage bags (20 gallon);
- 10 absorbent socks and spill pads;
- Hand-held fire extinguisher;
- barrier tape; and
- 2 orange reflector cones.

Fuel and service trucks shall carry a minimum of 20 pounds of suitable commercial sorbent material.

The Contractor shall inspect emergency equipment weekly, and service and maintain equipment regularly. Records shall be kept of all inspections and services.

3.4 Emergency Notification

Emergency notification procedures between the Contractor and Keystone shall be established in the planning stages of construction. A Keystone representative shall be identified to serve as contact in the event of a spill during construction activities. In the event of a spill meeting government reporting criteria, the Contractor immediately shall notify the Keystone representative who, in turn, shall notify the appropriate regulatory agencies.

Any material released into water that creates a sheen must be reported immediately to Keystone. The Contractor is required to notify Keystone immediately if there is any spill of oil, oil products, or hazardous materials that reaches a wetland or waterbody. Incidents on public highways shall be reported to Keystone and the appropriate agencies by Keystone.

If a spill occurs on navigable waters of the United States, Keystone shall notify the National Response Center (NRC) at 1-800-424-8802. For spills that occur on public lands, into surface waters, or into sensitive areas, the appropriate governmental agency's district office also shall be notified.

3.5 Spill Containment and Countermeasures

In the event of a spill of hazardous material, Contractor personnel shall:

- notify the appointed Keystone representative;
- identify the product hazards related to the spilled material and implement appropriate safety procedures, based on the nature of the hazard;
- control danger to the public and personnel at the site;
- implement spill contingency plans and mobilize appropriate resources and manpower;
- isolate or shutdown the source of the spill;
- block manholes or culverts to limit spill travel;
- initiate containment procedures to limit the spill to as small an area as possible to prevent damage to property or areas of environment concern (e.g., watercourses); and
- commence recovery of the spill and cleanup operations.

When notified of a spill, the Keystone representative shall immediately ensure that:

- Action is taken to control danger to the public and personnel at the site.
- Spill contingency plans are implemented and necessary equipment and manpower are mobilized.

- Measures are taken to isolate or shutdown the source of the spill.
- All resources necessary to contain, recover and clean up the spill are available.
- Any resources requested by the Contractor from Keystone are provided.
- The appropriate agencies are notified. For spills which occur on public lands, into surface waters or into sensitive areas, the appropriate federal or state managing office shall also be notified and involved in the incident.

For a land spill, berms shall be constructed with available equipment to physically contain the spill. Personnel entry and travel on contaminated soils shall be minimized. Sorbent materials shall be applied or, if necessary, heavily contaminated soils shall be removed to an approved facility. Contaminated sorbent materials and vegetation shall also be disposed of at an approved facility.

For a spill threatening a waterbody, berms or trenches shall be constructed to contain the spill prior to entry into the waterbody. Deployment of booms, skimmers, and sorbent materials shall be necessary if the spill reaches the water. The spilled product shall be recovered and the contaminated area shall be cleaned up in consultation with spill response specialists and appropriate government agencies.

4.0 UPLANDS (AGRICULTURAL, FOREST, PASTURE, RANGE AND GRASS LANDS)

4.1 Interference with Irrigation Systems

If existing irrigation systems (flood irrigation, ditch irrigation, pivot, wheel, or other type of spray irrigation systems), irrigation ditches, or sheet flow irrigation shall be impacted by the construction of the pipeline, the following mitigative measures shall be implemented unless otherwise approved or directed by Keystone:

- If it is feasible and mutually acceptable to Keystone and the landowner or landowner's designate, temporary measures shall be implemented to allow an irrigation system to continue to operate across land on which the pipeline is being constructed.
- If the pipeline or temporary work areas intersect an operational (or soon to be operational) pivot or other spray irrigation system, Keystone shall establish with the landowner or landowner's designate an acceptable amount of time the irrigation system may be out of service. If an irrigation system interruption results in crop damages, either on the pipeline construction right-of-way or off the construction right-of-way, the landowner shall be compensated reasonably for all such crop damages.
- If the pipeline or temporary work areas intersect an operational sheet flow irrigation system, Keystone shall establish with the landowner or landowner's designate an acceptable amount of time the irrigation system may be out of service. If an irrigation system interruption results in crop

damages, either on the pipeline construction right-of-way or off the construction right-of-way, the landowner shall be compensated reasonably for all such crop damages.

- Irrigation ditches that are active at the time of construction shall not be stopped or obstructed except for the length of time to install the pipeline beneath the ditch (typically, one day or less) unless otherwise approved or directed by Keystone.

4.2 Clearing

The objective of clearing is to provide a clear and unobstructed right-of-way for safe and efficient construction of the pipeline. The following mitigable measures shall be implemented:

- Construction traffic shall be restricted to the construction right-of-way, existing public roads, and approved private roads.
- Construction right-of-way boundaries including pre-approved temporary workspace shall be clearly staked to prevent disturbance to unauthorized areas.
- If crops are present, they shall be mowed or disced to ground level unless an agreement is made for the landowner to remove.
- Burning is prohibited on cultivated land.
- Construction right-of-way at timber shelterbelts in agricultural areas shall be reduced to the minimum necessary to construct the pipeline.

4.3 Topsoil Removal and Storage

The objective of topsoil handling is to maintain topsoil capability by conserving topsoil for future replacement and reclamation and to minimize the degradation of topsoil from compaction, rutting, loss of organic matter, or soil mixing so that successful reclamation of the right-of-way can occur. The following mitigative measures shall be implemented during topsoil removal and storage unless otherwise approved or directed by Keystone based on site-specific conditions or circumstances. All work shall be conducted in accordance with applicable permits.

- In areas designated for topsoil segregation, the actual depth of the topsoil, to a maximum depth of 12 inches, will be stripped from:
    - The area excavated above the pipeline; or
    - The area above the pipeline plus the spoil storage; or
    - The area above the pipeline plus the working side; or
    - Entire ROW

  as required by applicable permit agreements with the landowner or as dictated by site-specific conditions.

- Stripped topsoil is to be stockpiled in a windrow along the edge of the right-of-way. The Contractor shall perform work in a manner to minimize the potential for subsoil and topsoil to be mixed.
- Under no circumstances shall the Contractor use topsoil to fill a low area.
- If required due to excessively windy conditions, topsoil piles shall be tackified using either water or a suitable tackifier (liquid mulch binder).
- Gaps in the rows of topsoil will be left in order to allow drainage and prevent ponding of water adjacent to or on the right-of-way.
- Topsoil shall not be utilized to construct ramps at road or waterbody crossings.
- In areas with defined saline or sodic soil concerns, a triple-ditch method will be used to segregate problem soils as indicated in Detail 67 and 67A.
- If frozen topsoil conditions are encountered during winter construction, specialized construction equipment (i.e. ripping, frozen topsoil cutter, road reclaimer, etc) may be required to adequately segregate and conserve topsoil resources.

4.4 Grading

The objective of grading is to develop a right-of-way that allows the safe passage of equipment and meets the bending limitations of the pipe. The following mitigative measures shall be implemented during grading unless otherwise approved or directed by Keystone based on site-specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

- All grading shall be undertaken with the understanding that original contours and drainage patterns shall be re-established to the extent practicable..
- Agricultural areas that have terraces shall be surveyed to establish pre-construction contours to be utilized for restoration of the terraces after construction.
- On steep slopes, or wherever erosion potential is high, temporary erosion control measures shall be implemented.
- Bar ditches adjacent to existing roadways to be crossed during construction shall be adequately ramped with grade or ditch spoil to prevent damage to the road shoulder and ditch.
- Where the construction surface remains inadequate to support equipment travel, timber mats, timber riprap, or other method shall be used to stabilize surface conditions.

The Contractor shall limit the interruption of the surface drain network in the vicinity of the right-of-way using the appropriate methods:

- providing gaps in the rows of subsoil and topsoil in order to prevent any accumulation of water on the land;

- preventing obstructions in furrows, furrow drains, and ditches;
- installing flumes and ramps in furrows, furrow drains, and ditches to facilitate water flow across the construction right-of-way and allow for construction equipment traffic; and
- installing flumes over the trench for any watercourse where flow is continuous during construction.

4.5 Temporary Erosion and Sediment Control

4.5.1 General

Temporary erosion and sediment control measures shall be installed immediately after initial disturbance of the soil, maintained throughout construction (on a daily basis), and reinstalled as necessary until replaced by permanent erosion control structures or restoration of the construction right-of-way is complete.

Specifications and configurations for erosion and sediment control measures may be modified by Keystone as necessary to suit actual site conditions. However, all work shall be conducted in accordance with applicable permits.

The Contractor shall inspect all temporary erosion control measures at least daily in areas of active construction or equipment operation, weekly in areas with no construction or equipment operation, and within 24 hours of each significant rainfall event of 0.5 inches or greater. The Contractor shall repair all ineffective temporary erosion control measures as expediently as practicable.

4.5.2 Sediment Barriers

Sediment barriers shall be constructed of silt fence, staked hay or straw bales, compacted earth (e.g., drivable berms across travel lanes), sand bags, or other appropriate materials.

The Contractor shall install sediment barriers in accordance with Details 1 and 2 or as otherwise approved or directed by Keystone. The Contractor is responsible for properly installing, maintaining, and replacing temporary and permanent erosion controls throughout construction and cleanup. In wetland or riparian zones, the Contractor will install sediment control structures along the construction right-of-way edges prior to vegetation removal where practicable. The aforementioned sediment barriers may be used interchangeably or together depending on site-specific conditions. In most cases, silt fence shall be utilized where longer sediment barriers are required.

Sediment barriers shall be installed below disturbed areas where there is hazard of offsite sedimentation. These areas include:

- the base of slopes adjacent to road crossings;

- the edge of the construction right-of-way adjacent to and upgradient of a roadway, flowing stream, spring, wetland, or impoundment;
- trench or test water discharge locations where required;
- where waterbodies or wetlands are adjacent to the construction right-of-way; (the Contractor shall install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way)
- across the entire construction right-of-way at flowing waterbody crossings;
- right-of-way immediately upslope of the wetland boundary at all standard (saturated or standing water) wetland crossings as necessary to prevent sediment flow into the wetland; (Sediment control barriers are not required at "dry" wetlands.)
- along the edge of the construction right-of-way within standard (saturated or standing water) wetland boundaries as necessary to contain spoil and sediment within the construction right-of-way. Sediment control barriers are not required at "dry" wetlands (Detail 8).

Sediment barriers placed at the toe of a slope shall be set a sufficient distance from the toe of the slope, if possible, in order to increase ponding volume.

Sediment control barriers shall be placed so as not to hinder construction operations. If silt fence or straw bale sediment barriers (in lieu of drivable berms) are placed across the entire construction right-of-way at waterbodies, wetlands, or upslope of roads, a provision shall be made for temporary traffic flow through a gap for vehicles and equipment to pass within the structure. Immediately following each day's shutdown of construction activities, a row of straw bales or a section of silt fence shall be placed across the up gradient side of the gap with sufficient overlap at each end of the barrier gap to eliminate sediment bypass flow, followed by bales tightly fitted to fill the gap. Following completion of the equipment crossing, the gap shall be closed using silt fence or straw bale sediment barrier.

The Contractor shall maintain straw bale and silt fence sediment barriers by removing collected sediment and replacing damaged bales. Sediment shall be removed and placed where it shall not reenter the barrier when sediment loading is greater than 40 percent or if directed by Keystone. If straw bale filters cannot be cleaned out due to access problems, the Contractor shall place a new row of sediment barriers upslope.

The Contractor shall use mulch and straw bales that are free of noxious weeds. Mulch or straw bales that contain evidence of noxious weeds or other undesirable species shall be rejected by the Contractor.

The Contractor shall remove sediment barriers, except those needed for permanent erosion and sediment control, during cleanup of the construction right-of-way.

4.5.3 Trench Plugs

The Contractor shall use trench plugs at waterbody and wetland crossings at the direction of the Environmental Inspector to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody. Trench plugs shall be of sufficient size to withstand upslope water pressure.

4.5.4 Temporary Slope Breakers (Water Bars)

The Contractor shall install temporary slope breakers on slopes greater than 5% on all disturbed lands at the following recommended spacing:

Slope (%)	Spacing (feet)
5 - 15	300
>15 - 30	200
>30	100

The gradient of each slope breaker shall be 2 to 4 percent.

If so directed by the landowner, the Contractor may not install temporary slope breakers (water bars) in cultivated land.

Temporary slope breakers shall be constructed of soil, silt fence, staked straw bales, sand bags, or similar materials authorized by Keystone.

The Contractor shall direct the outfall of each temporary slope breaker to a stable, well-vegetated area or construct an energy-dissipating device at the end of the slope breaker and off the construction right-of-way as permitted in the landowner agreement as shown in Detail 3. The outfall of each temporary slope breaker shall be installed to prevent sediment discharge into wetlands, waterbodies, or other sensitive resources.

Specifications and configurations for temporary slope breakers may be modified by Keystone as necessary to suit actual site conditions. However, all work shall be conducted in accordance with applicable permits.

4.5.5 Drainage Channels or Ditches

Drainage channels or ditches shall be used on a limited basis to provide drainage along the construction right-of-way and toe of cut slopes as well as to direct surface runoff across the construction right-of-way or away from disturbances and onto natural undisturbed ground. Channels or ditches shall be constructed by the Contractor during grading operations. Where there is inadequate vegetation at the channel or ditch outlet,

sediment barriers, check berms, or other appropriate measures shall be used to control erosion.

4.5.6 Temporary Mulching and Cover Crops

Unless otherwise directed by Keystone, the Contractor shall apply temporary seed and/or mulch on disturbed construction work areas that have been inactive for one month or are expected to be inactive for a month or more. The Contractor shall not apply temporary mulch in cultivated areas unless specifically requested by the landowner or in areas particularly prone to erosion. The Contractor shall not apply mulch within wetland boundaries.

Temporary mulch of straw or equivalent applied on slopes shall be spread uniformly to cover at least 75 percent of the ground surface at an approximate rate of 2 tons per acre of straw or its equivalent. Mulch application on slopes within 100 feet of waterbodies and wetlands shall be increased to an approximate rate of 3 tons per acre.

All seed that is used as a temporary cover crop will be approved and/or provided by Keystone.

4.5.7 Tackifier

When wetting topsoil piles with water does not prevent wind erosion, the Contractor shall temporarily suspend topsoil handling operations and apply a tackifier to topsoil stockpiles at the rate recommended by the manufacturer. The type of Tackifier will be approved by Keystone.

Should construction traffic, cattle grazing, heavy rains, or other related construction activity disturb the tackified topsoil piles and create a potential for wind erosion, additional tackifier shall be applied by the Contractor.

4.6 Stringing

The objective of stringing is to place the line pipe along the construction right-of-way for bending and welding in an expedient and efficient manner.

The Contractor shall utilize one or more of the following mitigative measures as applicable and when necessary to reduce compaction on the working side of the right-of-way or as directed by Keystone. However, all work shall be conducted in accordance with applicable permits.

- prohibiting access by certain vehicles;
- using only machinery possessing low ground pressure (tracks or extra-wide tires);
- limiting access and thus minimizing the frequency of all vehicle traffic;
- digging ditches to improve surface drainage;

- using timber riprap, matting, or geotextile fabric overlain with soil; and
- stopping construction for a period of time.

4.7 Trenching

The objective of trenching is to provide a ditch of sufficient depth and width with a bottom to continuously support the pipeline. During trenching operations, the following mitigative measures shall be implemented unless otherwise approved or directed by Keystone based on site-specific conditions or circumstances. All work shall be conducted in accordance with applicable permits.

- Where required, subsoil shall be segregated from topsoil in separate, distinct rows with a separation that shall limit any admixing of topsoil and subsoil during handling.
- Triple ditch soil handling will be completed at sites identified by Keystone according to Detail 67 and 67A to prevent soil degradation.
- Gaps must be left in the spoil piles that coincide with breaks in the strung pipe to facilitate natural drainage patterns and to allow the passage of livestock or wildlife.
- Trenching operations shall be followed as closely as practicable by lower in and backfill operations to minimize the length of time the ditch is open.
- Construction debris (e.g., welding debris) and other garbage shall not be deposited in the ditch.
- If trenching, pipe installation and backfill operations take place during frozen soil conditions, final clean-`up (including additional trench compaction, subsoil feathering, final contouring and topsoil replacement) will be delayed until the subsoil and topsoil thaw completely the following spring/summer. A pronounced subsoil berm will be left over the trench line until final clean-up takes place to account for settlement of thawing backfill. Gaps will be left in the berm to maintain cross-ROW drainage

The Contractor shall prepare a blasting plan that is applicable to any locations where blasting will be necessary adjacent to existing high pressure pipelines, overhead or underground utilities, farm operations, or public crossings. The Contractor and its blasting supervisor shall be thoroughly familiar with and comply with the rules and regulations of Occupational Safety and Health Administration (OSHA) and all federal, state, county and local regulations governing blasting operations. Keystone will file the blasting plan with applicable state or local jurisdictions, where required. Excavation and blasting along the ROW may uncover paleontological resources of scientific value. Keystone will consult with the appropriate regulatory agencies in each state on the applicability and requirements for Paleontological Resource Protection Plans. Keystone will prepare and file plans addressing vertebrate fossils with any respective states, as required.

Should blasting be necessary for removal of rock, the following mitigative measures may be implemented:

- The Contractor shall use non-electric initiation systems for all blasting operations. If required by the blasting plan, blasting will be monitored for vibration levels and peak particle velocity. This work shall be performed by a third-party vibration monitoring consultant hired by and reporting to the Constructor Representative. The Contractor shall arrange for detonations to be carried out in cooperation with this consultant.
- Prior to using explosives, the Contractor shall advise residents of the immediate area, in order to prevent any risk of accidents or undue disturbances.
- No blasting shall be done without approval of the Constructor Representative. Prior to any detonation of explosives in the vicinity of a loaded line, dwelling, structure, overhead or underground utility, farm operation, or public crossings, a minimum of 48 hour's notice shall be given to the Constructor Representative, in order that the appropriate people can be notified and the upstream and downstream mainline valves can be staffed.
- The Contractor shall obtain all necessary permits and shall comply with all legal requirements in connection with the use, storage, and transportation of explosives.
- Blasting mats or subsoil may be piled over the trench line to prevent rock from being blown outside the construction right-of-way.
- Each blasting location shall be cleared and cleaned up before and after all blasting operations.
- Blasting shall be carried out during regular, daylight working hours.
- The Contractor shall at all times protect his workers and the public from any injury or harm that might arise from drilling dust and the use of explosives.
- Only workers thoroughly experienced in handling explosives shall be permitted to supervise, handle, haul, load or shoot explosives. In those jurisdictions where the licensing of blasters is mandatory, the Contractor shall provide the Constructor Representative with proof of the required certification for every person so required.
- The drilling pattern shall be set in a manner to achieve smaller rock fragmentation (maximum 1 foot in diameter) in order to use as much as possible of the blasted rock as backfill material after the pipe has been padded in accordance with the specifications.
- Blasting testing of surface-water resources and water wells within 150 feet of the centerline will be performed in compliance with all applicable permits.

4.7.1 Trench Dewatering/Well Points

The Contractor shall make all reasonable efforts to discharge trench water in a manner that avoids damage to adjacent agricultural land, crops, and pasture. Damage includes, but is not limited to, the inundation of crops for more than 24 hours, deposition of sediment in ditches, and the deposition of gravel in fields or pastures.

If trench dewatering is necessary in an area where salt damage to adjacent crops is evident, the Environmental Inspector shall conduct a field conductivity test on the trench water before it is discharged. If the conductivity of the trench water is determined to potentially affect soil quality, it shall not be discharged to areas where salt damage to crops is evident, but shall be directed as feasible so that water flows over a well vegetated, non-cropland area or through an energy dissipater and sediment barrier.

When pumping water from the trench for any reason, the Contractor shall ensure that adequate pumping capacity and sufficient hose is available to permit dewatering as follows:

- No heavily silt-laden trench water shall be allowed to enter a waterbody or wetland directly but shall instead be diverted through a well vegetated area, a geotextile filter bag, or a permeable berm (straw bale or Keystone approved equivalent).
- Trench water shall not be disposed of in a manner which could damage crops or interfere with the functioning of underground drainage systems.

The Contractor shall screen the intake hose and keep the hose either one foot off the bottom of the trench or in a container to minimize entrainment of sediment.

4.8 Welding, Field Joint Coating, and Lowering In

The objectives of welding, field joint coating, and lowering in are to provide continuous segments of pipeline, to provide corrosion protection to the weld areas of the pipeline, and to place the pipeline in the center of the trench, without stress, at the required depth of cover. The following mitigative measures shall be followed during pipe welding, field joint coating, and lowering in, unless otherwise specified by Keystone in response to site-specific conditions or circumstances. All work shall be conducted in accordance with applicable permits.

- Shavings produced during beveling of the line pipe are to be removed immediately following this operation to ensure that livestock and wildlife do not ingest this material. When welding operations create a continuous line of pipe that may be left in the right-of-way for an extended period of time due to construction or weather constraints, a gap in the welded pipe shall be provided to allow for access at farm road crossings and for passage of livestock and wildlife.
- Prior to the application of epoxy powder, urethane epoxy, or other approved pipe coatings, a tarp shall be placed underneath the pipe in wetlands to collect any overspray of epoxy powder and liquid drippings. Excess powder, liquid, or other hazardous materials (e.g. brushes, rollers, gloves) shall be continuously collected and removed from the construction right-of-way and disposed of in a manner appropriate for these materials.

4.9 Padding and Backfilling

The objective of padding and backfilling is to cover the pipe with material that is not detrimental to the pipeline and pipeline coating. The following mitigative measures shall be utilized during backfilling, unless otherwise approved or directed by Keystone based on site-specific conditions or circumstances. All work shall be conducted in accordance with applicable permits.

- Excessive water accumulated in the trench shall be eliminated prior to backfilling.
- In the event it becomes necessary to pump water from open trenches, the Contractor shall pump the water and discharge it in accordance with the requirements of the Stormwater Pollution Prevention Plan (SWPPP) in order to avoid damaging adjacent areas. Detail 5 and Detail 6 provide typical examples of dewatering structures.
- If it is impossible to avoid water-related damages (including inundation of crops for more than 24 hours, deposition of sediment in ditches and other water courses, and the deposition of gravel in fields, pastures, and any water courses), Keystone shall reasonably compensate the landowners for the damage and/or shall correct the damage so as to restore the land, crops, pasture, water courses, etc. to their pre-construction condition.
- All pumping of water shall comply with existing drainage laws and local ordinances relating to such activities and provisions of the Clean Water Act.
- Prior to backfilling, all drain tile shall be permanently repaired, inspected, and the repair documented as described in Section 5.5.
- Prior to backfilling, trench breakers shall be installed on slopes where necessary to minimize the potential for water movement down the ditch and potential subsequent erosion.
- During backfill, the stockpiled subsoil shall be placed back into the trench before replacing the topsoil.
- Topsoil shall not be utilized for padding the pipe.
- Backfill shall be compacted to a minimum of 90% of pre-existing conditions where the trench line crosses tracks of wheel irrigation systems (pivots).
- To reduce the potential for ditch line subsidence, spoil shall be replaced and compacted by backhoe bucket or by the wheels or tracks of equipment traversing down the trench.
- The lesser of 4 feet or the actual depth of topsoil cover, shall not be backfilled with soil containing rocks of any greater concentration or size than existed prior to pipeline construction in the pipeline trench, bore pits, or other excavations.

4.10 Cleanup

The objective of cleanup activities shall be to prepare the right-of-way and other disturbed areas to approximate pre-activity ground contours where appropriate and to replace spoil and stockpiled material in a manner which preserves soil

capability and quality to a degree reasonably equivalent to the original or that of representative undisturbed land. The following mitigative measures shall be utilized during cleanup, unless otherwise approved or directed by Keystone based on specific conditions or circumstances. All work shall be conducted in accordance with applicable permits.

- Cleanup shall occur immediately following backfilling operations when weather or seasonal conditions allow.
- All garbage and construction debris (e.g., lathing, ribbon, welding rods, pipe bevel shavings, pipe spacer ropes, end caps, pipe skids) shall be collected and disposed of at approved disposal sites.
- The right-of-way shall be re-contoured with spoil material to approximate pre-construction contours and as necessary to limit erosion and subsidence. Loading of slopes with unconsolidated spoil material shall be avoided during slope re-contouring. Topsoil shall be replaced after re-contouring of the grade with subsoil. The topsoil shall be replaced on the subsoil storage area and over the trench so that after settling occurs, the topsoil's approximate original depth and contour (with an allowance for settling) shall be achieved.
- Where topsoil has been segregated, subsoil shall not be permanently placed on top of topsoil.
- Surface drainage shall be restored and re-contoured to conform to the adjacent land drainage system.
- Erosion control structures such as permanent slope breakers and cross ditches shall be installed on steep slopes where necessary to control erosion by diverting surface run-off from the right-of-way to stable and vegetated off right-of-way areas.
- During cleanup, temporary sediment barriers such as silt fence and hay bale diversions will be removed; accumulated sediment will re-contoured with the rest of the ROW; and permanent erosion controls will be installed as necessary.
- After construction, all temporary access shall be returned to prior construction conditions unless specifically agreed with the landowner or otherwise specified by Keystone.
- Warning signs, aerial markers, and cathodic protection test leads shall be installed in locations in compliance with U.S. Federal code and in locations that shall not impair farming operations where practicable.
- All bridges, fences and culverts existing prior to construction shall be restored to meet or exceed approximate pre-construction conditions. Caution shall be utilized when re-establishing culverts to ensure that drainage is not improved to a point that would be detrimental to existing waterbodies and wetlands.
- All temporary gates installed during construction shall be replaced with permanent fence unless otherwise requested by the landowner.

4.11 Reclamation and Revegetation

The objectives of reclamation and revegetation are to return the disturbed areas to approximately pre-construction use and capability. This involves the treatment of soil as necessary to preserve approximate pre-construction capability and the stabilization of the work surface in a manner consistent with the initial land use.

The following mitigative measures will be utilized unless otherwise approved or directed by Keystone based on site specific conditions or circumstances. However, all work shall be conducted in accordance with applicable permits.

4.11.1 Relieving Compaction

Compaction will typically be relieved in subsoils that have received substantial construction traffic, as determined by Keystone, prior to replacing and respreading topsoil. Compaction will typically not be relieved in topsoils that have been left in place and that have not been driven on. Any rock that is brought to the surface during decompaction activities will be removed until the quantity, size, and distribution of rock is equivalent to that found on adjacent land as determined by the Environmental Inspector. Compaction will typically be relieved as follows:

- Compacted cropland compacted shall be ripped a minimum of 3 passes at least 18 inches deep and all pasture shall be ripped or chiseled a minimum of three passes at least 12 inches deep before replacing topsoil.
- Areas of the construction right-of-way that were stripped for topsoil salvage shall be ripped a minimum of 3 passes (in cross patterns, as practical) prior to topsoil replacement. The approximate depth of ripping shall be 18 inches (or a lesser depth if damage may occur to existing drain tile systems). After ripping, the subsoil surface shall be graded smooth and any subsoil clumps broken up (disc and harrow) in an effort to avoid topsoil mixing.
- The de-compacted construction right-of-way shall be tested by the Contractor at regular intervals for compaction in agricultural and residential areas. Tests shall be conducted on the same soil type under similar moisture conditions in undisturbed areas immediately adjacent to the right-of-way to approximate pre-construction conditions. Penetrometers or other appropriate devices shall be used to conduct tests
- Topsoil shall be replaced to pre-existing depths once ripping and discing of subsoil is complete up to a maximum of 12 inches. Topsoil compaction on cultivated fields shall be alleviated with cultivation methods by the contractor.
- If there is any dispute between the landowner and Keystone as to what areas need to be ripped or chiseled, the depth at which compacted areas should be ripped or chiseled, or the necessity or

rates of lime and fertilizer application, the appropriate NRCS shall be consulted by Keystone and the landowner.

Plowing under of organic matter including wood chips and manure, or planting of a green crop such as alfalfa to decrease soil bulk density and improve soil structure or any other measures in consultation with the Natural Resource Conservation Service (NCRS) shall be considered if mechanical relief of compaction is deemed not satisfactory.

In the first year after construction, Keystone will inspect the ROW to identify areas of erosion or settling. Subsequently, Keystone will monitor erosion and settling through aerial patrols, which are part of Keystone's Integrity Management Plan, and through landowner reporting. Landowner reporting will be facilitated through use of Keystone's toll-free telephone number, which will be made available to all landowners on the ROW. Landowner reporting also may be facilitated through contact with Keystone's field offices.

Keystone plans to minimize impacts on soil productivity that may result from construction activities, but recognizes that some short- to long-term decreases in agricultural productivity are possible. Keystone recognizes its responsibility to restore agricultural productivity on the pipeline ROW and to compensate landowners for demonstrated decreases in productivity that may result from any degradation of agricultural soils along the ROW.

4.11.2 Rock Removal

- Rocks that are exposed on the surface due to construction activity shall be removed from the right-of-way prior to and after topsoil replacement This effort will result in an equivalent quantity, size and distribution of rocks to that found on adjacent lands, as determined by the Environmental Inspectors.
- Clearing of rocks may be carried out with a mechanical rock picker or by manual means, provided that preservation of topsoil is assured. Rock removed from the right-of-way shall be hauled off the landowner's premises or disposed of on the landowner's premises at a location that is mutually acceptable to the landowner and to Keystone.

4.11.3 Soil Additives

If site-specific conditions warrant and if agreed to by the landowner, the Contractor shall apply amendments (fertilizer and soil pH modifier materials and formulations) commonly used for agricultural soils in the area and in accordance with written recommendations from the local soil conservation authority, land management agencies, or landowner. Amendments shall be incorporated into the normal plow layer as soon as possible after application.

4.11.4 Seeding

- The final seed mix shall be based on input from the local Natural Resource Conservation Service and the availability of seed at the time of reclamation. The landowner may request specific seeding requirements during easement negotiations.
- Certificates of seed analysis are required for all seed mixes to limit the introduction of noxious weeds.
- Seed not utilized within 12 months of seed testing shall be approved by Keystone prior to use. Seeding shall follow cleanup and topsoil replacement as closely as possible. Seed shall be applied to all disturbed surfaces (except cultivated fields unless requested by the landowner) as indicated on the construction drawings
- If mulch was applied prior to seeding for temporary erosion control, the Contractor shall remove and dispose of the excess mulch prior to seedbed preparation to ensure that seedbed preparation equipment and seed drills do not become plugged with excess mulch; and to support an adequate seedbed; and to ensure that seed incorporation or soil packing equipment can operate without becoming plugged with mulch.
- Identified seeding areas shall be seeded as specified by Keystone. Seeding rates shall be based on pure live seed.
- Weather conditions, construction right-of-way constraints, site access, topography and soil type shall influence the seeding method to be used (i.e., drill seeding versus broadcast seeding).
- The Contractor shall delay seeding as directed by Keystone until the soil is in the appropriate condition for seeding.
- The Contractor shall use a Truax brand or Keystone approved equivalent-type drill seeder equipped with a cultipacker designed and equipped to apply grass and grass-legume seed mixtures with mechanisms such as seed box agitators to allow even distribution of all species in each seed mix, with an adjustable metering mechanism to accurately deliver the specified seeding rate and with a mechanism such as depth bands to accurately place the seed at the specified depth.
- The Contractor shall operate drill seeders at an appropriate speed so the specified seeding rate and depth is maintained, as directed by Keystone.
- The Contractor shall calibrate drill seeders so that the specified seeding rate is planted. The row spacing on drill seeders shall not exceed 8 inches.
- The Contractor shall plant seed at depths consistent with the local or regional agricultural practices.

- Broadcast or hydro seeding, used in lieu of drilling, shall utilize NRCS-recommended seeding rates. Where seed is broadcast, the Contractor shall use a harrow, cultipacker, or other equipment immediately following broadcasting to incorporate the seed to the specified depth and to firm the seedbed.
- The Contractor shall delay broadcast seeding during high wind conditions if even distribution of seed is impeded.
- The Contractor shall hand rake all areas that are too steep or otherwise cannot be safely harrowed or cultipacked in order to incorporate the broadcast seed to the specified depth.
- Hydro seeding may be used, on a limited basis, where the slope is too steep or soil conditions do not warrant conventional seeding methods. Fertilizer, where specified, may be included in the seed, virgin wood fiber, tackifier, and water mixture. When hydro-seeding, virgin wood fiber shall be applied at the rate of approximately 3,000 pounds per acre on an air-dry weight basis as necessary to provide at least 75% ground cover. Tackifier shall consist of biodegradable, vegetable-based material and shall be applied at the rate recommended by the manufacturer. The seed, mulch, and tackifier slurry shall be applied so that it forms a uniform, mat-like covering of the ground.
- Keystone shall work with landowners to discourage intense livestock grazing of the construction right-of-way during the first growing season by utilization of temporary fencing or deferred grazing, or increased grazing rotation frequency.

4.11.5 Permanent Erosion and Sediment Control

The Contractor shall restore all existing landowner soil conservation improvements and structures disturbed by pipeline construction to the approximate pre-construction line and grade. Soil conservation improvements and structures include, but are not limited to, grassed waterways, toe walls, drop inlets, grade control works, terraces, levees, and farm ponds.

4.11.5.1 Trench Breakers

The Contractor shall install trench breakers in steep terrain where necessary to limit the potential for trench line erosion and at the base of slopes adjacent to waterbodies and wetlands.

Trench breakers shall be constructed of materials such as sand bags, sand/cement bags, bentonite bags, or other suitable materials by the Contractor (Detail 7). The Contractor shall not use topsoil in trench breakers.

4.11.5.2 Permanent Slope Breakers (Water Bars)

Permanent slope breakers (water bars) shall be constructed of soil or, in some instances, sand bags.

The Contractor shall construct permanent slope breakers on the construction right-of-way where necessary to limit erosion, except in cultivated and residential areas. Slope breakers shall divert surface runoff to adjacent stable vegetated areas or to energy-dissipating devices as shown on Detail 3. In general, permanent slope breakers should be installed immediately downslope of all trench breakers. Permanent slope breakers shall be installed as specified on the construction drawings or generally with a minimum spacing as shown on the following table:

Slope (%)	Spacing (feet)
5 - 15	300
>15 – 30	200
>30	100

The gradient (fall) for each slope breaker shall be two percent to four percent unless otherwise approved by Keystone based on site-specific conditions.

The Contractor shall construct slope breakers to divert surface flow to a stable, well-vegetated area. In the absence of a stable area, the Contractor shall construct appropriate energy-dissipating devices at the end of the slope breaker and beyond the area disturbed by construction.

4.11.5.3 Mulching

The Contractor shall apply mulch on all areas with high erosion potential and on slopes greater than 8 percent unless otherwise approved by Keystone based on site-specific conditions or circumstances. The Contractor shall spread mulch uniformly over the area to cover at least 75 percent of the ground surface at an approximate rate of 2 tons per acre of straw or its equivalent. The Environmental Inspector may reduce the application rate or forego mulching an area altogether if there is an adequate cover of rock or organic debris to protect the slope from erosion, or if annual companion crops have stabilized the soil.

Mulch application includes straw mulch, hydro mulch and tackifier or other materials as approved by Keystone.

The Contractor shall use mulch that is free of noxious weeds.

The Contractor shall apply mulch immediately following seeding. The Contractor shall not apply mulch in wetlands.

If a mulch blower is used, the majority of strands of the mulching material shall not be shredded to less than 8 inches in length to allow anchoring. The Contractor shall anchor mulch immediately after application to minimize loss by wind and water.

When anchoring (straw crimping) by mechanical means, the Contractor shall use a tool specifically designed for mulch anchoring with flat, notched disks to properly crimp the mulch to a depth of 2 to 3 inches. A regular farm disk shall not be used to crimp mulch. The crimping of mulch shall be performed across the slope of the ground, not parallel to it. In addition, in areas of steep terrain, tracked vehicles may be used as a means of crimping mulch (equipment running up and down the hill to leave crimps perpendicular to the slope), provided they leave adequate coverage of mulch.

In soils possessing high erosion potential, the Contractor may be required to make two passes with the mulch-crimping tool; passes must be as perpendicular to the others as possible.

When anchoring with liquid mulch binders (tackifiers), the Contractor shall use a biodegradable tackifier derived from a vegetable-based, organic source. The Contractor shall apply mulch binders at rates recommended by the manufacturer.

The Contractor shall limit the use of tackifiers for anchoring straw and the use of hydromulch and tackifier to areas that are too steep or rocky to safely or effectively operate mechanical mulch-anchoring tools. No asphalt-based tackifiers shall be used on the Project.

4.11.5.4 Erosion Control Matting

Erosion control matting shall be applied where shown on the construction drawings as shown on Detail 4. The Contractor shall anchor the erosion control matting with staples or other approved devices.

The Contractor shall use erosion control matting made of biodegradable, natural fiber such as straw or coir (coconut fiber).

The Contractor shall prepare the soil surface and install the erosion control matting to ensure it is stable and the matting makes uniform contact with the soil of the slope face or stream bank with no bridging of rills, gullies, or other low areas.

4.11.5.5 Riprap and Stream Bank Stabilization

Disturbed banks of streambeds and waterbodies shall be restored to their approximate original contours unless otherwise directed. Erosion protection shall be applied as specified in the construction drawings.

Most restored banks will be protected through the use of flexible channel liners installed as specified in Detail 19.

If the original stream bank is excessively steep and unstable and/or flow conditions are severe, a more stable final contour may be specified and alternate stabilization measures may be installed.

Alternate stabilization measures may consist of rock riprap, bio-stabilization, or engineered structures such as brush layering, logwalls, cribwalls, or vegetated geo-grids. See Details 20, 23, and 24.

Stream bank riprap structures shall consist of a layer of stone underlain with approved filter fabric or a gravel filter blanket. Riprap shall extend from the stabilized streambed to the top of the stream bank. Native rock shall be utilized wherever practicable.

4.11.6 Fences

Upon completion of all backfilling, cleanup, and restoration, including mulching and seeding of the construction right-of-way, permanent repairs shall be made to all fences by using either the original material or good quality new material similar to existing fences.

Historic fences shall be carefully reassembled by hand from the original material. Where the original material has deteriorated to a state that makes it unsalvageable, replacement material similar to the original shall be used if possible.

4.11.7 Farm Terraces

Keystone will work with landowners and farm service agencies to ensure restoration of farm terraces to their pre-construction function. Keystone may elect to negotiate a fair settlement with the landowner to employ a local land leveling contractor to restore the terrace.

Before any groundwork is performed in areas with farm terraces, Keystone will conduct a civil survey to document the location and contours of each terrace. Both the channel contour and the terrace berm will be surveyed within the construction right-of-way and up to 100 feet on either side of the ROW boundaries. The pre-construction survey will

provide a baseline to ensure the proper restoration of the terrace following construction.

The Contractor will maintain the pre-disturbance drainage of water along the terrace channel and will install temporary flume pipe for this purpose. As necessary, temporary erosion control measures such as water bars and sediment barriers will be installed and maintained throughout construction to reduce the potential for soil erosion along or off the construction ROW.

Following installation of the pipe, the trench will be backfilled, and the Contractor will restore the terrace contours as agreed to with the landowner.

Should the landowner agree to have a local contractor restore the terraces, the Contractor will backfill the trench and restore the terrace using typical compaction methods for pipeline construction with the understanding that the landowner's contractor will re-excavate the location and re-install the terrace utilizing land levelling equipment and special compaction methods.

Should the landowner desire the Contractor to restore the terraces, the pipeline contractor will compact the trench before the terrace berm is replaced. Following restoration of the terraces, final contours and grades will be re-surveyed and documented with survey notes. Keystone will perform post-construction monitoring and inspection with the landowner's concurrence. Should the terraces require further work, Keystone will either compensate the landowner to perform the work or arrange for a local contractor to perform the work.

4.11.8 Right-of-Way and Pipeline Markers

Upon completion of all backfilling, cleanup and restoration, including mulching and seeding of the construction right-of-way, and during the time when the Contractor is making permanent repairs to fences, the Contractor shall install pipeline markers on each side of all roads, railroads, fence lines, stream crossings, and other areas where the pipeline markers do not conflict with intended land use.

4.12 Pasture and Range Lands

The following mitigative measures shall be implemented in addition to the requirements previously stated in Sections 4.1 thru 4.11 unless otherwise approved by Keystone based on site-specific conditions or circumstances. All work shall be conducted in accordance with applicable permits.

- Access across the right-of-way during construction shall be provided at locations requested by landowners, if practicable.
- Shavings produced during pipe bevel operations are to be removed immediately to ensure that livestock and wildlife do not ingest this material.

- Litter and garbage shall be collected and removed from the construction site at the end of the day's activities.
- Temporary gates shall be installed at fence lines for access to the construction right-of-way. These gates shall remain closed at all times. Upon completion of construction, the temporary gates shall be removed and the permanent fence replaced.
- Feeding or harassment of livestock or wildlife is prohibited.
- Construction personnel shall not be permitted to have firearms or pets on the construction right-of-way.
- All food and wastes shall be stored and secured in vehicles or appropriate facilities.
- Areas of disturbance in native range shall be seeded with a native seed mix after topsoil replacement.
- Improved pasture shall be seeded with a seed mix approved by individual landowners.

4.13 Forested Lands

Mitigation measures are required to ensure that pipeline construction activities have a minimal impact on forested lands.

Clearing, grubbing, and grading of trees, brush, and stumps shall be performed in accordance with the following mitigative measures in addition to the requirements previously stated in Sections 4.1 thru 4.11 unless otherwise approved or directed by Keystone based on site-specific conditions or circumstances. Keystone will address mitigation, reclamation and remediation measures with individual landowners and comply with any applicable state requirements. These measures include non-vegetative remediation to reverse impacts on windbreaks, shelterbelts, and living snow fences. Where the pipeline follows an existing ROW in forested areas, Keystone attempted to route the pipeline as close as practical to the existing ROW. All work shall be conducted in accordance with applicable permits.

- Prior to the start of clearing activity, right-of-way boundaries, including pre-approved temporary workspaces, shall be clearly staked to prevent disturbance of unauthorized areas.
- If trees are to be removed from the construction right-of-way, Keystone shall consult with the landowner or landowner's designate to see if there are trees of commercial or other value to the landowner. Timber shall be salvaged as per landowner request.
- If there are trees of commercial or other value to the landowner, Keystone shall allow the landowner the right to retain ownership of the trees with the disposition of the trees to be negotiated prior to the commencement of land clearing and included in the easement agreement.
- If not performed by the landowner, the construction right-of-way Contractor may salvage all marketable timber from designated areas.

- Tree stumps shall be grubbed to a maximum of 5 feet on either side of the trench line and where necessary for grading a level surface for pipeline construction equipment to operate safely.
- Keystone shall follow the landowner's or landowner designee's desires as stated in the easement agreement regarding the disposal of trees, brush, and stumps of no value to the landowner by burning, burial, etc., or complete removal from any affected property.
- Timber salvage operations shall use cut-off-type saw equipment. Felling shall be undertaken in a manner that minimizes butt shatter, breakage, and off ROW disturbance. Skidders or alternate equipment shall be used to transport salvaged logs to stacking sites.
- Trees shall be felled to fall toward the center line of the right-of-way to avoid breaking trees and branches off ROW. Leaners (felled trees that inadvertently fall into adjacent undisturbed vegetation) shall be salvaged.
- Trees and slash falling outside the right-of-way shall be recovered and disposed..
- Salvaged logs shall be limbed and topped before removal from the construction right-of-way. Log decks (if required) shall be oriented to best facilitate loading by picker trucks and be located adjacent to the working side of the right-of-way, where possible.
- The Contractor shall not be allowed to dispose of woody debris in wooded areas along the pipeline right-of-way.
- Pruning of branches hanging over the right-of-way shall be done only when necessary for construction. Any branch that is broken or seriously damaged should be cut off near its fork and the collar of the branch preserved.
- All tree wastes, stumps, tree crowns, brushes, branches, and other forest debris shall be either burned, chipped (using a mobile chipper), or removed from the right-of-way according to Keystone instructions contained in the specific mitigation measures. Burial of this waste material on the site by the Contractor shall require the landowner’s authorization. Chips must not be spread over cultivated land. However, they may be spread and incorporated with mineral soil over the forest floor at a density that shall not prevent revegetation of grass.
- Stump removal and brush clearing shall be done with bulldozers equipped with brush rakes to preserve organic matter.
- Decking sites shall be established: (1) approximately 2000 feet apart in timbered areas; (2) on sites located on approved temporary workspace in existing cleared areas; (3) in non-merchantable stands of timber; or (4) if no other options are available, in merchantable timber stands. Deck sites shall be appropriately sized to accommodate the loading equipment.
- If the landowner does not want the timber, the Contractor shall remove decked timber from the construction right-of-way and transport it to a designated all-weather access point or mill

4.14 Residential and Commercial/Industrial Areas

4.14.1 Residential and Commercial Areas

The principal measures that shall be used to mitigate impacts on existing residential and commercial areas include the following unless otherwise directed or approved by Keystone based on site-specific conditions or circumstances. All work shall be conducted in accordance with applicable permits.

- notifying landowners prior to construction;
- posting warning signs as appropriate;
- reducing the width of construction right-of-way, if practicable, by eliminating the construction equipment passing lane, reducing the size of work crews, or utilizing the “stove pipe” or “drag section” construction techniques;
- removing fences, sheds, and other improvements as necessary for protection from construction activities;
- to the extent possible, preserving mature trees and landscaping while ensuring the safe operation of construction equipment;
- fencing the edge of the construction work area that is within 25 feet to a residence for a distance of 100 feet on either side of the residence to ensure that construction equipment and materials, including the spoil pile, remain within the construction work area;
- limiting the hours during which operations with high-decibel noise levels (i.e., drilling and boring) can be conducted;
- limiting dust impact through prearranged work hours and by utilizing dust minimization techniques;
- ensuring that construction proceeds quickly through such areas, thus minimizing exposure to nuisance effects such as noise and dust;
- maintaining access and traffic flow during construction activities, particularly for emergency vehicles;
- cleaning up construction trash and debris daily;
- fencing or plating open ditches during non-construction activities;
- if the pipeline centerline is within 25 feet of a residence, ensuring that the trench is not excavated until the pipe is ready for installation and that the trench shall be backfilled immediately after pipe installation; and
- immediately after backfilling the trench, restoring all lawn areas, shrubs, specialized landscaping, fences, and other structures within the construction work area to its pre-construction appearance or the requirements of the landowner. Restoration work shall be done by personnel familiar with local horticultural and turf establishment practices.
- to the extent possible, preserving mature trees and landscaping while ensuring the safe operation of construction equipment;

4.14.2 Site-Specific Plans

For any residence or commercial/industrial building closer than 25 feet to the construction work area, Keystone shall prepare a site-specific construction plan. The plan shall include:

- a description of construction techniques to be used;
- a dimensioned site plan that shows, at a minimum:
  - the location of the residence or commercial/industrial area in relation to the new pipeline;
  - the edge of the construction work area;
  - the edge of the new permanent construction right-of-way; and
  - other nearby topographical obstacles including landscaping, trees, structures, roads, parking areas, ditches, and streams; and
- a description of how Keystone would ensure that the trench is not excavated until the pipe is ready for installation and that the trench is backfilled immediately after pipe installation.

4.14.3 Landowner Complaint Resolution Procedure

Keystone shall implement a landowner complaint procedure as follows:

- Landowners should first contact the construction spread office to express their concern over restoration or mitigation of environmental damages on their property. The Construction Manager or his designated representative shall respond to the landowner within 24 hours of receipt of the phone call.
- If the landowner has not received a response or is not satisfied with the response, he can contact Keystone's representative at 1-877-880-4881. The landowner should expect a response within 48 hours.

4.15 Fragile Soil Clean-up and Reclamation/Revegetation

4.15.1 General

Fragile soil types are a result of the high percentage of sand content that exists within the surficial soil. Theses soil types exist within regions found in southern South Dakota and central Nebraska and fragile due to their inherent high wind and water erosion potential, low water holding capacity and arid nature of the region, rolling to steep terrain and usually consists of predominantly native prairie landscapes and supports a variety of uses such as livestock grazing, wildlife habitat and recreational opportunities.

4.15.2 Right-of-way Construction

- KXL will educate construction personnel regarding these areas and the necessity to strictly adhere to Project Best Management Practices (BMPs) designed to minimize impacts.

- Minor route re-alignments will be incorporated through these areas to avoid particularly erosion-prone locations, such as ridge tops and existing blowouts as much as practicable.
- KXL will avoid highly saturated areas, such as wetland, to the maximum extent possible.
- Construction soil handling procedures will strive to reduce the width of disturbance to the native prairie landscape by adopting "Trench-line or Blade-width stripping procedures where practicable.
- Topsoil conservation will be conducted on all areas where excavation occurs.
- Topsoil piles will be protected from erosion through matting, mulching, watering or tackifying as deemed practicable.
- Traffic management limitations will be employed on specific areas possessing high erosion potential or sensitive habitat.

4.15.3 Right-of-Way Reclamation

- Native seed mixes will be developed with input from the local NRCS offices and through collaboration with regional experts. All seed will be certified noxious weed-free and will be calculated on a pure live seed (PLS) basis.
- Straw or native prairie hay may be used as mulch, applied to the right-of-way and crimped into the soil to prevent wind erosion. All mulch will be documented as noxious weed-free.
- Land imprinting may be employed to create impressions in the soil, thereby reducing erosion, improving moisture retention and creating micro-sites for seed germination.
- Sediment logs or straw wattles will be used in place of slope breakers (short terraces) that are constructed of soil. Using sediment logs will result in less soil disturbance to the right-of-way.
- Photodegradable matting will be applied on steep slopes or areas prone to extreme wind exposure such as north- or west-facing slopes and ridge tops. Biodegradable pins will be used in place of metal staples to hold the matting in place.
- Keystone will work with landowners to evaluate fencing the right-of-way from livestock, or alternatively, provide compensation to rest a pasture until vegetation can become established. Management concerns such as livestock access to water or movement within a pasture would be incorporated as necessary.

4.15.4 Post-Construction

Keystone is committed to post-construction monitoring and repair and will monitor reclamation on the right-of-way for several years and repair

erosion and reseed poorly revegetated areas as necessary. During monitoring, landowners are informed of our efforts and intentions.

A noxious weed management plan will be established on these lands pending consultation with state and county experts

4.16 Operations and Maintenance

Operations and maintenance programs, such as vegetation management, pipeline maintenance, integrity surveys, and hydrostatic testing, may have an impact on the final reclamation of the right-of-way. To ensure the integrity of the facility and land surface reclamation of the right-of-way is maintained after completion of construction and that regulatory requirements are adhered to during operations, the following measures shall be implemented unless otherwise directed by Keystone in response to site-specific conditions or circumstances. All work shall be conducted in accordance with applicable permits.

- Keystone shall monitor the pipeline right-of-way and all stream crossings for erosion or other potential problems that could affect the integrity of the pipeline. Any erosion identified shall be reclaimed as expediently as practicable by Keystone or by compensating to the landowner to reclaim the area.
- Trench depressions on ditch line that may interfere with natural drainage, vegetation establishment, or land use shall be repaired as expediently as practicable by Keystone or by compensating the landowner to repair the area.
- Post-construction monitoring inspections shall be conducted after the first growing season to determine the success of revegetation, unless otherwise required by permit. Areas which have not been successfully re-established shall be revegetated by Keystone or by compensation of the landowner to reseed the area. If, after the first growing season, revegetation is successful, no additional monitoring shall be conducted unless otherwise required by permit.
- In non-agricultural areas, revegetation shall be considered successful if, upon visual survey, the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands, unless otherwise required by permit.
- In agricultural areas, revegetation shall be considered successful if crop yields are similar to adjacent undisturbed portions of the same field.
- Restoration shall be considered successful if the surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless requested otherwise by the landowner or land managing agency), revegetation is successful, and drainage has been restored.
- Weed control measures shall be implemented as required by any applicable plan and in conjunction with the landowner.
- Keystone shall be responsible for correcting tile line or irrigation system

repairs that fail, provided those repairs were made by Keystone. Keystone shall not be responsible for tile line or irrigation system repairs which Keystone compensated the landowner to perform.

- When requested by owners in cultivated land, Keystone shall monitor the yield of land impacted by construction with the help of agricultural specialists. If yield deficiencies are indicated compared to yields on unaffected land, Keystone will compensate the landowner for reduced yields and shall implement procedures to return the land to equivalent capability.
- In residential areas, landowners may use the right-of-way provided they do not interfere with the rights granted to Keystone. Trees, bushes, structures, including houses, tool sheds, garages, poles, guy wires, catch basins, swimming pools, trailers, leaching fields, septic tanks, and any other objects not easily removable, shall not be permitted on the permanent construction right-of-way without the written permission of Keystone, because they could impair access for maintenance of the pipeline.
- Keystone shall maintain communication with the landowner and tenant throughout the operating life of the pipeline to allow expedient communication of issues and problems as they occur. Keystone shall provide the landowner with corporate contact information for these purposes. Keystone shall work with landowners to prevent excessive erosion on lands disturbed by construction. Reasonable methods shall be implemented to control erosion. These may not be implemented if the property across which the pipeline is constructed is bare cropland which the landowner intends to leave bare until the next crop is planted.
- If the landowner and Keystone cannot agree upon a reasonable method to control erosion on the landowner's property, the recommendations of the appropriate NRCS office shall be considered by Keystone and the landowner.

5.0 DRAIN TILE SYSTEMS

5.1 General

If underground drainage tile is damaged by the pipeline installation, it shall be repaired in a manner that ensures the tile line's proper operating condition at the point of repair. Keystone may elect to negotiate a fair settlement with the affected county or landowner for repair of the damaged drain tile. In the event the landowner chooses to have the damaged tile repaired by Keystone, the Contractor shall follow these guidelines and procedures to identify the location of drain tiles, to mitigate damages to drain tiles prior to and during construction, to repair drain tiles damaged during installation of the pipeline, to inspect the proper repair of drain tiles, and to provide post-construction monitoring to determine any impacts caused by repair of drain tiles. Since all public and private drain tile systems are unique, i.e., varying age, depth of cover, type of material, geometry on the land, etc., it is not possible to develop a standard procedure for resolving each county's or landowner's drain tile issues. These guidelines provide a basis on which to develop site specific methodology to mitigate damage and to repair drain tiles affected by construction of the Project. A typical right-of-way layout and typical orientation for crossing drain tiles is provided in Detail 25. Typical header and main

crossovers are provided in Details 26 and 27. Actual measures will be developed based on site-specific information unique to specific installations. However, all work will be conducted in accordance with applicable permits.

5.2 Identification and Classification of Drain Tile Systems

Personnel shall attempt to identify and classify existing drain tile systems by meeting with local public officials and county engineers, and individual private landowners and tenants.

5.2.1 Publicly Owned Drain Tiles

Personnel shall identify and meet with the responsible county or local authority responsible for publicly owned drain tiles. Publicly owned drain tiles shall be identified and documented on the Project's 1" = 2000' USGS quad strip maps and additional data collected for input into an electronic spreadsheet by county, township, range, and section; responsible agency; and size, type, and depth of cover (if known). This data shall be cross-referenced to the centerline survey to be completed by Keystone. Additionally, any public records including maps or easement instruments on the drain tiles shall be acquired as well as any requirements of the local authority for installation of the pipeline.

5.2.2 Privately Owned Drain Tiles

Right-of-way agents shall meet with landowners and tenants of privately owned land along the route. As a minimum, the right-of-way agents shall ascertain the data concerning drain tiles outlined in a landowner questionnaire. The questionnaire requests data concerning: type of drain tile system; size, type of material, and depth of cover; preference for repair of drain tiles; and identification of local drain tile contractors. These data shall be collected into an electronic spreadsheet for utilization by right-of-way personnel in negotiating payments for easements and damages and by engineering or construction personnel for inclusion in specifications for the construction Contractor.

5.3 Mitigation of Damage to Drain Tile Systems

Keystone shall undertake mitigation measures to reduce damage to publicly and privately owned drain tile systems prior to and during installation of the pipeline.

5.3.1 Non-interference with Drain Tile

The Project shall be installed at a depth of cover and elevation so as not to interfere with the elevation and grade of existing drain tiles where practicable. Where not practicable, Keystone shall pursue alternative mitigation measures mutually acceptable to the landowner and jurisdictional agencies. Typically, the pipeline shall be installed below the elevation of drain tiles with a minimum clearance of 12 inches. Detail 25, Typical Right-of-Way Layout/Soil Handling, represents a typical drain tile crossing by the

pipeline with additional temporary work space to facilitate handling of topsoil and trench spoil created by the additional depth of cover for the pipeline.

5.3.2 Non-disturbance of Drain Tile Mains

Publicly owned and privately owned drain tile mains shall be identified through the processes identified in Section 5.2. Drain tile mains are essential to the overall drainage system of a land area and if disturbed, may require excessive pumping/dewatering of the pipe trench unless temporarily repaired and maintained until permanently repaired.

Keystone shall review drain tile mains and consider their size, flow rate, type of material, depth of cover, and geographic location. If determined to be practicable and reasonable for construction, the drain tile main shall not be cut and repaired during mainline installation (a pipe section shall be left out and installed by a tie-in crew without damaging the drain tile main).

5.3.3 Relocation or Replacement of Existing Drain Tiles Prior to Construction

In many instances, drain tile systems that have been installed after the installation of adjacent existing pipelines were installed with “headers” parallel to the existing pipeline with periodic jump overs as depicted on Detail 26, Header/Main Crossovers of Keystone XL Pipeline. The distance of these headers from the existing pipeline may vary.

Some of these drain tile headers may be most effectively relocated and/or replaced to the east of the Project. The existing header will be capped and made into a single drain tile as depicted on Detail 27, Relocate/Replace Drainage Header/Main. This could reduce the number of drain tile crossings on a particular landowner’s property by a significant quantity, thereby reducing the risk that repairs will fail.

5.3.4 Future Drain Tiles/Systems

Keystone shall attempt to determine where public agencies and private landowners or tenants are proposing to install drain tile systems in the future. These locations shall be input into an electronic spreadsheet by county, township, range, and section; landowner or responsible public agency; and proposed size and depth of cover. Keystone shall endeavor to construct the pipeline at a depth and elevation to accommodate the future installation of the proposed drain tile systems.

5.3.5 Other Mitigation Measures

Other mitigation measures that may be implemented during installation of the pipeline are as follows:

- not removing topsoil from the working side of the construction right-of-way to prevent crushing of drain tile by heavy equipment;
- spreading ditch and spoil side topsoil (not subsoil) over the working side to provide additional soil depth to protect existing drain tiles;

- restricting the work of the pipe lower in crew if ground conditions are too wet to adequately support the heavy equipment;
- limiting travel of heavy equipment the working lane of the construction right-of-way where possible;
- limiting travel of heavy equipment to one pass over the drain tile per work crew where possible; and
- removing and replacing topsoil during drain tile replacement should tile be crushed on the working side of the right-of-way.

5.4 Responsibility for Repair of Drain Tile Systems

Temporary and permanent drain tile repairs shall be the responsibility of the Contractor. The physical repairs shall be made by qualified and experienced drain tile repair personnel.

5.4.1 Local Drain Tile Contractor Repair

Keystone shall identify and qualify local drain tile contractors in the geographical area of the pipeline route from interviews with local public officials, landowners, tenants, and drain tile contractors. The preferred responsibility for permanent repair of drain tiles shall be for the pipeline Contractor to subcontract the supervision and repair to local reputable drain tile contractors acceptable to the landowners and tenants.

5.4.2 Pipeline Contractor Repair

In the event local drain tile contractors are not available to subcontract the supervision and repair, permanent repair shall be made with the Contractor's supervision, equipment, and labor.

5.4.3 Landowner/Tenant Repair

The landowner or tenant may agree to take responsibility for the permanent repair of his drain tiles if not precluded by regulatory agency. The landowner or tenant shall be requested to ensure his ability to coordinate and complete the drain tile repair in a timely manner to allow the pipeline Contractor to completely backfill the damaged drain tile for repair by landowner/tenant in the immediate future. Keystone shall require that its representative be present to ensure the permanent drain tile repairs are made in accordance with the minimum requirements of this manual.

5.5 Drain Tile Repairs

The Contractor shall endeavour to locate all tile lines within the construction right-of-way prior to and during installation so repairs can be made if necessary.

5.5.1 Temporary Repairs During Construction

Drain tiles damaged or cut during the excavation of the trench shall be marked with a lath and ribbon in the spoil bank. Care shall be taken to

locate markers where the chance of disturbance shall be minimized and a written record maintained of each drain tile crossing. A work crew following the pipeline trench crew shall complete a temporary repair to allow continuing flow. Detail 28, Temporary Drain Tile Repair, depicts the materials and installation procedure to complete the temporary repair. If a drain tile line shall not be temporarily repaired, the open ends of the drain tile shall be screened to prevent entry of foreign materials and small animals.

5.5.2 Permanent Repairs

Permanent repairs shall be made for all drain tiles damaged by installation of the pipeline.

5.5.2.1 Ditch Line Only Repairs

If water is flowing through a damaged tile line, the tile line shall be immediately and temporarily repaired until such time that permanent repairs can be made. If tile lines are dry and water is not flowing, temporary repairs are not required if the permanent repair is made within 7 days of the time damage

occurred. The temporary repair shall be removed just prior to lowering in the pipeline.

Drain tiles must be permanently repaired before the pipeline trench is backfilled and within 14 days of construction completion, weather and soil conditions permitting. All tile lines shall be repaired with materials of the same or better quality as that which was damaged. The drain tile marker shall not be removed until the tile repairs have been inspected, approved, and accepted by Keystone's inspectors, the county inspectors, where applicable, and the landowner or tenant. Detail 29, Permanent Repair Method of Drain Tiles, depicts the minimum materials and installation procedure to complete a permanent repair.

5.5.2.2 Ditch Line and Temporary Work Space Repairs

Prior to making the permanent drain tile repair, the Contractor shall probe a segmented sewer rod with a plug that is not more than 15% smaller than the internal diameter of the drain tile to determine if additional damage has occurred to the drain tile. If the probe does not freely insert into the drain tile across the temporary workspace of pipeline construction, the Contractor shall excavate, expose, and repair the damaged drain tile to its original or better condition.

5.6 Inspection/Acceptance of Drain Tile Repairs

Drain tile repairs shall be inspected by Keystone construction inspectors, county inspectors, as applicable, and the landowner or tenant or his representative.

Keystone shall designate inspector(s) for the sole purpose and responsibility for inspection of all repairs of drain tiles. These inspectors shall be, if possible, employed from local drain tile installation contractors, local farmers with extensive drain tile experience, or previously employed or retired employees of local jurisdictions familiar with drain tile installation and repair. In the event that a sufficient quantity of inspectors from these sources is not available, Keystone shall conduct in-the-field training seminars on drain tile repair for additional inspection personnel.

Inspection personnel shall observe the permanent repair of all drain tiles to ensure the replacement drain tile is: (1) the proper size and type; (2) installed at the proper grade; (3) properly supported and backfill beneath the drain tile is properly placed and compacted; and (4) properly tied into the existing drain tile. The inspection shall be documented on the Drain Tile Inspection Report Form.

A drain tile repair shall not be accepted until Keystone's construction inspector and the landowner or tenant or designated representative approves the inspection form.

6.0 WETLAND CROSSINGS

6.1 General

Wetland boundaries shall be clearly marked in the field with signs and/or highly visible flagging during construction.

In the event a waterbody crossing is located within or adjacent to a wetland crossing, the measures of both Section 6 - Wetland Crossings and Section 7 - Waterbodies and Riparian Lands shall be implemented to the extent practicable.

A dry wetland is defined in Section 6.5.1. In these wetlands, equipment can traverse the wetland without the support of mats or timber riprap.

A standard wetland environment typically has soils that are saturated and non-cohesive. Difficult trenching conditions are likely resulting in excessively wide trenches. In these wetland environment types, supplemental support in the form of timber riprap or prefabricated equipment mats may be required for construction equipment to safely and efficiently operate.

A flooded wetland involves the presence of standing water over much of the wetland area. Equipment typically cannot traverse the wetland and must generally move around that portion of the area. Access is typically limited to marsh backhoes or equipment working from flexifloats or equivalents.

Keystone may allow modification of the following specifications as necessary to accommodate site-specific conditions or procedures. Any modifications must still comply with all applicable regulations and permits.

6.2 Easement and Workspace

The Contractor shall maintain wetland boundary markers during construction in all areas and until permanent seeding is complete in non-cultivated areas.

The width of the construction right-of-way shall be reduced to 85 feet or less in standard wetlands unless non-cohesive soil conditions require utilization of a greater width and unless the USACE or other regulatory authority authorizes a greater width.

The Contractor shall locate extra work areas (such as staging areas and additional spoil storage areas) shall be at least 10 feet away from wetland boundaries, where topographic conditions permit.

The Contractor shall limit clearing of vegetation between extra work areas and the edge of the wetland to the construction right-of-way and limit the size of extra work areas to the minimum needed to construct the wetland crossing.

6.3 Vehicle Access and Equipment Crossing

The only access roads, other than the construction right-of-way, that the Contractor shall use in wetlands are those existing public roads and private roads acquired by Keystone from the landowner shown on the construction drawings.

To the extent practicable, the Contractor's construction equipment operating in saturated wetlands or wetlands with standing water shall be limited to that needed to clear the construction right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction right-of-way.

If equipment must operate within a wetland containing standing water or saturated soils, the Contractor shall use the following methods for equipment access unless otherwise approved by Keystone based on site-specific conditions:

- wide-track or balloon-tire construction equipment; and
- conventional equipment operated from timber and slash (riprap) cleared from the right-of-way, timber mats, or prefabricated equipment mats.

6.4 Temporary Erosion and Sediment Control

The Contractor shall install sediment barriers across the entire construction right-of-way immediately upslope of the wetland boundary at all standard wetland crossings, as necessary, to prevent sediment flow into the wetland. Sediment barriers must be properly maintained by the Contractor throughout construction and reinstalled as necessary. In the travel lane, these may incorporate removable sediment barriers or drivable berms. Removable sediment barriers can be removed during the construction day, but shall be re-installed after construction has stopped for the day or when heavy precipitation is imminent. The Contractor shall maintain sediment barriers until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. The Contractor shall not install sediment barriers at wetlands designated as "dry" unless otherwise specified by Keystone.

Where standard wetlands are adjacent to the construction right-of-way, the Contractor shall install sediment barriers along the edge of the construction right-of-way as necessary to prevent a sediment flow into the wetland.

6.5 Wetland Crossing Procedures

The following general mitigative procedures shall be followed by the Contractor in all wetlands unless otherwise approved or directed by Keystone based on site-specific conditions. All work shall be conducted in accordance with applicable permits.

- limit the duration of construction-related disturbance within wetlands to the extent practicable;

- use no more than two layers of timber riprap to stabilize the construction right-of-way;
- cut vegetation off at ground level leaving existing root systems in place and remove it from the wetland for disposal;
- limit pulling of tree stumps and grading activities to directly over the trench line unless safety concerns require the removal of stumps from the working-side of the construction ROW;
- segregate a maximum of 12 inches of topsoil from the area disturbed by trenching in dry wetlands, where practicable;
- restore topsoil to its approximate original stratum, after backfilling is complete;
- dewater the trench in a manner to prevent erosion and heavily silt-laden flowing directly into any wetland or waterbody;
- remove all timber riprap and prefabricated equipment mats upon completion of construction;
- locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable;
- prohibit storing hazardous materials, chemicals, fuels, lubricating oils, or perform concrete coating activities in a wetland, or within 100 feet of any wetland boundary;
- perform all equipment maintenance and repairs upland locations at least 100 feet from waterbodies and wetlands;
- avoid parking equipment overnight within 100 feet of a watercourse or wetland;
- prohibit washing equipment in streams or wetlands;
- install trench breakers and/or seal the trench to maintain the original wetland hydrology, where the pipeline trench may drain a wetland;
- attempt to refuel all construction equipment in an upland area at least 100 feet from a wetland boundary (otherwise follow the procedures outlined in Section 3); and
- avoid sand blasting in wetlands to the extent practicable. If sandblasting is performed within a wetland, the Contractor shall place a tarp or suitable material in such a way as to collect as much waste shot as possible and dispose of the collected waste. The Contractor shall clean up all visible deposits of wastes and dispose of the waste at an approved disposal facility.

Specific procedures for each type of wetland crossing method are listed below and shall be designated on the construction drawings but may be modified depending on site conditions at the time of construction. All work shall be conducted in accordance with applicable permits.

6.5.1 Dry Wetland Crossing Method

Topsoil shall be segregated. Pipe stringing and fabrication may occur within the wetland adjacent to the trench line or adjacent to the wetland in a designated extra workspace.

The dry wetland crossing procedure depicted in Detail 8 shall be used where this type of wetland is identified on the construction drawings. The following are exceptions to standard wetland crossing methods:

- The width of the construction right-of-way for upland construction is maintained through the wetland.
- Where extra work areas (such as staging areas and additional spoil storage areas) are designated on the construction drawings, they may be placed no closer than 10 feet from the wetland's edge.
- Seeding requirements for agricultural lands shall be applied to farmed wetlands.

6.5.2 Standard Wetland Crossing Method

Topsoil stripping is impracticable due to the saturated nature of the soil. Pipe stringing and fabrication may occur within the wetland adjacent to the trench line or adjacent to the wetland in a designated extra workspace. Based upon the length of a standard wetland crossing and presence of sufficient water to float the pipe, the Contractor may elect to install a standard wetland crossing utilizing the “push/pull” method.

The standard wetland crossing procedure depicted in Detail 9 shall be used where this type of wetland is identified on the construction drawings.

Procedures unique to standard wetlands include:

- limiting construction right-of-way width to a maximum of 85 feet unless site conditions warrant a wider width;
- utilizing low-ground-pressure construction equipment or support equipment on timber riprap or timber mats; and
- installing sediment barriers across the entire right-of-way where the right-of-way enters and exits the wetland.

6.5.3 Flooded Push/Pull Wetland Crossing Method

Where standing surface water or high groundwater levels make trenching difficult, trench widths up to 35 feet are common. Topsoil stripping is impossible due to the flooded conditions. Pipe stringing and fabrication is required adjacent to the wetland in a designated extra workspace. Using floatation devices, the pipe string is pushed and pulled from the extra workspace to the trench.

The Push/Pull wetland crossing procedure as depicted in Detail 10 shall be used where water is sufficient to float the pipeline in the trench and other site conditions allow.

Clean metal barrels or Styrofoam floats may be used to assist in the flotation of the pipe. Metal banding shall be used to secure the barrels or floats to the pipe. All barrels, floats, and banding shall be recovered and removed upon completion of lower in. Backfill shall not be allowed before recovery of barrels, floats, and banding.

6.6 Restoration and Reclamation

All timber riprap, timber mats, and prefabricated equipment mats and other construction debris shall be removed upon completion of construction. As much as is feasible, the Contractor shall replace topsoil and restore original contours with no crown over the trench. Any excess spoil shall be removed from the wetland. The Contractor shall stabilize wetland edges and adjacent upland areas by establishing permanent erosion control measures and revegetation, as applicable, during final clean up.

For each standard wetland crossed, the Contractor shall install a permanent slope breaker and trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas. The Contractor shall locate the trench breaker immediately upslope of the slope breaker.

The Contractor shall not use fertilizer, lime, or mulch in wetlands unless required in writing by the appropriate land management agency.

All wetland areas within conservation lands or easements will be restored to a level consistent with any additional criteria established by the relevant managing agency.

7.0 WATERBODIES AND RIPARIAN AREAS

7.1 General

The Contractor shall comply with requirements of all permits issued for the waterbody crossings by federal, state or local agencies.

Waterbody includes any areas delineated as jurisdictional natural or artificial stream, river, or drainage, and other permanent waterbodies such as ponds and lakes:

- Minor Waterbody includes all waterbodies less than or equal to 10 feet wide at the water's edge at the time of construction.
- Intermediate Waterbody includes all waterbodies greater than 10 feet wide but less than or equal to 100 feet wide at the water's edge at the time of construction.
- Major Waterbody includes all waterbodies greater than 100 feet wide at the water's edge at the time of construction.

In the event a waterbody crossing is located within or adjacent to a wetland crossing, the Contractor, to the extent practicable, shall implement the provisions of both Section 6 - Wetland Crossings and Section 7 - Waterbodies and Riparian Areas.

The Contractor shall supply and install advisory signs in a readily visible location along the construction right-of-way at a distance of approximately 100 feet on each side of the crossing and on all roads which provide direct construction access to waterbody crossing sites. Signs shall be supplied, installed, maintained, and then removed upon completion of the Project. Additionally, signs shall be supplied and installed by the Contractor on all intermediate and major waterbodies accessible to recreational boaters warning boaters of pipeline construction operations.

The Contractor shall not store hazardous materials, chemicals, fuels, lubricating oils, or perform concrete coating within 100 feet of any waterbody. The Contractor shall not refuel construction equipment within 100 feet of any waterbody. If the Contractor must refuel construction equipment within 100 feet of a waterbody, it must be done in accordance with the requirements outlined in Section 3. All equipment maintenance and repairs will be performed in upland locations at least 100 feet from waterbodies and wetlands. All equipment parked overnight shall be at least 100 feet from a watercourse or wetland, if possible. Equipment shall not be washed in streams or wetlands.

Throughout construction, the Contractor shall maintain adequate flow rates to protect aquatic life and to prevent the interruption of existing downstream uses.

Keystone may allow modification of the following specifications as necessary to accommodate specific situations or procedures. Any modifications must comply with all applicable regulations and permits. Keystone will complete site-specific

crossing plans for certain waterbody crossings if required by the applicable regulatory agencies during federal or state permitting processes.

7.2 Easement and Work Space

The permanent easement, temporary work space, additional temporary work space, and any special restrictions shall be depicted on the construction drawings. The work shall be contained within these areas and be limited in size to the minimum required to construct the waterbody crossing.

The Contractor shall locate all extra work areas (such as staging areas and additional spoil storage areas) at least 10 feet from the water's edge if practicable.

At all waterbody crossings, the Contractor shall install flagging across the construction right-of-way at least 10 feet from the water's edge prior to clearing and ensure that riparian cover is maintained where practicable during construction.

7.3 Vehicle Access and Equipment Crossings

The Contractor shall inspect equipment for fluid leaks prior to entering or crossing over waterbodies.

Equipment bridges shall be installed at all flowing waterbodies and as directed by the Keystone EI. Equipment crossings shall be constructed as described in Details 16, 17
and/or 18.

Equipment crossings shall be perpendicular to drainage bottoms wherever possible.

Erosion and sediment control barriers will be installed and maintained around vehicle access points as necessary to prevent sediment from reaching the waterway.

The Contractor shall be responsible for the installation, maintenance, and removal of all temporary access crossings including portable bridges, bridges made from timber or mats, flumes, culverts, sand bags, subsoil, coarse granular material, and riprap.

The Contractor shall ensure that culverts and flumes are sized and installed of sufficient diameter to accommodate the existing flow of water and those that may potentially be created by sudden runoffs. Flumes shall be installed with the inlet and outlet at natural grade if possible.

Where bridges, culverts or flumes are installed across the work area, the Contractor shall be responsible for maintaining them (e.g. preventing collapse, clogging or tilting). All flumes and culverts shall be removed as soon as possible upon completion of construction.

The width of the temporary access road across culverts and flumes and the design of the approaches and ramps shall be adequate for the size of vehicle and equipment access required. The ramps shall be of sufficient depth and constructed to prevent collapse of the flumes, and the approaches on both sides of the flume shall be feathered.

Where culverts are installed for access, the culvert shall be of sufficient length to convey the stream flow through the construction zone.

The Contractor shall maintain equipment bridges to prevent soil from entering the waterbody.

7.4 Waterbody Crossing Methods

Construction methods pertinent to waterbody crossings are presented below. Selection of the most appropriate method at each crossing shall be depicted on the construction drawings but may be amended or changed based on site-specific conditions (i.e., environmental sensitivity of the waterbody, depth, and rate of flow, subsurface soil conditions, and the expected time and duration of construction) at the time of crossing. Construction will involve dry-ditch techniques at crossings where the timing of construction does not adequately protect environmentally sensitive waterbodies, as determined by the appropriate regulatory authority. Where required, horizontal directional drilling (HDD) will be used at designated major and sensitive waterbodies crossings. Each waterbody crossing shall be accomplished using one of the following construction methods:

- Non-flowing Open Cut Crossing Method - (Detail 11)
- Flowing Open Cut Crossing Method – Minor, Intermediate or Major Waterbody - (Detail 12)
- Flowing Stream Crossing – Dry Flume Method - (Detail 13)
- Flowing Stream Crossing – Dry Dam-and-Pump Method - (Detail 14)
- Horizontal Directional Drill Crossing - (Detail 15)
- Horizontal Bore Crossing - (Detail 21)

In conjunction with the appropriate jurisdictional agency, Keystone will develop specific crossing plans for major water bodies that contain recreationally or commercially important fisheries, or are classified as special use. Keystone will consult with state fisheries agencies with respect to applicable construction windows for each crossing and develop specific construction and crossing methods for open cuts in conjunction with USACE permitting and USFWS consultation.

7.4.1 Non-flowing Open Cut Crossing Method

The Contractor shall utilize the Non-flowing Open Cut Crossing Method (Detail 11) for all waterbody crossings (ditches, gullies, drains, swales, etc.) with no perceptible flow at the time of construction. Should site conditions change and the waterbody is flowing at the time of

construction, the Contractor shall install the crossing utilizing the Flowing Open Cut Crossing Method (Detail 12) unless otherwise approved by Keystone.

7.4.2 Flowing Open Cut Crossing Method of Minor, Intermediate, and Major Waterbodies

For minor waterbody crossings, except where the flume method is used, the Contractor shall complete construction in the waterbody (not including blasting, if required) as shown on Detail 12 within 24 hours if practicable.

For intermediate waterbodies, the Contractor shall attempt to complete trenching and backfill work within the waterbody (not including blasting if required) within 48 hours if practicable as shown on Detail 12.

The Contractor shall construct each major waterbody crossing in accordance with a site-specific plan as shown in the construction drawings. The Contractor shall complete in-stream construction activities as expediently as practicable.

7.4.3 Flowing Stream Crossing – Dry Flume Method

Where required, the Contractor shall utilize the Flowing Open Cut Crossing – Dry Flume Method as shown on Detail 13 with the following "dry ditch" techniques:

- Flume pipe shall be installed after blasting (if necessary), but before any trenching.
- Sand bag, sand bag and plastic sheeting diversion structure, or equivalent shall be used to develop an effective seal and to divert stream flow through the flume pipe (some modifications to the stream bottom may be required in order to achieve an effective seal).
- Flume pipe(s) shall be aligned to prevent bank erosion and streambed scour.
- Flume pipe shall not be removed during trenching, pipe laying, or backfilling activities, or initial streambed restoration efforts.
- All flume pipes and dams that are not also part of the equipment bridge shall be removed as soon as final clean up of the stream bed and bank is complete.

7.4.4 Flowing Stream Crossing – Dry Dam-and-Pump Method

Where specified in the construction drawings, the Contractor shall utilize the Flowing Open Cut Crossing – Dry Dam-and-Pump Method as shown on Detail 14. The dam-and-pump crossing method shall meet the following performance criteria:

- sufficient pumps to maintain 1.5 times the flow present in the stream at the time of construction;

- at least one back up pump available on site;
- dams constructed with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);
- screen pump intakes installed;
- streambed scour prevented at pump discharge; and
- dam and pumps shall be monitored to ensure proper operation throughout the waterbody crossing.

7.4.5 Horizontal Directional Drill Crossings

Where required, the horizontal directional drill method as shown on Detail 15 shall be utilized for designated major and sensitive waterbodies. The Contractor shall construct each directional drill waterbody crossing in accordance with a site specific plan as shown in the construction drawings.

Drilling fluids and additives utilized during implementation of a directional drill shall be non-toxic to the aquatic environment.

The Contractor shall develop a contingency plan to address a frac-out during a directional drill. The plan shall include instructions for monitoring during the directional drill and mitigation in the event that there is a release of drilling fluids. Additionally, the waterbody shall be monitored downstream by the Contractor for any signs of drilling fluid.

The Contractor shall dispose of all drill cuttings and drilling mud as permitted by the appropriate regulatory authority at a Keystone-approved location. Disposal options may include spreading over the construction right-of-way in an upland location approved by Keystone or hauling to an approved licensed landfill or other site approved by Keystone.

7.4.6 Horizontal Bore Crossings

Where required, the horizontal bore method as shown on Detail 21 shall be utilized for crossing waterbodies. The Contractor shall construct each horizontal bore waterbody crossing in accordance with a site specific plan as shown in the construction drawings.

7.5 Clearing

Except where rock is encountered and at non-flowing open cut crossings, all necessary equipment and materials for pipe installation must be on site and assembled prior to commencing trenching in a waterbody. All staging areas for materials and equipment shall be located at least 10 feet from the waterbody edge. The Contractor shall preserve as much vegetation as possible along the waterbody banks while allowing for safe equipment operation.

Clearing and grubbing for temporary vehicle access and equipment crossings shall be carefully controlled to minimize sediment entering the waterbody from the construction right-of-way.

Clearing and grading shall be performed on both sides of the waterbody prior to initiating any trenching work. All trees shall be felled away from watercourses.

Plant debris or soil inadvertently deposited within the high water mark of waterbodies shall be promptly removed in a manner that minimizes disturbance of the waterbody bed and bank. Excess floatable debris shall be removed above the high water mark from areas immediately above crossings.

Vegetation adjacent to waterbody crossings by horizontal directional drill or boring methods shall not be disturbed except by hand clearing as necessary for drilling operations.

7.6 Grading

The construction right-of-way adjacent to the waterbody shall be graded so that soil is pushed away from the waterbody rather than towards it whenever possible.

In order to minimize disturbance to woody riparian vegetation within extra workspaces adjacent to the construction right-of-way at waterbody crossings, the Contractor shall minimize grading and grubbing of waterbody banks. To the extent practicable, grubbing shall be limited to the ditch line plus an appropriate width to accommodate safe vehicle access and the crossing.

7.7 Temporary Erosion and Sediment Control

The Contractor shall install and maintain sediment barriers across the entire construction right-of-way at all flowing waterbody crossings.

The Contractor shall install sediment barriers immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete.

Where waterbodies are adjacent to the construction right-of-way, the Contractor shall install and maintain sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way.

7.8 Trenching

The following requirements apply to all waterbody crossings except those being installed by the non-flowing open cut crossing method.

All equipment and materials shall be on site before trenching in the active channel of all minor waterbodies containing state-designated fisheries, and in

intermediate and major waterbodies. All activities shall proceed in an orderly manner without delays until the trench is backfilled and the stream banks stabilized. The Contractor shall not begin in-stream activity until the in-stream pipe section is complete and ready to be installed in the waterbody.

The Contractor shall use trench plugs at the end of the excavated trench to prevent the diversion of water into upland portions of the pipeline trench and to keep any accumulated upland trench water out of the waterbody. Trench plugs must be of sufficient size to withstand upslope water pressure.

The Contractor shall conduct as many in-stream activities as possible from the banks of the waterbodies. The Contractor shall limit the use of equipment operating in waterbodies to that needed to construct each crossing.

The Contractor shall place all spoil from minor and intermediate waterbody crossings and upland spoil from major waterbody crossings in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas. No trench spoil, including spoil from the portion of the trench across the stream channel, shall be stored within a waterbody unless the crossing cannot be reasonably completed without doing so.

The Contractor shall install and maintain sediment barriers around spoil piles to prevent the flow of spoil into the waterbody.

Spoil removed during ditching shall be used to backfill the trench usually with a backhoe, clamshell, or a dragline working from the waterbody bank. Sand, gravel, rockshield, or fill padding shall be placed around the pipe where rock is present in the channel bottom.

7.9 Pipe Installation

The following requirements apply to all waterbody crossings except those being installed by the non-flowing open cut crossing method.

A "free stress" pipe profile shall be used at all minor, intermediate, and major waterbodies with gradually sloping stream banks. The "box bend" pipe profile may be used for intermittent and major waterbodies with steep stream banks.

The trench shall be closely inspected to confirm that the specified cover and adequate bottom support can be achieved, and shall require Keystone approval prior to the pipe being installed. Such inspections shall be performed by visual inspection and/or measurement by a Keystone representative. In rock trench, the ditch shall be adequately padded with clean granular material to provide continuous support for the pipe.

The pipe shall be pulled into position or lowered into the trench and shall, where necessary, be held down by suitable negative buoyancy control, as-built recorded and backfilled immediately to prevent the pipe from floating.

The Contractor shall provide sufficient approved lifting equipment to perform the pipe installation in a safe and efficient manner. As the coated pipe is lowered in,

it shall be prevented from swinging or rubbing against the sides of the trench. Only properly manufactured slings, belts, and cradles suitable for handling coated pipe shall be used. All pipes shall be inspected for coating flaws and/or damage as it is being lowered into the trench. Any damage to the pipe or coating shall be repaired.

7.10 Backfilling

The following requirements apply to all waterbody crossings except those being installed by the non-flowing open cut crossing method.

Trench spoil excavated from waterbodies shall be used to backfill the trench across waterbodies.

After lowering in is complete, but before backfilling, the line shall be re-inspected to ensure that no skids, brush, stumps, trees, boulders, or other debris is in the trench. If discovered, such materials or debris shall be removed from the trench prior to backfilling.

For each major waterbody crossed, the Contractor shall install a trench breaker at the base of slopes near the waterbody unless otherwise directed by Keystone based on site specific conditions. The base of slopes at intermittent waterbodies shall be assessed on site and trench breakers installed only where necessary.

Slurred muck or debris shall not be used for backfill. At locations where the excavated native material is not acceptable for backfill or must be supplemented, the Contractor shall provide granular material approved by Keystone.

If specified in the construction drawings, the top of the backfill in the stream shall be armored with rock riprap or bio-stabilization materials as appropriate.

7.11 Stabilization and Restoration of Stream Banks and Slopes

The Contractor will restore the contours of the bed and banks of all waterways immediately after pipe installation and backfill, except over the travel lane. Travel lanes and bridges may stay in place until hydrostatic testing and cleanup are complete. All materials used to support construction activities will be removed from waterbodies and wetlands, including, but not limited to, flumes, mats, plastic sheeting, and sandbags.

The stream bank contour shall be re-established. All debris shall be removed from the streambed and banks. Stream banks shall be stabilized and temporary sediment barriers shall be installed within 24 hours of completing the crossing if practicable.

Approach slopes shall be graded to an acceptable slope for the particular soil type and surface run off controlled by installation of permanent slope breakers. Where considered necessary, the integrity of the slope breakers shall be ensured by lining with erosion control blankets.

Immediately following reconstruction of the stream banks, the Contractor shall install seed and flexible channel liners on waterbody banks as shown in Detail 19.

If the original stream bank is excessively steep and unstable or flow conditions are severe, or if specified on the construction drawings, the banks shall be stabilized with rock riprap, gabions, stabilizing cribs, or bio-stabilization measures to protect backfill prior to reestablishing vegetation.

Stream bank riprap structures shall consist of a layer of stone, underlain with approved filter fabric or a gravel filter blanket in accordance with Detail 20. Riprap shall extend from the stabilized streambed to the top of the stream bank. Where practicable, native rock shall be utilized.

Bio-stabilization techniques which may be considered for specific crossings are shown in Details 23 and 24.

The Contractor shall remove equipment bridges as soon as possible after final clean up.

8.0 HYDROSTATIC TESTING

8.1 Testing Equipment Location

The Contractor shall provide for the safety of all pipeline construction personnel and the general public during hydrostatic test operations by placing warning signs in populated areas.

The Contractor shall locate hydrostatic test manifolds 100 feet outside wetlands and riparian areas to the maximum extent practicable.

8.2 Test Water Source and Discharge Locations

Keystone is responsible for acquiring all permits required by federal, state and local agencies for procurement of water and for the discharge of water used in the hydrostatic testing operation. Keystone shall provide the Contractor with a copy of the appropriate withdrawal/discharge permits for hydrostatic test water. The Contractor shall keep water withdrawal/discharge permits on site at all times during testing operations.

Any water obtained or discharged shall be in compliance with permit notice requirements and with sufficient notice for Keystone's Testing Inspector to make water sample arrangements prior to obtaining or discharging water. Keystone will obtain water samples for analysis from each source before filling the pipeline. In addition, water samples will be taken prior to discharge of the water, as required by state and federal permits.

In some instances sufficient quantities of water may not be available from the permitted water sources at the time of testing. Withdrawal rates may be limited as stated by the permit. Under no circumstances shall an alternate water source be used without prior authorization from Keystone.

The Contractor shall be responsible for obtaining any required water analyses from each source to be used in sufficient time to have a lab analysis performed prior to any filling operations. The sample bottle shall be sterilized prior to filling with the water sample. The analysis shall determine the pH value and total suspended solids. Each bottle shall be marked with:

- source of water with pipeline station number;
- date taken;
- laboratory order number; and
- name of person taking sample.

Staging/work areas for filling the pipeline with water will be located a minimum of 100 feet from the waterbody or wetland boundary if topographic conditions permit. The Contractor will install temporary sediment filter devices adjacent to all streams to prevent sediments from leaving the construction site.

The Contractor shall screen the intake hose to prevent the entrainment of fish or debris. The hose shall be kept at least 1 foot off the bottom of the waterbody. Refueling of construction equipment shall be conducted a minimum distance of 100 feet from the stream or a wetland. Pumps used for hydrostatic testing within 100 feet of any waterbody or wetland shall be operated and refueled in accordance with Section 3.

During hydrostatic test water withdrawals, the Contractor will maintain adequate flow rates in the waterbody to protect aquatic life and provide for downstream uses, in compliance with regulatory and permit requirements.

The Contractor shall not use chemicals in the test water. The Contractor shall not discharge any water containing oil or other substances that are in sufficient amounts as to create a visible color film or sheen on the surface of the receiving water.

Selected road, railroad, and river crossing pipe sections may be specified to be pre-tested for a minimum of 4 hours. The water for pre-testing of any road and railroad crossings shall be hauled by a tanker truck from an approved water source. Water for pre-testing of a river crossing may be hauled or taken from the respective river if it is an approved water source. Since the volume of water utilized in these pre-tests shall be relatively small, the water shall be discharged overland along the construction right-of-way and allowed to soak into the ground utilizing erosion and sediment control mitigative measures.

Selection of final test water sources will be determined based on site conditions at the time of construction and applicable permits.

8.3 Filling the Pipeline

After final positioning of the pipe, the Contractor shall fill the pipe with water. Pipe ends shall not be restrained during the fill. The fill pump shall be set on a metal catch pan of sufficient dimensions to contain all leaking lubricants or fuel and prevent them from entering the water source. The suction inlet must be placed in a screened enclosure located at a depth that shall not allow air to be drawn in with the water. The screened enclosure shall be such that the fill water is free of organic or particulate matter.

The Contractor shall provide a filter of the back flushing or cartridge type with a means of cleaning without disconnecting the piping. The filter shall have the specifications of 100 mesh screen. If the cartridge type is used, a sufficient quantity of cartridges shall be on hand at the filter location. The Contractor shall install the filter between the fill pump and the test header. The Contractor shall be responsible for keeping the back flush valve on the filter closed during the filling operation. The Contractor shall be responsible for the proper disposal of materials back flushed from the filter or filter cartridges. The Contractor shall not be allowed to back flush the filter into the stream or other water source.

During water-filling of the pipeline, the Contractor shall employ fill pumps capable of injecting water into the pipeline at a maximum rate of approximately 0.7 to 1.0 mile per hour, except as limited by permits or the maintenance of adequate flow rates in the waterbody, as follows:

Nominal OD	Max GPM
36”	3000

The Contractor shall maintain flow rates as necessary to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.

In areas where zebra mussels are known to occur, all equipment used during the hydrostatic test withdrawal and discharge will be thoroughly cleaned before being used at subsequent hydrostatic test locations to prevent the transfer of zebra mussels or their larvae (veligers) to new locations.

8.4 Dewatering the Pipeline

The Contractor shall comply with state-issued NPDES permits for discharging test water.

The Contractor shall not discharge any water containing oil or other substances that are in sufficient amounts as to create a visible color film on the surface of the receiving water.

The Contractor shall not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and local permitting agencies grant written permission.

To avoid impacts from introduced species, no inter-basin transfers (discharge) of hydrostatic test water will occur.

The discharge operation will be monitored and water samples will be taken prior to the beginning of the discharge to ensure that it complies with the Project and permit requirements. If required by state permits, additional water quality testing will be conducted during discharge, in accordance with permit conditions.

The Contractor shall calculate, record, and provide to Keystone the day, date, time, location, total volume, maximum rate, and methods of all water discharged to the ground or to surface water in association with hydrostatic testing.

The Contractor shall regulate the pig velocity discharge rate (3000 gpm maximum), use energy dissipation devices, and install sediment barriers, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive stream flow. Water must be disposed of using good engineering judgment so that all federal, state, and local environmental standards are met. Dewatering lines shall be of sufficient strength and be securely supported and tied down at the discharge end to prevent whipping during this operation.

To reduce the velocity of the discharge, The Contractor shall utilize an energy-dissipating device described as follows:

8.4.1 Splash Pup

A splash pup consists of a piece of large diameter pipe (usually over 20" outside diameter) of variable length with both ends partially blocked that is welded perpendicularly to the discharge pipe. As the discharge hits against the inside wall of the pup, the velocity is rapidly reduced and the water is allowed to flow out either end. A variation of the splash pup concept, commonly called a diffuser, incorporates the same design, but with capped ends and numerous holes punched in the pup to diffuse the energy.

8.4.2 Splash Plate

The splash plate is a quarter section of 36-inch pipe welded to a flat plate and attached to the end of a 6-inch discharge pipe. The velocity is reduced by directing the discharge stream into the air as it exits the pipe. This device is also effective for most overland discharge.

8.4.3 Plastic Liner

In areas where highly erodible soils exist or in any low flow drainage channel, it is a common practice to use layers of Visqueen (or any of the new construction fabrics currently available) to line the receiving channel for a short distance. One anchoring method may consist of a small load of rocks to keep the fabric in place during the discharge. Additional best management practices, such as the use of plastic sheeting or other material to prevent scour, will be used as necessary to prevent excessive sedimentation during dewatering.

8.4.4 Straw Bale Dewatering Structure

Straw bale dewatering structures are designed to dissipate and remove sediment from the water being discharged. Straw bale structures are used for on land discharge of wash water and hydrostatic test water and in combination with other energy dissipating devices for high volume discharges. A straw bale dewatering structure is shown In Detail 6. A dewatering filter bags may be sued as an alternative to show bale dewatering structures. A dewatering filter bag is shown in Detail 5.

Typical Drawing Index

NOTE: **The following typical drawings are included for ease of reference.**

- Details 1 through 31 can be found in the Construction Mitigation and Reclamation Plan

REVISIONS
01 2008-11-05 REVISED TITLES, ADDED/DEL. DETAILS
02 2010-10-08 REVISED TITLES
03 2010-10-11 REVISED TITLE BLOCK

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DESIGNER: JMP (NAME) 2010-10-21 (DATE)
CHECKED BY: WSF
DESIGN CHECKER: RW P7100

KEYSTONE XL PROJECT
FIA # 4359 | CHAINAGE: | DISCIPLINE # 03
TITLE: DETAIL INDEX
SCALE N.T.S. | DWG No 4359-03-ML-00-700 | REV 03

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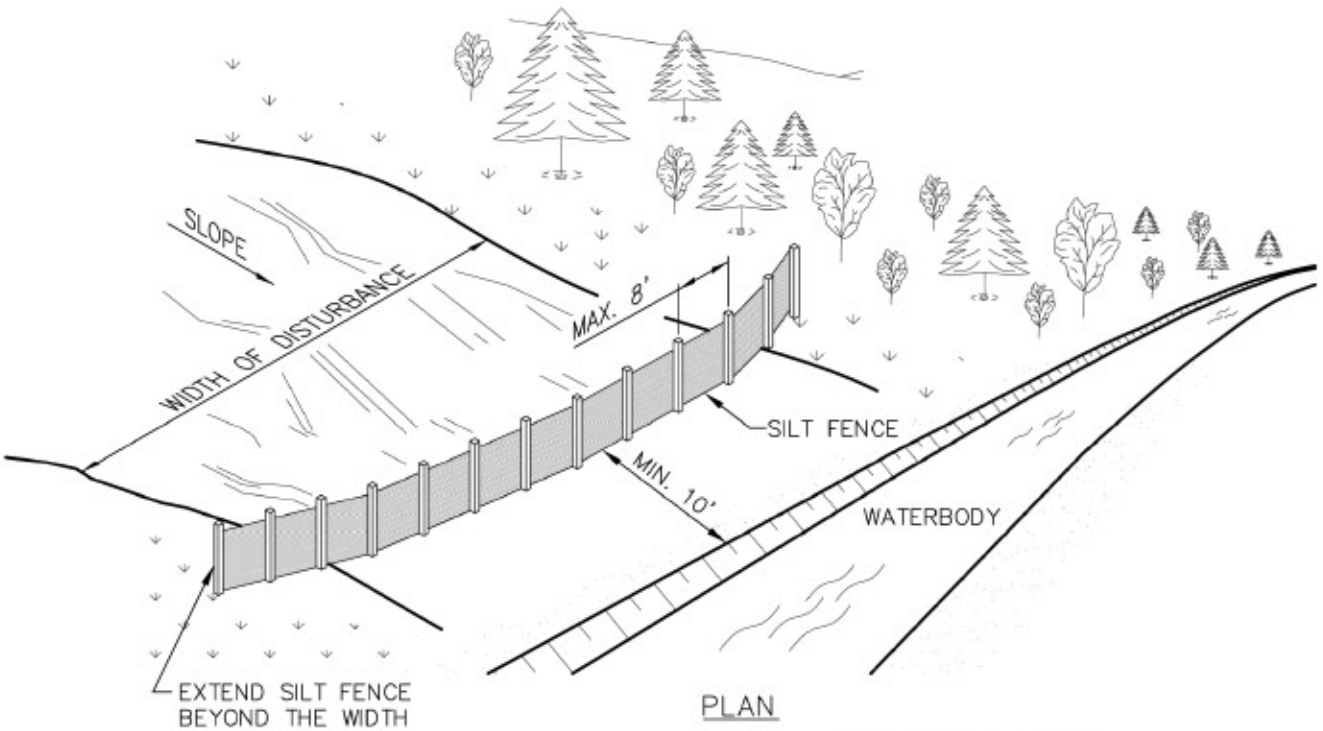

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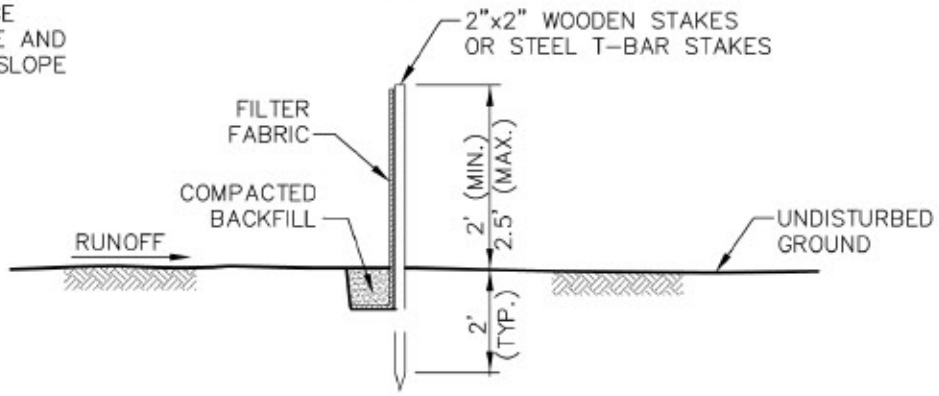

SECTION "A-A"

NOTES:

1. MATERIAL SHOULD BE WOVEN GEOTEXTILE FABRIC SUCH AS EXXON GTF 180 OR MIRAFI 600X, OR AN APPROVED EQUIVALENT. SECONDARY REINFORCEMENT, SUCH AS A CONSTRUCTION BARRIER FENCE OR WIRE MESH CAN ALSO BE USED BEHIND THE FILTER FABRIC.
2. SILT FENCE TO BE REINFORCED WITH 2"x2" WOODEN STAKES OR STEEL T-BAR STAKES PLACED EVERY 8' OR CLOSER AS CONDITIONS REQUIRE.
3. ATTACH FILTER FABRIC AT EACH POST AT A MINIMUM OF 3 LOCATIONS.
4. THE FILTER FABRIC MINIMUM LENGTH OF 1' IS TO BE ANCHORED IN A TRENCH WITH WELL COMPACTED BACKFILL OVER THE FABRIC TO PREVENT UNDERMINING.
5. TO ELIMINATE POSSIBLE END FLOW, BOTH ENDS OF THE SILT FENCE SHALL BE TURNED AND EXTENDED UPSLOPE.
6. SILT FENCES ARE TO BE CHECKED AND MAINTAINED ON A REGULAR BASIS. REMOVE ANY BUILD-UP OF SEDIMENT. REPLACE DAMAGED OR INEFFECTIVE SILT FENCE AS SOON AS POSSIBLE.
7. WHERE ANCHORING CONDITIONS FOR THE SILT FENCE ARE POOR, PLACE STRAW BALES ON DOWNSTREAM SIDE OF THE SILT FENCE.
8. INSTALLATION TO BE MODIFIED BY THE PROJECT AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

REVISIONS
01 2008-11-04 UPDATED DRAWING NOTES
02 2010-10-08 UPDATED DRAWING NOTES
03 2010-10-11 REVISED TITLE BLOCK

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 1 TYPICAL SILT FENCE BARRIER		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-05-701	REV 03

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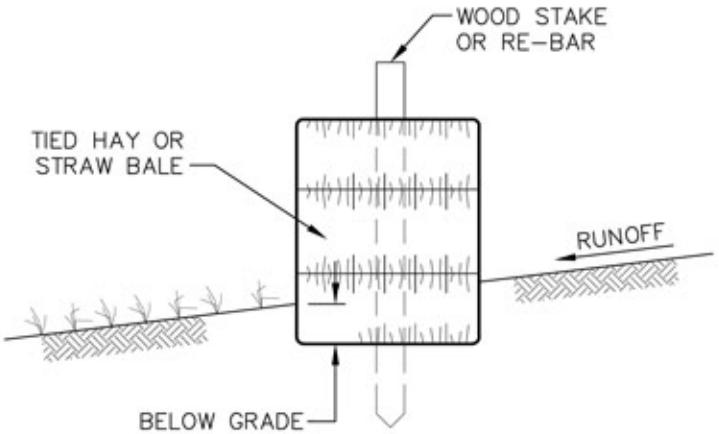

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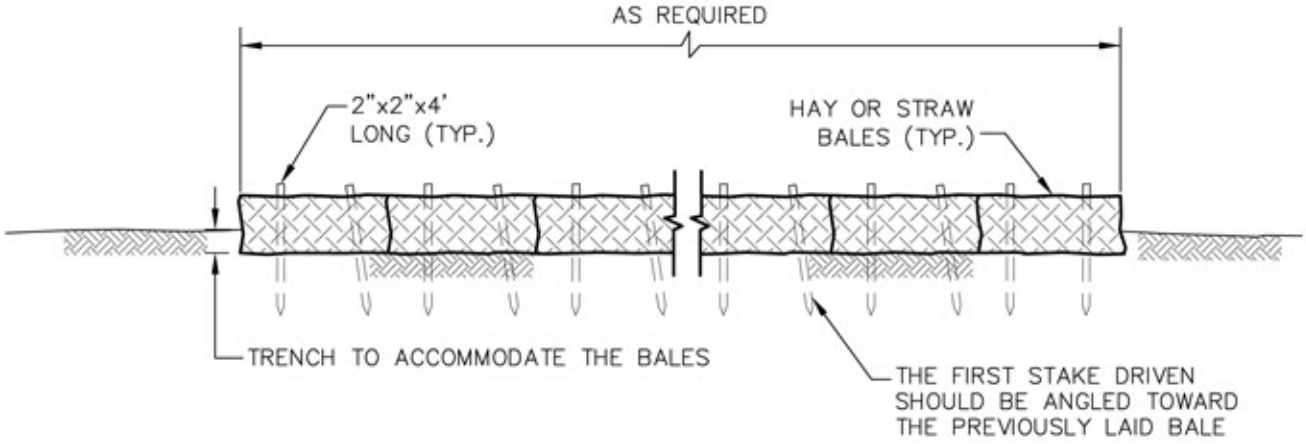

SECTION

NOTES:

1. TO ELIMINATE POSSIBLE END FLOW, BOTH ENDS OF THE STRAW BALE BARRIER SHOULD BE TURNED AND EXTENDED UPSLOPE.
2. EACH BALE SHOULD BE SECURED BY AT LEAST 2 STAKES. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER. ANY GAPS CAN BE FILLED IN BY WEDGING LOOSE STRAW BETWEEN THE BALES. STAKES SHOULD BE DRIVEN. REBAR OR STANDARD "T" OR "U" STEEL POSTS CAN BE USED AS STAKES, BUT IT SHOULD BE NOTED THAT THEY MAY POSE A HAZARD TO EQUIPMENT IF THE BALES DISINTEGRATE.
3. COMPACT THE EXCAVATED SOIL AGAINST THE UPHILL SIDE OF THE BARRIER TO PREVENT PIPING.
4. STRAW OR HAY BALE BARRIERS REQUIRE CONTINUAL MAINTENANCE TO REMOVE COLLECTED SEDIMENT AND REPLACE DAMAGED BALES AS SOON AS POSSIBLE. PAY CLOSE ATTENTION TO THE REPAIR OF DAMAGED BALES, END RUNS AND UNDERCUTTING BENEATH BALES.
5. INSTALLATION TO BE MODIFIED BY THE PROJECT AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

REVISIONS
01 2008-11-04 UPDATED DRAWING NOTES
02 2010-10-08 UPDATED DRAWING NOTES
03 2010-10-11 UPDATED DRAWING NOTES

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		TITLE: DETAIL 2 TYPICAL STRAW OR HAY BALE BARRIER		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-05-702	REV 03

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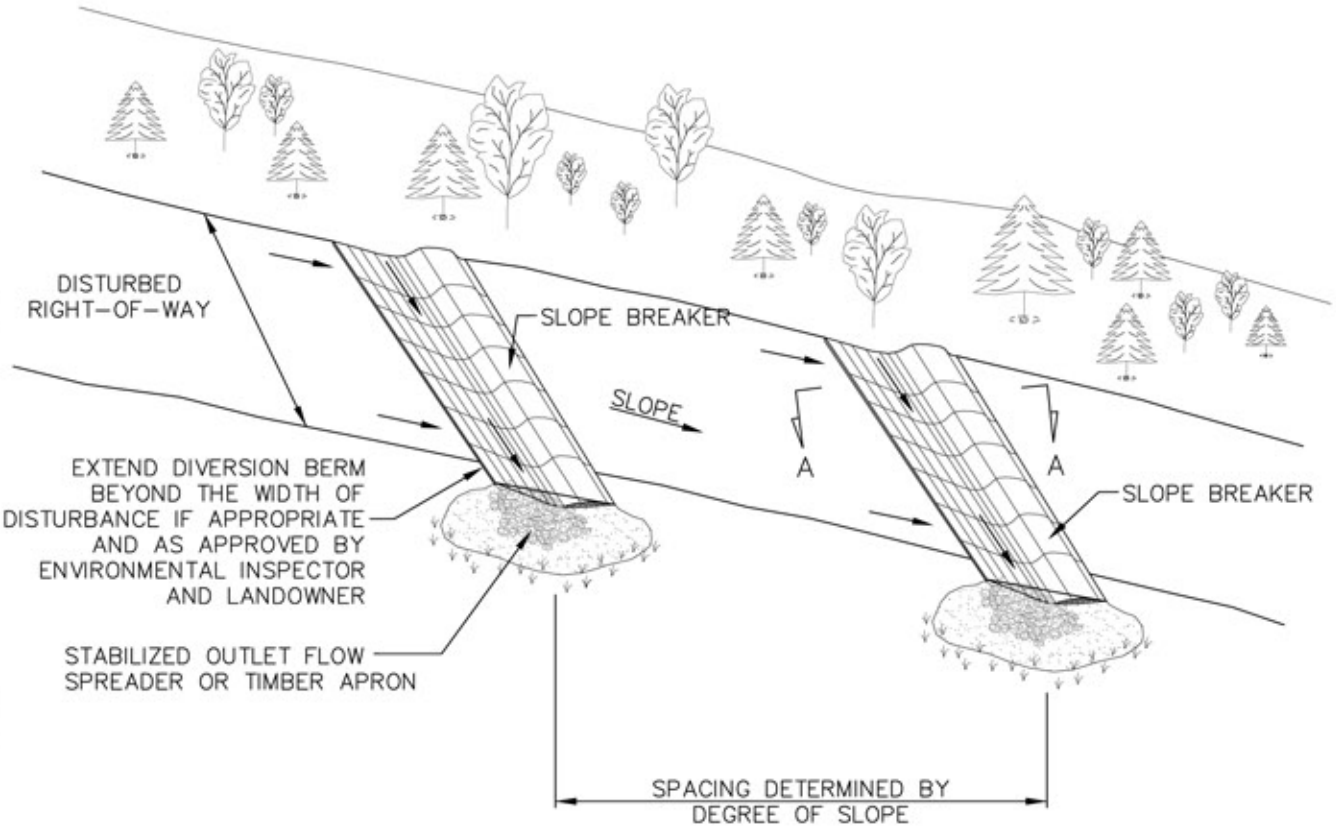

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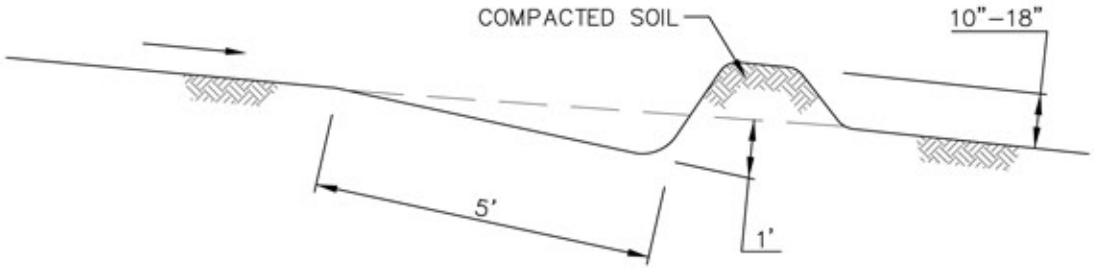

NOTES:

1. PERMANENT SLOPE BREAKERS TO PROVIDE POSITIVE DRAINAGE TO A STABILIZED OUTLET.
2. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY THE PROJECT AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.
3. THE CONTRACTOR SHALL INSTALL TEMPORARY AND PERMANENT SLOPE BREAKERS ON SLOPES GREATER THAN APPROXIMATELY 5% ON ALL DISTURBED LANDS AT THE FOLLOWING RECOMMENDED SPACING:

SLOPE (%)	SPACING (FEET)
5-15	300
>15-30	200
>30	100

REVISIONS
01 2008-11-04 MODIFIED DRAWING NOTES
02 2010-10-08 UPDATED DRAWING NOTES
03 2010-10-11 REVISED TITLE BLOCK

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		TITLE: DETAIL 3 TEMPORARY/PERMANENT SLOPE BREAKER DETAIL (WATER BARS)		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-05-703	REV 03

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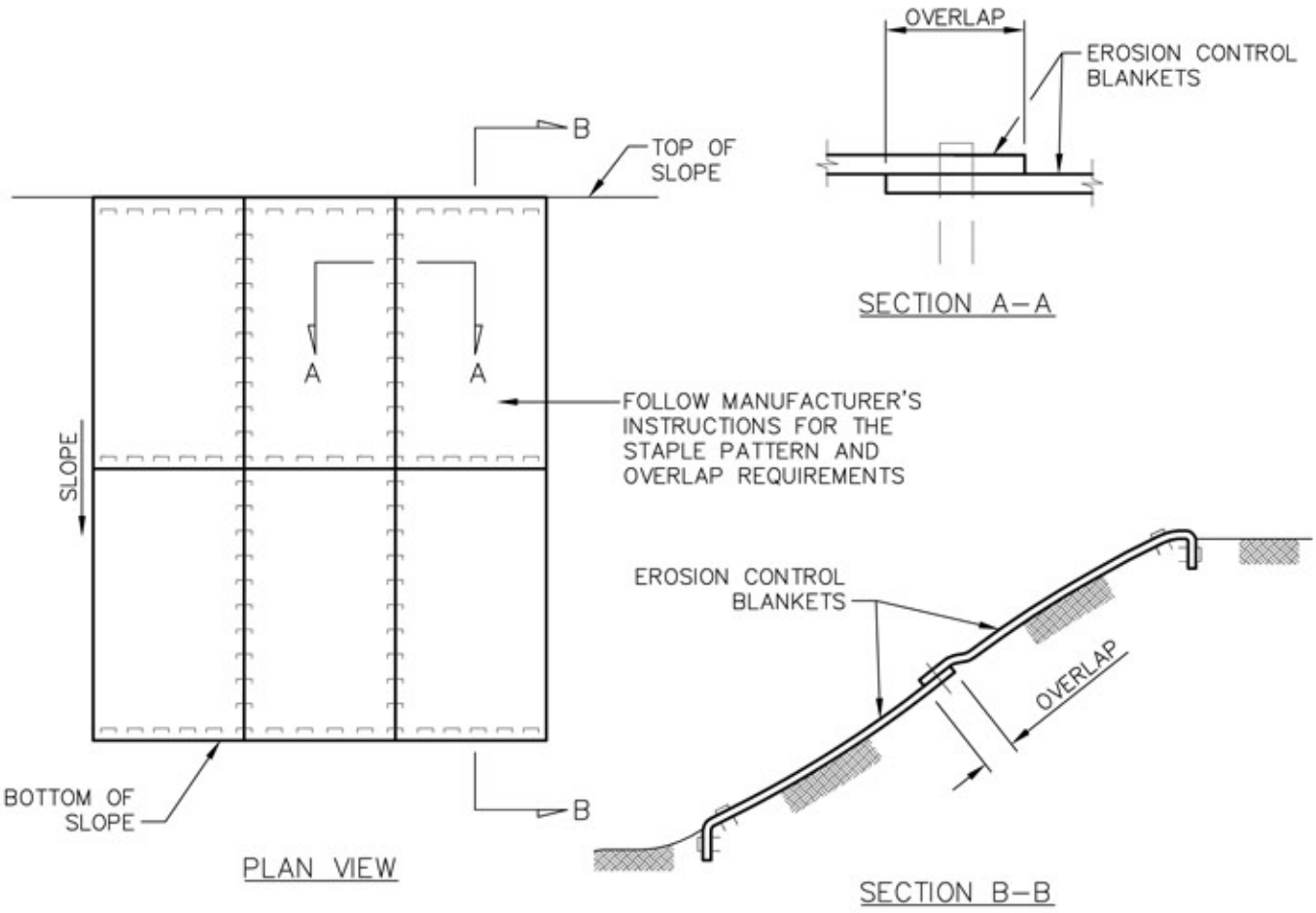

NOTES:

1. INSTALL MATTING IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. PREPARE SOIL BEFORE INSTALLING MATTING, INCLUDING GRADING, REMOVAL OF LARGE ROCKS AND DEBRIS, AND THE APPLICATION OF SEED AND FERTILIZER IF NOT USING PRE–SEEDED MATTING.
3. EROSION CONTROL MATTING SHALL EXTEND COMPLETELY ACROSS DISTURBED AREAS TO PROTECT ERODIBLE SURFACES.
4. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE MATTING IN A TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
5. ROLL THE MATTING DOWN THE SLOPE IN THE DIRECTION OF THE WATER FLOW.
6. AS AN ALTERNATIVE TO STAPLES, WOODEN STAKES OR BIO–DEGRADEABLE PINS CAN BE USED WHERE SPECIFIED BY THE COMPANY.
7. ENSURE COMPLETE CONTACT BETWEEN THE MATTING AND THE SLOPE FACE. ADDITIONAL STAPLES CAN BE USE TO ELIMINATE GAPS.
8. INSTALLATION SPECIFICATIONS TO BE MODIFIED BY THE PROJECT AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

REVISIONS
01 2008–11–04 MODIFIED DRAWING NOTES
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DESIGN CHECKER: RW P7100

KEYSTONE XL PROJECT

FIA #	CHAINAGE:	DISCIPLINE #
4359		03

TITLE
DETAIL 4
EROSION CONTROL MATTING INSTALLATION

SCALE	DWG No	REV
N.T.S.	4359–03–ML–05–704	03

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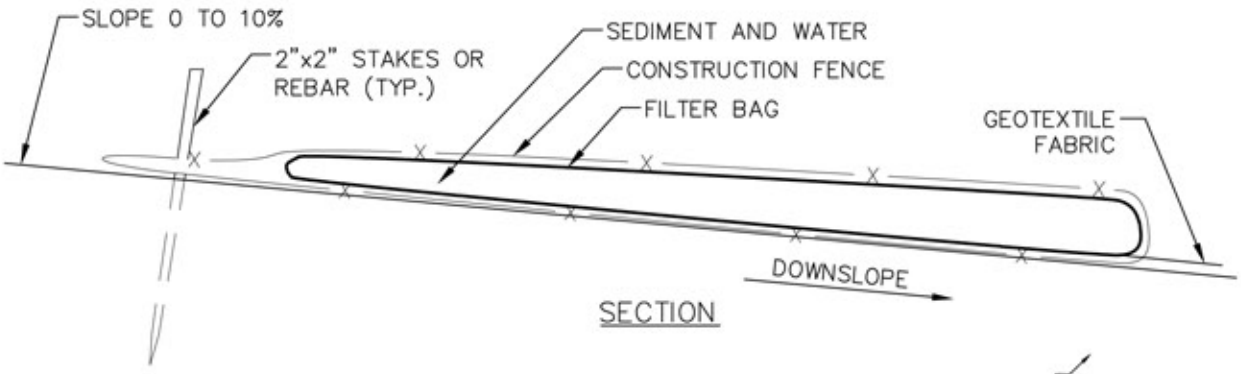

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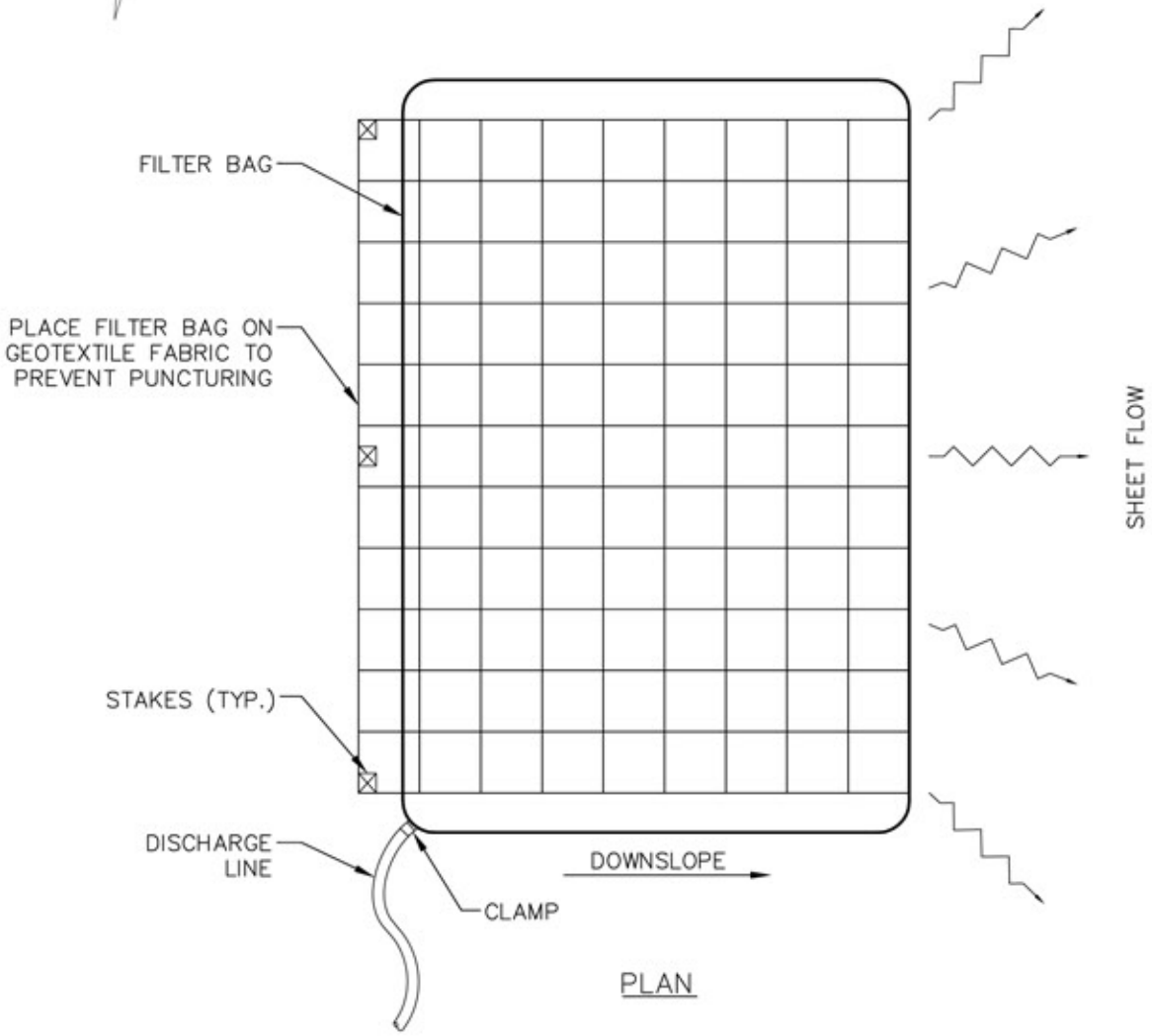

PLAN

NOTES:

1. MANUFACTURED NONWOVEN (FELT) FILTER BAGS ARE A SUITABLE ALTERNATIVE TO STRAW BALE STRUCTURES FOR TRENCH DEWATERING. FILTER BAGS SHALL BE INSTALLED AS SPECIFIED BY THE MANUFACTURER.
2. INSTALLATION SPECIFICATIONS TO BE MODIFIED AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

REVISIONS
01 2008-11-04 MODIFIED DRAWING NOTES
02 2010-10-11 REVISED TITLE BLOCK

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 5 TYPICAL DEWATERING FILTER BAG		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-05-705	REV 02

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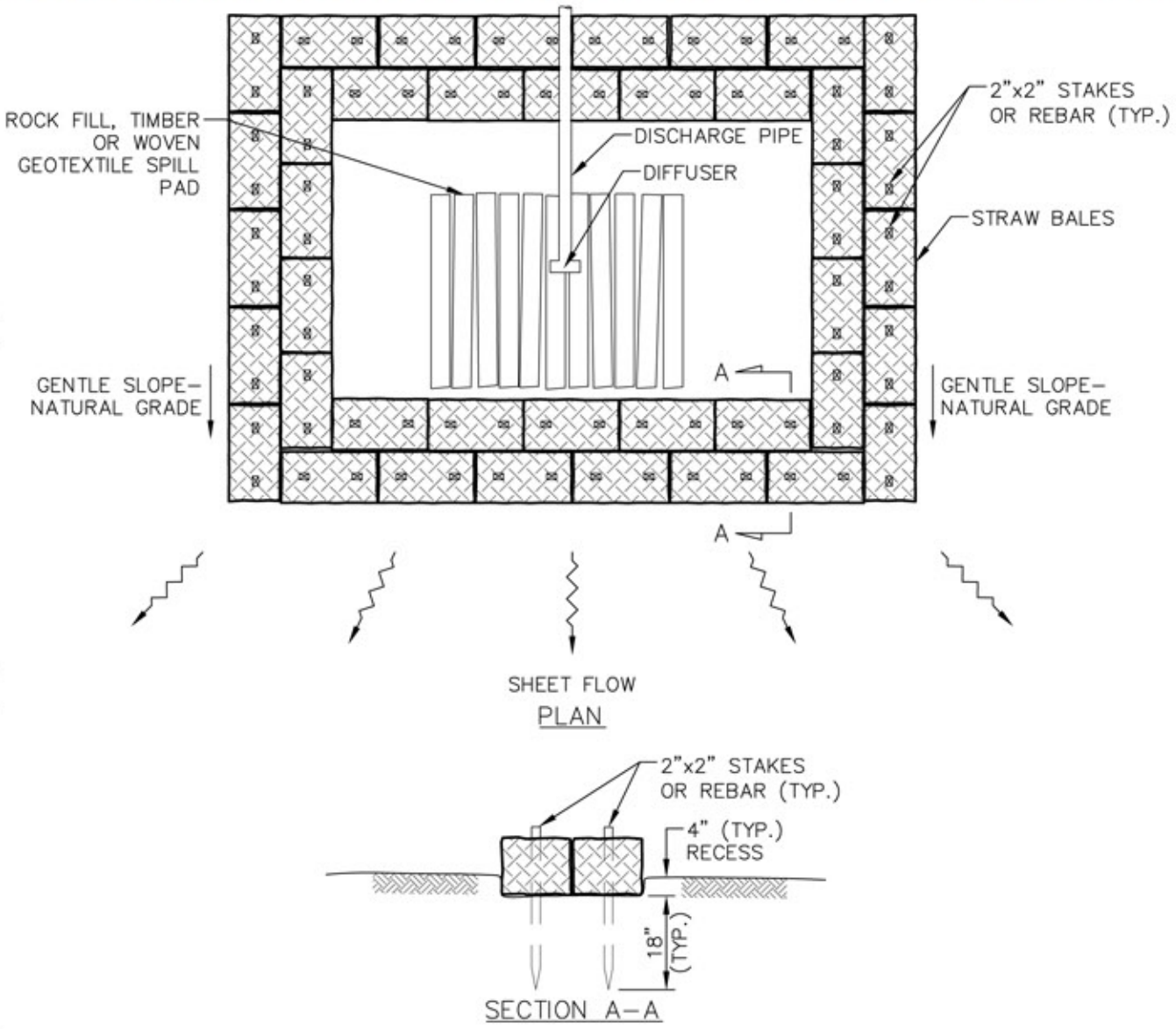

PLAN

SECTION A–A

NOTES:

1. INSTALL A STRAW BALE DEWATERING STRUCTURE WHEREVER IT IS NECESSARY AND AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR TO PREVENT THE FLOW OF HEAVILY SILT LADEN WATER INTO WATERBODIES OR WETLANDS.
2. DISCHARGE SITE SHOULD BE WELL VEGETATED AND LOCATED AT LEAST 50 FEET FROM ANY WATERBODY. THE TOPOGRAPHY OF THE SITE SHOULD BE SUCH THAT WATER WILL FLOW INTO THE DEWATERING STRUCTURE AND AWAY FROM ANY WORK AREAS. THE AREA DOWNSLOPE FROM THE DEWATERING SITE MUST BE REASONABLY FLAT OR STABILIZED BY VEGETATION OR OTHER MEANS TO ALLOW THE FILTERED WATER TO CONTINUE AS SHEET FLOW.
3. DIRECT THE PUMPED WATER ONTO A STABLE SPILL PAD CONSTRUCTED OF ROCKFILL, WEIGHTED TIMBERS, OR A WOVEN GEOTEXTILE STAKED TO THE GROUND SURFACE, SUCH AS MIRAFI 600X, TERRAFIX 400W, OR A COMPANY APPROVED EQUIVALENT. BEYOND THE SPILL PAD FORCE THE DISCHARGE WATER INTO SHEET FLOW USING STRAW BALES AND THE NATURAL TOPOGRAPHY.
4. DISCHARGE RATES SHOULD BE SUCH THAT THE CAPACITY OF THE STRUCTURE WILL NOT BE EXCEEDED.
5. DISCHARGE WATER SHALL BE FORCED INTO SHEET FLOW IMMEDIATELY BEYOND THE SPILL PAD USING A COMBINATION OF STRAW BALES AND THE NATURAL TOPOGRAPHY. RECESS STRAW BALES. DRIVE TWO (2) STAKES OR REBAR INTO EACH BALE TO ANCHOR THEM IN PLACE.
6. INSTALLATION SPECIFICATIONS TO BE MODIFIED AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

REVISIONS
01 2008-11-04 MODIFIED DRAWING NOTES
02 2010-10-08 UPDATED DRAWING NOTES
03 2010-10-11 UPDATED DRAWING NOTES

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DESIGNER: JMP (NAME) 2010-10-21 (DATE)
CHECKED BY: WSF
DESIGN CHECKER: RW P7100

KEYSTONE XL PROJECT

FIA # 4359	CHAINAGE:	DISCIPLINE # 03

TITLE
DETAIL 6
TYPICAL STRAW BALE DEWATERING STRUCTURE

SCALE N.T.S.	DWG No 4359-03-ML-05-706	REV 03

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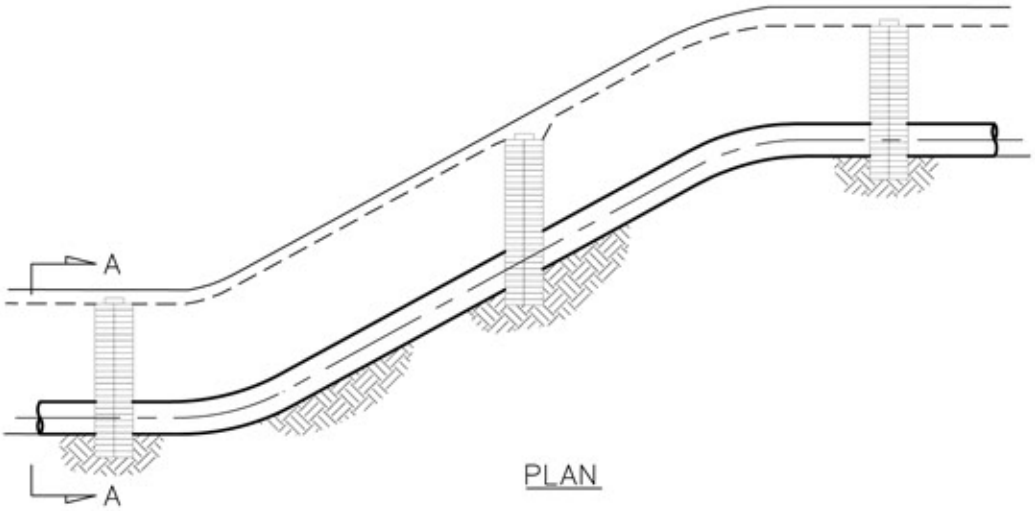
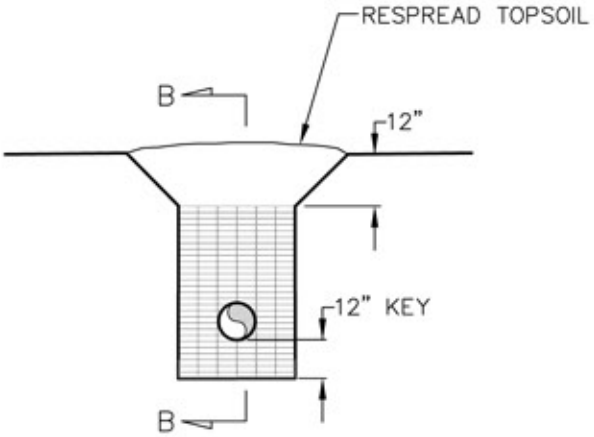
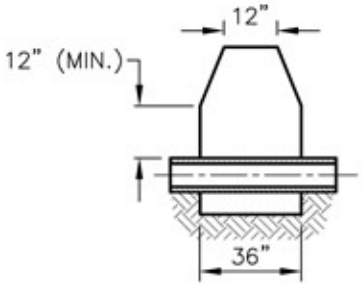


PLAN



SECTION A–A



SECTION B–B

NOTES:

1. TRENCH BREAKERS TO BE INSTALLED AS SHOWN ON THE CONSTRUCTION DRAWINGS, WHERE DESCRIBED IN THE PLAN, AND AS DIRECTED.
2. OPEN WEAVE HEMP OR JUTE SACKS SHALL BE FILLED WITH AN AVERAGE 55 LBS. MIXTURE OF:
   1) ONE (1) PART CEMENT AND SIX (6) PARTS SAND OR SUBSOIL, OR
   2) ONE (1) PART CEMENT, THREE (3) PARTS FLYASH, AND FIVE (5) PARTS SAND OR SUBSOIL
   3) SAND WITH JUST SUFFICIENT WATER TO PERMIT MIXTURE TO EXUDE AND BOND SACKS TOGETHER. TOPSOIL IS NOT TO BE USED IN SACKS.
3. KEY EACH TRENCH BREAKER A MINIMUM OF ONE (1) FT. INTO BOTTOMS AND SIDES OF TRENCH.
4. FOAM TRENCH BREAKERS MAY BE USED IN LIEU OF SAND SACK TRENCH BREAKERS.
5. INSTALLATION SPECIFICATIONS TO BE MODIFIED AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.
6. TRENCH BREAKERS SHALL BE INSTALLED SUCH THAT THE TOP OF EACH DOWNSLOPE BREAKER IS ABOVE THE BOTTOM OF THE NEXT UPSLOPE BREAKER.

REVISIONS
01 2008-11-04 UPDATED DRAWING NOTES
02 2010-10-11 UPDATED PLAN DETAIL

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 7 TYPICAL PERMANENT TRENCH BREAKER		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-05-707	REV 02

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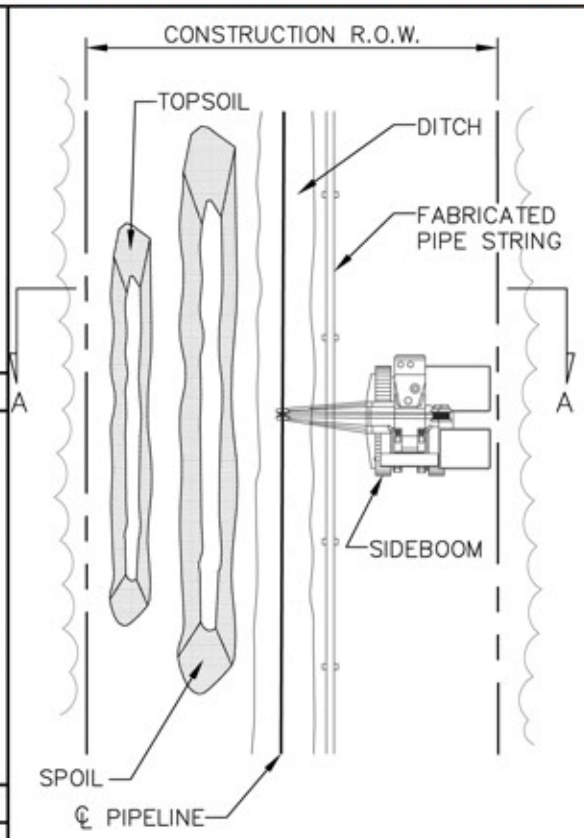
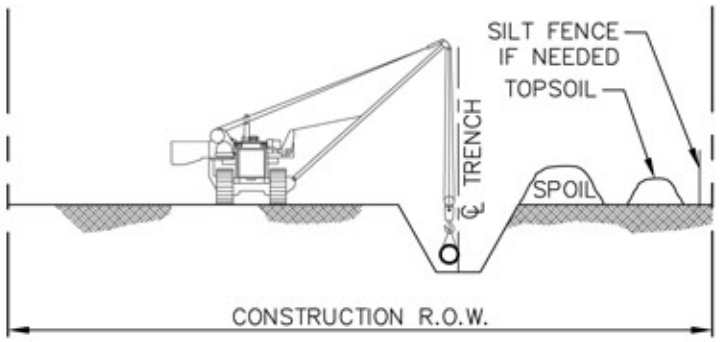


PLAN VIEW



SECTION "A–A"

CONSTRUCTION PROCEDURES:

1. IF THE WETLAND IS BEING CULTIVATED AND FARMED, NO WETLAND CONSTRUCTION PROCEDURES ARE REQUIRED.
2. FLAG WETLAND BOUNDARIES PRIOR TO CLEARING.
3. NO REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS APPROXIMATELY 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER THE PROJECT'S SPILL PREVENTION PROCEDURES.
4. INSTALL TEMPORARY SLOPE BREAKER UPSLOPE WITHIN 100 FEET OF WETLAND BOUNDARY IF DIRECTED BY THE PROJECT.
5. DO NOT TRENCH WETLAND UNTIL PIPE IS READY TO INSTALL.
6. CONSTRUCT WHEN DRY, IF POSSIBLE. IF SITE BECOMES WET AT TIME OF TRENCHING, AVOID SOIL COMPACTION BY UTILIZING TIMBER RIP–RAP OR PREFABRICATED EQUIPMENT MATS.
7. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS (STRAW BALES AND/OR SILT FENCE) AT DOWN SLOPE EDGE OF RIGHT–OF–WAY ALONG WETLAND EDGE IF NEEDED TO CONTAIN SPOIL WITHIN RIGHT–OF–WAY.
8. RESTRICT ROOT GRUBBING TO ONLY THAT AREA OVER THE DITCHLINE AND REMOVE STUMPS FROM WETLAND FOR DISPOSAL.
9. CONDUCT TRENCH LINE TOPSOIL STRIPPING (IF TOPSOIL IS NOT SATURATED). SALVAGE TOPSOIL TO ACTUAL DEPTH OR A MAXIMUM DEPTH OF 12 INCHES.
10. TRENCH THROUGH WETLANDS.
11. PIPE SECTION TO BE FABRICATED WITHIN THE WETLAND AND ADJACENT TO ALIGNMENT, OR IN STAGING AREA OUTSIDE THE WETLAND AND WALKED IN.
12. LOWER–IN PIPE. PRIOR TO BACKFILLING TRENCH, IF REQUIRED, TRENCH PLUGS SHALL BE INSTALLED AS REQUIRED. BACKFILL TRENCH.
13. RESTORE GRADE TO NEAR PRE–CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL AND INSTALL PERMANENT EROSION CONTROL.
14. IF UTILIZED, REMOVE TIMBER MATS OR PRE–FABRICATED MATS FROM WETLANDS UPON COMPLETION.
15. IN THE ABSENCE OF A DETAILED REVEGETATION PLANS, APPLY A TEMPORARY COVER CROP AS DIRECTED BY KEYSTONE.

REVISIONS
01 REVISED NOTES 3 & 4
02 2010–10–08 UPDATED DRAWING NOTES
03 2010–10–11 UPDATED DRAWING NOTES

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JMP (NAME)	2010–10–21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 8 "DRY" WETLAND CROSSING METHOD		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359–03–ML–03–701	REV 03

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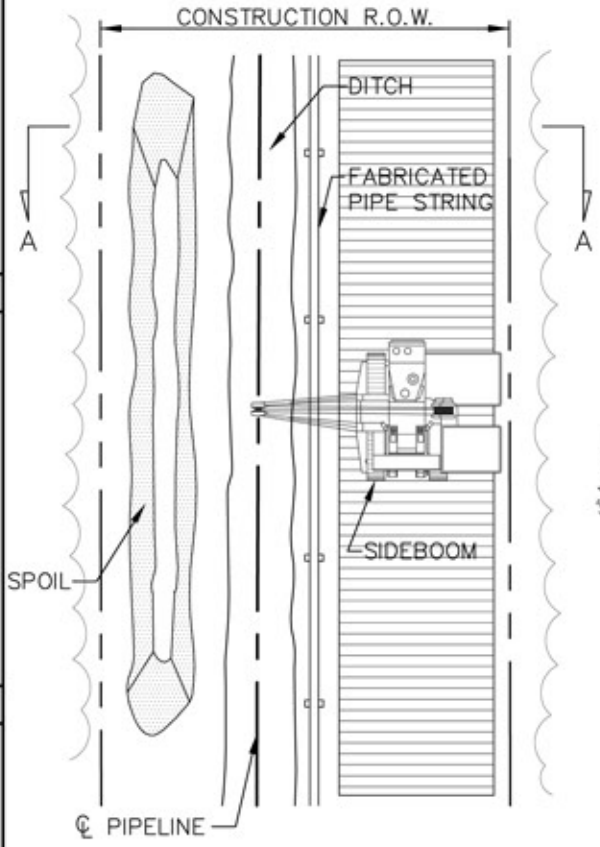
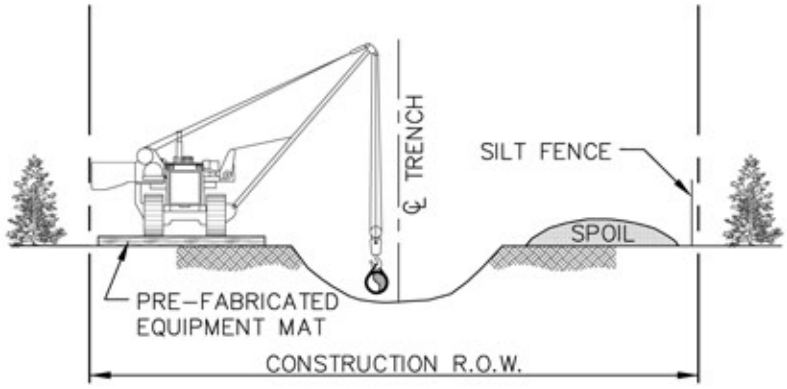


PLAN VIEW



SECTION A-A

CONSTRUCTION PROCEDURES:

1. FLAG WETLAND BOUNDARIES PRIOR TO CLEARING.
2. NO REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER THE PROJECT'S SPILL PREVENTION PROCEDURES.
3. INSTALL TEMPORARY SLOPE BREAKER UPSLOPE WITHIN 100 FEET OF WETLAND BOUNDARY IF DIRECTED BY THE PROJECT.
4. INSTALL TIMBER MATS/RIPRAP THROUGH ENTIRE WETLAND AREA. EQUIPMENT NECESSARY FOR RIGHT-OF-WAY CLEARING MAY MAKE ONE (1) PASS THROUGH THE WETLAND BEFORE MATS ARE INSTALLED.
5. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS (STRAW BALES AND/OR SILT FENCE) AT DOWNSLOPE EDGE OF RIGHT-OF-WAY AND ALONG WETLAND EDGE AS REQUIRED.
6. RESTRICT ROOT GRUBBING TO ONLY THAT AREA OVER THE DITCHLINE AND DITCH SPOIL AREAS AND REMOVED FROM WETLAND FOR DISPOSAL.
7. DO NOT TRENCH WETLAND UNTIL PIPE IS READY TO INSTALL.
8. TOPSOIL STRIPPING SHALL NOT BE REQUIRED IN SATURATED SOIL CONDITIONS.
9. LEAVE HARD PLUGS AT EDGE OF WETLAND UNTIL JUST PRIOR TO TRENCHING.
10. PIPE SECTION MAY BE FABRICATED WITHIN THE WETLAND AND ADJACENT TO ALIGNMENT, OR IN STAGING AREA OUTSIDE THE WETLAND AND WALKED IN.
11. TRENCH THROUGH WETLANDS.
12. LOWER-IN PIPE, INSTALL TRENCH PLUGS AT WETLAND EDGES AS REQUIRED AND BACKFILL IMMEDIATELY.
13. REMOVE TIMBER MATS OR PRE-FABRICATED MATS FROM WETLAND UPON COMPLETION.
14. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY, REPLACE TOPSOIL IF SALVAGED AND INSTALL PERMANENT EROSION CONTROL.

REVISIONS
01 REVISED NOTES 2 & 3
02 2010-10-11 UPDATED DRAWING NOTES

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JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 9 STANDARD WETLAND CROSSING METHOD		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-03-702	REV 02

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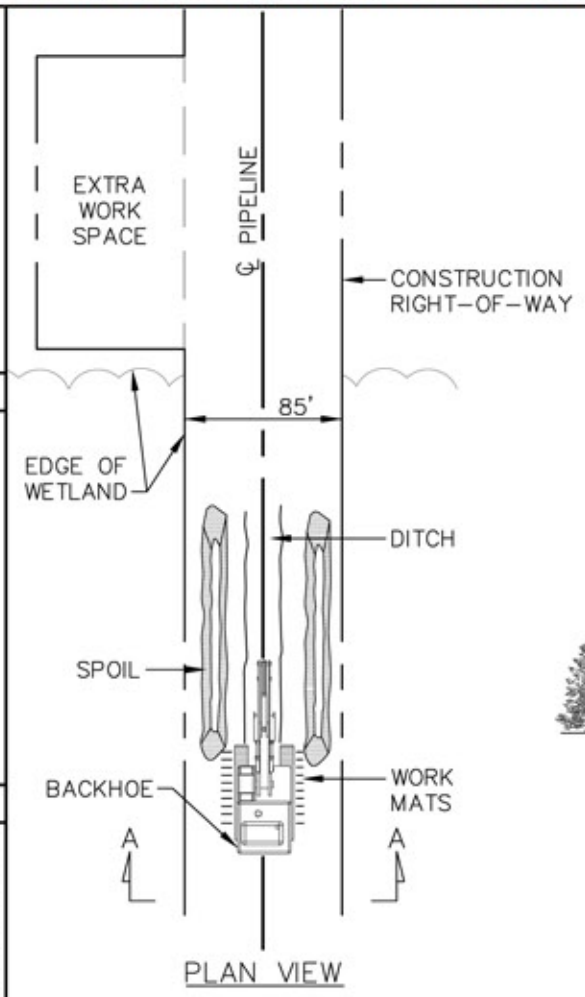
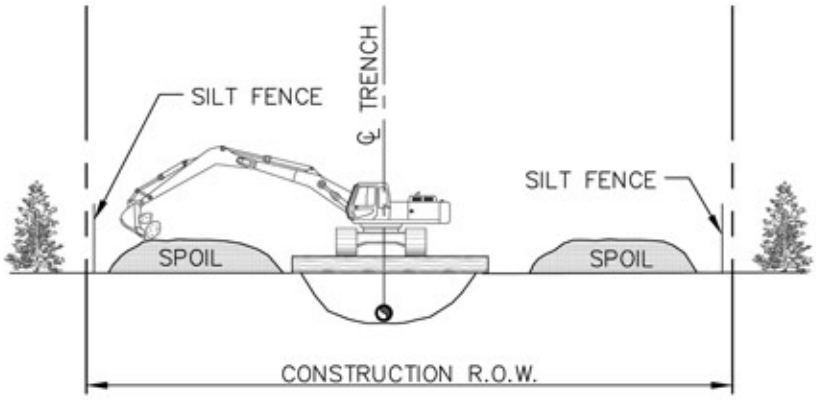


PLAN VIEW



SECTION A-A

CONSTRUCTION PROCEDURES:

1. FLAG WETLAND BOUNDARIES PRIOR TO CLEARING.
2. NO REFUELING OF MOBILE EQUIPMENT IS ALLOWED WITHIN 100 FEET OF WETLAND. PLACE "NO FUELING" SIGN POSTS 100 FEET BACK FROM WETLAND BOUNDARY. REFUEL STATIONARY EQUIPMENT AS PER THE PROJECT'S SPILL PREVENTION PROCEDURES.
3. INSTALL TEMPORARY SLOPE BREAKER UPSLOPE WITHIN 100 FEET OF WETLAND BOUNDARY AS DIRECTED BY THE PROJECT.
4. RESTRICT ROOT GRUBBING TO ONLY THE AREA OVER THE DITCHLINE.
5. DO NOT TRENCH WETLAND UNTIL PIPE IS READY TO INSTALL.
6. TOPSOIL STRIPPING SHALL NOT BE REQUIRED IN SATURATED SOIL CONDITIONS.
7. UTILIZE AMPHIBIOUS EXCAVATORS (PONTOON MOUNTED BACKHOES) OR TRACKED BACKHOES SUPPORTED BY FABRICATED TIMBER MATS OR FLOATS TO EXCAVATE TRENCH. IF FABRICATED TIMBER MATS ARE USED FOR STABILIZATION, THE BACKHOE SHALL GRADUALLY MOVE ACROSS THE WETLAND BY MOVING THE MAT FROM IMMEDIATELY BEHIND TO IMMEDIATELY IN FRONT OF THE BACKHOE'S PATH.
8. AVOID ADJACENT WETLANDS. INSTALL SEDIMENT BARRIERS (STRAW BALES AND/OR SILT FENCE) AT EDGE OF RIGHT-OF-WAY AND ALONG WETLAND EDGE IF PRACTICAL.
9. FABRICATE PIPE IN STAGING AREA OUTSIDE THE WETLAND IN THE EXTRA WORK SPACE AS INDICATED ON THE CONSTRUCTION DRAWINGS.
10. LEAVE HARD PLUGS AT THE EDGE OF THE WETLAND UNTIL JUST PRIOR TO PIPE PLACEMENT.
11. FLOAT PIPE IN PLACE, LOWER-IN, INSTALL TRENCH PLUGS AT WETLAND EDGES WHERE REQUIRED AND BACKFILL IMMEDIATELY.
12. REMOVE TIMBER MATS OR PRE-FABRICATED MATS OF NON-NATIVE MATERIAL FROM WETLANDS UPON COMPLETION.
13. RESTORE GRADE TO NEAR PRE-CONSTRUCTION TOPOGRAPHY AND INSTALL PERMANENT EROSION CONTROL.
14. THE CONSTRUCTION RIGHT-OF-WAY FOR THIS TYPE OF CONSTRUCTION SHALL BE 85 FEET.

REVISIONS
01 REVISED NOTES 2, 3 & 13
02 2010-10-11 UPDATED DRAWING NOTES

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 10 PUSH/PULL WETLAND CROSSING METHOD		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-03-703	REV 02

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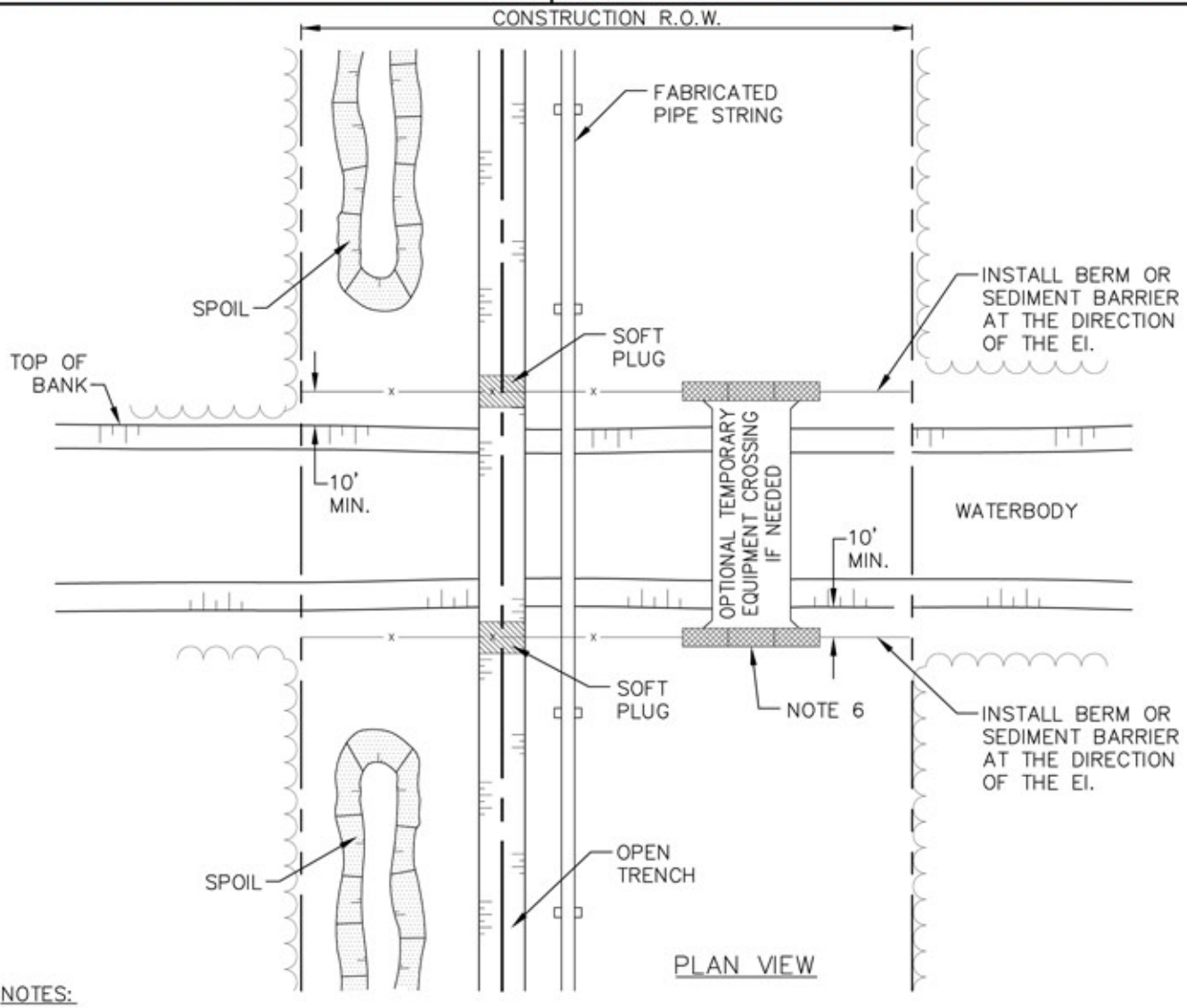

NOTES:

1. THIS METHOD APPLIES TO DRY WASHES, SWALES, INCISED DRAINAGES AND DITCHES WITH NO PERCEPTIBLE FLOW AT TIME OF CROSSING. IF FLOWS ARE PRESENT DURING CONSTRUCTION REFER TO DETAIL 12. CLEARING AND GRADING, TOPSOIL SALVAGE AND TOPSOIL STRIPPING DEPTHS SHALL BE THE SAME AS INDICATED FOR ADJACENT UPLAND UNLESS OTHERWISE DIRECTED BY KEYSTONE.
2. EI TO FLAG THE ORDINARY HIGH WATER MARK (OHWM) PRIOR TO CLEARING.
3. INSTALL SILT FENCE OR A BERM AT DIRECTION OF KEYSTONE EI TO PREVENT RUNOFF FROM ROW TO ADJACENT, UNDISTURBED DRAINAGE.
4. STOCKPILE TOPSOIL AND SPOIL SEPARATELY. TOPSOIL SHALL NOT BE STOCKPILED ACROSS THE DRAINAGE CHANNEL AND SHALL BE PLACED A MINIMUM OF 15 FEET FROM THE OHWM OR TO SUIT CONDITIONS AND PROTECT THE DRAINAGE AS DETERMINED BY KEYSTONE.
5. INSTALL TEMPORARY SLOPE BREAKERS WHERE IDENTIFIED BY THE EI.
6. TRENCH, STRING PIPE, AND BACKFILL USING STANDARD UPLAND CONSTRUCTION PROCEDURES UNLESS OTHERWISE DIRECTED BY KEYSTONE.
7. RESTORE WATERCOURSE CHANNEL AND BANKS (EXCEPT TRAVEL LANE IF USED) TO APPROXIMATE PRE-CONSTRUCTION PROFILE IMMEDIATELY AFTER PIPE IS LOWERED IN AND BACKFILLED. INSTALL PERMANENT EROSION CONTROLS WHERE DIRECTED BY KEYSTONE.
8. REMOVE ANY TEMPORARY CROSSING STRUCTURES AND/OR GRAVEL.

REVISIONS
01 UPDATED DRAWING NOTES
02 2010-10-08 UPDATED DRAWING NOTES
03 2010-10-11 UPDATED DRAWING NOTES

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CHECKED BY: WSF
DESIGN CHECKER: RW P7100

KEYSTONE XL PROJECT

FIA # 4359	CHAINAGE:	DISCIPLINE # 03

TITLE
DETAIL 11
TYPICAL OPEN CUT WET CROSSING METHOD
NON-FLOWING WATERBODY

SCALE N.T.S.	DWG No 4359-03-ML-03-704	REV 03

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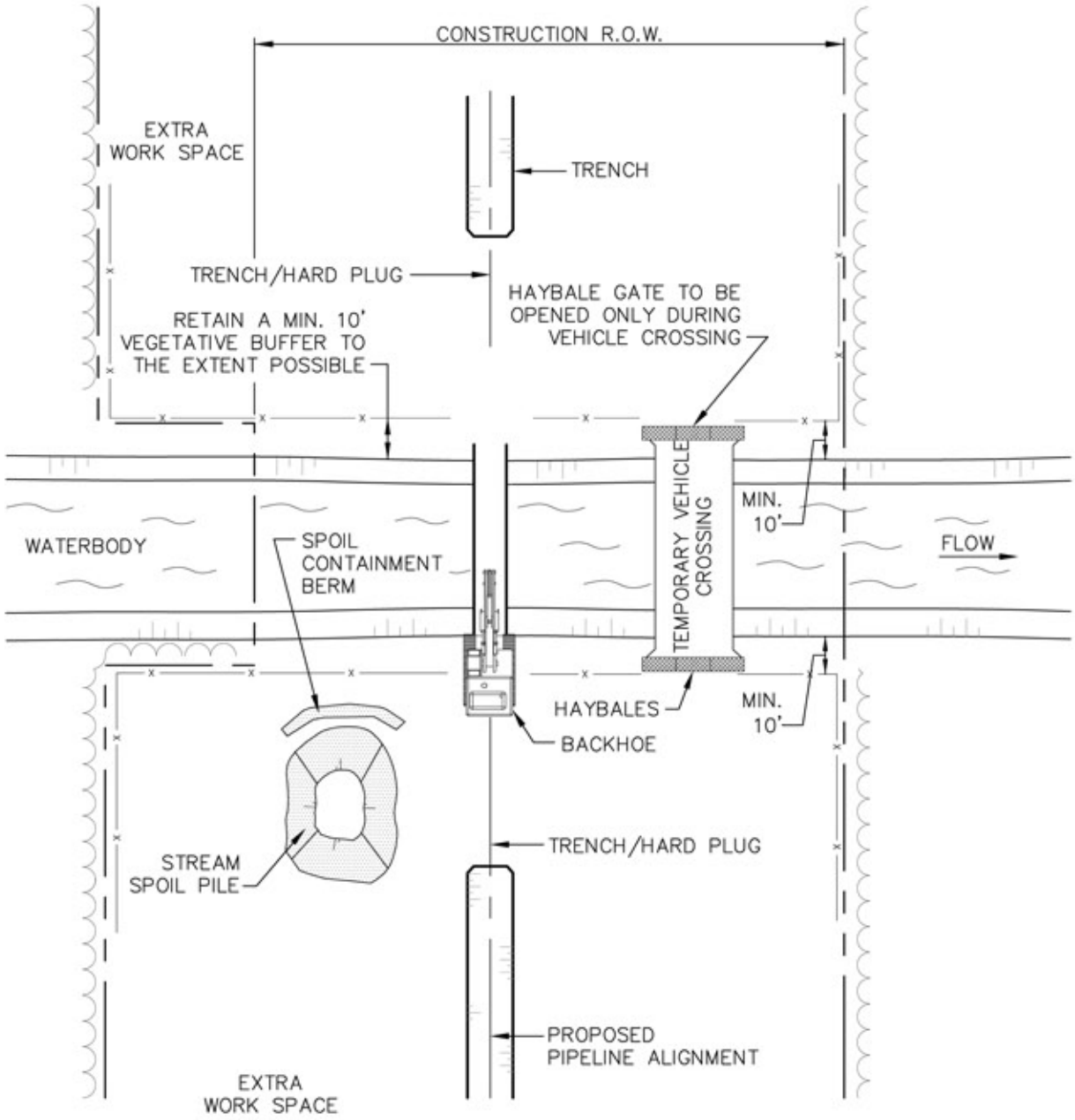

PLAN VIEW

REVISIONS
01 UPDATED DRAWING NOTES
02 2010-10-11 REVISED TITLE BLOCK

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	TITLE: DETAIL 12 TYPICAL OPEN CUT WET CROSSING METHOD FLOWING WATERBODY		
		SCALE N.T.S.	DWG No 4359-03-ML-03-705	REV 02

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CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

CONSTRUCTION PROCEDURES:

1. RIGHT-OF-WAY BOUNDARIES AND WORK SPACE LIMITS SHALL BE CLEARLY DELINEATED. STAGING FOR MAKEUP SHALL BE LOCATED A MINIMUM OF 10 FEET FROM WATERBODY.

2. CLEARING LIMITS WILL BE CLEARLY DELINEATED AND 10 FOOT VEGETATIVE BUFFER STRIP BETWEEN DISTURBED AREA AND THE WATERBODY SHALL BE MAINTAINED TO THE EXTENT POSSIBLE. ALL CLEARING SHALL BE MINIMIZED TO THE EXTENT POSSIBLE AND TO ONLY THAT NECESSARY FOR CONSTRUCTION. WOODY VEGETATION SHALL BE CUT AT GROUND LEVEL AND THE STUMPS/ROOTS LEFT IN PLACE TO THE EXTENT POSSIBLE.

3. TOPSOIL SHALL BE STRIPPED FROM THE DITCH LINE IN ALL WETLANDS RIPARIAN.

4. CONTRACTOR SHALL INSTALL SIGNS APPROXIMATELY 100 FEET MINIMUM FROM EACH WATERBODY AND WETLAND TO IDENTIFY THE HAZARDOUS MATERIALS EXCLUSION AREA.

5. EROSION AND SEDIMENT CONTROL
   a. CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES, AS DEPICTED OR ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVILY SILT LADEN WATER ENTERS WATERBODY OR WETLAND.

   b. NO HEAVILY SILT LADEN WATER SHALL BE DISCHARGED DIRECTLY OR INDIRECTLY INTO THE WATERBODY. ALL EROSION AND SEDIMENT CONTROL STRUCTURE LOCATIONS AS DEPICTED ARE APPROXIMATE AND MAY BE ADJUSTED AS DIRECTED BY THE COMPANY INSPECTOR TO SUIT ACTUAL SITE CONDITIONS. SILT FENCE OR STRAW BALE INSTALLATIONS SHALL INCLUDE REMOVABLE SECTIONS TO FACILITATE ACCESS DURING CONSTRUCTION.

   c. SEDIMENT LADEN WATER FROM TRENCH DEWATERING SHALL BE DISCHARGED TO A WELL VEGETATED UPLAND AREA INTO A STRAW BALE DEWATERING STRUCTURE OR GEOTEXTILE FILTER BAG. SEDIMENT CONTROL STRUCTURES MUST BE IN PLACE AT ALL TIMES ACROSS THE DISTURBED CONSTRUCTION RIGHT-OF-WAY EXCEPT DURING EXCAVATION/INSTALLATION OF THE CROSSING PIPE.

   d. SOFT DITCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE MAINLINE DITCH FROM THE WATERBODY CROSSING UNTIL THE WATER CROSSING IS INSTALLED AND BACKFILLED.

   e. TRENCH BREAKERS ARE TO BE INSTALLED AT THE SAME SPACING AND IMMEDIATELY UPSLOPE OF PERMANENT SLOPE BREAKERS, OR AS DIRECTED BY THE COMPANY.

6. CONTRACTOR SHALL MAINTAIN HARD PLUGS IN THE DITCH AT THE WATERBODY UNTIL JUST PRIOR TO PIPE INSTALLATION. CONTRACTOR SHALL EXCAVATE TRENCH AND INSTALL PIPE AS EXPEDIENTLY AS PRACTICAL TO REDUCE THE DURATION OF WORK ACTIVITIES IN THE WATERBODY BED.

7. CONTRACTOR SHALL PLACE TRENCH SPOIL ONLY IN CERTIFICATED WORK SPACE AND A MINIMUM OF 10 FEET FROM THE WATERBODY BANKS TO PREVENT ENTRY OF SPOIL INTO THE WATERBODY. SPOIL SHALL BE CONTAINED AS NECESSARY USING EITHER A STRAW BALE BARRIER OR AN EARTH/ROCK BERM.

8. CONTRACTOR SHALL RESTORE THE WATERBODY AND BANKS TO APPROXIMATE PRE-CONSTRUCTION CONTOURS, UNLESS OTHERWISE APPROVED BY THE COMPANY. CONTRACTOR SHALL INSTALL PERMANENT EROSION AND SEDIMENT CONTROL STRUCTURES AS INDICATED. ANY MATERIALS PLACED IN THE WATERBODY TO FACILITATE CONSTRUCTION SHALL BE REMOVED DURING RESTORATION. BANKS SHALL BE STABILIZED AND TEMPORARY SEDIMENT BARRIERS INSTALLED AS SOON AS POSSIBLE AFTER CROSSING, BUT WITHIN 24 HOURS OF COMPLETING THE CROSSING. MAINTAIN A SILT FENCE OR STRAW BALE BARRIER ALONG THE WATERBODY AND WETLAND BOUNDARIES UNTIL VEGETATION IS ESTABLISHED IN ADJACENT DISTURBED AREAS.

9. VEHICLE CROSSING CAN BE CONSTRUCTED USING EITHER A FLUME CROSSING OR A TEMPORARY BRIDGE. VEHICLE CROSSING ONLY REQUIRED IF STREAM SUPPORTS A STATE DESIGNATED FISHERY.

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	TITLE: DETAIL 12A TYPICAL OPEN CUT WET CROSSING METHOD FLOWING WATERBODY – CONSTRUCTION PROCEDURES		
		SCALE N.T.S.	DWG No 4359-03-ML-03-706	REV 01

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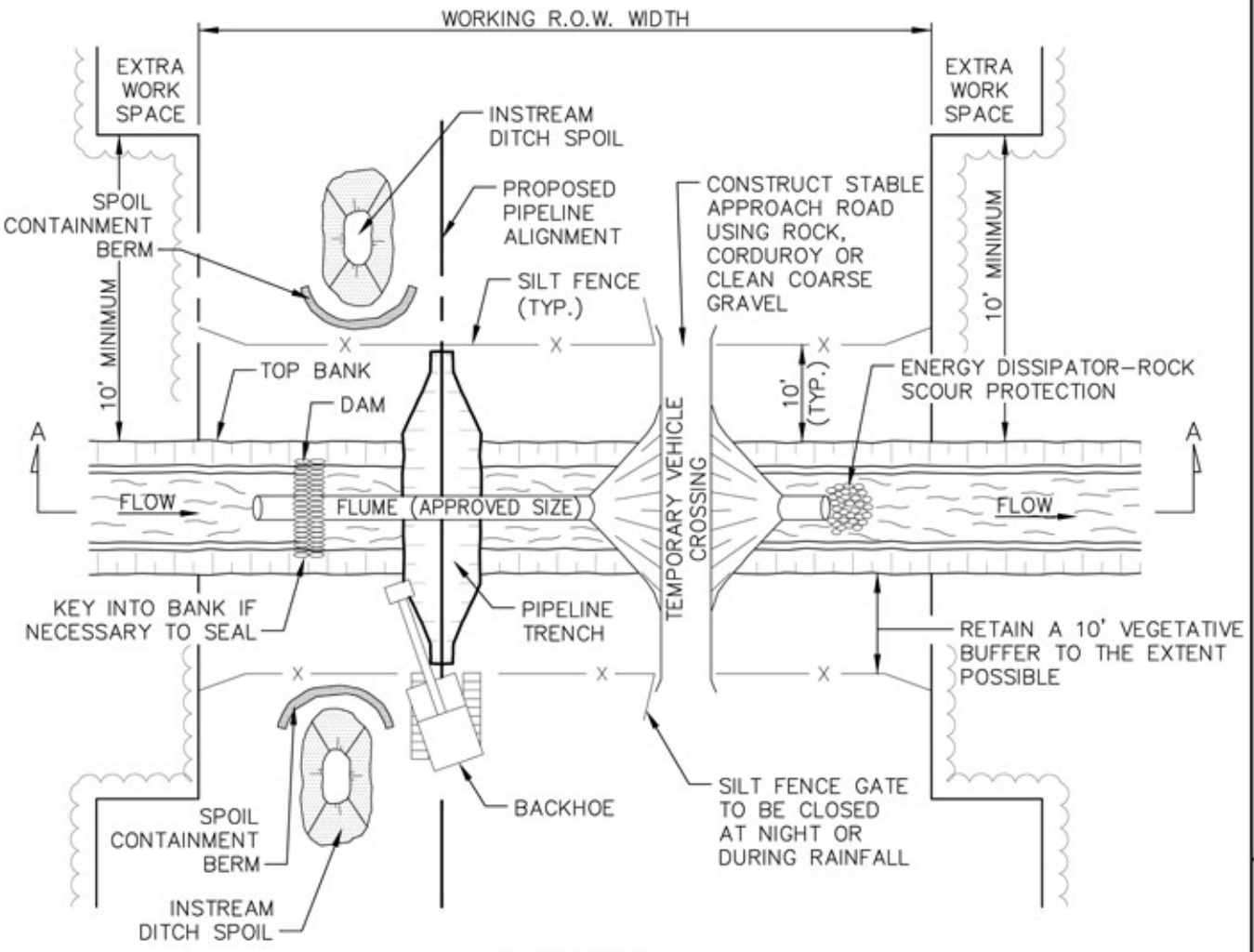
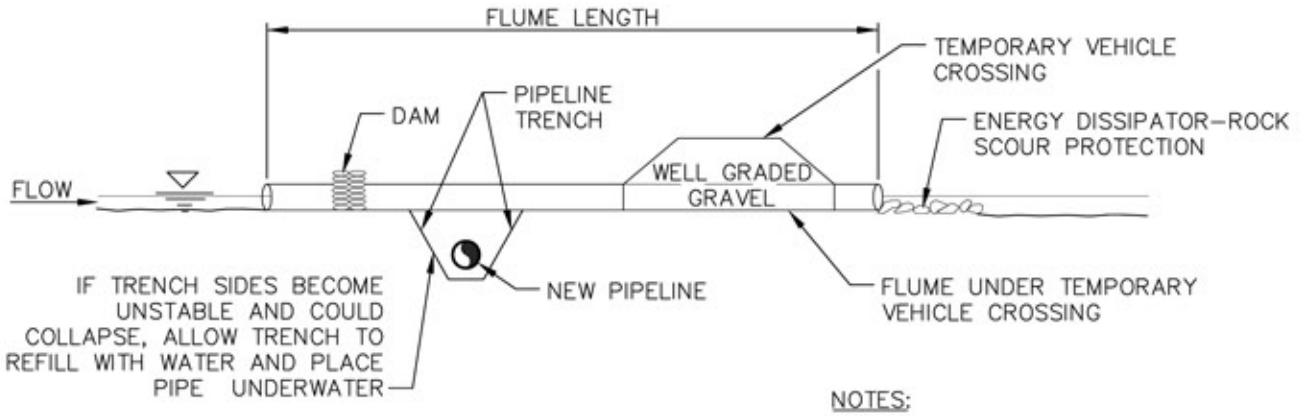


PLAN VIEW



SECTION A–A

NOTES:

1. PIPELINE PLACEMENT WITHIN RIGHT–OF–WAY CONCEPTUAL ONLY.
2. SEE DETAIL 13A FOR CONSTRUCTION PROCEDURES.

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		TITLE: DETAIL 13 TYPICAL DRY FLUME CROSSING METHOD		
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CONSTRUCTION PROCEDURES:

1. MARK OUT AND MAINTAIN LIMITS OF AUTHORIZED WORK AREAS WITH FENCING OR FLAGGING TAPE TO AVOID UNNECESSARY DISTURBANCE OF VEGETATION. ENSURE EQUIPMENT OPERATORS WORKING ON THE CROSSING HAVE BEEN BRIEFED ABOUT THIS PLAN AND THE MEASURE NEEDED TO PROTECT WATER QUALITY.
2. ALL NECESSARY EQUIPMENT AND MATERIALS TO BUILD THE FLUME MUST BE ON-SITE OR READILY AVAILABLE PRIOR TO COMMENCING IN-WATER WORK.
3. TO THE EXTENT POSSIBLE, MAINTAIN A MINIMUM 10 FT. VEGETATIVE BUFFER STRIP BETWEEN DISTURBED AREAS AND THE WATERCOURSE. INSTALL AND MAINTAIN A SILT FENCE OR STRAW BALE BARRIER UPSLOPE OF THE BUFFER STRIP ON EACH SIDE OF THE WATERCOURSE.
4. CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES, AS DEPICTED OR ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVILY SILT LADEN WATER ENTERS STREAM.
   a. NO HEAVILY SILT LADEN WATER SHALL BE DISCHARGED DIRECTLY INTO THE STREAM.
   b. EROSION AND SEDIMENT CONTROL STRUCTURE LOCATIONS AS DEPICTED ARE APPROXIMATE AND MAY BE ADJUSTED AS DIRECTED BY THE COMPANY INSPECTOR TO ACTUAL SITE CONDITIONS.
   c. SILT FENCE OR STRAW BALE INSTALLATIONS SHALL INCLUDE REMOVABLE SECTIONS TO FACILITATE ACCESS DURING CONSTRUCTION. UTILIZE STRAW BALE BARRIERS ONLY IN LIEU OF A SILT FENCE WHERE FREQUENT ACCESS IS REQUIRED.
   d. SEDIMENT LADEN WATER FROM TRENCH DEWATERING SHALL BE DISCHARGED TO A WELL VEGETATED UPLAND AREA INTO A STRAW BALE DEWATERING STRUCTURE OR GEOTEXTILE FILTER BAG.
   e. SEDIMENT CONTROL STRUCTURES MUST BE IN PLACE AT ALL TIMES ACROSS THE DISTURBED PORTIONS OF THE RIGHT-OF-WAY EXCEPT DURING EXCAVATION/INSTALLATION OF THE CROSSING PIPE.
   f. SOFT DITCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE MAINLINE DITCH FROM THE RIVER CROSSING UNTIL THE RIVER CROSSING IS INSTALLED AND BACKFILLED.
5. PIPE SHALL BE STRUNG AND WELDED FOR READY INSTALLATION PRIOR TO WATERCOURSE TRENCHING.
6. FLUME CAPACITY DURING DRY CROSSING SHALL BE SUFFICIENT TO ACCOMMODATE 1.5 TIMES THE FLOW MEASURED AT THE TIME OF CONSTRUCTION PROVIDED THAT THE FLUMES WILL BE IN PLACE NOT MORE THAN 96 HOURS AND NO PRECIPITATION IS FORECAST. FLUME CAPACITY FOR VEHICLE ACCESS SHALL BE SUFFICIENT TO PASS THE 2 YEAR DESIGN FLOW OR THE FLOW REASONABLY EXPECTED TO OCCUR DURING THE INSTALLATION. EXCESS FLUMES REQUIRED FOR LONGER TERM ACCESS SHALL BE CAPPED DURING DRY CROSSING PROCEDURES.
7. ENSURE THAT THE DAMS AND VEHICLE CROSSING ARE LOCATED FAR ENOUGH APART TO ALLOW FOR A WIDE EXCAVATION.
8. FLUMES ARE TO BE SET WITH 10 PERCENT OF THEIR DIAMETER BELOW STREAMBED LEVEL WHERE SOIL CONDITIONS PERMIT (OTHERWISE INSTALLED AT STREAM GRADE AND SLOPE.)
9. PLACE IMPERVIOUS DAMS AT EACH END OF THE FLUME, UPSTREAM FIRST, THEN DOWNSTREAM. ACCEPTABLE ALTERNATIVES INCLUDE GRAVEL WITH RIP-RAP PROTECTION, SAND BAGS, STEEL PLATE AND ROCKFILL. DURING INSTALLATION, INSTALL AN IMPERVIOUS MEMBRANE, IF NECESSARY, TO LIMIT LEAKAGE. DAMS MAY NEED KEYING INTO THE BANK AND STREAMBED.
   EXCAVATE TRENCH THROUGH PLUGS AND UNDER FLUME FROM BOTH SIDES. WORK IS TO BE COMPLETED AS QUICKLY AS POSSIBLE.
   a. LOWER IN PIPE BY PASSING UNDER FLUME AND BACKFILL IMMEDIATELY WITH SPOIL MATERIAL.
   b. IT IS NOT NECESSARY TO DEWATER THE IN-STREAM TRENCH, HOWEVER, DISPLACED WATER SHALL BE PUMPED TO A STABLE UPLAND AREA TO AVOID OVERTOPPING OF DAMS DURING PIPE PLACEMENT.
   c. IF THE SPOIL MATERIAL IS NOT SUITABLE, USE IMPORTED CLEAN GRANULAR MATERIAL.
   d. IF BLASTING IS REQUIRED, USE CONTROLLED BLASTING TECHNIQUES TO PREVENT DAMAGE TO THE FLOW CONVEYANCE SYSTEM. ALTERNATIVELY, BLASTING MAY BE ACCOMPLISHED PRIOR TO THE FLUME INSTALLATION BY DRILLING THROUGH THE OVERBURDEN.
10. EXCAVATED MATERIAL MUST NOT BE STOCKPILED WITHIN 10 FT. OF THE WATERCOURSE. THIS MATERIAL SHALL BE CONTAINED TO PREVENT SATURATED SOIL FROM FLOWING BACK INTO THE WATERCOURSE.
11. DEWATERING OF THE ONLAND TRENCH SHOULD OCCUR IN A STABLE VEGETATED AREA A MINIMUM OF 50 FT. FROM ANY WATERBODY. THE PUMP DISCHARGE SHOULD BE DIRECTED ONTO A STABLE SPILL PAD CONSTRUCTED OF ROCKFILL OR TIMBERS TO PREVENT LOCALIZED EROSION. THE DISCHARGE WATER SHOULD ALSO BE FORCED INTO SHEET FLOW IMMEDIATELY BEYOND THE SPILL PAD BY USING STRAW BALES AND THE NATURAL TOPOGRAPHY.
12. FLUMES SHOULD BE REMOVED AS SOON AS POSSIBLE, WHEN NO LONGER REQUIRED FOR PIPE LAYING OR FOR ROAD ACCESS, IN THE FOLLOWING MANNER:
   a. REMOVE THE VEHICLE CROSSING RAMP. BANKS ARE TO BE RESTORED TO A STABLE ANGLE AND PROTECTED WITH EROSION RESISTANT MATERIAL COMPATIBLE WITH THE FLOW CONDITIONS (E.G., EROSION CONTROL BLANKETS, CRIBBING, ROCK RIP-RAP, ETC.) TO THE MAXIMUM EXTENT POSSIBLE BEFORE REMOVING THE DAMS.
   b. REMOVE DOWNSTREAM DAM.
   c. REMOVE UPSTREAM DAM.
   d. REMOVE FLUME.
   e. COMPLETE BANK TRIMMING AND EROSION PROTECTION. IF SANDBAGS ARE USED FOR THE DAMS, PLACE AND REMOVE BY HAND TO AVOID EQUIPMENT BREAKING BAGS.
13. RESTORE THE STREAMBED AND BANKS TO APPROXIMATE PRE-CONSTRUCTION CONTOURS, BUT NOT TO EXCEED 2 HORIZONTAL TO 1 VERTICAL.
   a. INSTALL PERMANENT EROSION AND SEDIMENT CONTROL STRUCTURES AS INDICATED ON A SITE SPECIFIC BASIS. IN THE ABSENCE OF SITE SPECIFIC INFORMATION, A FLEXIBLE CHANNEL LINER SUCH AS NAG C125 OR C350 WHICH IS CAPABLE OF WITHSTANDING ANTICIPATED FLOW SHALL BE INSTALLED. ALTERNATIVELY, ROCK RIP-RAP SHALL BE INSTALLED.
   b. ANY MATERIALS PLACED IN THE STREAM TO FACILITATE CONSTRUCTION SHALL BE REMOVED DURING RESTORATION. BANKS SHALL BE STABILIZED AND TEMPORARY SEDIMENT BARRIERS INSTALLED AS SOON AS POSSIBLE AFTER CROSSING, BUT WITHIN 24 HOURS OF COMPLETING THE CROSSING.
   c. MAINTAIN A SILT FENCE OR STRAW BALE BARRIER ALONG THE WATER COURSE UNTIL VEGETATION IS ESTABLISHED IN ADJACENT DISTURBED AREAS.

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KEYSTONE XL PROJECT

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TITLE
DETAIL 13A
TYPICAL DRY FLUME CROSSING METHOD - CONSTRUCTION PROCEDURES

SCALE N.T.S. | DWG No 4359-03-ML-03-708 | REV 02

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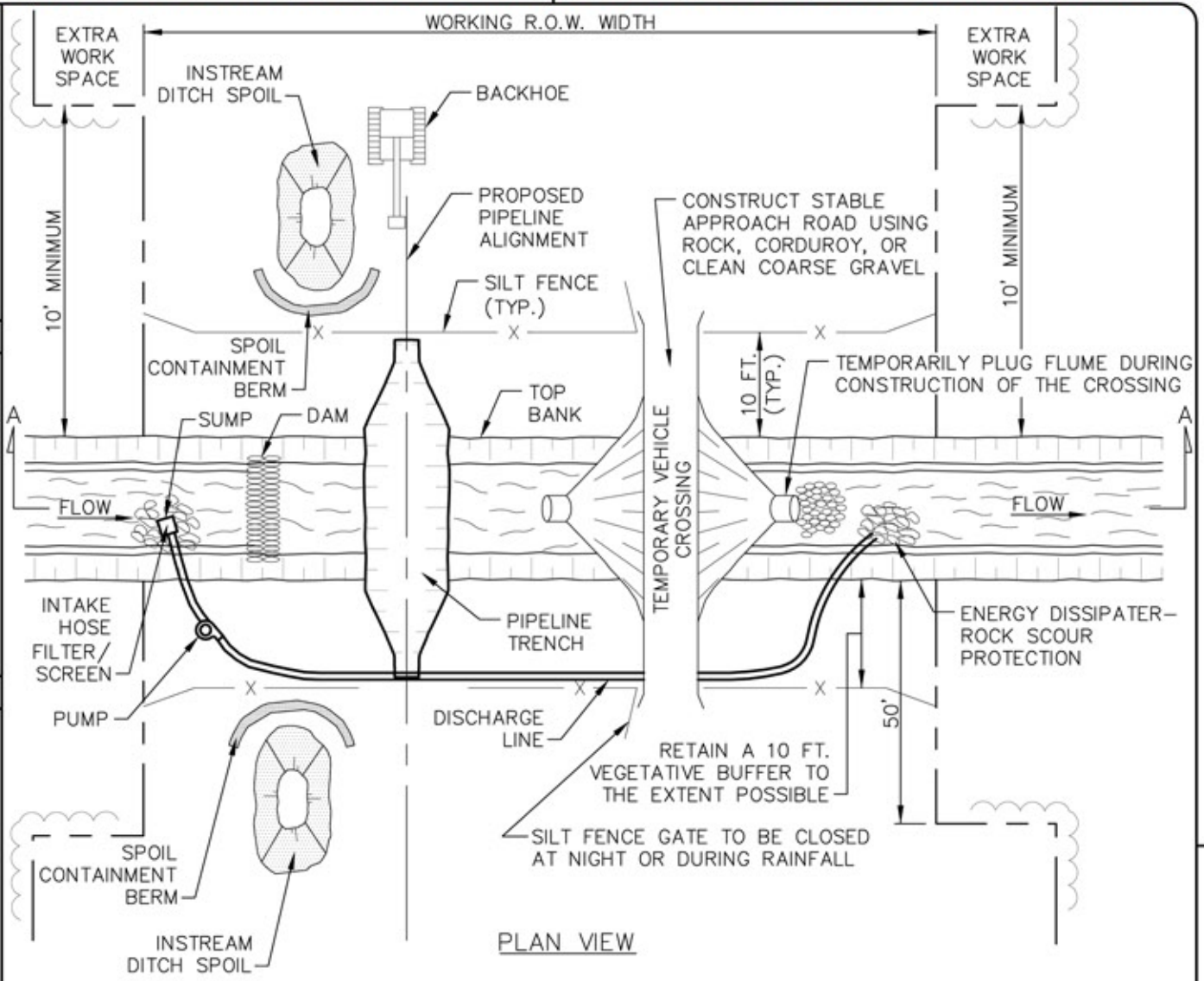

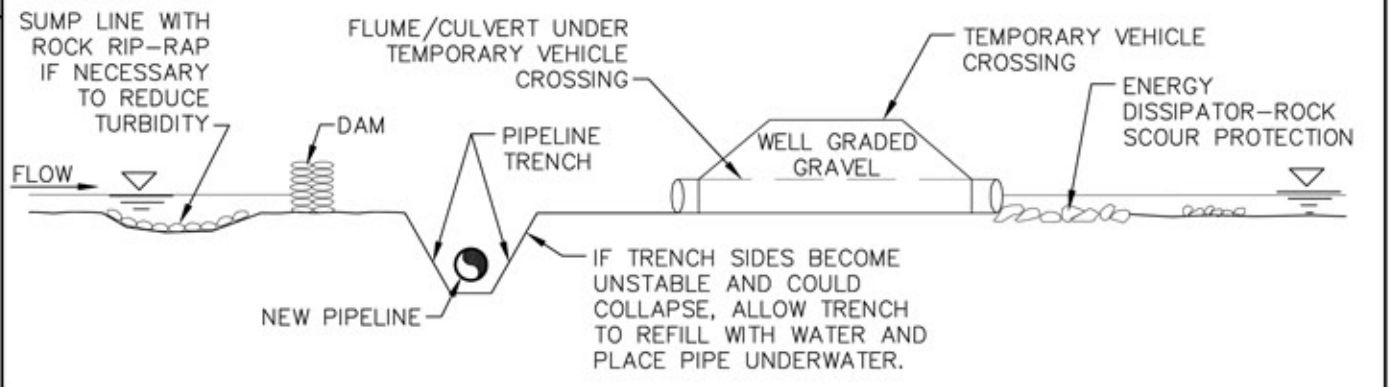

NOTES:

1. PIPELINE PLACEMENT WITHIN RIGHT-OF-WAY CONCEPTUAL ONLY.
2. SEE DETAIL 14A FOR CONSTRUCTION PROCEDURES.

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TITLE

DETAIL 14
TYPICAL DAM AND PUMP CROSSING

SCALE N.T.S. | DWG No 4359-03-ML-03-709 | REV 01

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CONSTRUCTION PROCEDURES:

1. WHERE NECESSARY, OBTAIN PRIOR APPROVAL BEFORE USING THE DAM AND PUMP METHOD.
2. IF THERE IS ANY FLOW IN THE WATERCOURSE, INSTALL PUMPS TO MAINTAIN STREAMFLOW AROUND THE BLOCKED OFF SECTIONS OF CHANNEL. THE PUMP IS TO HAVE 1.5 TIMES THE PUMPING CAPACITY OF ANTICIPATED FLOW. A SECOND STANDBY PUMP OF EQUAL CAPACITY IS TO BE READILY AVAILABLE AT ALL TIMES. AN ENERGY DISSIPATER IS TO BE BUILT TO ACCEPT PUMP DISCHARGE WITHOUT STREAMBED OR STREAMBANK EROSION. IF THE CROSSING IS PROLONGED BEYOND ONE DAY THE OPERATION NEEDS TO BE MONITORED OVERNIGHT.
3. SCHEDULE INSTREAM ACTIVITY FOR LOW FLOW PERIODS IF POSSIBLE.
4. MARK OUT AND MAINTAIN LIMITS OF AUTHORIZED WORK AREAS WITH FENCING OR FLAGGING TAPE TO AVOID UNNECESSARY DISTURBANCE OF VEGETATION. ENSURE EQUIPMENT OPERATORS WORKING ON THE CROSSING HAVE BEEN BRIEFED ABOUT THIS PLAN AND THE MEASURES NEEDED TO PROTECT WATER QUALITY. INSTALL PRE-WORK SEDIMENT CONTROL MEASURES AS SPECIFIED IN THE PLAN. ALL NECESSARY EQUIPMENT AND MATERIALS TO BUILD THE DAMS AND TO PUMP WATER MUST BE ON SITE OR READILY AVAILABLE PRIOR TO COMMENCING IN-WATER CONSTRUCTION. PIPE SHOULD BE STRUNG, WELDED AND COATED AND READY FOR INSTALLATION PRIOR TO WATERCOURSE TRENCHING.
5. CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES, AS DEPICTED AND ALONG DOWN GRADIENT SIDES OF WORK AREAS AND STAGING AREAS SUCH THAT NO HEAVILY SILT LADEN WATER ENTERS STREAM.
   a. NO HEAVILY SILT LADEN WATER SHALL BE DISCHARGED DIRECTLY INTO THE STREAM.
   b. EROSION AND SEDIMENT CONTROL STRUCTURE LOCATIONS AS DEPICTED ARE APPROXIMATE AND MAY BE ADJUSTED AS DIRECTED BY THE COMPANY INSPECTOR TO ACTUAL SITE CONDITIONS.
   c. SILT FENCE OR STRAW BALE INSTALLATIONS SHALL INCLUDE REMOVABLE SECTIONS TO FACILITATE ACCESS DURING CONSTRUCTION. UTILIZE STRAW BALE BARRIERS ONLY IN LIEU OF A SILT FENCE WHERE FREQUENT ACCESS IS REQUIRED.
   d. SEDIMENT LADEN WATER FROM TRENCH DEWATERING SHALL BE DISCHARGED TO A WELL VEGETATED UPLAND AREA INTO A STRAW BALE DEWATERING STRUCTURE OR GEOTEXTILE FILTER BAG.
   e. SEDIMENT CONTROL STRUCTURES MUST BE IN PLACE AT ALL TIMES ACROSS THE DISTURBED PORTIONS OF THE RIGHT-OF-WAY EXCEPT DURING EXCAVATION/INSTALLATION OF THE CROSSING PIPE.
   f. SOFT DITCH PLUGS MUST REMAIN IN PLACE AT CONVENIENT LOCATIONS TO SEPARATE MAINLINE DITCH FROM THE RIVER CROSSING UNTIL THE RIVER CROSSING IS INSTALLED AND BACKFILLED.
6. TO THE EXTENT POSSIBLE, MAINTAIN A MINIMUM 10 FEET VEGETATIVE BUFFER STRIP BETWEEN DISTURBED AREAS AND THE WATERCOURSE. INSTALL AND MAINTAIN A SILT FENCE UPSLOPE OF THE BUFFER STRIP ON EACH SIDE OF THE WATERCOURSE. THE SILT FENCE SHOULD INCORPORATE REMOVABLE "GATES" AS REQUIRED TO ALLOW ACCESS WHILE MAINTAINING EASE OF REPLACEMENT FOR OVERNIGHT OR DURING PERIODS OF RAINFALL.
7. CONSTRUCT A TEMPORARY SUMP UPSTREAM OF THE DAM AND LINE WITH ROCKFILL IF A NATURAL POOL DOES NOT EXIST. INSTALL THE PUMP OR PUMP INTAKE IN THE POOL OR SUMP. DISCHARGE WATER ONTO AN ENERGY DISSIPATER DOWNSTREAM OF THE WORK AREA.
8. EXCAVATED MATERIAL MUST NOT BE STOCKPILED WITHIN 10 FT. OF THE WATERCOURSE. THIS MATERIAL MUST BE CONTAINED WITHIN BERM CONTAINMENT, WITH SECONDARY SILT FENCE PROTECTION TO PREVENT SATURATED SOIL FROM FLOWING BACK INTO THE WATERCOURSE.
9. CHEMICALS, FUELS, LUBRICATING OILS SHALL NOT BE STORED AND EQUIPMENT REFUELED WITHIN 100 FT. OF THE WATERBODY. PUMPS ARE TO BE REFUELED AS PER THE SPCC PLANS.
10. STAGING AREAS ARE TO BE LOCATED AT LEAST 10 FT. FROM THE WATER'S EDGE (WHERE TOPOGRAPHIC CONDITIONS PERMIT) AND SHALL BE THE MINIMUM SIZE NEEDED.
11. DAMS ARE TO BE MADE OF STEEL PLATE, INFLATABLE PLASTIC DAM, SAND BAGS, COBBLES, WELL GRADED COARSE GRAVEL FILL, OR ROCK FILL. DAMS MAY NEED KEYING INTO THE BANKS AND STREAMBED. ENSURE THAT THE DAM AND VEHICLE CROSSING ARE LOCATED FAR ENOUGH APART TO ALLOW FOR A WIDE EXCAVATION. CAP FLUMES USED UNDER VEHICLE CROSSING DURING DRY CROSSING.
12. DEWATER AREA BETWEEN DAMS IF POSSIBLE. DEWATERING SHOULD OCCUR IN A STABLE VEGETATIVE AREA A MINIMUM OF 50 FT. FROM ANY WATERBODY. THE PUMP DISCHARGE SHOULD BE DISCHARGED ONTO A STABLE SPILL PAD CONSTRUCTED OF ROCKFILL SANDBAGS, OR TIMBERS TO PREVENT LOCALIZED EROSION. THE DISCHARGE WATER SHOULD ALSO BE FORCED INTO SHEET FLOW IMMEDIATELY BEYOND THE SPILL PAD BY USING STRAW BALES AND THE NATURAL TOPOGRAPHY DISCHARGED WATER SHALL NOT BE ALLOWED TO FLOW INTO ANY WATERCOURSE OR WETLAND. IF IT IS NOT POSSIBLE TO DEWATER THE EXCAVATION DUE TO SOILS WITH A HIGH HYDRAULIC CONDUCTIVITY, THE EXCAVATION AND PIPE PLACEMENT IS TO BE CARRIED OUT IN THE STANDING WATER. PUMP ANY DISPLACED WATER AS DESCRIBED ABOVE TO PREVENT OVERTOPPING OF DAMS.
13. EXCAVATE TRENCH THROUGH PLUGS AND STREAMBED FROM BOTH SIDES, RE-POSITIONING DISCHARGE HOSE AS NECESSARY. LOWER THE PIPE IN THE TRENCH AND BACKFILL IMMEDIATELY. DURING THIS OPERATION WORK IS TO BE COMPLETED AS QUICKLY AS POSSIBLE.
14. CONTRACTOR SHALL RESTORE THE STREAM BED AND BANKS TO APPROXIMATE PRE-CONSTRUCTION CONTOURS, BUT NOT TO EXCEED 2 HORIZONTAL TO 1 VERTICAL.
   a. CONTRACTOR SHALL INSTALL PERMANENT EROSION AND SEDIMENT CONTROL STRUCTURES AS INDICATED ON A SITE SPECIFIC BASIS. IN THE ABSENCE OF SITE SPECIFIC INFORMATION, A FLEXIBLE CHANNEL LINER SUCH AS NAG C125 OR C350 WHICH IS CAPABLE OF WITHSTANDING ANTICIPATED FLOW SHALL BE INSTALLED. ALTERNATIVELY, ROCK RIP-RAP SHALL BE INSTALLED.
   b. ANY MATERIALS PLACED IN THE STREAM TO FACILITATE CONSTRUCTION SHALL BE REMOVED DURING RESTORATION. BANKS SHALL BE STABILIZED AND TEMPORARY SEDIMENT BARRIERS INSTALLED AS SOON AS POSSIBLE AFTER CROSSING, BUT WITHIN 24 HOURS OF COMPLETING THE CROSSING.
   c. MAINTAIN A SILT FENCE OR STRAW BALE BARRIER ALONG THE WATER COURSE UNTIL VEGETATION IS ESTABLISHED IN ADJACENT DISTURBED AREAS.
15. WHEN THE STREAMBED HAS BEEN RESTORED, THE CREEK BANKS ARE TO BE CONTOURED TO A STABLE ANGLE AND PROTECTED WITH EROSION RESISTANT MATERIAL COMPATIBLE WITH FLOW VELOCITY BETWEEN DAMS (E.G., EROSION CONTROL BLANKETS, CRIBBING, ROCK RIP-RAP, ETC.). THE DAMS ARE TO BE REMOVED DOWNSTREAM FIRST. KEEP PUMP RUNNING UNTIL NORMAL FLOW IS RESUMED. COMPLETE BANK TRIMMING AND EROSION PROTECTION. IF SANDBAGS ARE USED FOR THE DAMS, PLACE AND REMOVE BY HAND TO AVOID EQUIPMENT BREAKING BAGS.

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KEYSTONE XL PROJECT

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TITLE
DETAIL 14A
TYPICAL DAM AND PUMP CROSSING – CONSTRUCTION PROCEDURES

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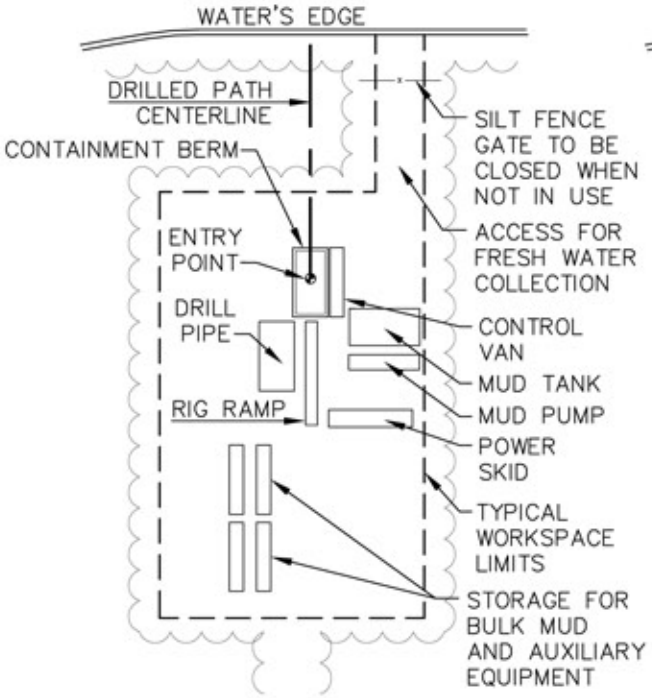
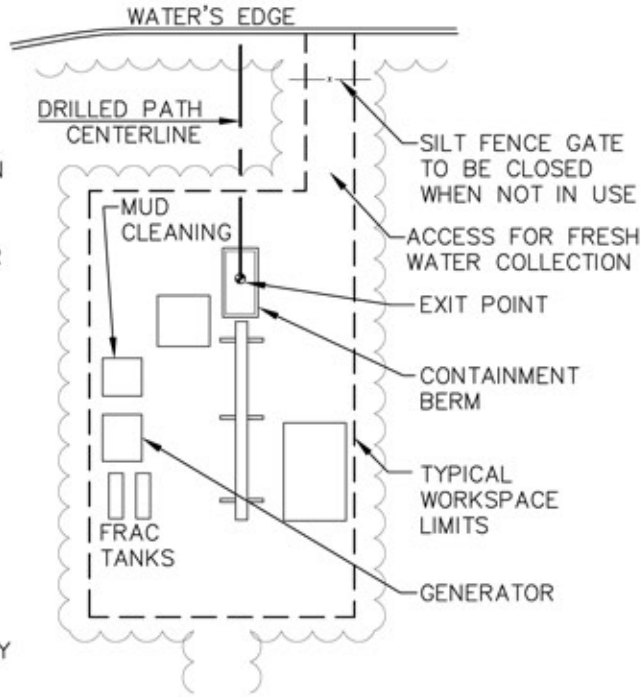


SITE PLAN
ENTRY SIDE



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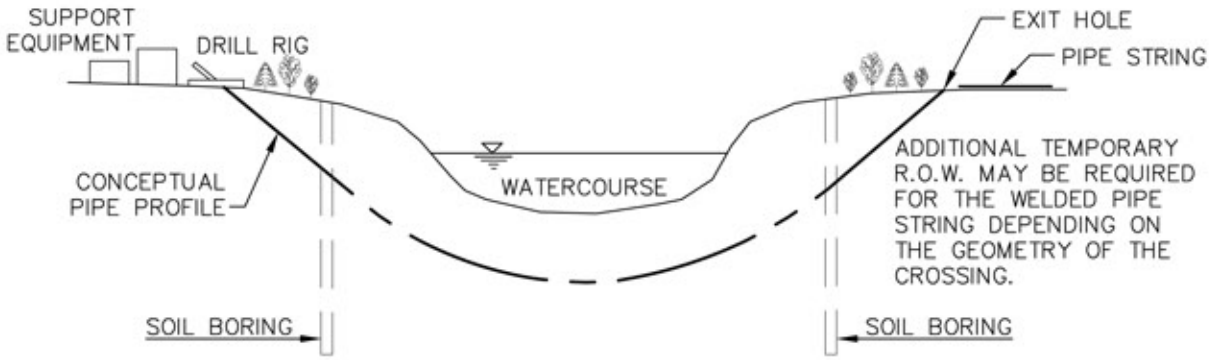

PROFILE

NOTES:

1. SET UP DRILLING EQUIPMENT A MINIMUM OF 100 FEET FROM THE EDGE OF THE WATERCOURSE. LIMIT CLEARING BETWEEN DRILL ENTRY AND EXIT POINT TO HAND CUTTING BRUSH FOR TRACKING WIRES.
2. ENSURE THAT ONLY BENTONITE-BASED DRILLING MUD IS USED.
3. INSTALL SUITABLE DRILLING MUD TANKS OR SUMPS TO PREVENT CONTAMINATION OF WATERCOURSE.
4. INSTALL BERMS DOWNSLOPE FROM THE DRILL ENTRY AND ANTICIPATED EXIT POINTS TO CONTAIN ANY RELEASE OF DRILLING MUD.
5. DISPOSE OF DRILLING MUD IN ACCORDANCE WITH THE APPROPRIATE REGULATORY AUTHORITY REQUIREMENTS.

REVISIONS
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		SCALE N.T.S.	DWG No 4359-03-ML-03-711	REV 02

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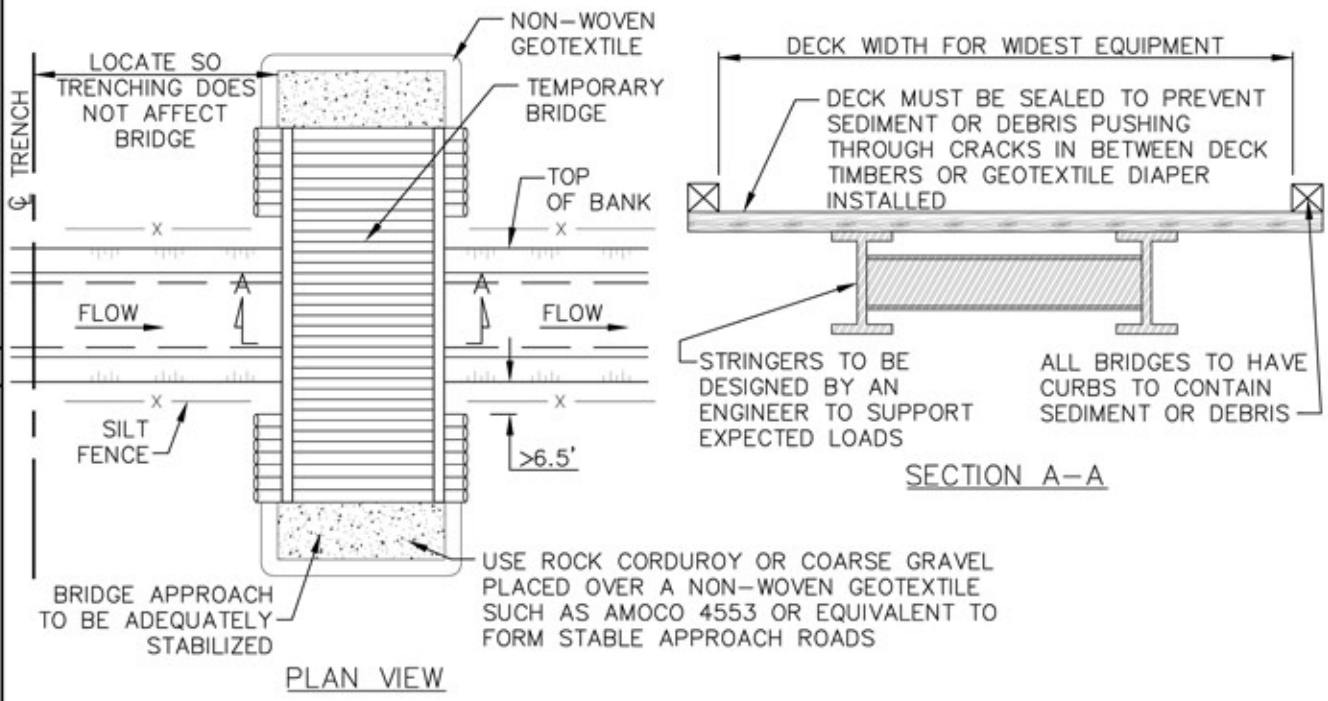
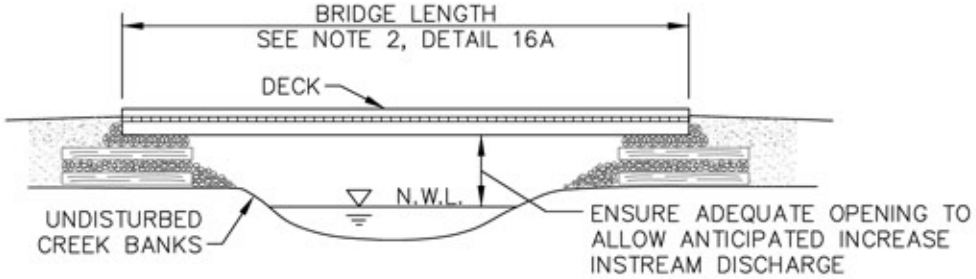
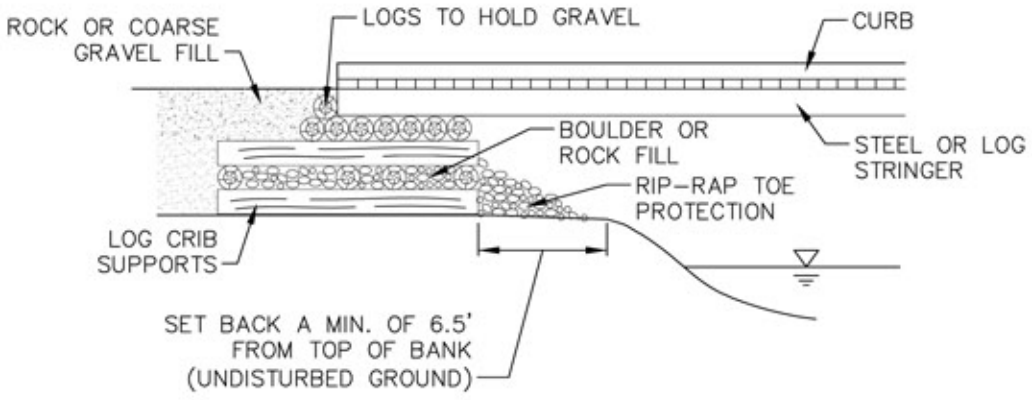




BRIDGE PROFILE



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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 16 TYPICAL TEMPORARY BRIDGE CROSSING		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-03-712	REV 01

TC_A4_BR.DWG 8.5X11

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

CONSTRUCTION PROCEDURES:

IN GENERAL TERMS, THE FOLLOWING IS A SEQUENCE OF CONSTRUCTION PROCEDURES THAT ARE RECOMMENDED TO BE FOLLOWED FOR TEMPORARY BRIDGE CROSSINGS:

1. A PORTABLE BRIDGE, FLEXI-FLOAT OR FLUMED VEHICLE CROSSING MAY BE SUBSTITUTED FOR THE TEMPORARY BRIDGE. IT IS IMPORTANT THAT THE SIZE OF THE TOTAL OPENING BE SELECTED SO THE STRUCTURE CAN SAFELY PASS FLOOD FLOWS THAT CAN REASONABLY BE EXPECTED TO OCCUR DURING THE LIFE OF THE CROSSING.

2. DETERMINE BRIDGE LENGTH REQUIRED AND FOLLOW EITHER METHOD A) OR B) FOR DETERMINING THE OPENING SIZE. IF A) IS FOLLOWED, A MINIMUM 6.5 FT. SETBACK FROM TOP OF BANK MUST BE PRESERVED AS A "NO DISTURBANCE AREA". IF ABUTMENTS OR PIERS IN THE STREAMBED ARE REQUIRED, METHOD B) IS TO BE FOLLOWED.

3. INSTALL THE BRIDGE IN A MANNER THAT WILL MINIMIZE SEDIMENT ENTERING THE WATER. STRINGERS MUST BE DESIGNED TO SUPPORT THE LOADS EXPECTED ON THE BRIDGE. CURBS MUST BE INSTALLED ALONG THE EDGE OF THE DECK TO CONTAIN SEDIMENT AND DEBRIS ON THE BRIDGE. FASTENERS CONNECTING COMPONENTS MUST BE STRONG ENOUGH TO HOLD THEM IN POSITION DURING THE LIFE OF THE BRIDGE. CRIBS ARE TO BE FILLED WITH ROCK OR COBBLE. RIP-RAP EROSION PROTECTION IS TO BE PLACED AROUND THE CRIBS AND ON ANY FILL SLOPES PROJECTING INTO THE WATERBODY.

4. ROAD APPROACHES LEADING TO THE BRIDGE MUST BE RAISED AND STABLE SO EQUIPMENT LOADS ARE SUPPORTED A SUFFICIENT DISTANCE BACK FROM THE WATER TO REDUCE SEDIMENT AND DEBRIS ENTERING THE WATERBODY FROM EQUIPMENT TRACKS. THIS MAY REQUIRE USING MATERIALS SUCH AS GRAVEL, ROCK OR CORDUROY. DO NOT USE SOIL TO CONSTRUCT OR STABILIZE EQUIPMENT BRIDGES. IF CUTS ARE NEEDED TO OBTAIN A SATISFACTORY GRADE, THEY ARE TO BE DUG WITH SIDE DITCHES AND STABLE SLOPES. EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED TO KEEP SEDIMENT ON LAND (E.G., SILT FENCING, FILTER CLOTH, RIP-RAP, SEED AND MULCH, ETC.)

5. MAINTAIN A SILT FENCE ON EACH SIDE OF THE WATERBODY EXTENDING A MINIMUM OF 10 FEET BEYOND THE WIDTH OF DISTURBANCE UNTIL VEGETATION HAS BEEN ESTABLISHED IN UPSLOPE AREAS.

6. PERIODICALLY CHECK BRIDGE INSTALLATION AND REMOVE ANY BUILD-UP OF SEDIMENT OR DEBRIS ON THE BRIDGE. DISPOSE OF THIS MATERIAL IN A LOW LYING AREA AT LEAST 100 FEET FROM THE WATERBODY.

7. REMOVE TEMPORARY CROSSINGS AS SOON AS POSSIBLE AFTER FINAL CLEAN-UP. MATERIALS PLACED ALONG THE WATERBODY SHOULD BE COMPLETELY REMOVED DURING FINAL CLEAN-UP. REMOVAL SHOULD NOT OCCUR OUTSIDE THE CONSTRUCTION WINDOWS. SURPLUS GRAVEL IS TO BE SPREAD ON THE RIGHT-OF-WAY AS GRAVEL SHEETING, IF GRADATION IS SUITABLE, OR MOVED AT LEAST 100 FEET FROM TOP OF BANK FOR DISPOSAL. BRIDGE MATERIALS ARE TO BE REMOVED FROM THE CROSSING AREA. THE WATERBODY BED AND BANKS ARE TO BE RESTORED TO A STABLE ANGLE AND PROTECTED WITH EROSION RESISTANT MATERIAL COMPATIBLE WITH THE EXPECTED FLOW CONDITIONS.

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JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	TITLE: DETAIL 16A TYPICAL TEMPORARY BRIDGE CROSSING - CONSTRUCTION PROCEDURES		
		SCALE N.T.S.	DWG No 4359-03-ML-03-713	REV 01

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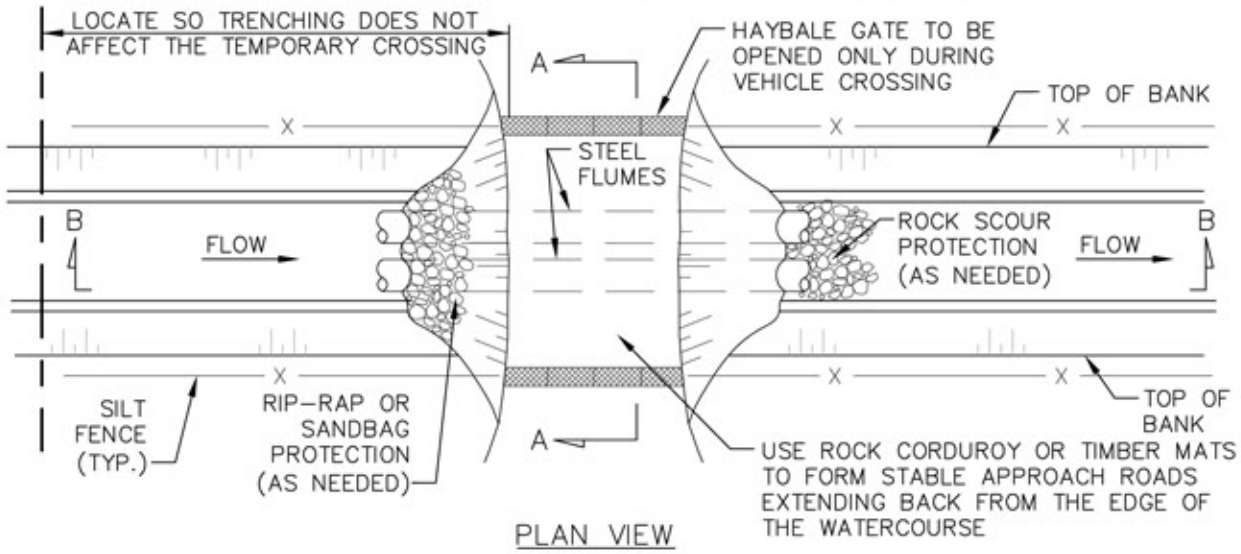
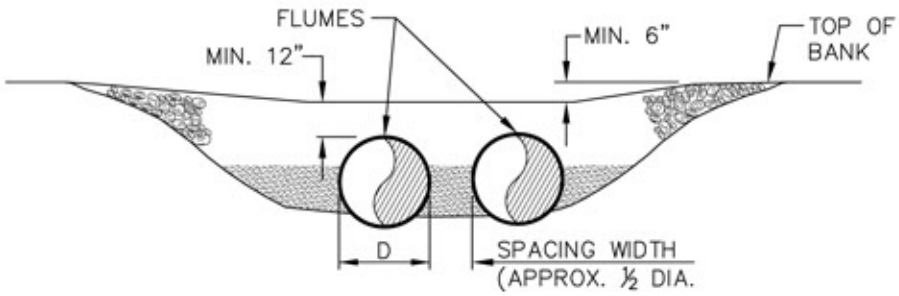
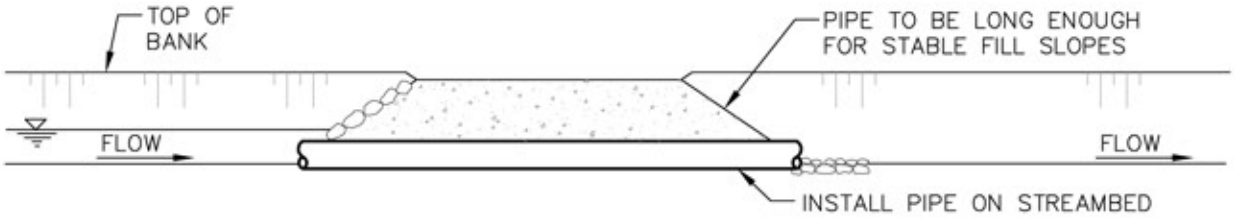


PLAN VIEW



SECTION A–A



SECTION B–B

CONSTRUCTION PROCEDURES:

THE FOLLOWING IS A SEQUENCE OF CONSTRUCTION AND PROCEDURES MEASURES TO BE FOLLOWED AT ALL TEMPORARY FLUME VEHICLE CROSSINGS.

1. A PORTABLE FLEXI–FLOAT, OR TEMPORARY BRIDGE MAY BE SUBSTITUTED FOR THE TEMPORARY FLUME CROSSING.
2. THE LENGTH OF THE FLUME SHALL BE SUFFICIENT TO SPAN THE ENTIRE AREA REQUIRED FOR VEHICULAR ACCESS, EXTENDING 4 FEET BEYOND TOE OF FILL MATERIAL, SO TRENCHING WILL NOT AFFECT THE ROAD CROSSING. A LONGER PIPE IS TO BE USED, IF NEEDED, TO MAINTAIN STABLE SIDE SLOPES. FLUME CAPACITY TO BE BASED ON THE 2–YEAR DESIGN FLOW OR MAXIMUM FLOW ANTICIPATED TO OCCUR DURING INSTALLATION, AS SPECIFIED IN CONSTRUCTION DOCUMENTS.
3. WHERE PRACTICAL, BACKFILL AROUND THE PIPES AT THE ROAD WITH CLEAN, COARSE ROCK FILL MATERIAL. IF SCOUR IS POSSIBLE, RIP–RAP IS TO BE PLACED ON THE WATERBODY BED DOWNSTREAM OF THE PIPE OUTLET EXTENDING A MINIMUM OF TWO PIPE DIAMETERS. ALTERNATIVELY, TIMBER EQUIPMENT MATS, SAND BAGS OR TIMBER CORDUROY MAY BE USED TO FORM THE TRAVEL SURFACE.
4. TO REDUCE DEBRIS ENTERING THE WATERBODY FROM EQUIPMENT TRACKS, THE APPROACH ROAD LEADING TO THE CULVERT CROSSING MUST BE RAISED AND STABLE SO EQUIPMENT LOADS ARE SUPPORTED A SUFFICIENT DISTANCE BACK FROM THE WATER. IF CUTS ARE NEEDED TO OBTAIN A SATISFACTORY GRADE, THEY ARE TO BE DUG WITH SIDE DITCHES AND STABLE SLOPES. EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED TO LIMIT THE POTENTIAL FOR SEDIMENT TO ENTER THE WATERBODY (E.G., CHECK DAMS, SILT FENCE, RIP–RAP, SEED AND MULCH, SEDIMENT TRAPS, ETC.).
5. PERIODICALLY CHECK THE TEMPORARY CROSSING INSTALLATION AND REMOVE ANY BUILD–UP OF SEDIMENT OR DEBRIS ON THE BRIDGE. DISPOSE OF THIS MATERIAL AT LEAST 100 FEET FROM THE WATERBODY AND ABOVE THE HIGH WATER LEVEL.
6. FOLLOWING COMPLETION OF THE CROSSING, REMOVE ROCKFILL IN/OR AROUND FLUME PIPES FROM THE WATERBODY OR WETLAND.
7. RESTORE STREAM BANKS AND WATERBODY BOTTOM.

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		TITLE: DETAIL 17 TYPICAL FLUME BRIDGE CROSSING		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359–03–ML–03–714	REV 01

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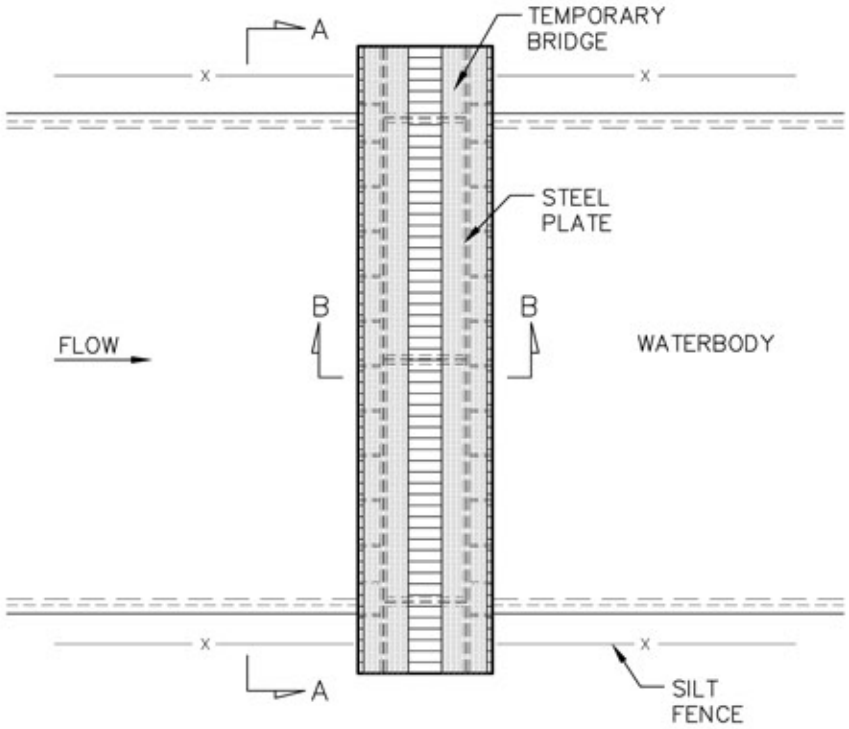
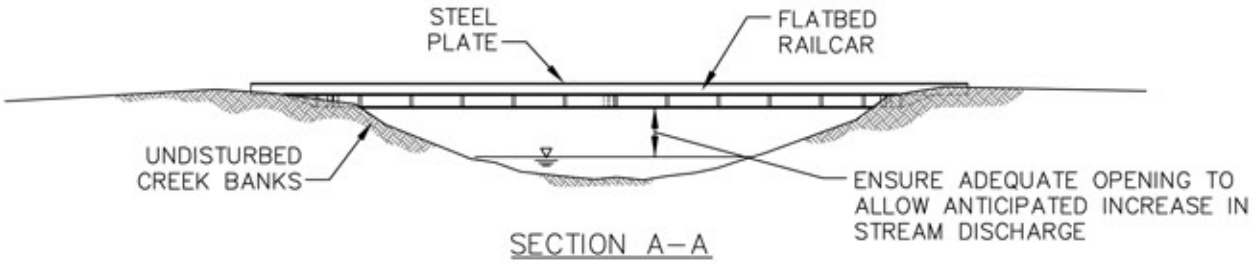
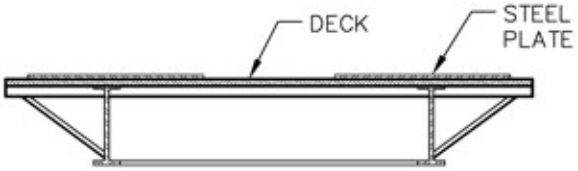


PLAN VIEW



SECTION A–A



SECTION B–B

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DESIGNER: JMP (NAME) 2010-10-21 (DATE)	KEYSTONE XL PROJECT		
	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
	TITLE: DETAIL 18 TYPICAL RAILCAR BRIDGE CROSSING		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-03-715 REV 01

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CONSTRUCTION PROCEDURES:

1. THIS TYPICAL DRAWING PROVIDES FOR A RAILCAR BRIDGE EQUIPMENT CROSSING.

2. BRIDGE SHOULD BE A MINIMUM OF 12 FEET LONGER THAN BANK TO BANK WIDTH.

3. BEST MANAGEMENT PRACTICES UTILIZING EROSION CONTROL DEVICES, SUCH AS HAY BALES AND SILT FENCE ARE REQUIRED TO PREVENT SEDIMENTATION OF THE STREAM. EROSION PROTECTION SHALL BE PLACED ON THE STREAM BANKS.

4. DURING FINAL CLEAN-UP, REMOVE TEMPORARY EQUIPMENT CROSSINGS AS SOON AS POSSIBLE. INSTALLED MATERIALS, SUCH AS HAY BALES AND SILT FENCE MUST BE REMOVED AND DISPOSED IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS AND REQUIREMENTS. THE STREAMBED, BANKS AND AREAS AFFECTED BY CONSTRUCTION OF THE TEMPORARY EQUIPMENT CROSSING SHOULD BE RESTORED TO A STABLE CONDITION. IF REQUIRED TO PREVENT TRANSPORT OF SEDIMENTATION TO THE STREAM, SILT FENCE SHOULD BE INSTALLED AT THE TOP OF THE BANKS.

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FIA # 4359 | CHAINAGE: | DISCIPLINE # 03

TITLE: DETAIL 18A
TYPICAL RAILCAR BRIDGE CROSSING -
CONSTRUCTION PROCEDURES

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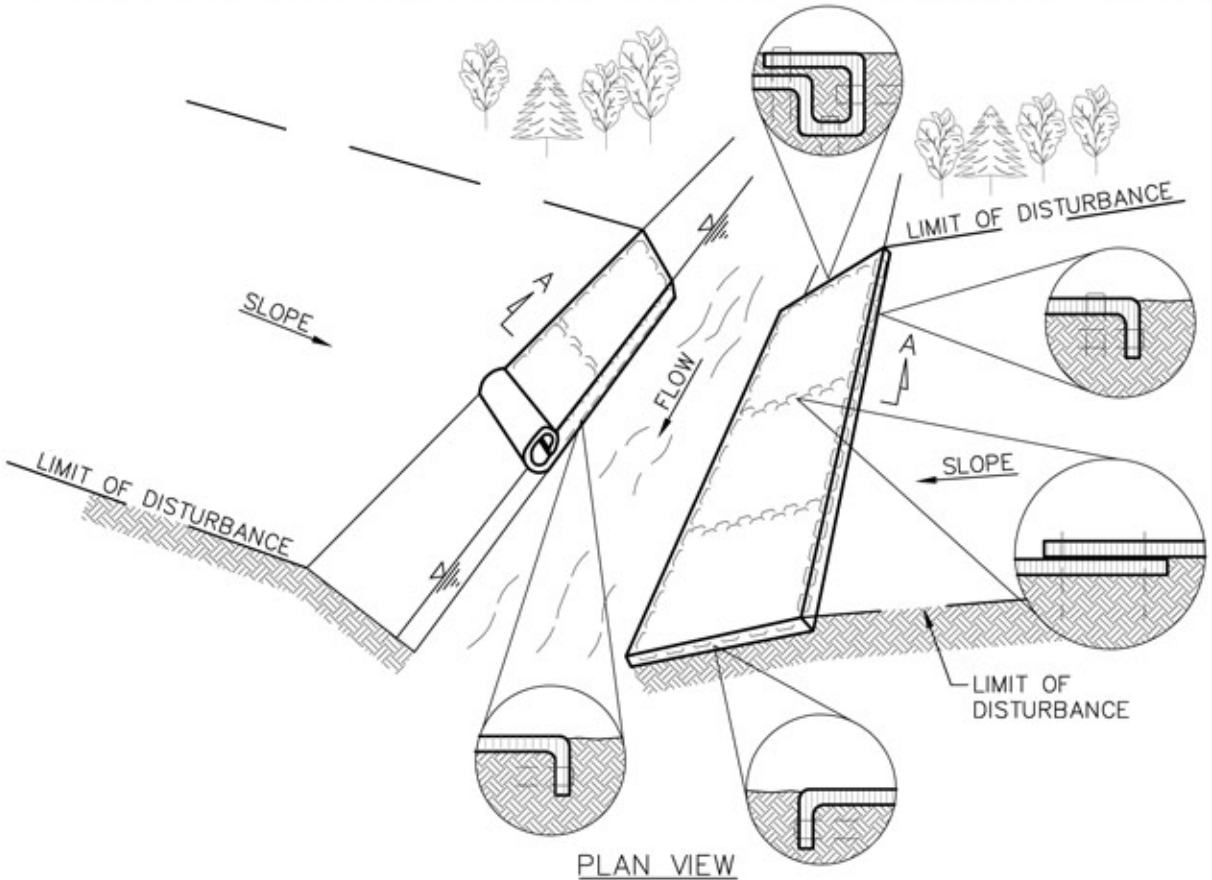

PLAN VIEW

SECTION A–A

NOTES:

1. INSTALL AND ANCHOR LINERS FOLLOWING MANUFACTURER'S INSTRUCTIONS.
2. PREPARE SOIL BEFORE INSTALLING CHANNEL LINER, INCLUDING THE APPLICATION OF
3. SEED. CHANNEL LINERS SHOULD EXTEND COMPLETELY ACROSS DISTURBED BANK AREAS TO PROTECT ERODIBLE SURFACES.
4. BEGIN AT THE END OF THE CHANNEL BY ANCHORING THE LINER IN A TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
5. ROLL LINER IN DIRECTION OF WATER FLOW.
6. INSTALL LINERS END–OVER–END (SHINGLE STYLE) WITH OVERLAP USING A DOUBLE ROW OF STAGGERED STAPLES 4 INCHES BELOW THE FIRST ROW IN A STAGGERED PATTERN.
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FEET INTERVALS. USE A ROW OF STAPLES 4 INCHES BELOW THE FIRST ROW IN A STAGGERED PATTERN.
8. INSTALL CHANNEL LINER TO THE TOP OF THE DEFINED CHANNEL SECTION. TWO OR MORE ROWS OF BLANKETS MAY BE NECESSARY, THESE LINERS MUST BE OVERLAPPED 4 INCHES AND STAPLED.
9. THE CHANNEL LINER SHOULD EXTEND TO THE BASE OF THE CHANNEL AND STAPLED. FOR CHANNELS WITH VERY LITTLE OR NO FLOW, EXTEND A MINIMUM OF 1 FOOT BELOW THE LOW WATER LEVEL AND STAPLE IN PLACE.
10. INSTALLATION SPECIFICATIONS TO BE MODIFIED AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

REVISIONS
01 2008-11-04 UPDATED DRAWING NOTES
02 2010-10-11 REVISED TITLE BLOCK

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		TITLE: DETAIL 19 FLEXIBLE CHANNEL LINER INSTALLATION		
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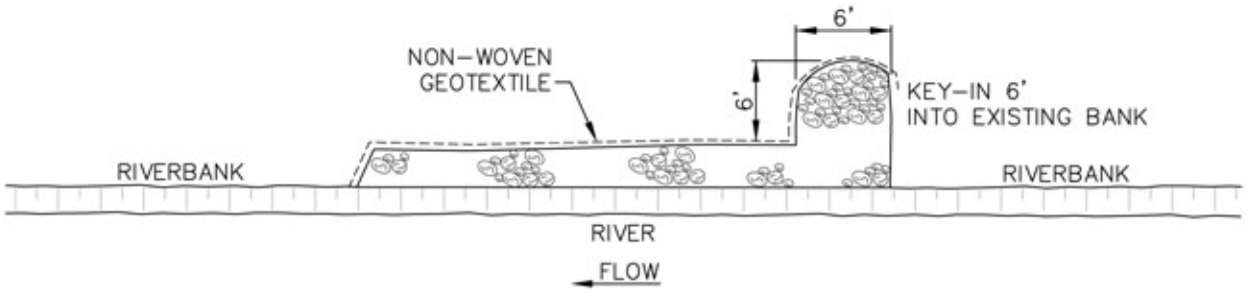
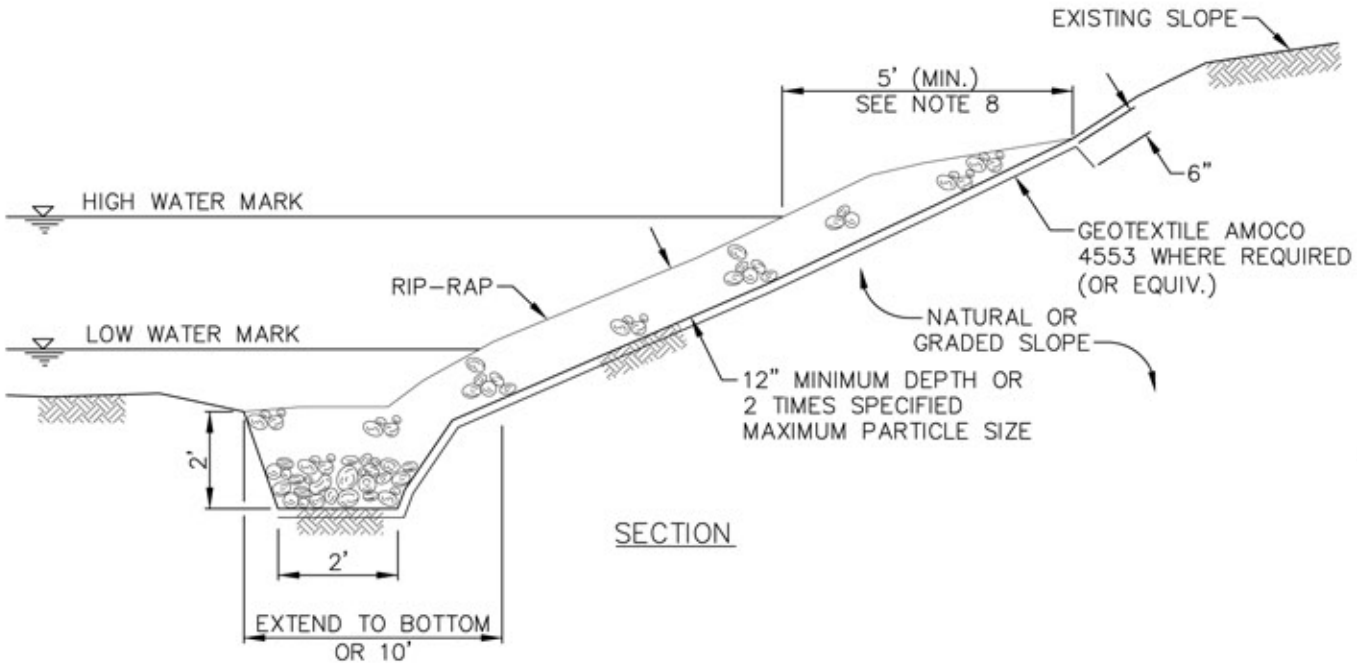


PLAN



SECTION

NOTES:

1. REMOVE ALL STUMPS, ORGANIC MATERIAL AND PREPARE BANKS TO A STABLE CONFIGURATION TO A MAXIMUM SLOPE OF 2 HORIZONTAL TO 1 VERTICAL.
2. CONSTRUCT TOE TRENCH TO KEY IN BOTTOM OF RIP-RAP PROTECTION.
3. INSTALL FILTER CLOTH (GEOTEXTILE), SUCH AS AMOCO 4553 OR EQUIVALENT, UNDER ROCK WHERE SPECIFIED OR AS DIRECTED BY THE COMPANY. ADJOINING EDGES OF CLOTH SHALL OVERLAP A MINIMUM OF 12".
4. ROCK UTILIZED FOR RIP-RAP SHALL CONSIST OF SOUND, DURABLE ROCK, AND RESISTANT TO WEATHERING. INDIVIDUAL PIECES SHOULD BE ANGULAR, BLOCK SHAPED AND HAVE A MINIMUM SPECIFIC GRAVITY OF 2.2.
5. INSTALL RIP-RAP TO A THICKNESS OF APPROXIMATELY 2 TIMES THE MAXIMUM EQUIVALENT DIAMETER OF THE RIP-RAP. EACH LOAD SHOULD BE WELL GRADED. A WELL GRADED MIXTURE IS COMPOSED 60% (MINIMUM) OF LARGER SIZES WITH 40% OF SMALLER SIZES TO FILL THE VOIDS.
6. SIZE OF RIP-RAP IS DEPENDENT UPON THE PREDICTED FLOW CONDITIONS.
7. KEY IN THE EDGES OF THE RIP-RAP AND FILTER CLOTH TO NATURAL GROUND CONTOURS SO THAT UNDERMINING DOES NOT OCCUR.
8. RIP-RAP IS TO BE INSTALLED TO 2 FEET. ABOVE THE NORMAL HIGH WATER MARK OR 5 FEET ALONG THE SLOPE, WHICHEVER IS LESS.
9. INSTALLATION SPECIFICATIONS TO BE MODIFIED TO SUIT ACTUAL SITE CONDITIONS.

REVISIONS
01 2008-11-04 UPDATED DRAWING NOTES
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JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 20 TYPICAL ROCK RIP-RAP		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-05-709	REV 02

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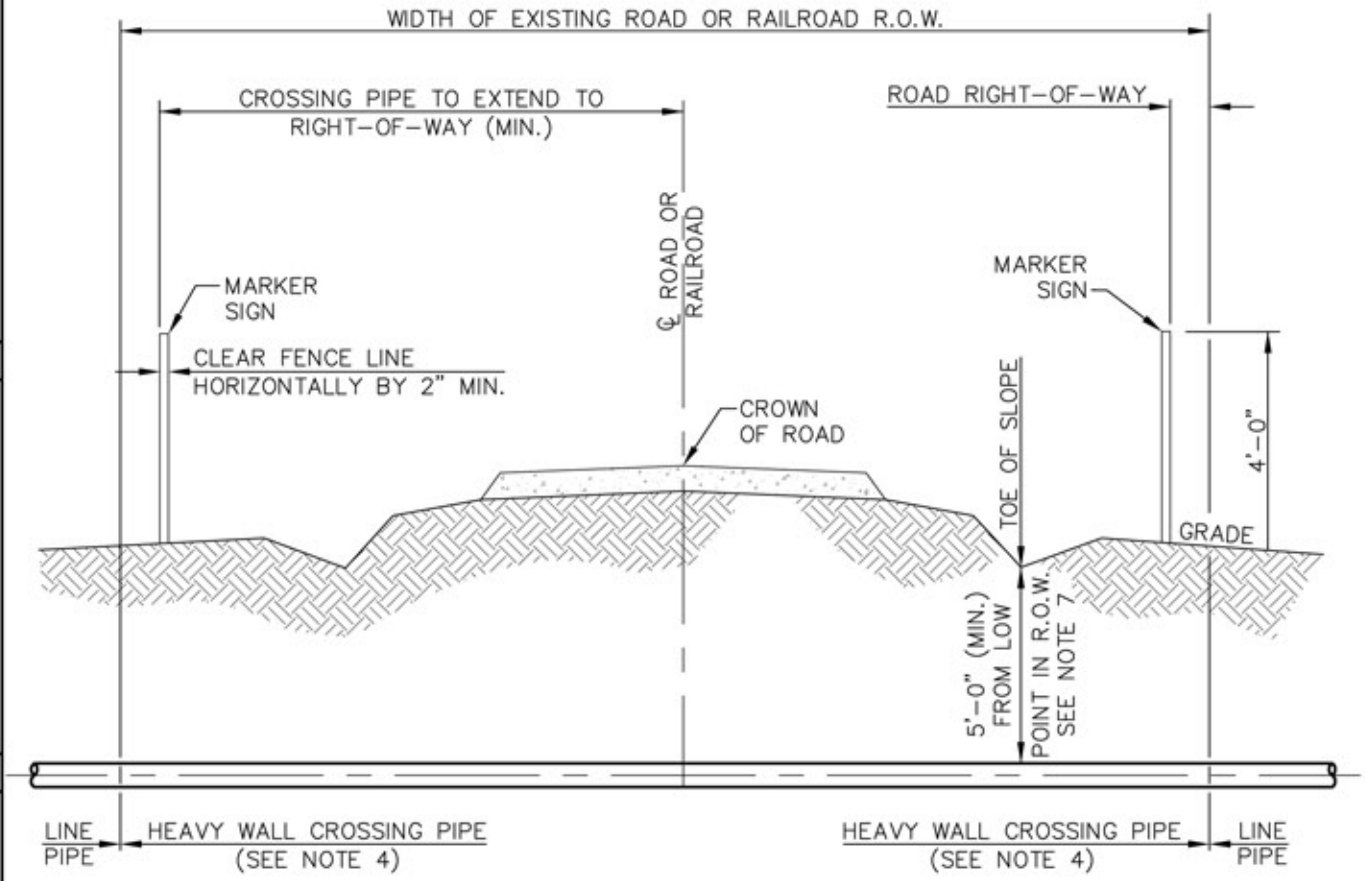

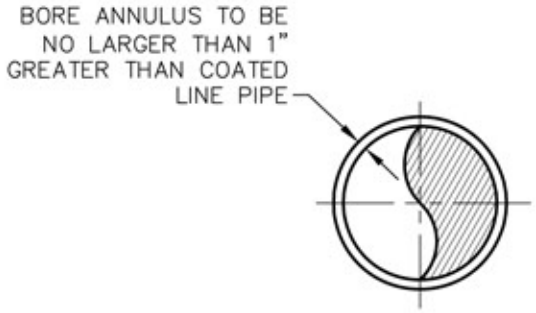

NOTES:

1. CROSSINGS SHALL BE IN ACCORDANCE WITH APPLICABLE PERMIT.
2. ROAD CROSSING PIPE SHALL EXTEND AT MINIMUM TO RIGHT-OF-WAY LINE UNLESS OTHERWISE SPECIFIED.
3. THE TYPE AND MINIMUM REQUIRED LENGTH OF PIPE FOR CROSSINGS OF ROADS SHALL BE AS SPECIFIED ON ALIGNMENT SHEETS.
4. PIPE FOR BORED CROSSINGS TO INCLUDE ABRASION-RESISTANT (ARB) COATING.
5. PIPELINE MARKER AND TEST STATIONS TO BE INSTALLED ON RIGHT-OF-WAY LINE NEXT TO FENCE IF POSSIBLE.
6. THE CROSSING PIPE SHALL BE STRAIGHT WITH NO VERTICAL OR HORIZONTAL BENDS WITHIN ROAD RIGHT-OF-WAY.
7. MINIMUM PIPELINE COVER IN DRAINAGE DITCHES AT PUBLIC ROADS IS 60 INCHES; 36 INCHES IN CONSOLIDATED ROCK.

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CHECKED BY: WSF	DESIGN CHECKER: RW P7100	TITLE: DETAIL 21 TYPICAL UNCASED ROAD/RAILROAD CROSSING BORE DETAIL		
		SCALE N.T.S.	DWG No 4359-03-ML-03-717	REV 02

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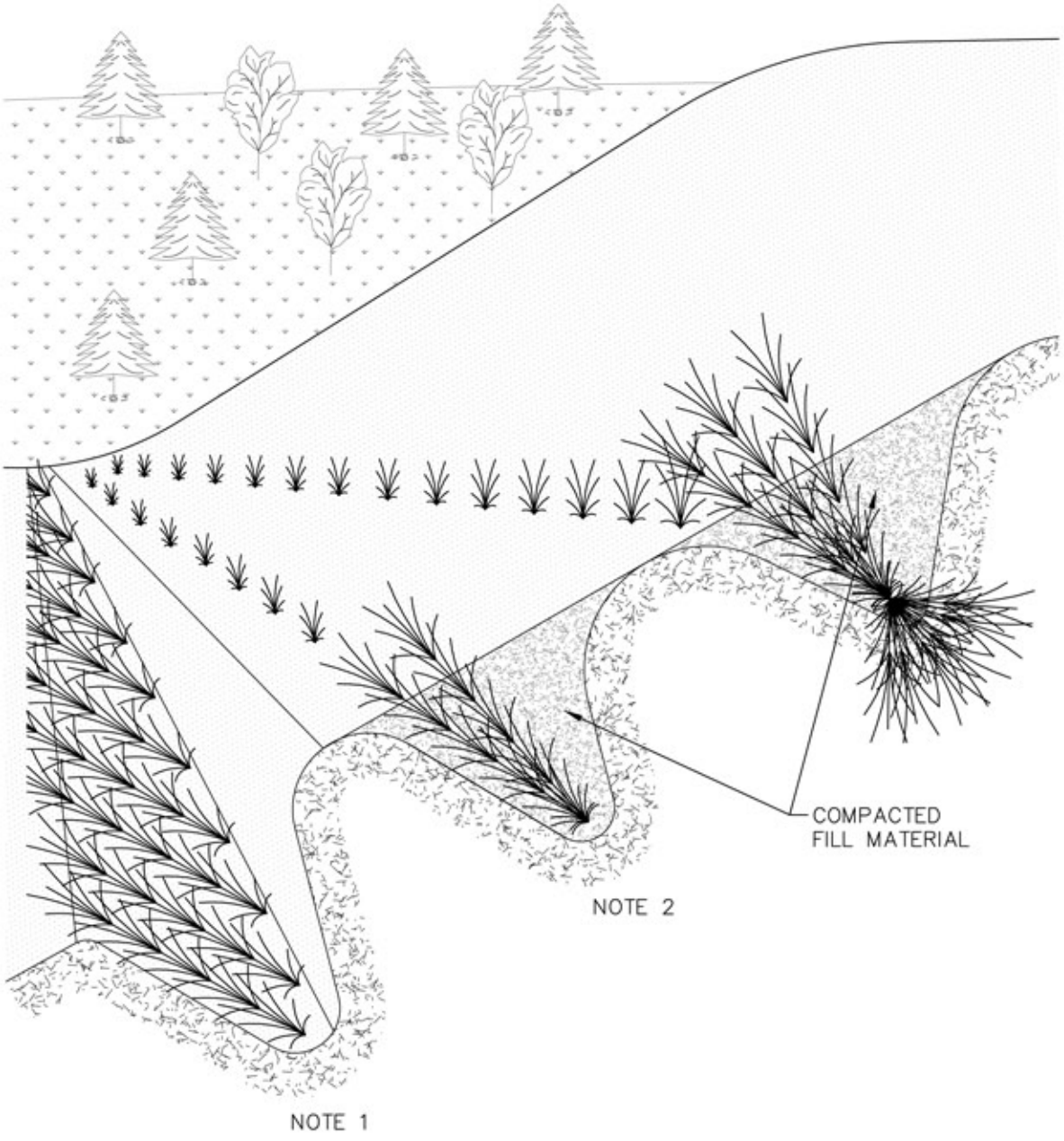

NOTES:

1. CUT TRENCH ACROSS SLOPE. FILL WITH DORMANT WOODY PLANT MATERIAL.
2. FILL IS PLACED ON TOP OF BRANCH LAYER AND COMPACTED.
3. INSTALLATION SPECIFICATIONS TO BE MODIFIED AS NECESSARY TO SUIT SITE CONDITIONS.

REVISIONS
01 2008-11-04 UPDATED DRAWING NOTES
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DESIGN CHECKER: RW P7100

KEYSTONE XL PROJECT

FIA # 4359	CHAINAGE:	DISCIPLINE # 03

TITLE
DETAIL 22
STREAMBANK RECLAMATION –
BRUSH LAYER IN CROSS CUT SLOPE

SCALE N.T.S.	DWG No 4359-03-ML-05-710	REV 02

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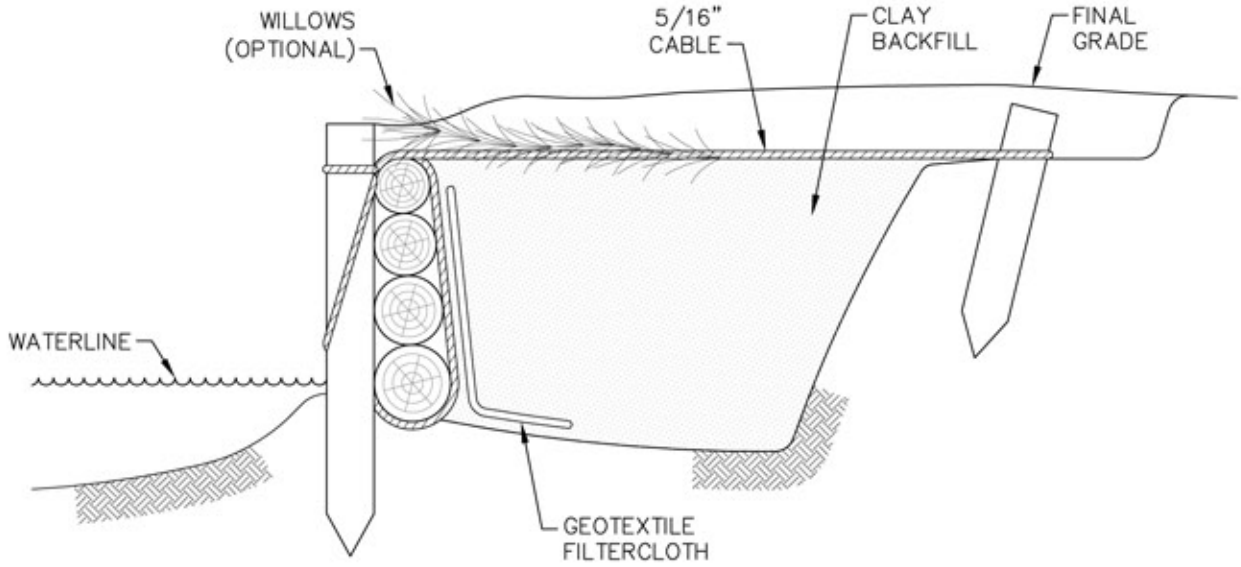

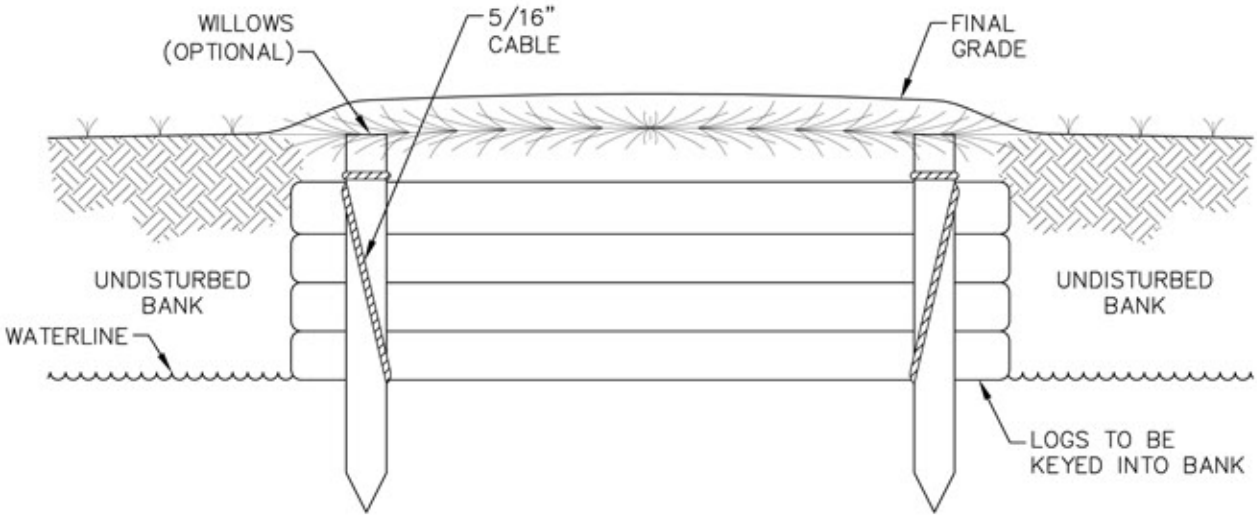

NOTES:

1. LOG WALLS TO BE CONSTRUCTED USING CONIFEROUS MATERIAL.
2. NATURE BACKFILL OR LOOSE GRADE MATERIAL SHOULD BE USED AS FILL MATERIAL.
3. ANCHOR PILINGS OR DEADMAN ANCHORS TO BE USED TO SECURE CABLE IN BANK.
4. NON-WOVEN FILTER CLOTH (NYLEX C34 OR EQUIVALENT) TO BE USED TO LINE LOG WALL.
5. INSTALLATION SPECIFICATIONS TO BE MODIFIED AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

REVISIONS
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FIA # 4359 | CHAINAGE: | DISCIPLINE # 03

TITLE
DETAIL 23
STREAMBANK RECLAMATION – LOGWALL

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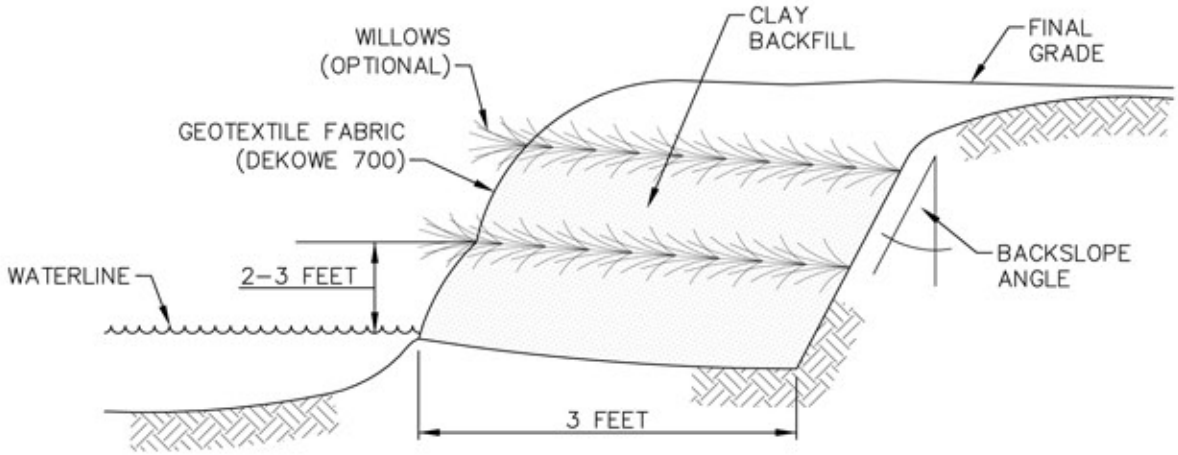

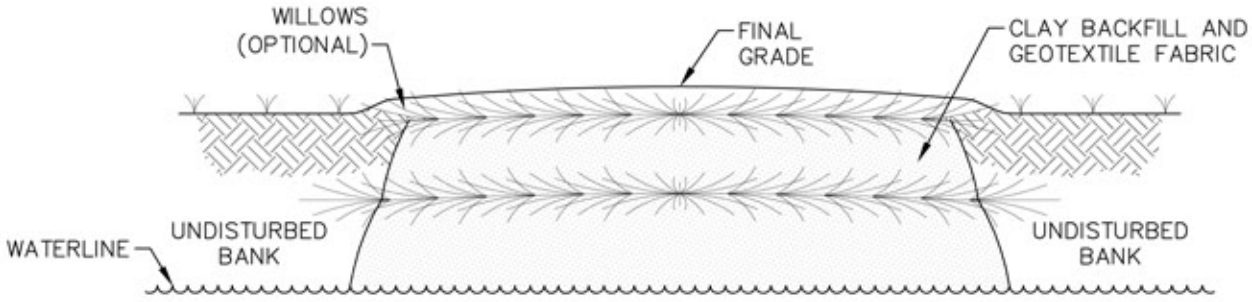

NOTES:

1. NATURE BACKFILL OR LOOSE GRADE MATERIAL SHOULD BE USED TO MINIMIZE AIR SPACES. THIS ALLOWS PROPER SOIL FABRIC CONTACT, WHICH MINIMIZES STEELING AND SCOURING DURING RUNOFF AND ENSURES SURVIVAL OF THE WILLOW CUTTINGS.
2. PLYWOOD FORMS (8'x2') MAY BE REQUIRED TO HELP RECONSTRUCT STEEP OR VERTICAL BANKS.
3. GRID LAYERS SHOULD NOT EXCEED 3 FEET IN HEIGHT WITH A MINIMUM OF 3 FEET SET IN BANK.
4. WILLOWS SHOULD BE HARVESTED AS CLOSE TO INSTALLATION AS POSSIBLE, PREFERABLY THE PREVIOUS DAY BUT NO MORE THAN 2 DAYS EARLY.
5. WILLOWS SHOULD BE 0.5 TO 1 INCH IN DIAMETER AND 2 TO 3 FEET LONG WITH NO MORE THAN 10 INCHES LEFT EXPOSED.
6. PLANTING RATE SHOULD BE APPROXIMATELY 1 STEM PER 6 INCHES.
7. INSTALLATION TO BE MODIFIED AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

REVISIONS
01 2008-11-04 UPDATED DRAWING NOTES
02 2010-10-11 REVISED TITLE BLOCK

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	TITLE: DETAIL 24 STREAMBANK RECLAMATION – VEGETATED GEOTEXTILE INSTALLATION		
		SCALE N.T.S.	DWG No 4359-03-ML-05-712	REV 02

TC_A4_BR.DWG 8.5X11

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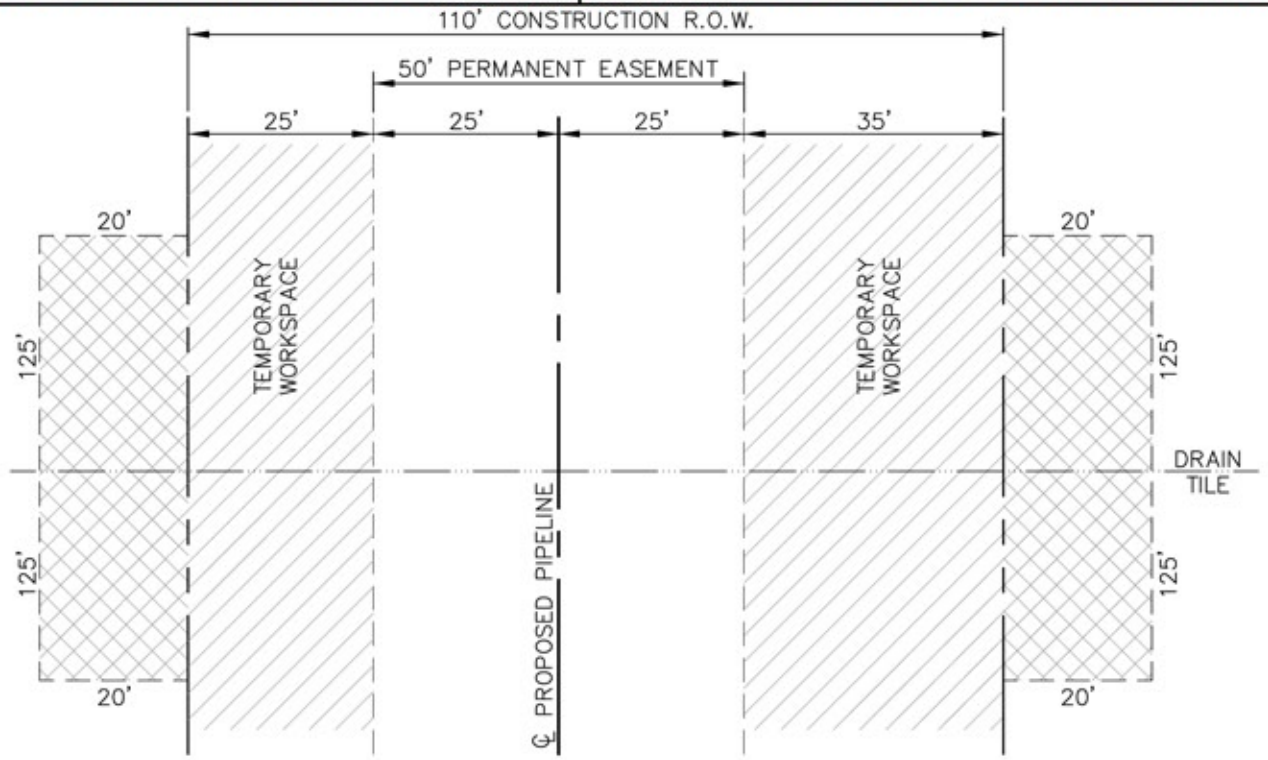
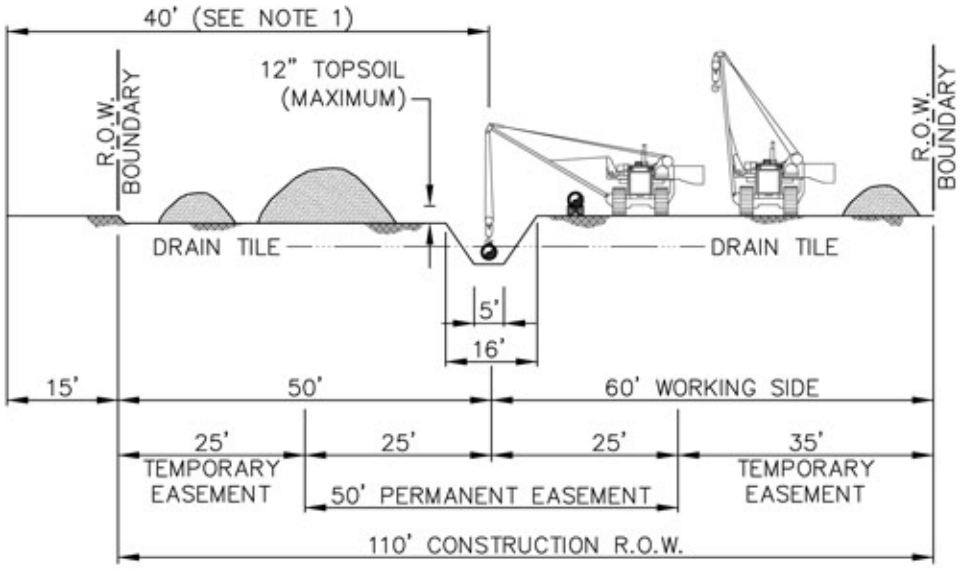


PLAN VIEW



ELEVATION

NOTES:

1. THE OFFSET FROM A FOREIGN PIPELINE, WHERE APPLICABLE, WILL BE 40' FOR MOST LOCATIONS, BUT MAY BE INCREASED OR DECREASED DEPENDING ON THE SITE SPECIFIC CONSTRUCTION REQUIREMENTS.
2. THE MINIMUM CLEARANCE BETWEEN THE TOP OF PIPE AND THE BOTTOM OF DRAIN TILE WILL BE 12 INCHES.
3. INSTALLATION SPECIFICATIONS TO BE MODIFIED AS NECESSARY TO SUIT ACTUAL SITE CONDITIONS.

REVISIONS
01 REVISED NOTE 3; DELETED DIMENSION
02 2010-10-11 REVISED TITLE BLOCK

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JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	TITLE: DETAIL 25 TYPICAL R.O.W. LAYOUT/SOIL HANDLING 110' CONSTRUCTION R.O.W. 50' EASEMENT DRAIN TILE CROSSING		
		SCALE N.T.S.	DWG No 4359-03-ML-03-718	REV 02

TC_A4_BR.DWG 8.5X11

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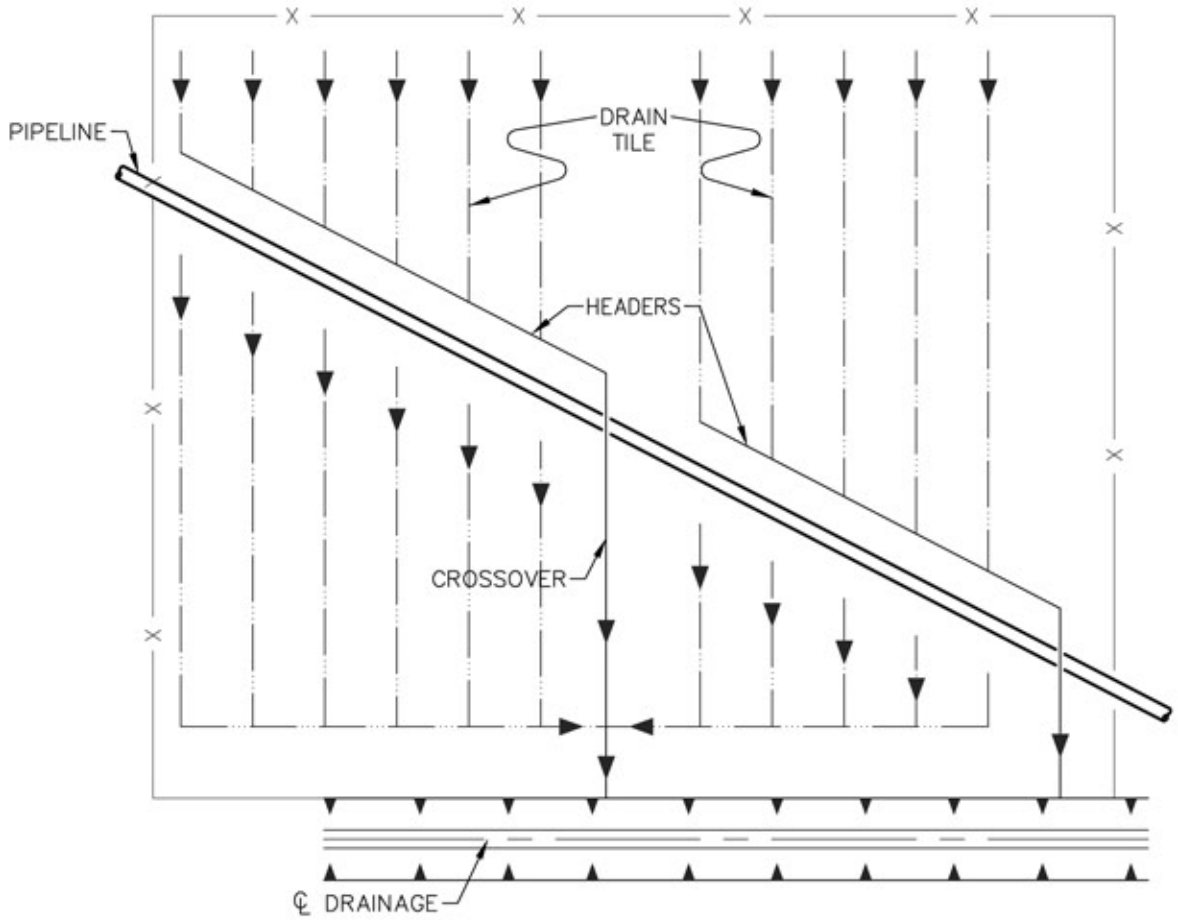

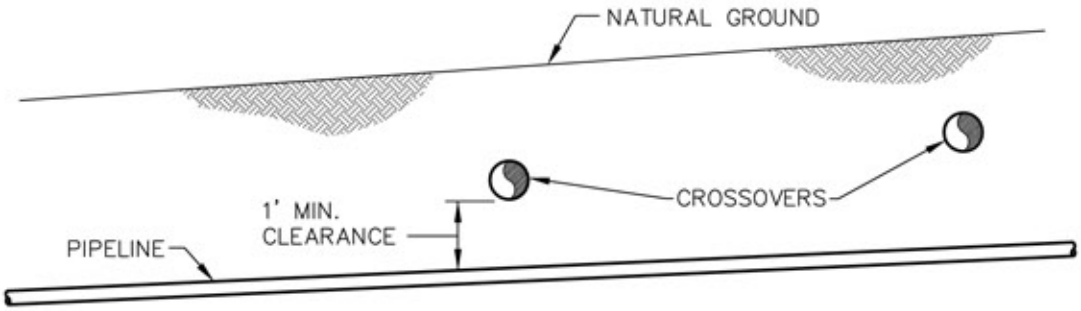

PROFILE

REVISIONS
01 ADDED DIMENSION
02 2010-10-11 REVISED TITLE BLOCK

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 26 HEADER/MAIN CROSSOVERS OF PIPELINE		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-03-719	REV 02

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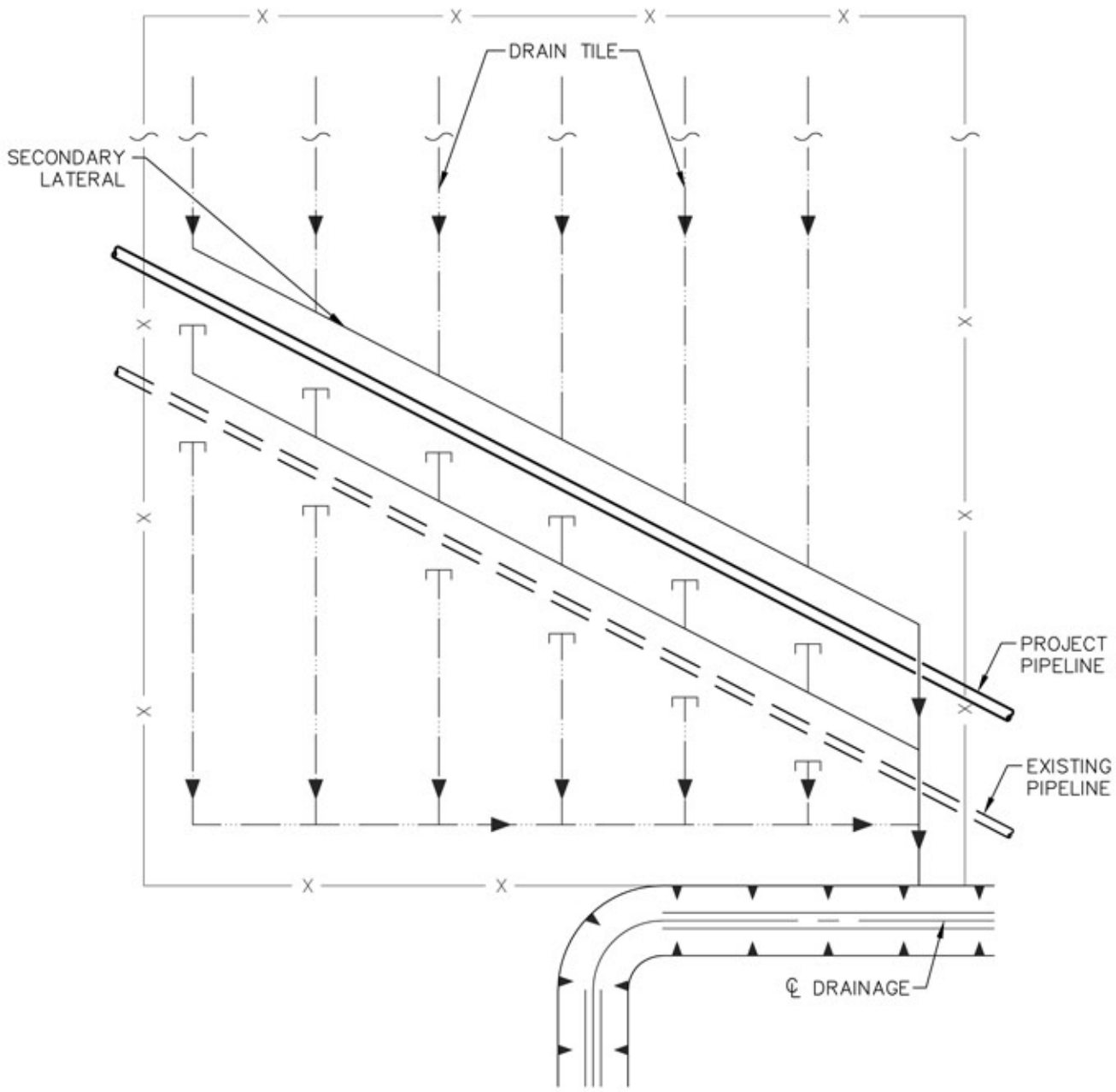
RELOCATE/REPLACE DRAINAGE HEADER/MAIN



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01 REVISED LABELS
02 2010-10-11 REVISED TITLE BLOCK

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DESIGNER: JMP (NAME) 2010-10-21 (DATE)	KEYSTONE XL PROJECT		
	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
	TITLE: DETAIL 27 HEADER/MAIN CROSSOVERS OF PIPELINE		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-03-720 REV 02

TC_A4_BR.DWG 8.5X11

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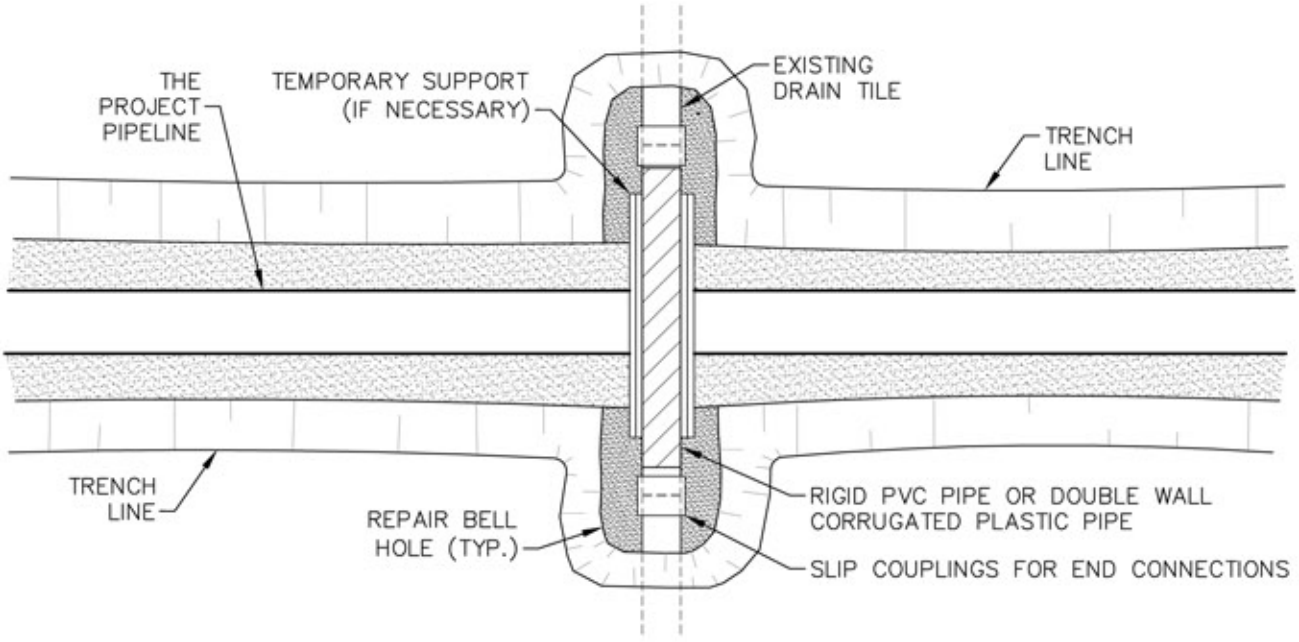
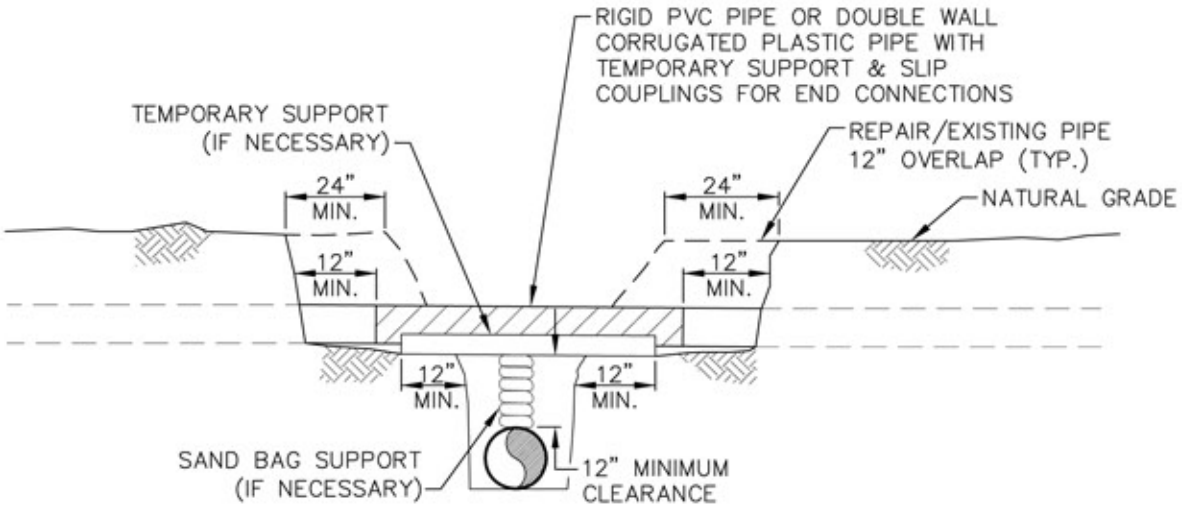


PLAN



PROFILE

NOTES:

1. IMMEDIATELY REPAIR TILE IF WATER IS FLOWING THROUGH TILE AT TIME OF TRENCHING.
2. SCREEN ALL EXPOSED ENDS OF TILE LINES.

REVISIONS
01 2008-11-04 UPDATED DRAWING NOTES
02 2010-10-11 REVISED TITLE BLOCK

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 28 DRAINAGE AND IRRIGATION TEMPORARY DRAIN TILE REPAIR		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-03-721	REV 02

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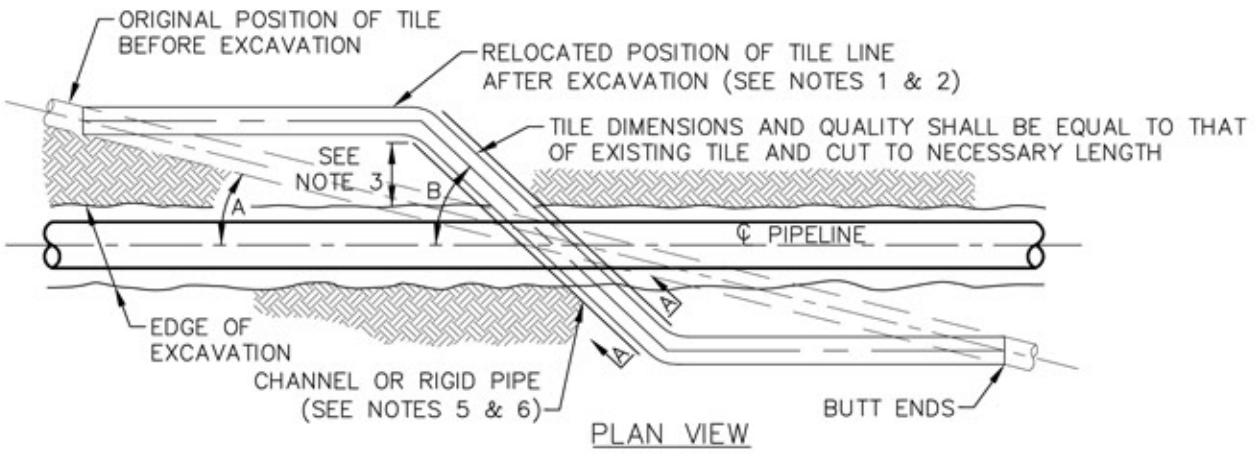
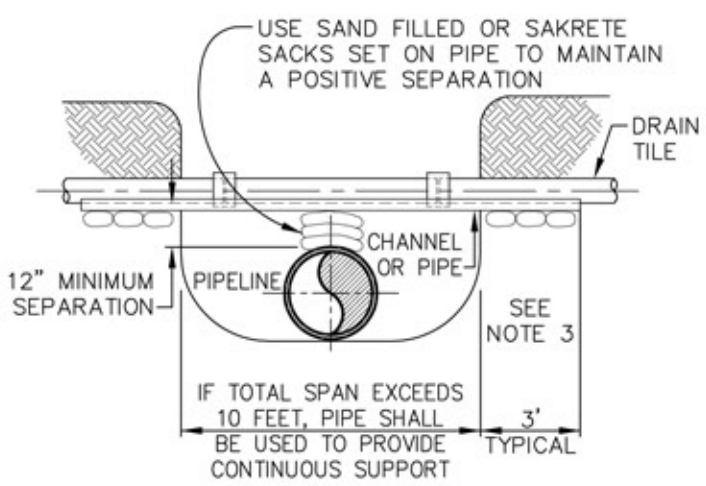
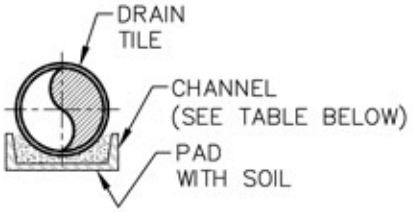


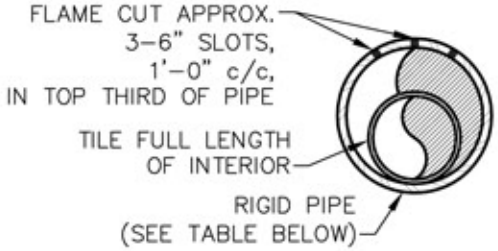
PLAN VIEW



END VIEWS



SECTION "A–A" CHANNEL (SPANS < 10 FEET)



SECTION "A–A" RIGID PIPE (SPANS > 10 FEET)

NOTES:

1. TILE REPAIR SHALL MAINTAIN ORIGINAL ALIGNMENT AND GRADIENT WHEN ANGLE "A", BETWEEN PIPELINE AND ORIGINAL TILE, IS MORE THAN 20 FEET UNLESS OTHERWISE DIRECTED BY THE PROJECT REPRESENTATIVE.
2. WHEN ANGLE "A" IS LESS THAN 20 FEET, UNLESS OTHERWISE DIRECTED BY COMPANY, ANGLE "B" SHALL BE 45° FOR USUAL WIDTHS OF TRENCH. FOR EXTRA WIDTHS, IT MAY BE GREATER AS DIRECTED BY THE PROJECT REPRESENTATIVE.
3. 3 FOOT MINIMUM LENGTH OF CHANNEL OR RIGID PIPE SHALL BE SUPPORTED BY UNDISTURBED SOIL, OR IF CROSSING IS NOT AT RIGHT ANGLES TO GAS PIPELINE, EQUIVALENT LENGTH PERPENDICULAR TO TRENCH. SHIM WITH SAKRETE, SAND BAGS OR CONCRETE BLOCKS TO UNDISTURBED SOIL FOR SUPPORT AND DRAINAGE GRADIENT MAINTENANCE (TYPICAL BOTH SIDES).
4. DRAINAGE TILE SHALL BE REPLACED SO THAT ITS FORMER GRADIENT AND ALIGNMENT ARE RESTORED.
5. DIAMETER OF RIGID PIPE SHALL BE OF ADEQUATE SIZE TO ALLOW FOR THE INSTALLATION OF THE TILE FOR THE FULL LENGTH OF THE RIGID PIPE.
6. OTHER METHODS OF SUPPORTING DRAIN TILE MAY BE USED IF THE ALTERNATE PROPOSED IS EQUIVALENT IN STRENGTH TO THE CHANNEL/PIPE SECTIONS SHOWN AND IF APPROVED BY THE PROJECT REPRESENTATIVE IN ADVANCE. SITE SPECIFIC ALTERNATE SUPPORT SYSTEM TO BE DEVELOPED BY THE PROJECT REPRESENTATIVE AND FURNISHED TO CONTRACTOR FOR SPANS IN EXCESS OF 20 FEET, TILE GREATER THAN 10 INCHES DIAMETER, AND FOR HEADER SYSTEMS.
7. ALL MATERIAL TO BE FURNISHED BY CONTRACTOR.
8. PRIOR TO REPAIRING TILE, CONTRACTOR SHALL PROBE INTO THE EXISTING TILE TO THE FULL WIDTH OF THE RIGHT-OF-WAY TO DETERMINE IF ADDITIONAL DAMAGE HAS OCCURRED. ALL DAMAGED/DISTURBED TILE SHALL BE REPAIRED AS NEAR AS PRACTICABLE TO ITS ORIGINAL OR BETTER CONDITION.
9. "NIGHT CAP" OPEN ENDS OF PIPE AND/OR DRAIN TILES IF REPAIRS ARE NOT COMPLETED BY END OF WORK DAY.

MINIMUM SUPPORT TABLE		
TILE SIZE	CHANNEL SIZE	PIPE SIZE
3"	4" @ 5.4 #/FT.	4" STD. WT
4"–5"	5" @ 6.7 #/FT.	6" STD. WT
6"–9"	7" @ 9.8 #/FT.	8"–10" STD. WT
10"	10" @ 15.3 #/FT.	12" STD. WT

REVISIONS
01 2008-11-04 UPDATED DRAWING NOTES
02 2010-10-11 REVISED TITLE BLOCK

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CHECKED BY: WSF

DESIGN CHECKER: RW P7100

KEYSTONE XL PROJECT

FIA # 4359 | CHAINAGE: | DISCIPLINE # 03

TITLE
DETAIL 29
DRAINAGE AND IRRIGATION
PERMANENT DRAIN TILE REPAIR

SCALE N.T.S. | DWG No 4359-03-ML-03-722 | REV 02

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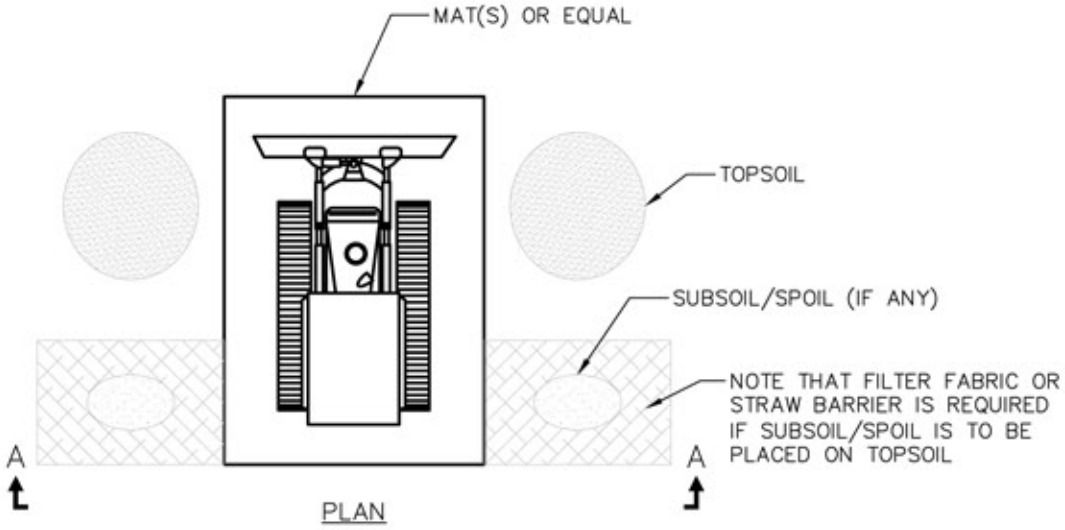
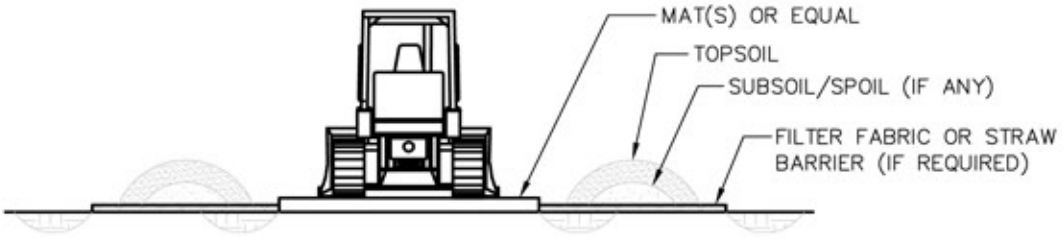


PLAN



SECTION A–A

CLEANING STATION NOTES:

1. ALL EQUIPMENT WILL BE REQUIRED TO BE CLEANED AT EQUIPMENT CLEANING STATIONS LOCATED AS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
2. STOCKPILE TOPSOIL/SUBSOIL AS SHOWN OR IN ANY CONFIGURATION APPROVED BY THE ENVIRONMENTAL INSPECTOR.
3. SHOVELS OR OTHER HAND TOOLS AND/OR COMPRESSED AIR WILL BE USED TO REMOVE AS MUCH AS MUCH SOIL AS PRACTICAL FROM TRACKED EQUIPMENT. EFFORT WILL BE FOCUSED ON TRACKS AND BLADES.
4. IF CONDITIONS ARE MUDDY, WHEELED EQUIPMENT WILL ALSO BE CLEANED USING HAND TOOLS TO REMOVE EXCESS SOIL FROM TIRES AND WHEEL WELLS.
5. CLEANING WILL BE CONDUCTED ON CONSTRUCTION MATS OR OTHER RAISED SURFACE TO MINIMIZE REATTACHMENT OF SOIL THAT HAS BEEN PREVIOUSLY REMOVED.
6. MATS WILL BE CLEANED BETWEEN EACH PIECE OF EQUIPMENT.
7. SOIL COLLECTED DURING THE CLEANING PROCESS WILL BE STOCKPILED AT A CONVENIENT LOCATION NEAR THE CLEANING STATION AND DISPOSED OF IN AN ACCEPTABLE LAND FILL.
8. IF THE SOIL HAS A SIGNIFICANT COMPONENT OF SUBSOIL, IT WILL BE PLACED OVER THE BACKFILLED TRENCH OR IN THE ADJACENT SPOIL STORAGE AREA, AND SUBSEQUENTLY COVERED WITH TOPSOIL. IF THE LAND OWNER DIES NOT APPROVE OF ON–SITE DISPOSAL, THE SOIL WILL BE TAKEN TO AN APPROVED DISPOSAL SITE.
9. SOILS CONTAMINATED WITH OIL OR GREASE WILL BE REMOVED AND DISPOSED OF IN ACCORDANCE PROJECT SPCCC PLAN.

REVISIONS
01 REVISED LABELS
02 2010–10–11 REVISED TITLE BLOCK

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DESIGNER: JMP (NAME) 2010–10–21 (DATE)

CHECKED BY: WSF

DESIGN CHECKER: RW P7100

KEYSTONE XL PROJECT

FIA # 4359 | CHAINAGE: | DISCIPLINE # 03

TITLE
DETAIL 30
EQUIPMENT CLEANING STATION DETAIL

SCALE N.T.S. | DWG No 4359–03–ML–05–713 | REV 02

TC_A4_BR.DWG 8.5X11

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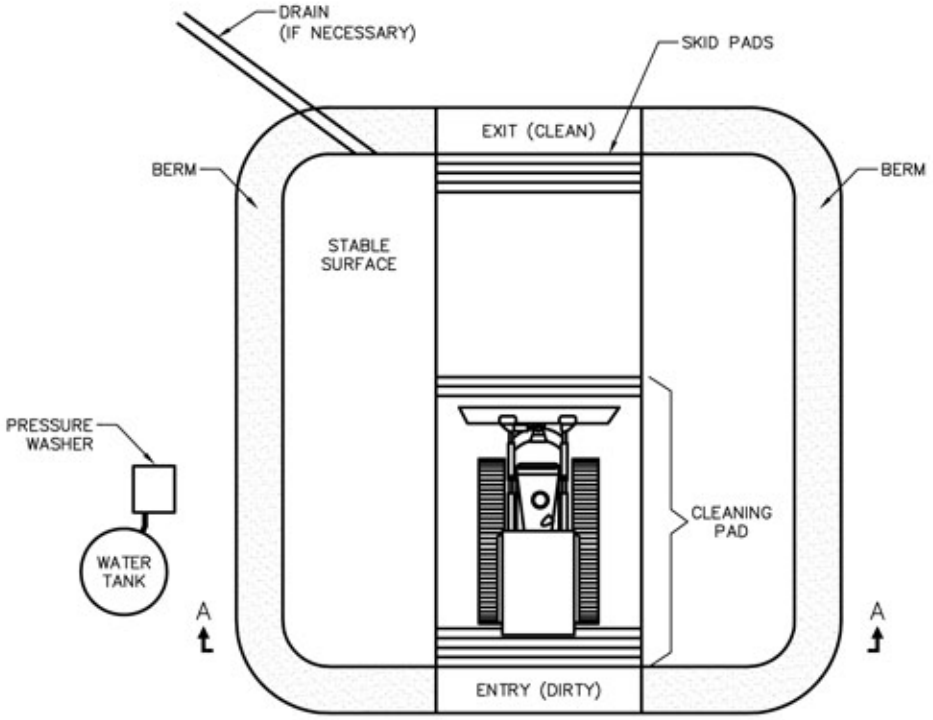
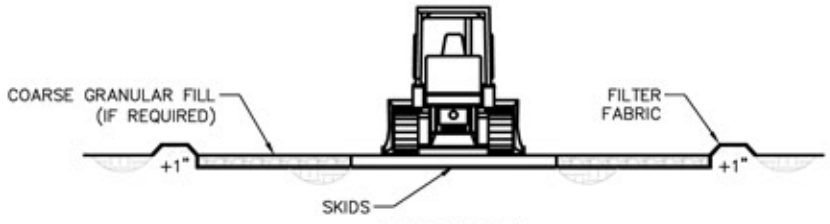


PLAN



SECTION A–A

WASH STATION NOTES:

1. ALL EQUIPMENT AND VEHICLES ARE REQUIRED TO BE CLEANED AT WASH STATION LOCATIONS SHOWN ON THE CONSTRUCTION DRAWINGS OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR. WASH STATIONS WILL BE CONSTRUCTED BY THE CONTRACTOR. WASHINGS WILL BE CARRIED OUT UNDER THE SUPERVISION AND TO SATISFACTION OF THE ENVIRONMENTAL INSPECTOR.
2. WASH WATER USED FOR CLEANING WILL NOT BE ALLOWED TO ENTER ANY WATERBODY, WETLAND, OR IRRIGATION CANAL/DITCH. ANY SOILS CONTAMINATED BY PETROLEUM–BASED, OR OTHER UNDESIRABLE MATERIALS FROM WASH STATIONS WILL BE REMOVED.
3. THE SIZE OF STATION WILL BE ADEQUATE TO ACCOMMODATE THE MAXIMUM SIZE OF EQUIPMENT EXPECTED.
4. EQUIPMENT WILL CONSISTENTLY ENTER THE "DIRTY END" AND EXIT THE "CLEAN END."
5. STABLE DRAINAGE FROM THE SITE WILL BE PROVIDED (IF NECESSARY). NO DISCHARGE TO STREAMS OR WETLANDS WILL BE ALLOWED.
6. WASH STATIONS WILL BE EQUIPPED WITH SKID PADS OR WASH RACKS TO PREVENT SOIL FROM BEING CARRIED ON TRACKS OR TIRES AS EQUIPMENT AND VEHICLES EXIT THE WASH STATION. SKIDS ARE TO BE CLEANED EACH TIME A PIECE OF EQUIPMENT IS CLEANED.
7. GRAVEL FILL (IF REQUIRED) AND FILTER FABRIC WILL BE REMOVED AND DISPOSED OF IN AN ACCEPTABLE LAND FILL.
8. THE DEPRESSION WILL BE BACKFILLED WITH BERMED MATERIAL.
9. CLEANING SITES WILL BE MONITORED DURING THE POST CONSTRUCTION MONITORING PROGRAM AND WEEDS WILL BE CONTROLLED PER THE NOXIOUS WEED MANAGEMENT PLAN.

REVISIONS | 01 | REVISED LABELS | 02 | 2010-10-11 REVISED TITLE BLOCK

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE: DETAIL 31 EQUIPMENT WASH STATION DETAIL		
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	SCALE N.T.S.	DWG No 4359-03-ML-05-714	REV 02

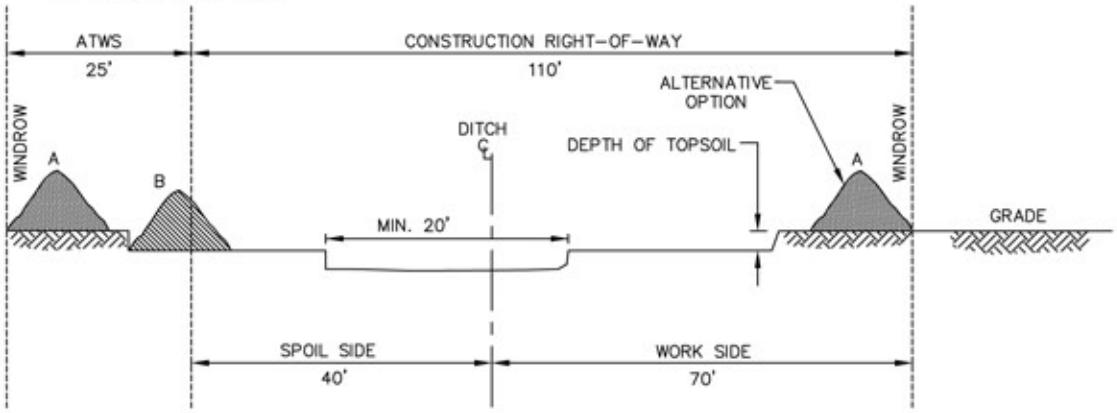
TC_A4_BR.DWG 8.5X11

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

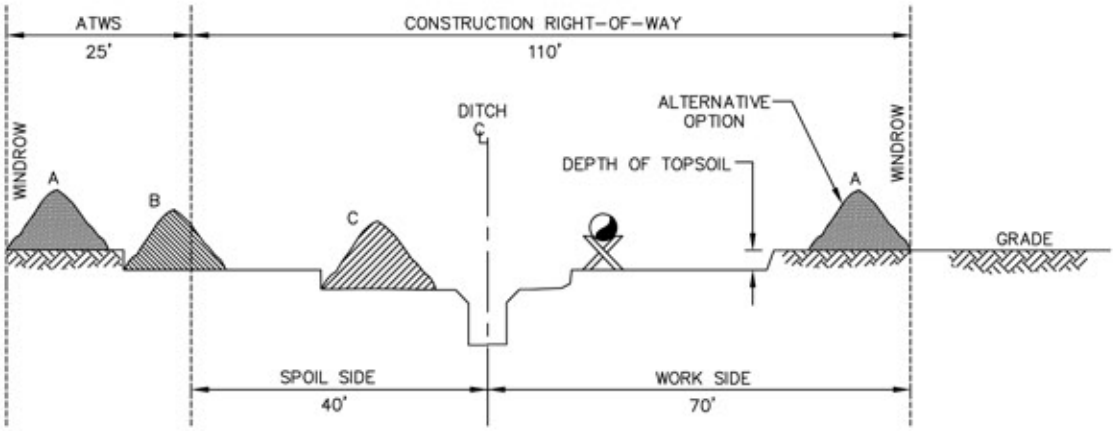
THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.

1. POTENTIAL LOCATIONS WHERE TRIPLE DITCH TOPSOIL CONSERVATION MAY BE COMPLETED ARE SHOWN ON THE ALIGNMENT SHEETS. KEYSTONE WILL DIRECT THE ACTUAL LOCATIONS WHERE TRIPLE DITCH WILL BE COMPLETED DURING, OR IMMEDIATELY PRIOR TO, TOPSOILING THE ROW. KEYSTONE MAY MODIFY TRIPLE DITCH PROCEDURES FROM THOSE DESCRIBED HERE TO ADDRESS SITE-SPECIFIC, OR SOIL-SPECIFIC, CONDITIONS.

2. STRIP TOPSOIL ("A" HORIZON) ACCORDING TO THE "A" HORIZON DEPTHS AND CONSTRUCTION DETAILS SHOWN ON CONSTRUCTION ALIGNMENT SHEETS. PLACE "A" HORIZON IN THE ADDITIONAL TEMPORARY WORKSPACE OR THE WINDROW WITHIN THE WORKING SIDE OF THE CONSTRUCTION RIGHT-OF-WAY. IN AREAS OF THICKER "A" HORIZON'S, "A" HORIZON MAY BE SPLIT TO BOTH SIDES OF THE RIGHT-OF-WAY.
REMOVE "B" HORIZON (2ND DITCH) TO DEPTHS SPECIFIED BY KEYSTONE AND STOCKPILE ON SPOIL SIDE. THE "B" HORIZON SHOULD BE REMOVED IN A STRIP AT LEAST 20 FEET WIDE OVER THE TRENCH TO ALLOW FOR STORAGE OF THE TRENCH SPOIL MATERIALS. MAINTAIN A MINIMUM OF 2 FEET BETWEEN "A" HORIZON AND "B" HORIZON STOCKPILES.



3. EXCAVATE TRENCH. ENSURE THE DIFFERENT SOIL HORIZONS ("B" HORIZON AND "C" HORIZON) ARE IN SEPARATE STOCKPILES. THE VISUAL DISTINCTION OF EACH PILE MUST BE POSSIBLE AT ALL TIMES. THE STOCKPILING SHALL ALLOW FOR RE-PLACEMENT OF THE SOIL HORIZONS BACK TO THEIR ORIGINAL SEQUENCE WITHOUT LOSS OF SOIL. MAINTAIN A MINIMUM OF 2 FEET BETWEEN "B" HORIZON AND "C" HORIZON STOCKPILES.



REVISIONS
01 REVISED LABELS
02 2010-10-08 REVISED DETAIL
03 2010-10-11 REVISED TITLE BLOCK

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DESIGNER: JMP (NAME) 2010-10-21 (DATE)

CHECKED BY: WSF

DESIGN CHECKER: RW P7100

KEYSTONE XL PROJECT

FIA # 4359 | CHAINAGE: | DISCIPLINE # 03

TITLE
DETAIL 67
TOPSOIL CONSERVATION DITCH & SPOIL STRIPPING TRIPLE DITCH

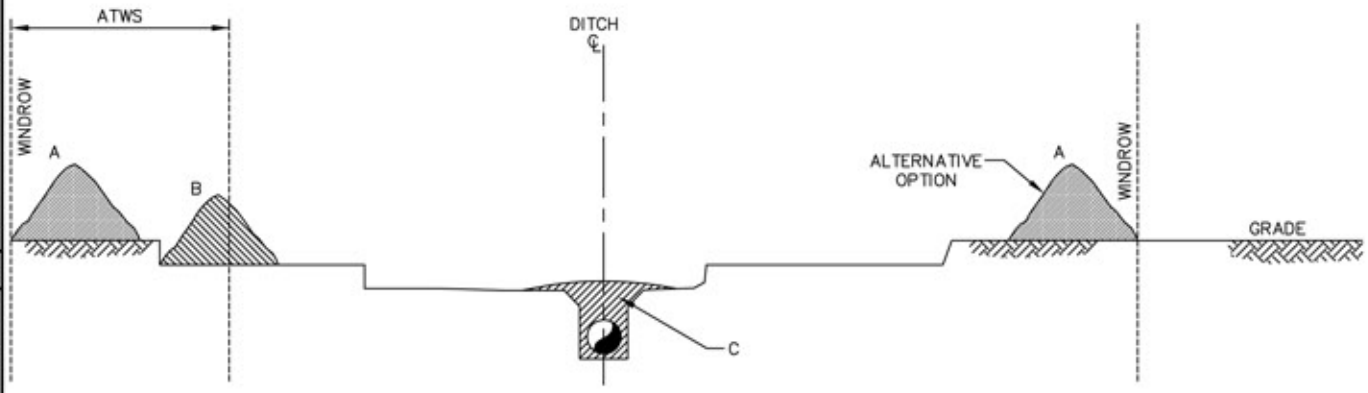
SCALE N.T.S. | DWG No 4359-03-ML-05-724 | REV 03

TC_A4_BR.DWG 8.5X11

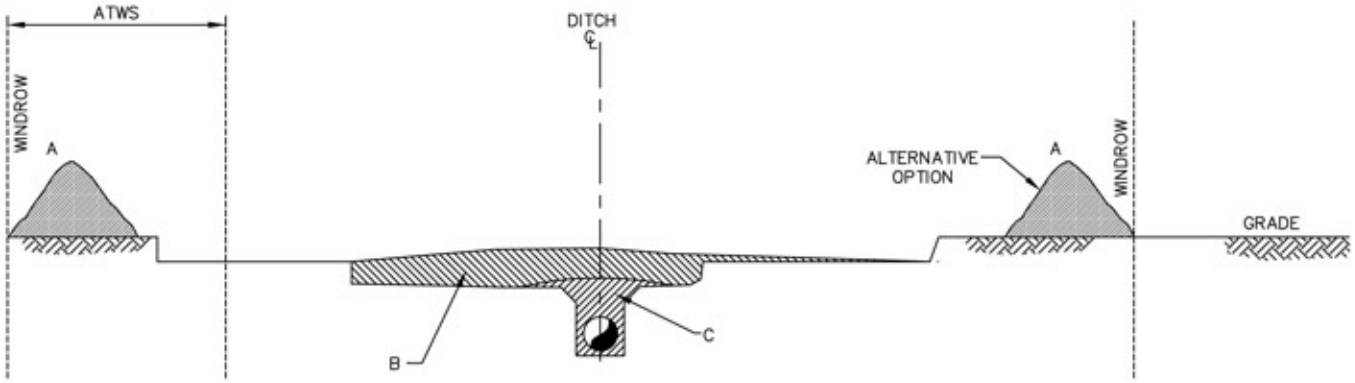
CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.

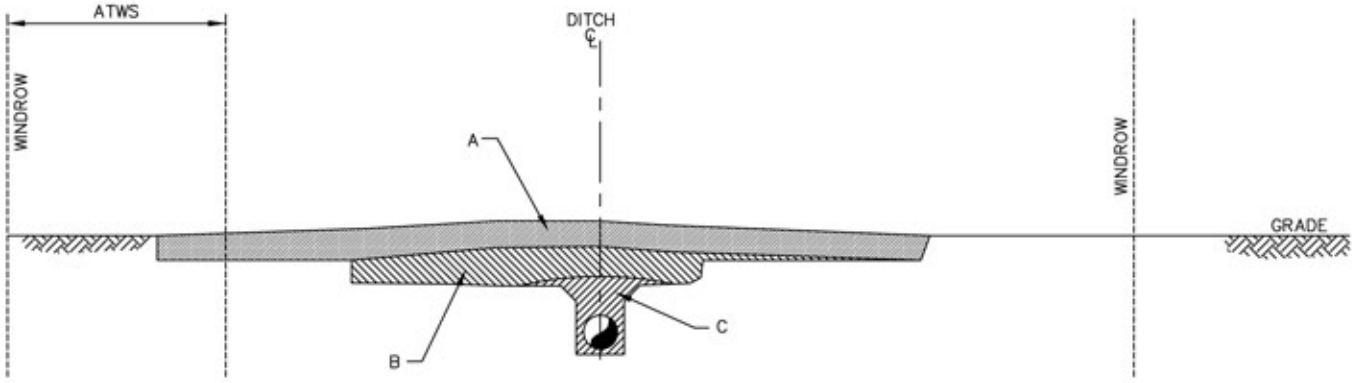
4. BACKFILL TRENCH AND COMPACT AS PER APPROVED PROCEDURE.. PLACE THE SOIL HORIZONS BACK IN THEIR ORIGINAL SEQUENCE IN THE TRENCH.



5. RELIEVE AREAS OF COMPACTION AND FEATHER (B) MATERIAL EVENLY OVER STRIPPED AREA.



6. REPLACE "A" HORIZON PILE EVENLY OVER STRIPPED AREA.



REVISIONS
01 REVISED LABELS
02 2010-10-08 REVISED DETAIL
03 2010-10-11 REVISED TITLE BLOCK

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DESIGNER:		KEYSTONE XL PROJECT		
JMP (NAME)	2010-10-21 (DATE)	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
CHECKED BY: WSF	DESIGN CHECKER: RW P7100	TITLE: DETAIL 67A TOPSOIL CONSERVATION DITCH & SPOIL STRIPPING TRIPLE DITCH		
		SCALE N.T.S.	DWG No 4359-03-ML-05-725	REV 03

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CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

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Keystone XL Pipeline Project

HORIZIONTAL DIRECTIONAL DRILL
FRAC-OUT CONTINGENCY PLAN

Prepared for:

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Project No:

Revision No:
Issue Date: August 31, 2011

Table of Contents

1. Introduction

This horizontal directional drilling mud contingency plan provides specific procedures and steps to contain the inadvertent releases of drilling mud (frac-outs) during pipeline installations using horizontal direction drilling (HDD) techniques. Keystone will designate a representative that will coordinate the implementation of this plan and perform any environmental agency communications in the event of a frac-out during the project.

2. Drilling Fluid and Drilling Fluid System

The HDD process involves the use of a drilling fluid (also referred to as drilling mud) made up primarily of water. Bentonite clay is added to the water to enhance lubricating, spoil transport and caking properties of the drilling fluid. Bentonite is a naturally occurring, non-toxic, inert substance that meets NSF/ANSI 60 NSF Drinking Water Additives Standards and is frequently used for drilling potable water wells.

The primary purpose of drilling fluid is to power the downhole cutting tools, remove cuttings from the drill hole, stabilize the hole, and act as a coolant and lubricant during the drilling process.

The drilling fluid is prepared in a mixing tank containing both new and clean recycled drilling fluid. The fluid is pumped at rate of 100 to 1,000 gallons per minute (gpm) through the center of the drill pipe to the cutters. Return flow is through the annulus created between the wall of the boring and the drill pipe. The cuttings are then carried back to either the entry or the exit pit, depending on a combination of elevation difference and drilling/hole opening direction.

Once in the entry pit, the fluid moves to the pickup pit to be pumped to the fluid processing equipment. Typically, shaker screens, desanders and desilters remove increasingly finer cuttings from the drilling fluid. The cleaned and recycled fluid is returned to the mixing tank and pumps for reuse in the borehole. Following completion of the drill, cuttings and clay will be disposed of in accordance with all applicable federal, state and local environmental regulations. Accordingly, this material may be made available to landowners for use, mixed with native soil and buried on site with landowner permission, or disposed of in a landfill.

The HDD method has the potential for loss or seepage of drilling fluid into the native material through which the drill passes. In some cases, the drilling fluid may be forced to the surface resulting in what is commonly referred to as an inadvertent release or a frac-out. While one of the positive aspects of the HDD method is the avoidance surface disturbance, surface disturbances may occur when there is an inadvertent release of drilling fluid. Drilling fluid release is typically caused by pressurization of the drill hole beyond the containment capability of the overburden soil material or due to inherent weaknesses within the overlying soils such as a fissure or other pathway. In some cases, the pathway can be associated with boreholes advanced for geotechnical investigations or by bridge or building pilings.

The HDD operation is a closed system to minimize the discharge of drilling mud, fluids, and cuttings outside of the work area. To minimize the possibility of fluid escape, mud pits shall be used to contain the drilling fluids. The drilling fluids are cleaned and recycled to the extent possible. Tanks or dumpsters will be installed in lined pits. Care will be taken to prevent the fluids from getting into the soil and to prevent groundwater from entering the pits.

3. HDD Contractor Responsibilities and Requirements

The HDD contractor is responsible for execution of the HDD operation, including actions for detecting and controlling the inadvertent release of drilling fluid. Keystone will closely supervise the progress and actions of the HDD contractor through the use of onsite inspection teams.

The HDD contractor will be required to conduct the HDD operation in compliance with the project specific Spill Prevention Control and Countermeasure Plan (SPCC) which includes specifies the types and quantities of equipment to be provided, which would typically consist of a tracked hydraulic excavator, straw or hay bales, stakes to secure bails, silt fence, sand bags, shovels, pumps, and any other materials or equipment deemed necessary and adequate to contain and clean up inadvertent releases. The contractor will also provide for a vacuum truck and operator to be on call during drilling operations, such that the vacuum truck can respond and be on-site within three hours of notification.

The Contractor will provide a site-specific plan for each HDD crossing, identifying any site-specific requirements and provisions to be made to meet special site conditions.

Ancillary items must be readily available during drilling operations including a light tower in case cleanup operations are needed after dark, a boat with relevant safety equipment during the crossing of large water bodies, and leak free hose to allow pumping spilled drilling mud for mitigation where small creeks or drainages are involved.

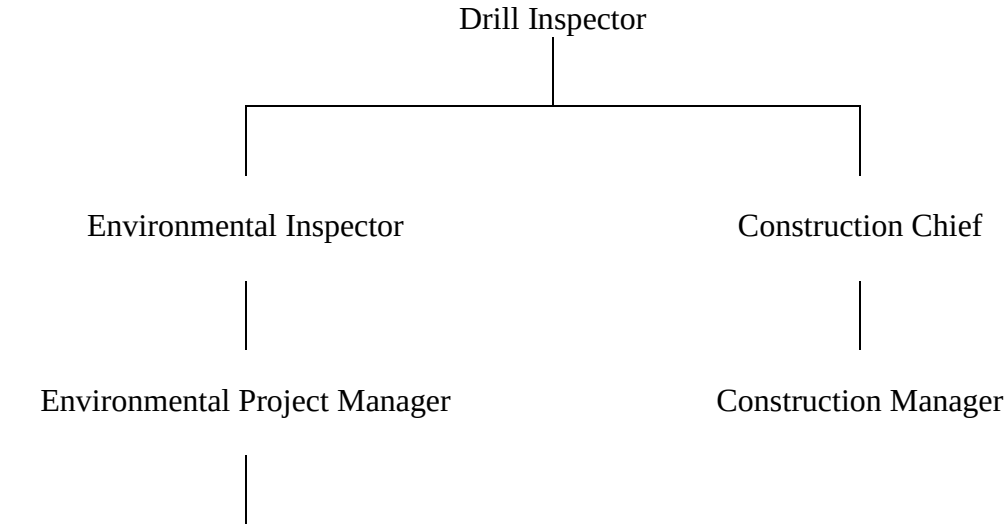
4. Fluid Migration Detection

Drilling crews and the Keystone inspection personnel will be responsible for monitoring and detection of frac-outs. The most obvious signs of a frac-out are the visible pooling of drilling mud on the surface or a sudden decease in mud volume during drilling operations or loss in drilling mud pressure. The annular pressure will be specified in the HDD contract. Drilling and mud system personnel will observe alterations in drilling pressure or the volume of drilling fluid return and immediately report reductions or anomolies to the foreman and Keystone personnel. The contract will specify the use of an Electronic Data Recorder (EDR) to monitor volumes, pressures and other HDD operations.

5. Corrective Action for an Inadvertent Release

In the event of inadvertent release to the surface at locations other than the borehole location, the following actions will be taken:

- Notify the Keystone Drill Inspector, who will contact the appropriate Keystone representatives per the following communication outline:



- Suspend active drilling operations
- Search for surface fractures
- Determine the volume of lost fluid to surface
- Contain any drilling fluid that has surfaced
- Evaluate the circumstances leading to circulation loss to determine if the fracture can be sealed. This shall include a review of the annular pressure history during the drill
- In the event of partial circulation loss, pumping of drilling fluid may be reduced to reduce pressure applied to native formation materials or LCM's may be added. Use of pressure reduction or addition of LCM's will be identified in the contract specification.
- Additional berms will be constructed around the bore pit as directed by the Keystone Representative to prevent release of materials into the adjacent water body

- The contractor will pump the spill in an attempt to recover all of the spilled fluid for disposal

- Measures will be implemented (berm, silt fence, and/or hay bale installation) to prevent silt laden water from flowing into the water body.

- If hand tools cannot contain a small on-land release, small collection sumps may be constructed to pump the released material into the mud processing system.

- Sump pumps or vacuum trucks will be used to remove and dispose of any drilling fluids.

6. Containment of Drilling Fluid Release

Immediately following the detection of the inadvertent drilling fluid release, containment and clean-up operations shall commence and Keystone will notify all appropriate authorities. For releases on land, Contractor shall use straw bales, silt fences, sand bags and earth berms to prevent fluid from migrating or flowing from the immediate area of the discharge. If the volume released is too small for containment measures or if the release occurs in an environmentally sensitive area where release of containments can cause additional damage, the receiving area will be allowed to dry naturally. If there is a threat to a sensitive resource or a threat to public safety, HDD activities will cease immediately.

In cases of inadvertent releases to open water or flooded wetlands, it may impractical or impossible to contain the release. For releases in shallow water, the HDD contractor shall install staked sediment barriers as described in the Keystone XL Construction Mitigation and Reclamation Plan (CMRP). Removal by vacuum truck may be attempted if deemed appropriate. The decision to proceed with the drilling operation will be at the sole discretion of the Keystone representative after all methods to seal off the location of the discharge identified in the SPCC Plan have been attempted. Underwater releases may be allowed to dissipate where cleanup would cause more damage than leaving the material in place. Where cleanup can be accomplished without causing additional damage, the cleanup of the spill will be conducted. The regulating agency with jurisdiction over the operation will be advised of planned actions in response to spills, when those actions do not include complete removal of the spilled material.

7. Clean-up of Releases

The clean-up shall commence after the release is contained. Clean-up shall include removal of all visible drilling fluid located in accessible areas. Removal methods will vary based on the volume of the release and the site specific conditions. Removal equipment may include vacuum trucks, loader and track hoe buckets, small pumps, shovels, buckets, brooms and squeegees. If the release occurs in a sensitive area, it may be necessary to pump the fluid into an upland area for additional containment and disposal. After removal of the released drilling fluid, the release area will be returned as close to the original condition as feasible. It may be necessary to store the drilling fluid residue on-site prior to disposal. On-site storage will include secondary containment with the capacity of 110 percent of the volume of drilling fluid residue to be stored.

Any water discharged from the HDD operation will be discharged through filter bags, or other approved dewatering structure, to contain suspended solids.

8. Agency Notification Procedures

If an inadvertent release is discovered, steps will be taken to contain the release as described in Section 4. It will be reported in accordance with the Keystone communication outline. The appropriate agency(s) will be consulted regarding the nature of the release the corrective actions to be applied and any additional measures necessary to minimize potentially adverse environmental impacts.

In the event an HDD crossing cannot be successfully completed, an alternative crossing plan will be developed and its implementation will be coordinated with the appropriate agencies.

2012 NATIONWIDE PERMITS
REGIONAL CONDITIONS
OMAHA DISTRICT
STATE OF SOUTH DAKOTA

The following Nationwide Permit (NWP) regional conditions will be used in the State of South Dakota. Regional conditions are placed on NWPs to ensure projects result in less than minimal adverse impacts to the aquatic environment and to address local resources concerns.

Wetlands Classified as Peatlands – Revoked for Use

All NWPs, with the exception of 3, 5, 20, 27, 30, 32, 38, and 45, are revoked for use in peatlands in South Dakota.

"Peatlands" are saturated and inundated wetlands where conditions inhibit organic matter decomposition and allow for the accumulation of peat. Under cool, anaerobic, and acidic conditions, the rate of organic matter accumulation exceeds organic decay. Peatlands can be primarily classified into ombrotrophic bogs and minerotrophic fens; the latter subdivided into poor, moderate-rich, and extreme-rich fens, each with distinctive indicator species, community physiognomy, acidity, alkalinity, and base cation content.

Wetlands Classified as Peatlands – Pre-construction Notification Requirement

For NWPs 3, 5, 20, 27, 30, 32, 38, and 45 permittees must notify the Corps in accordance with General Condition No. 31 (Notification) prior to initiating any regulated activity impacting peatlands in South Dakota.

Waters Adjacent to Natural Springs – Pre-construction Notification Requirement – All Nationwide Permits

For all NWPs, permittees must notify the Corps in accordance with General Condition No. 31 (Notification) for regulated activities located within 100 feet of the water source in natural spring areas in South Dakota. For purposes of this condition, a spring source is defined as any location where there is artesian flow emanating from a distinct point at any time during the growing season. Springs do not include seeps and other groundwater discharge areas where there is no distinct point source.

Borrow Site Identification – All Nationwide Permits

The permittee is responsible for ensuring that the Corps is notified of the location of any borrow site that will be used in conjunction with the construction of the authorized activity so that the Corps may evaluate the site for potential impacts to aquatic resources, historic properties, and endangered species. For projects where there is another lead Federal agency, the permittee shall provide the Corps documentation indicating that the lead Federal agency has complied with the National Historic Preservation Act and Endangered Species Act for the borrow site. The permittee shall not initiate work at the borrow site in conjunction with the authorized activity until approval is received from the Corps.

Minimum Culvert Width – All Nationwide Permits

The permittee shall size culvert stream crossings based on the estimated two-year storm event or the width of the bankfull stream channel. Culverts placed in streams with a discernable bed and bank shall have a maximum width that is at least as wide as the bankfull channel width in the section of stream where the culvert will be placed. In lieu of bankfull width as a reference for minimum culvert size, the permittee may install a culvert that can pass the two-year storm event without causing rise of flood flows upstream of the culvert. Bankfull width shall be defined as the width of the stream at where over-bank flow begins during a flood event. In incised stream channels that do not or infrequently access their floodplains bankfull indicators may include slope changes, vegetation changes, the maximum elevation of deposited bedload, or the top of undercut banks.

Culvert Countersink Depth for Aquatic Organism Depth – All Nationwide Permits

The permittee shall install culverts as so that the culvert invert is set below the natural flowline of the water body according to the below table.

Culvert Type	Drainage Area	Culvert Invert Depression Below Stream Grade Line
All culvert types	$\leq$ 100 acres	Not required
Pipe diameter < 8.0 ft	100 to 640 acres	0.5 ft
Pipe diameter < 8.0 ft	> 640 acres	1.0 ft
Pipe diameter $\geq$ 8.0 ft	All drainage sizes	20 % of pipe diameter
Box culvert	All drainage sizes	1.0 ft

- **The stream grade line shall be defined as the longitudinal average of the low-flow stream channel.**
- **The slope of the culvert should be parallel to the slope of the stream grade line.**
- **The culvert invert depression depth shall be measured at the culvert inlet for culverts installed at a slope less than the slope of the stream grade line.**
- **Riprap inlet and outlet protection shall be placed to match the height of the culvert invert.**

GENERAL CONDITIONS (REGIONAL ADDITIONS)

General Condition 3 - Spawning Areas

In order to further minimize adverse impacts in certain waters of the United States and to comply with General Condition No. 3, projects authorized under all available Section 404 NWPs that would occur in South Dakota's cold water streams must comply with the following regional condition:

In all South Dakota streams classified as cold water streams, when water flow is present, the discharge of dredged or fill material shall not take place without the permittee notifying the Corps in accordance with General Condition No. 31 (Notification) prior to initiating any regulated activity between October 15 and April 1. The Corps of Engineers, the South Dakota Department of Game, Fish and Parks, or the South Dakota Department of Environment and Natural Resources can be contacted for the location of State classified cold water streams. The cold water fisheries rivers and streams in South Dakota may be found at http://legis.state.sd.us/rules/DisplayRule.aspx?Rule=74:51:03.

General Condition 6 - Suitable Material

Permittees are reminded that General Condition No. 6 prohibits the use of unsuitable material. In addition, the following materials are not suitable for discharge into waters of the United States in the State of South Dakota:

1. Vehicle bodies, farm machinery and metal junk, including appliances and metal containers, are prohibited.

2. The use of old or used asphalt paving material as a fill material and the use of new or used asphalt for bank stabilization or erosion control is prohibited.

3. The use of organic debris as fill material is prohibited. (Properly anchored trees, treetops, root wads, logs, and hay bales may be allowed on a case-by-case basis.)

4. Any material subject to leaching when in an aquatic environment is prohibited (for example, but not limited to, chemically-treated building material, roofing material, and wood debris).

5. Individual or unanchored tires are prohibited. (Tires may be allowed on a case-by-case basis when placed in the form of a mat or grid with multiple anchoring points to reduce the risk of design failure.)

6. Small aggregate (i.e. less than 6 inches in diameter) may not be placed below the ordinary high water mark (OHWM) of a water body for the purpose of bank stabilization or erosion control when such aggregate will be unstable or subject to frequent failure. Small aggregate may, however, be placed below the OHWM if its purpose is to fill the interstices of a well-graded rock riprap revetment or channel lining.

7. Slab material, regardless of source, must be broken before placement so that the dimension of the largest slab will not be more than 3.5 times the dimension of the smallest slab (unless justified by a qualified engineer) and must be free of exposed rebar, wire and wire mesh.

8. The use of clean brick, broken concrete and cinder block for erosion control or bank stabilization will be considered on a case-by-case basis. If allowed, the broken concrete must be free of exposed rebar, wire, wire mesh, asphalt paving material, paint, and other erodible materials. Broken concrete must range in size from 6 to 36 inches (unless justified by a qualified engineer).

All mapping produced by TransCanada in response to DRA Request for Production of Documents #31 appended to the Pre-Construction Notice to US Army Corps of Engineers.