

DRAFT HABITAT CONSERVATION PLAN

TRANSCANADA KEYSTONE PIPELINE, LP GULF COAST PROJECT

Prepared for:

TransCanada Keystone Pipeline, LP
2700 South Post Oak Boulevard; Suite 400
Houston, Texas 77056

Prepared by:

Enercon Services, Inc.
6525 North Meridian Avenue
Oklahoma City, Oklahoma 73116

August 15, 2012

TABLE OF CONTENTS

1.	INTRODUCTION.....	1
2.	PURPOSE AND NEED	2
2.1.	PROJECT DESCRIPTION SUMMARY	2
2.2.	REGULATORY CONTEXT	3
2.2.1.	<i>Endangered Species Act</i>	3
2.2.2.	<i>National Environmental Policy Act</i>	4
2.2.3.	<i>Bald and Golden Eagle Protection Act</i>	5
2.2.4.	<i>Migratory Bird Treaty Act</i>	5
3.	DESCRIPTION OF THE AREA TO BE ANALYZED	6
3.1.	PLAN AREA	6
3.2.	PERMIT AREA	6
3.3.	ENVIRONMENTAL SETTING.....	6
3.3.1.	<i>Regional Geology and Topography</i>	6
3.3.2.	<i>Hydrology and Water Resources</i>	7
3.3.3.	<i>Vegetation</i>	7
3.3.4.	<i>Public Lands</i>	7
3.3.5.	<i>Listed, Proposed, Candidate, and Other Protected Species</i>	7
3.3.5.1.	<i>Covered Species</i>	7
3.3.5.2.	<i>Evaluation Species</i>	10
4.	PROPOSED COVERED ACTIVITIES.....	15
4.1.	PIPELINE CONSTRUCTION OVERVIEW.....	15
4.1.1.	<i>Ancillary Facilities Summary</i>	15
4.1.2.	<i>Pipeline ROW</i>	16
4.1.3.	<i>Temporary Work Space Areas</i>	16
4.1.4.	<i>Pipe Stockpile Sites, Railroad Sidings, and Contractor Yards</i>	16
4.1.5.	<i>Access Roads</i>	16
4.1.6.	<i>Aboveground Facilities</i>	17
4.2.	CONSTRUCTION PROCEDURES.....	18
4.2.1.	<i>General Pipeline Construction Procedures</i>	18
4.2.2.	<i>Non-Standard Construction Procedures</i>	23
4.2.3.	<i>Aboveground Facilities Construction Procedures</i>	28
4.2.4.	<i>Future Plans and Abandonment</i>	29
4.3.	OPERATIONS AND MAINTENANCE.....	29
4.3.1.	<i>Normal Operations and Routine Maintenance</i>	29
4.3.2.	<i>Abnormal Operations</i>	30
4.4.	MAINTENANCE SCHEDULES	32
5.	ANALYSIS OF IMPACTS	33
5.1.	EFFECTS TO COVERED SPECIES AND IMPACT ANALYSIS	33
5.1.1.	<i>Direct and Indirect Impacts to ABB</i>	36
5.1.1.1.	<i>Construction Phase</i>	36

5.1.1.2.	<i>Operations and Maintenance Phase</i>	38
5.1.2.	<i>Habitat Impacts</i>	40
5.1.2.1.	<i>Temporary Habitat Loss</i>	40
5.1.2.2.	<i>Permanent Habitat Loss</i>	40
5.1.2.3.	<i>Habitat Delineation Method</i>	41
5.1.2.4.	<i>Total Direct and Indirect Habitat Impacts</i>	42
5.2.	FINAL PRECONSTRUCTION IMPACT ASSESSMENT	43
5.3.	EVALUATION SPECIES EFFECTS AND IMPACT ANALYSIS	43
6.	PROPOSED HABITAT CONSERVATION PLAN	53
6.1.	ASSESSMENT OF TAKE	54
6.2.	BIOLOGICAL GOALS AND OBJECTIVES	56
6.3.	IMPACT MINIMIZATION MEASURES	56
6.3.1.	<i>ABB Impact Avoidance and Minimization Measures</i>	57
6.3.1.1.	<i>Removal of Carrion from ROWs Prior to Disturbance</i>	57
6.3.1.2.	<i>Limited Clearing in Temporary Work Areas</i>	57
6.3.1.3.	<i>Limited Use of Artificial Lighting</i>	57
6.3.1.4.	<i>Educational Program for Construction Personnel</i>	57
6.3.1.5.	<i>Re-Establishment of Vegetation</i>	57
6.3.1.6.	<i>Relief of Soil Compaction</i>	58
6.3.1.7.	<i>Addition of Supplemental Soil</i>	58
6.3.1.8.	<i>Erosion Control</i>	58
6.3.2.	<i>Mitigation Approaches</i>	58
6.3.2.1.	<i>Mitigation Ratios</i>	58
6.3.2.2.	<i>ABB Conservation Bank</i>	59
6.3.2.3.	<i>Provision of Funding to a Third-Party Entity for ABB Habitat Conservation</i>	60
6.3.3.	<i>Evaluation Species Impact Avoidance and Minimization Measures</i>	60
6.4.	MONITORING PLAN	61
6.4.1.	<i>Annual Reports</i>	62
6.4.2.	<i>Adaptive Management Plan</i>	63
6.4.3.	<i>“No Surprises” Assurances</i>	63
7.	CHANGED AND UNFORESEEN CIRCUMSTANCES	64
7.1.	CHANGED CIRCUMSTANCES	64
7.1.1.	<i>Drought</i>	64
7.1.2.	<i>Construction Timing</i>	64
7.1.3.	<i>Delisting During Permit Tenure</i>	64
7.1.4.	<i>Listing During Permit Tenure</i>	64
7.1.5.	<i>Emergency Repairs Requiring Habitat Clearing</i>	65
7.1.6.	<i>Wildfire in ROW</i>	65
7.2.	UNFORESEEN CIRCUMSTANCES	66
7.2.1.	<i>Effects of Unforeseen Circumstances on Permit</i>	66
7.2.2.	<i>Notice of Unforeseen Circumstances</i>	67
7.3.	AMENDMENT PROCEDURES	67

7.3.1.	<i>Minor Amendments</i>	67
7.3.2.	<i>All Other Amendments</i>	67
7.4.	REQUESTED PERMIT DURATION	67
8.	FUNDING ASSURANCES.....	67
8.1.	IMPLEMENTATION COSTS.....	67
8.2.	FUNDING ASSURANCES.....	68
8.2.1.	<i>Operating Budget</i>	68
8.2.2.	<i>Corporate Credit Facility</i>	68
9.	ALTERNATIVES TO THE TAKING.....	68
9.1.	PROPOSED ALTERNATIVE.....	69
9.2.	NO ACTION ALTERNATIVE.....	69
10.	SUCH OTHER MEASURES THAT THE SERVICE MAY REQUIRE.....	69
11.	PUBLIC AND AGENCY PARTICIPATION	70
12.	CONCLUSION.....	70
13.	LITERATURE CITED	70

LIST OF TABLES

Table 1:	Minimum Pipeline Cover for Pipeline Installation	20
Table 2:	Potential Hydrostatic Test Water Sources in the Plan Area.....	22
Table 3:	Surface Water Features Crossed using Horizontal Directional Drilling.....	26
Table 4:	Impact Analysis for the ABB CPA and the ABB Range in Oklahoma	42
Table 5:	Impact Avoidance and Minimization Measures for Evaluation Species	61

LIST OF FIGURES

Figure 1:	Project Area in Oklahoma
Figure 2:	Plan & Permit Area with ABB Range and Conservation Priority Area
Figure 3:	Level III Ecoregions Map
Figure 4:	Major Surface Water Features Map
Figure 5:	ABB Habitat Fragmentation in Plan Area

LIST OF APPENDICES

Appendix A:	Construction, Mitigation, and Reclamation Plan
-------------	--

LIST OF ACRONYMS AND ABBREVIATIONS

ABB:	American Burying Beetle
BGEPA:	Bald and Golden Eagle Protection Act
BMP:	Best Management Practice
bpd:	Barrels per Day
CMR Plan:	Construction, Mitigation, and Reclamation Plan
CPA:	Conservation Priority Area
CWA:	Clean Water Act
DDT:	Dichloro-diphenyl-trichloroethane
EA:	Environmental Assessment
EPA:	Environmental Protection Agency
ERP:	Emergency Response Plan
ESA:	Endangered Species Act of 1973, as amended
fps:	Feet per Second
gpm:	Gallons per Minute
HCP:	Habitat Conservation Plan
HDD:	Horizontal Directional Drill
ITP:	Incidental Take Permit
MBTA:	Migratory Bird Treaty Act
MLV:	Mainline Valve
MOP:	Maximum Operating Pressure
NEPA:	National Environmental Policy Act
NPDES:	National Pollutant Discharge Elimination System
NRC:	National Response Center
NRCS:	Natural Resources Conservation Service
OCC:	Operations Control Center
OPS:	Office of Pipeline Safety
PHMSA:	Pipeline Hazardous Material Safety Administration
PMP:	Pipeline Maintenance Program
ROW:	Right-of-Way
SCADA:	Supervisory Control and Data Acquisition
Service:	United States Fish and Wildlife Service
SPCC:	Spill Prevention, Control, and Countermeasure
TWA:	Temporary Work Space Area
USACE:	United States Army Corps of Engineers
USDOT:	United States Department of Transportation
USFWS:	United States Fish and Wildlife Service

1. INTRODUCTION

TransCanada Keystone Pipeline, LP (Keystone) is proposing to construct and operate a crude oil pipeline and related facilities from the crude oil supply hub at Cushing, Oklahoma to existing crude oil storage terminal facilities near Nederland, Texas. The project is known as the Gulf Coast Project (Project). The Project will consist of approximately 485 miles of new pipeline. The Project is planned to be placed into service in 2013. In addition to the pipeline, Keystone will construct permanent and temporary construction access roads, temporary facilities (contractor yards, pipe yards, and rail sidings) and aboveground facilities including pump stations, delivery facilities, and mainline valves.

The construction of the Project and associated facilities in Oklahoma may cause the loss and disturbance of habitat used by the American burying beetle (*Nicrophorus americanus*, ABB). This species is listed as endangered and protected under the Endangered Species Act of 1973, as amended (ESA, 16 USC 1531 – 1544). Consequently, Keystone has decided it would be prudent to apply to the United States Fish and Wildlife Service (Service) for a Section 10(a)(1)(B) permit (ITP) to authorize the incidental take of federally listed species resulting from construction, operation, maintenance, and repair (both routine and emergency) for the Project. These activities will be referred to collectively as “Covered Activities”. This Habitat Conservation Plan (HCP) has been prepared in support of the Permit application.

An ESA Section 10(a)(1)(B) permit is a tool by which a non-federal entity may voluntarily obtain authorization to take listed species in connection with otherwise lawful activities such as pipeline construction and operation. Among other things, an HCP specifies conservation measures that will be implemented to minimize and mitigate, to the maximum extent practicable, a specified level of incidental take of listed species. “Incidental take” is defined by the ESA (ESA Section 10(a)(1)(B)) and relevant regulations (50 CFR 17.3) as take of any federally listed wildlife species that is incidental to, but not the purpose of, otherwise lawful activities.

Two groups of species are addressed in this HCP, “Covered Species” and “Evaluation Species.” Covered Species are those for which an ITP is being sought. The Covered Species addressed in this HCP is the ABB. This species is known to occur in a portion of the Project area in Oklahoma.

Evaluation Species will not be covered by the ITP – no incidental take authorization has been requested for these species. Evaluation Species can include federally listed, proposed, and candidate species that are known to occur or have a potential to occur within the geographic scope addressed in this HCP. Although these species occur in the Plan Area addressed in the HCP, they are not considered at risk of being taken by the Covered Activities because avoidance measures will be implemented. These species include bald eagle (*Haliaeetus leucocephalus*), least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), whooping crane (*Grus americana*), Sprague’s pipit (*Anthus spragueii*), and Arkansas River shiner (*Notropis girardi*).

In this HCP, potential incidental take of the ABB is expressed as the number of acres of known and potential habitat that will be directly and indirectly impacted by Covered Activities within the Plan Area. This approach is used because estimating the number of individual ABBs taken is impractical. This approach is supported by case law (*Oregon Natural Resources Council. Allen*, 476F.3d 1031, 1037 (9th Cir. 2007) and *Ariz. Cattle Growers’ Ass’n v. U.S. Fish and Wildlife Service*, 273 F.3d 1229, 1249-50 (9th Cir.

2001)) where quantifying the actual number of species members taken is not practical. Use of acres of habitat as a proxy for impacts to individual ABBs is described in greater detail in Section 5 of this document.

2. PURPOSE AND NEED

The primary purpose of the Project is to transport growing domestic crude oil production to serve Gulf Coast refinery demand which is currently being met through foreign imports of crude oil. Construction of the Project will enable U.S. producers to reach a market with significantly lower transportation costs compared to alternatives such as rail, trucking or barging. It will also enable Gulf Coast refineries to access lower cost domestic production and avoid paying a premium to foreign producers of crude oil.

The market need for the Project is demonstrated in part by confirmed contractual shipper commitments. Shippers evaluate the merits of various pipeline proposals and ultimately decide which projects to support. Shippers have expressed material interest in the Project and in securing additional pipeline capacity. Shippers have already committed to binding contracts in support of the Project to transport crude oil from Cushing, Oklahoma to near Nederland, Texas. These binding commitments demonstrate a material endorsement of support for the Project. The market need for the Project is to:

- Increase domestic crude oil supply;
- Decrease demand for light domestic crude oil from U.S. Midwest refineries due to conversion projects which rely extensively on heavy crude oil supplies;
- Alleviate pipeline capacity limitations between Cushing, Oklahoma and the U.S. Gulf Coast; and
- Provide a means to reduce U.S. dependence on foreign oil supplies by increasing domestic production at Gulf Coast refineries.

In summary, the need for the Project is demonstrated by (1) confirmed shipper interest represented by binding contracts in support of the Project to transport crude oil from Cushing, Oklahoma to Nederland, Texas; (2) the growth in domestic light crude oil production in the US; (3) diminishing demand for light crude oil at Midwest U.S. refineries; (4) increasing oversupply of light crude at Cushing; (5) the large volume of light crude that is processed at Gulf Coast refineries, which is primarily imported to the Gulf Coast by tanker from foreign countries; (6) the limited existing pipeline capacity to move incremental volumes of light crude oil from Cushing to the U.S. Gulf Coast; and (7) the impracticality of transporting domestic crude oil to the Gulf Coast by other modes of transportation.

2.1. PROJECT DESCRIPTION SUMMARY

Keystone is proposing to construct and operate a crude oil pipeline and related facilities from Cushing, Oklahoma to near Nederland, Texas. The Project will consist of approximately 485 miles of new, 36-inch-diameter pipeline and will have a nominal capacity to deliver up to 830,000 barrels per day (bpd) of crude oil. It will interconnect with the southern terminus of the 298-mile-long, 36-inch-diameter

Keystone Cushing Extension. Approximately 156.2 miles of new pipeline will be constructed in Oklahoma. A Project location in Oklahoma overview map is included as Figure 1.

Specific Issues and Reasons:

In past years, the Service provided guidance detailing measures which could be implemented to avoid or minimize take of ABBs prior to the start of construction activities. These measures included (1) trapping and relocating and (2) diversionary baiting (bait away). In 2012, the Service changed the ABB protocol and removed these activities from the approved avoidance measures. Because of these changes, no approved measure is currently available to facilitate avoidance of take for the Project, as proposed. In response to these changes, and given the possibility that take may occur, Keystone decided to apply for a Section 10 ITP. The HCP is a requirement for obtaining the Permit.

Problems to be Solved:

Keystone's intention is to construct the Project while complying with the ESA. Because no approved measures to avoid take are currently available for the Project, as proposed, an ITP is required to assure compliance with the ESA.

Background and Historical Information:

The Project was originally a part of the Keystone XL project, a larger project. A portion of the larger Keystone XL Project has been suspended due to the denial of a Presidential Permit. Keystone decided to move forward with construction of the portion of the original project in Oklahoma and Texas under the project name Gulf Coast Project. Keystone is able to construct the Project in the absence of the additional facilities included in the Keystone XL Project due to its independent utility as a domestic crude oil pipeline. This HCP addresses that portion of the Project within the ABB range in Oklahoma.

Stakeholders:

- TransCanada – Keystone
- Oil producers, refiners, and marketers
- Consumers of petroleum products

2.2. REGULATORY CONTEXT

2.2.1. *Endangered Species Act*

Section 9 of the ESA prohibits “take” of any federally listed endangered wildlife species. By definition, the Service has extended the take prohibition to most species listed as threatened. The ESA defines “take” as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” (ESA § 3(19)). “Harm” is not defined in the statute, but the Service’s regulations define it as “an act which actually kills or injures wildlife and may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering” (50 CFR 17.3). Section 10(a)(1)(B) of the

ESA authorizes the Service to issue a permit allowing take that is “incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.”

Section 10(a)(2)(A) of the ESA provides that in order to obtain an ITP, the applicant must submit an HCP that identifies or satisfies several substantive criteria: (1) the impact that will likely result from the taking; (2) the steps the applicant will take to minimize and mitigate the impacts and the funding available to implement those steps; (3) what alternative actions to the taking were considered and the reasons the alternatives were not chosen; and (4) other measures that the Service may require as necessary or appropriate for purposes of the conservation plan. The Service’s ESA implementing regulations also provides permittees with “no surprises” assurances, which provide certainty as to their future obligations under an HCP (50 CFR 17.22, 17.32, 63 FR 8859). The Service’s Habitat Conservation Planning Handbook (“HCP Handbook”) provides overall guidance on the elements of an HCP (USFWS 1996).

Section 7(a)(2) of the ESA requires that each federal agency must consult with the Service to ensure that agency actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. “Jeopardize” is defined by the regulations as engaging in an action that would reasonably be expected, directly or indirectly, to appreciably reduce the likelihood of the survival and recovery of the species in the wild (50 CFR 402.02). Issuance of an ITP is considered an action for which the mandate of consultation applies (HCP Handbook at 1–6). With respect to the issuance of ITPs, the Service functions as both the “action” agency and the “resource” agency, so that the Service is actually consulting “with itself.” According to the HCP Handbook, the consultation must include consideration of direct and indirect effects on the species, as well as the impacts of the Project on listed plants and critical habitat, if any (HCP Handbook; 3–17 through 3–19).

2.2.2. National Environmental Policy Act

The Service considers issuance of an ITP a federal action subject to the requirements of the National Environmental Policy Act (NEPA, 42 USC 4321–4327). NEPA requires federal agencies to (1) study proposed projects to determine if they will result in significant environmental impacts; and (2) review the alternatives available for the Project and consider the impact of the alternatives on the environment (NEPA § 102(c)). The scope of NEPA is broader than the ESA in that it requires that the agency consider the impacts of the action on the “human environment,” including a variety of resources such as water quality, air quality, and cultural and historic resources. In the context of an HCP and ITP, the scope of the NEPA analysis covers the direct, indirect, and cumulative effects of the proposed incidental take and the mitigation and minimization measures proposed in the HCP (HCP Handbook at 5–1).

As defined by NEPA regulations, indirect impacts are those effects “caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern in land use, population density, or growth rate...” (40 CFR 1508.8). In accordance with NEPA regulations, therefore, it is appropriate to consider the degree to which the Covered Activities and any connected actions are likely to induce other growth and development that may have further effects on the resources under

consideration in this HCP. If the Service considers the construction of the Project to be a connected action to the issuance of the Section 10(a) Permit, then the Service should also consider the degree to which such construction will induce other growth and development. Based on existing judicial guidance, relevant factors in the causal analysis concerning growth-inducement include (1) whether the action is the sole cause; (2) whether the action has a useful purpose other than serving new growth; (3) whether the action is intended to induce growth or to address existing levels of demand, and; (4) whether growth is being regulated at the local level. The test embraced by the courts demonstrates a pragmatic approach that recognizes a stopping point must exist in any causal analysis.

The HCP Handbook describes the Service's procedures for complying with NEPA with respect to HCPs. Most HCPs require preparation of an Environmental Assessment (EA) to comply with NEPA. The Service will review Keystone's Permit application and HCP pursuant to the EA.

2.2.3. Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 USC 668) prohibits taking, possession, and commerce of bald eagles and golden eagles or any part, nest, or eggs without a permit issued by the Secretary of the Interior. "Take" under BGEPA is defined as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." "Disturb" is defined in 50 CFR 22.3 as the act of agitating or bothering a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, the following: (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or shelter behavior. Furthermore, "disturb" also includes impacts that result from human-induced alterations occurring near a nest site, which was used previously by eagles, during a time when eagles are absent from the area, and if, when the eagle returns, these alterations agitate or bother an eagle to the extent that it interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.

The golden eagle was never listed as threatened or endangered under the ESA, and on August 8, 2007, the Service removed the bald eagle from the List of Threatened and Endangered Wildlife due to the species' recovery (72 FR 37345). As a result, neither species is protected from "take" under the ESA, but the BGEPA provides protection for bald and golden eagles. The Service concluded that a mechanism should be available to authorize take of bald and golden eagles pursuant to the BGEPA (74 FR 46836). On November 10, 2009, the Service authorized limited take of bald and golden eagles under the BGEPA for cases where the take to be authorized is associated with otherwise lawful activities (74 FR 46836). Keystone does not intend to apply for authorization from the Service for the incidental take of bald or golden eagles pursuant to the BGEPA because such take is not anticipated to result from the construction and maintenance of the Project.

2.2.4. Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-712) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior.

3. DESCRIPTION OF THE AREA TO BE ANALYZED

3.1. PLAN AREA

The “Plan Area” is the geographic area that is analyzed in the NEPA document. It may be considered as analogous to the “Action Area” in a Section 7 consultation. The Plan Area is that portion of the Project area within the ABB range in Oklahoma which includes all the counties known to support ABBs within the state of Oklahoma. The Plan Area is analyzed in this HCP. The Plan Area is shown in Figure 2.

3.2. PERMIT AREA

The “Permit Area” includes all lands over which the permittee has direct control as well as all areas where take of Covered Species will be authorized by the ITP. For this HCP, the Plan Area and Permit Area are synonymous. The Permit Area is shown on Figure 2.

3.3. ENVIRONMENTAL SETTING

For this HCP, the Plan Area is defined as that portion of the Project right-of-way (ROW) located within the current ABB range in Oklahoma (Figure 2). The Plan Area bisects portions of Atoka, Bryan, Coal, Creek, Hughes, Okfuskee, and Seminole counties. General physical and vegetative characteristics of the Plan Area are described below.

3.3.1. *Regional Geology and Topography*

The Plan Area traverses central Oklahoma and crosses three different ecoregions including the Cross Timbers, Arkansas Valley, and the South Central Plains (Figure 3). Each of these ecoregions is discussed in further detail below.

The Northern Cross Timbers subset of the Cross Timbers ecoregion of Oklahoma are naturally covered by oak savanna, scrubby oak forest, eastern red cedar (*Juniperus virginiana*), and tallgrass prairie. Tallgrass prairie occurs on fine-textured soils derived from shale or limestone. Livestock farming is the main land use and soils are highly erodible when disturbed. Streams are typically shallow and have sandy substrates (Woods et al., 2005).

The Lower Canadian Hills subset of the Arkansas Valley ecoregion of Oklahoma is underlain by Pennsylvanian-age shale, sandstone, and coal. This ecoregion is a transition between the dryer cross-timbers to the west and the more mesic Arkansas Valley to the east. Native vegetation is a mixture of oak woodland, tallgrass prairie, oak-hickory forest, and oak-hickory-pine forest. Most streams are composed of a series of long pools that are interspersed with occasional, short riffle sections (Woods et al., 2005).

The Cretaceous Dissected Uplands of the South Central Plains ecoregion of Oklahoma are underlain by poorly-consolidated deposits. The Cretaceous Dissected Uplands are mostly underlain by calcareous sands, gravels, and clays of the Cretaceous age. Natural vegetation is oak-hickory-pine forest (Woods et al., 2005).

3.3.2. Hydrology and Water Resources

The Plan Area is drained by perennial rivers, intermittent streams, and ephemeral drainages (Figure 4). Many of the rivers have been dammed to create reservoirs. Major streams and rivers that will be crossed by the Project include Deep Fork River (Creek County), North Canadian River (Okfuskee/Seminole counties), Little River (Hughes County), South Canadian River (Hughes County), Clear Boggy Creek (Atoka County), and Red River (Bryan County).

Two reservoirs occur in the vicinity of the Plan Area including Atoka Reservoir and Lake Texoma; however, neither is crossed by it. Numerous municipal ponds and private stock ponds of varying size have also been constructed along creeks and in uplands within the Plan Area.

3.3.3. Vegetation

The distribution of vegetation community types in the Plan Area is controlled by a variety of factors, such as geology, soils, slope, aspect, water availability, and land use. In general, the dominant community types within the Plan Area include upland forest, riparian forest, and mixed grass pasture. Limited areas of native prairie, oak savannas, and developed land are also present. Dominant vegetation in the upland forest community type typically includes post oak (*Quercus stellata*), blackjack oak (*Q. marilandica*), black hickory (*Carya texana*), mockernut hickory (*C. tomentosa*), and eastern red cedar. Dominant vegetation in the riparian forest community type typically includes American elm (*Ulmus americana*), boxelder (*Acer negundo*), sycamore (*Platanus occidentalis*), hackberry (*Celtis occidentalis*), green ash (*Fraxinus pennsylvanica*), pecan (*C. illinoensis*), coralberry (*Symphoricarpos orbiculatus*), Indian woodoats (*Chasmanthium latifolium*), Virginia wildrye (*Elymus virginicus*), and poison ivy (*Toxicodendron radicans*). Dominant vegetation in the mixed grass pasture community type typically includes Bermudagrass (*Cynodon dactylon*), tall fescue (*Schedonorus phoenix*), giant ragweed (*Ambrosia trifida*), switchgrass (*Panicum virgatum*), broomsedge (*Andropogon virginicus*), little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), and Johnsongrass (*Sorghum halepense*).

3.3.4. Public Lands

No State Parks, Wildlife Management Areas, or other public lands occur within the Plan Area.

3.3.5. Listed, Proposed, Candidate, and Other Protected Species

3.3.5.1. Covered Species

This HCP covers one species, the ABB, for incidental take. Among other things, this HCP describes the potential for impacts to individuals and potentially suitable habitat, which may result in take of the Covered Species. It is important to note that the ESA does not prohibit impacts to potential habitat for listed species, rather, it prohibits take of individuals of a listed species. Thus, even if a particular parcel of property contains potential habitat for listed species, it does not mean that the habitat is occupied by a given species at a particular time. It is also important to note that potential habitat for listed species or habitat occupied by listed species is not necessarily “critical habitat” as defined by the ESA. In order for listed species habitat to be considered “critical habitat” within the regulatory context, the Service must

go through a formal rule making process, including allowing opportunity for public review and comment. No critical habitat has been designated for the ABB.

American Burying Beetle (*Nicrophorus americanus*)

The American Burying Beetle (ABB) is a large black beetle with orange markings. The size range of individuals is 1 – 1.8 inches (approximately 2.5 to 4.6 centimeters (cm)) (Backlund and Marrone 1997). The species historically occurred across a large range with documented occurrences from 150 counties in 34 states in the eastern and central United States. The species is also documented from southern Canada (USFWS 1991). Documentation of records is not uniform throughout this broad historical range. More records exist from the Midwest, southern Canada, and the northeastern U.S. relative to the southern Atlantic and Gulf of Mexico region (USFWS 1991). During the 20th century, the ABB disappeared from over 90 percent of its historical range (Ratcliffe 1996). Historic population levels are not known, but the species is thought to have been at least locally common. Populations of ABBs rapidly declined across the eastern portion of their range and became almost completely extirpated from areas east of the Mississippi River by the mid-1970s (a small population remained at Block Island off the coast of Rhode Island). Presently, the species is mainly found along the western periphery of its former range. Larger populations are found in two general areas: Arkansas and Oklahoma; and Nebraska and South Dakota. The species has also been documented to occur in limited areas of Texas, Kansas, and Missouri.

The ABB is a member of the genus *Nicrophorus* which also includes other species that occur in areas supporting the ABB. Species in the genus are generally referred to as burying, sexton, or undertaker beetles because they share the unique behavior of burying carrion to provide a source of nutrition for developing young. The ideal size carrion appears to be in the weight range of 3.5 to 7 ounces (approximately 100 – 200 grams) (Kozol et al. 1988). Primary carrion sources are small birds and mammals. Northern bobwhites (*Colinus virginianus*) and mourning doves (*Zenaida macroura*) are examples of birds which would provide appropriate-sized carrion. Small mammals such as eastern cottontails (*Sylvilagus floridanus*), gray squirrels (*Sciurus carolinensis*), and rats (*Neotoma* spp.) are examples of mammals in the preferred size range. ABBs are also reported to utilize other carrion within the appropriate size range such as snakes and fish. Kozol et al. (1988) found no significant difference in the ABBs preference for avian versus mammalian carcasses. At Fort Chaffee (western Arkansas), Holloway and Schnell (1997) found that ABB numbers were higher in areas with high densities of small mammals.

The life history of the ABB is similar to that of other burying beetles (Kozol et al. 1988; Pukowski 1933; Scott and Traniello 1987). The ABB is a nocturnal species that lives only for one year. ABBs are active in the summer months and bury themselves in the soil during the winter. Teneral (period when the adult insect is newly emerged from the pupal case or nymphal skin) ABBs emerge in late summer, over-winter as adults, and comprise the breeding population the following summer (Kozol 1990). Adults and larvae are dependent on carrion for feeding and reproduction.

When the nighttime ambient air temperature is consistently below 60° F (15.5° C), ABBs bury into the soil and become inactive (USFWS 1991). In Oklahoma, this typically occurs from late September until mid-May (USFWS 2011a). However, the length of the inactive period can vary depending on

temperature. Recent studies indicate that ABBs bury to depths ranging from 0 to 8 inches (to 20.3 cm) in Arkansas (Schnell et al. 2007). Habitat structure (i.e., woodland vs. grassland) does not appear to be a factor influencing over-winter survival rates in Oklahoma (Holloway and Schnell 1997).

The ABB is active in the summer months, emerging from their winter inactive period when ambient nocturnal air temperatures consistently exceed 60°F. They are most active from 2 to 4 hours after sunset, with no captures recorded immediately after dawn (Bedick et al. 1999). During the daytime, ABBs are believed to shelter under soil or leaf litter.

ABBs are nocturnal and highly mobile. The longest distance recorded for an individual was 6.2 miles over six nights. The maximum distance moved by one ABB in one night was 1.8 miles (Creighton and Schnell 1998). When not involved with brood rearing, carrion selection by adult ABBs for food can include an array of available carrion species and size (Trumbo 1992). Burying beetles are capable of finding a carcass between 1 and 48 hours after death at a distance up to 2 miles (Ratcliffe 1996).

The ABB displays an interesting and relatively complex reproductive behavior. Reproductive activity usually begins in mid-May and is completed by mid-August in Oklahoma. In summer months and during hours of darkness, ABBs search for dead animals using chemoreceptors located on their antennae. ABBs can detect carrion up to two miles away under ideal wind conditions. When suitable carrion is located males release pheromones that attract females. When females arrive, there is often competition between the males for mates. Mating pairs then prepare the carcass (by removing hair or feathers and covering it with body secretions that act as preservatives) and excavate a brood chamber where the carcass will be buried. ABBs are known to move carcasses to areas with soils more suitable for burying the carrion. ABBs then mate and lay eggs in the soil near the brood chamber. Larvae emerge a few days later and feed on the buried carcass. ABBs are unique insects because they provide bi-parental care for the developing young.

ABBs are considered feeding habitat generalists and have been successfully live-trapped in several vegetation types including native grasslands, grazed pasture, riparian zones, coniferous forests, mature forest, and oak-hickory forest, as well as on a variety of soil types (Creighton et al. 1993; Lomolino and Creighton 1996; Lomolino et al. 1995; USFWS 1991). Ecosystems supporting ABB populations are diverse and include primary forest, scrub forest, forest edge, grassland prairie, riparian areas, mountain slopes, and maritime scrub communities (Ratcliffe 1996; USFWS 1991). The ABB readily moves between different habitats (Creighton and Schnell 1998; Lomolino et al. 1995).

The ABB appears to be most common in areas representing broad transition zones between forested and open habitats. It is a habitat generalist and neither a prairie nor woodland specialist as was once commonly believed. However, ABB are more restrictive when choosing locations to bury a suitable carcass for reproduction. In Oklahoma, the ABB has been captured in a variety of habitats including grasslands, grazed pastures, bottomland forest, riparian zones, and oak-hickory forest (USFWS 2005). Soil conditions for suitable ABB reproductive habitat must be conducive to burial of carcasses (Anderson 1982; Lomolino and Creighton 1996).

Some noteworthy areas in Oklahoma with relatively large populations of ABBs occur at Camp Gruber in Cherokee County, areas around McAlester in Pittsburg County, and areas near Atoka in Atoka County (a

particularly large population occurs just across the Oklahoma border at Fort Chafee, Arkansas). ABBs have been found in 27 Oklahoma counties and may also occur in additional counties. The Project ROW in Oklahoma passes through six counties with confirmed presence of ABBs (Atoka, Bryan, Coal, Hughes, Okfuskee, and Seminole) and one county with unconfirmed presence (Creek) (unpublished USFWS data 2012).

The causes for the ABB's decline are complex and not well-understood. The ABB's vulnerability to extinction is likely due to its complex life history and dependence on carrion, which is a finite resource that varies widely spatially and temporally (Karr 1982; Pimm et al. 1988; Peck and Kaulbars 1987). The general explanation for the species' decline is usually attributed to anthropogenic habitat alteration or changing land use practices at the landscape level. Some examples of these anthropogenic alterations include direct loss of habitat associated with urbanization, industrial development, row crop farming, fragmentation of habit, wide scale use of pesticides, interruption of behavior caused by artificial lighting, and various other proposed causal factors, including extinction of the once common passenger pigeon (*Ectopistes migratorius*). The passenger pigeon, which formerly occurred in the billions across most of the ABB's range, was an ideal size and almost certainly provided an abundant and important carrion source. The decline and disappearance of this species occurred just prior to the ABB's. Other suitable carrion species, such as northern bobwhites and greater prairie-chickens (*Tympanuchus cupido*), have also experienced drastic declines. Competition for limited carrion is apparently exacerbated by increasing numbers of mid-sized mammals such as skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), foxes (*Vulpes* spp.), and coyotes (*Canis latrans*) which have increased in number in response to extinction or extirpation of large predators and a drastic reduction in fur trapping. These medium sized mammals, which often compete with ABBs for carrion, often thrive in the patchy and fragmented habitat of the modern landscape.

Relatively recently, fire ants (*Solenopsis invicta*) have become competitors for carrion and a potential source of mortality for burying beetles where they co-occur (Warriner 2004; Godwin and Minich 2005). Collins and Scheffrahn (2005) noted that fire ants may reduce ground-nesting populations of rodents and birds, and in some instances, may completely eliminate ground-nesting species from a given area. Fire ant infestations are not evenly distributed; rather, they tend to be more numerous in open, disturbed habitats. Fire ants now infest large areas within the ABB's range in Oklahoma (USDA 2003).

No single factor can fully explain the decline of ABBs. It is apparent that the organism simply cannot tolerate the wide range of landscape changes and other human activities imposed upon them. Perhaps the species' complex and highly evolved life cycle makes it more susceptible to negative effects from high levels of disturbance and landscape alteration relative to other species. Large populations today seem to be limited to relatively large blocks of land with low human population densities, intact native plant communities, and high densities of small birds and mammals.

3.3.5.2. Evaluation Species

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle was listed as endangered in 1967 (32FR 4001) and downlisted to threatened in 1995 (60 FR 35999). Successful recovery efforts led to its removal from the federal list of threatened and

endangered species on July, 9 2007 (72 FR37345). At the time of its listing, numbers of bald eagles in the lower 48 states had been severely reduced. This can be accredited to hunting in the nineteenth century and then as a result of an extended period of very low reproductive success in the mid twentieth century caused by high levels of organochlorine pesticides in the environment, especially dichloro-diphenyl-trichloroethane (DDT) (64 FR 36453). The banning of the use of DDT combined with earlier prohibitions on hunting (i.e., BGEPA and MBTA) and subsequent habitat protection and other management efforts allowed bald eagles to increase greatly in number. Currently, bald eagles occupy much of their former range.

Bald eagles are typically associated with aquatic habitats. They are commonly found along most major river systems and reservoirs in Oklahoma. Fish usually comprise a large portion of their diet, but bald eagles are opportunistic and will take waterfowl, mammals, and turtles, as well as eat carrion (Ortego et al. 2009). The typical bald eagle nesting period in Oklahoma is October through July.

Although the bald eagle has been federally delisted, it is protected by MBTA and BGEPA. Though the same level of protection is not provided, the Eagle remains protected from “take” of their offspring, eggs, parts, or nests, as well as disturbance. “Disturb” means to agitate an eagle to the degree that it causes or is likely to (1) cause injury, (2) interfere with breeding, feeding, or sheltering behavior, or (3) cause nest abandonment. The MBTA and BGEPA are enforced by the Service.

One active bald eagle nest, that is located approximately 1,203 feet west of the Project ROW, was identified during nesting surveys that were conducted for the Project during 2011 and 2012. This nest is located adjacent to the North Canadian River and, at its shortest length, has over 400 feet of mature deciduous forest separating it from the ROW. The recommendation from the National Bald Eagle Management Guidelines for avoiding disturbance to bald eagles during activities, such as the construction Keystone has proposed, is 660 feet. However, Keystone proposes to construct the portion of the Project within one mile of the nest outside of the breeding season (before January 1).

Least Tern (*Sterna antillarum*)

The least tern is the smallest member of the tern family with a wingspan of 20 inches and is typically 8 to 10 inches in length. They have a grayish back and wings, and snowy white undersides. Least terns can be distinguished from all other terns by their combination of a black crown, white forehead, and a variable black-tipped yellow bill (USFWS 2011b).

The interior population of the least tern was listed as endangered on May 28, 1985 (50 FR 21784-21792) (USFWS 1985b). Historically, the breeding range of this population extended from Texas to Montana and from eastern Colorado and New Mexico to southern Indiana. In Oklahoma, interior least terns nest along most of the larger rivers, as well as at the Salt Plains National Wildlife Refuge near Jet, Oklahoma (USFWS 2011b). No critical habitat has been designated for this population.

Interior least terns spend 4 to 5 months at their breeding sites. They arrive at breeding areas from late April to early June. Nesting areas of interior least terns include sparsely vegetated sand and gravel bars within a wide, unobstructed river channel or salt flats along lake shorelines (Nelson 1998; USFWS 1990).

The interior least tern is piscivorous, feeding in shallow waters of rivers, streams, and lakes. In addition to small fish, terns also may feed on crustaceans, insects, mollusks, and worms. On the Great Plains, fish are the primary diet of this species (Nelson 1998; USFWS 1990). Although terns nesting at sand and gravel pits or other artificial habitats may travel up to 2 miles to forage (USFWS 1990), terns usually feed close to their nesting sites. Feeding behavior involves hovering and diving over standing or flowing water.

Alteration and destruction of riverine habitats, primarily as a result of changes in channel characteristics due to channelization, irrigation, and construction of reservoirs and pools, is a threat to the long-term survival of this species.

The interior least tern is known to use reaches of the North Canadian River, South Canadian River, and Red River in Oklahoma (USFWS 2011b). The Plan Area would cross the North Canadian River on the Okfuskee County – Seminole County border and the South Canadian River in Hughes County. The species also occurs along the Red River in Bryan County, Oklahoma and Fannin County, Texas.

Piping Plover (*Charadrius melodus*)

The piping plover was listed as endangered and threatened December 11, 1985 (50 FR 50726, USFWS 1985a). Piping plover on the Great Lakes were listed as endangered, while the remaining Atlantic and Northern Great Plains populations were listed as threatened. Populations of piping plover within the Plan Area are considered to belong to the threatened Northern Great Plains population. Primary habitat includes: (1) prairie alkali lakes and wetlands; (2) shallow, seasonally to permanently flooded, wetlands with sandy to gravelly, sparsely vegetated beaches, salt-encrusted mud flats, and/or gravelly salt flats; (3) springs and fens along edges of alkali lakes and wetlands; (4) adjacent uplands 200 feet above the high water mark of alkali lakes or wetlands; (5) rivers with sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and the interface with the river; and (6) reservoirs with sparsely vegetated shoreline beaches, peninsulas, and islands composed of sand, gravel, or shale. Critical habitat has been designated for the piping plover; however, none of these areas are in Oklahoma.

Threats to piping plover nesting habitat include reservoirs, channelization of rivers, and modifications of river flows that have eliminated hundreds of kilometers of nesting habitat along Northern Great Plains' rivers (USFWS 1994). Eggs and young are vulnerable to predation and human disturbance, including recreational activities and off-road vehicle use. Human-caused disturbance to wintering habitats is also a threat to the continued existence of this species. Motorized and pedestrian recreational activities, shoreline stabilization projects, navigation projects, and development can degrade and eliminate suitable wintering habitat for this species.

Suitable migration stopover habitats include sandy shorelines of lakes and rivers (Campbell 2003), gravel bars, or mudflats in agricultural fields. These habitats are present along the North Canadian River, South Canadian River, and Red River within the Plan Area. The Project would cross the North Canadian River on the Okfuskee – Seminole County line, the South Canadian River in Hughes County, and the Red River in Bryan County. However, piping plovers rarely, if ever, nest in Oklahoma.

Whooping Crane (*Grus americana*)

The whooping crane was listed as endangered on March 11, 1967 (32 FR 4001). Whooping cranes occur only in North America and the total wild population was estimated at 338 birds in 2006 (Canadian Wildlife Service [CWS] and USFWS 2007). This estimate includes 215 birds in the Aransas-Wood Buffalo National Park Population that winters in coastal marshes in Texas and migrates to Canada to nest in the Wood Buffalo National Park and adjacent areas. The other population includes 123 captive-raised birds that have been released in Florida and the eastern U.S. in an effort to establish a non-migratory population in Florida and a migratory population between Florida and Wisconsin (CWS and USFWS 2007). The overall decline of whooping cranes has been attributed to habitat loss, direct disturbance and hunting by humans, predation, disease, and collisions with manmade features (CWS and USFWS 2005).

During spring and fall migration, the Aransas-Wood Buffalo National Park population moves through the central Great Plains including portions of Montana, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Birds from this population depart from their wintering grounds in Texas from late March through May 1. Fall migration typically begins in mid-September with most birds arriving on wintering grounds between late October and mid-November (CWS and USFWS 2005).

Whooping cranes use a variety of habitats during migration (Howe 1987; Lingle 1987; Lingle et al. 1991; Johns et al. 1997). The whooping crane is most closely associated with river bottoms, marshes, potholes, prairie grasslands, and croplands (CWS and USFWS 2005). Whooping cranes generally use seasonally or semi permanently flooded marshes, broad river channels, and shallow portions of reservoirs for roosting and various cropland and emergent wetlands for feeding (Austin and Richert 2001; Johns et al. 1997). They generally feed on small grains (including a number of cultivated crops), aquatic plants, insects, crustaceans, and small vertebrates (Oklahoma State University 1993). Cranes roost on submerged sandbars in wide unobstructed channels that are isolated from human disturbance (Armbruster 1990).

Suitable migration stopover habitats include sandy shorelines of lakes and rivers as well as large palustrine wetlands and row crop agricultural fields. The Project would cross the North Canadian River on the Okfuskee – Seminole County line, the South Canadian River in Hughes County, and the Red River in Bryan County. No large wetlands with a potential for providing stopover habitat have been identified within the Plan Area. Row crop agricultural fields do, however, occur within and in the vicinity of the Plan Area and could provide stopover foraging habitat. The primary migration corridor for whooping cranes is located to the west of the Plan Area; few sightings occur within this part of Oklahoma compared to areas farther west.

Critical habitat for migrating whooping cranes has been designated in Oklahoma at the Salt Plains National Wildlife Refuge (43 FR 20938-942; CWS and USFWS 2005). This area is located more than 100 miles northwest of the Plan Area in Oklahoma; no critical habitat would be impacted by the Project.

Sprague's Pipit (*Anthus spragueii*)

The Sprague's pipit is a candidate for federal listing as threatened or endangered (75 FR 56028). Sprague's pipit is a medium sized (5.5 inches long), short distance migrant songbird (passerine). They breed in the northern Great Plains primarily in Montana, North Dakota, and South Dakota (Jones 2010).

Migration occurs through the central Great Plains in April to May and late September through early November (Jones 2010). They winter from the southeast corner of Arizona, southern New Mexico, central and southern Texas, and southern Oklahoma. The highest wintering densities occur in Texas (Jones 2010).

Sprague's pipits establish nesting territories and construct nests on the ground in intermediate height and density grasslands, primarily with native grasses, little bare ground, and few shrubs during May to August (Jones 2010). Breeding territories are established for both nesting and foraging and are likely influenced by the size of grassland patches and the amount of grassland in the landscape (Jones 2010). Males establish and maintain territories, presumably using a high altitude (984 feet), high pitch display (Jones 2010). They forage primarily on the ground and eat insects in the summer and insects and seeds during fall and winter (NatureServe 2012).

There are an estimated 870,000 Sprague's pipits in North America and populations have experienced a range-wide decline at a rate of about 3 percent per year since 1980 in the U.S. (Jones 2010). Decline in this species is attributed to habitat loss, degradation, and fragmentation through conversion to seeded pasture, hayfields, and croplands, as well as overgrazing by livestock and reduced fire frequency (Jones 2010). Current threats to the Sprague's pipit include habitat loss, degradation, and fragmentation; inappropriate land management (overgrazing, mowing, reduced fire frequency); nest predation and parasitism; energy development, introduced plants, and droughts (Jones 2010).

Sprague's pipits occur in the central and western two-thirds of Oklahoma and in the southern portion of the panhandle during migration; however, they have not been observed in the eastern third of the state (Jones 2010) where the Plan Area is located.

Arkansas River Shiner (*Notropis girardi*)

The Arkansas River shiner was listed as threatened on November 23, 1998 (63 FR 64771). This listing was based on habitat destruction and modification from stream dewatering or depletions due to diversion of surface water and groundwater pumping, construction impoundments, and water quality degradation. Competition with the Red River shiner (*Notropis bairdi*) in the Cimarron River also has contributed to reduced distribution and abundance of the Arkansas River shiner. Critical habitat has been designated for the Arkansas River shiner in the Cimarron River in Kansas and Oklahoma and the South Canadian River in Oklahoma (70 FR 59807).

The Arkansas River shiner inhabits the main channels of wide, shallow, sandy bottomed rivers and larger streams in the Arkansas River basin (Gilbert 1980). Studies by Polivka and Matthews (1997) in the South Canadian River indicated that this species used a broad range of microhabitat features. Microhabitat types such as bank, island, sand ridges, backwaters, mid channel, and pools were analyzed separately for abundance at all sampling locations. Bank habitat, islands, and sand ridges supported greater numbers

of Arkansas River shiners than the other types. Sand was the predominant type of substrate in these microhabitats. Seasonally, adults selected bank and backwater areas in the winter and remained in islands and sand ridges during the fall, spring, and summer. In contrast, juveniles exhibited their highest numbers in backwaters; however, they also were abundant in bank and sand ridge habitats. The spawning period for the Arkansas River shiner occurs from June 1 through August 15 (NatureServe 2012). Spawning consists of pelagic, non-adhesive eggs that are broadcast and drift with the current during high flow periods. Hatching occurs within 1 or 2 days, with larvae capable of swimming within 3 or 4 days (63 FR 64771). Larvae seek out backwater pools and quiet water at the mouth of tributaries where food is more abundant (Moore 1944).

The Project would cross the North and South Canadian rivers using Horizontal Directional Drilling (HDD) methods. The Arkansas River shiner is known to occur in the South Canadian River and potentially occurs in the North Canadian River and critical habitat has been designated in the South Canadian River. Keystone will cross these rivers without impact to the rivers or the Arkansas River shiner.

4. PROPOSED COVERED ACTIVITIES

Keystone proposes to construct and operate a crude oil transmission system from an oil supply hub at Cushing, Oklahoma to crude oil storage facilities near Nederland, Texas. The Covered Activities include those necessary to construct and operate the pipeline within the Plan Area as addressed in this HCP (Figure 2).

4.1. PIPELINE CONSTRUCTION OVERVIEW

The Project is planned to be constructed as follows:

- Keystone will be constructing approximately 485 miles of 36-inch diameter pipeline from Cushing, Oklahoma to near Nederland, Texas.
- This Project would be constructed with 3 mainline spreads (construction sections), varying in lengths from 112.87 to 186.14 miles, in 2012 – 2013.
- The area addressed in this HCP (Plan Area) is a subset of Spread 1 and consists of 138.8 miles within the ABB range in Oklahoma; 83.6 miles of which are located in the ABB conservation priority area.

4.1.1. Ancillary Facilities Summary

In addition to the pipeline, Keystone proposes to install and operate aboveground facilities in the Plan Area. These facilities consist of 3 pump stations in the Plan Area (1 in the ABB non-priority area in Oklahoma and 2 in the ABB conservation priority area), 11 intermediate mainline valves (MLV) in the Plan Area (5 in the ABB non-priority area in Oklahoma and 6 in the ABB conservation priority area), and maintenance facilities. All of these facilities would be located within the permanent easement or on Keystone fee owned property. Additionally, there would be check valves located within the intermediate MLVs downstream of major river crossings. The ABB range in Oklahoma and ABB conservation priority area are discussed in more detail in Section 5.1.2.3.

Additional facilities such as power lines required for the pump stations, remotely operated valves, and densitometers would be installed and operated by local power providers; not by Keystone.

4.1.2. Pipeline ROW

The installation of the new 36-inch diameter pipeline would occur within a 110-foot-wide construction ROW, consisting of a 60-foot temporary construction ROW and a 50-foot permanent ROW. The construction ROW would be reduced to 85 feet in certain areas, which could include some wetlands, cultural sites, residential areas, and commercial/industrial areas.

4.1.3. Temporary Work Space Areas

In addition to the typical construction ROW, Keystone has identified typical types of additional Temporary work space areas (TWA) that would be required. These include areas requiring special construction techniques (e.g., river, wetland, and road/rail crossings, HDD entry and exit points, steep slopes, and rocky areas) and construction staging areas.

4.1.4. Pipe Stockpile Sites, Railroad Sidings, and Contractor Yards

Extra workspace areas outside of the temporary construction ROW covering about 218.58 acres would be required during the construction of the Project in the Plan Area to serve as pipe storage sites, railroad sidings, and contractor yards. Pipe stockpile sites along the pipeline route have typically been identified in proximity to railroad sidings. To the extent practical, Keystone would use existing commercial/industrial sites or sites that previously were used for construction. Existing public or private roads would be used to access each yard. Both pipe stockpile sites and contractor yards would be used on a temporary basis and would be restored, as appropriate, upon completion of construction. Survey of pipe stockpile sites, railroad sidings, and contractor yards would be completed prior to construction.

4.1.5. Access Roads

The Project would use public and existing private roads to provide access to most of the construction ROW. Paved roads are not likely to require improvement or maintenance prior to or during construction. Gravel roads and dirt roads may require maintenance during the construction period due to high use. Road improvements such as blading and filling would generally be restricted to the existing road footprint, widening of roads may also be required in some areas. Private roads and any new temporary access roads would be used and maintained only with permission of the landowner or land management agency.

Access pads would be placed within the construction ROW at crossings of public and private roads, requiring a total of about 37,860 cubic yards of gravel. There are approximately 147 such road crossings.

4.1.6. Aboveground Facilities

The Project would not require any land outside of the permanent ROW within the Plan Area. Gravel would be used to stabilize the land for permanent facilities, including pump stations, valve sites, and permanent access roads.

Pump Stations

A total of 3 new pump stations, each situated on approximately 5- to 15-acre sites, would be constructed within the Plan Area. Each pump station would consist of up to six pumps driven by electric motors, an electrical equipment shelter, a variable frequency drive equipment shelter, an electrical substation, one sump tank, a remotely operated MLV, a communication tower, a small maintenance building, and a parking area for station maintenance personnel. Stations would operate on locally purchased electric power and would be fully automated for unmanned operation. The pump stations would have an uninterruptable power supply (battery backup) on all communication and specific controls equipment in the case of a power failure. Communication towers at pump stations would generally be approximately 33 feet in height. However, antenna height at select pump stations, as determined upon completion of a detailed engineering study, may be taller (but in no event would exceed a maximum height of 190 feet). Communication towers would be constructed without guy wires. The pipe entering and exiting the pump station sites would be located below grade. Keystone would use down-shielding of exterior lights to minimize impacts to wildlife and would install a security fence around the entire pump station site. Inspection and maintenance personnel would access the pump stations through a gate that would be locked when no one is at the pump station.

Other Aboveground Facilities

Keystone proposes to construct 11 intermediate MLV sites along the new pipeline ROW in the Plan Area. Intermediate MLVs would be constructed within a fenced 40- by 50-foot site located within the permanent easement. Remotely operated intermediate MLVs would be located at major river crossings, other surface water features over 100 feet in width, and at intermediate locations. Additional remotely operated MLVs would be located at pump stations. These remotely operated valves can be activated to shutdown the pipeline in the unlikely event of a spill. The actual spacing intervals between the MLVs and intermediate MLVs would be based upon the location of the pump stations, surface water features wider than 100 feet, sensitive environmental resources, and other hydraulic profile considerations.

Keystone would use high-resolution internal line inspection, maintenance, and cleaning tools known as “pigs” during operation of the Project. The Project would be designed to permit pigging of the entire length of the pipeline with minimal interruption of service. Pig launchers and/or receivers would be constructed and operated completely within the boundaries of the pump stations or delivery facilities. Launchers and receivers would allow pigging of the pipeline with high resolution internal line inspection tools and maintenance cleaning pigs.

4.2. CONSTRUCTION PROCEDURES

The proposed facilities would be designed, constructed, tested, and operated in accordance with all applicable requirements included in the U.S. Department of Transportation (USDOT) regulations at 49 CFR 195, *Transportation of Hazardous Liquids by Pipeline*, other applicable federal and state regulations, and in accordance with the Project-specific special conditions recommended by the Pipeline Hazardous Material Safety Administration (PHMSA) and agreed to by Keystone. These regulations and special conditions are intended to ensure adequate protection for the public and to prevent crude oil pipeline accidents. Project-specific special conditions (as well as 49 CFR 195) specify pipeline material and qualification to be used, minimum design requirements, and measures to ensure protection from internal, external, and atmospheric corrosion.

To manage construction impacts, Keystone would implement its Construction Mitigation and Reclamation Plan (CMR Plan, Appendix A). This plan contains procedures that would be used throughout the Project to avoid and/or minimize permanent impacts. Subsections address specific environmental conditions. Procedures to restore impacts to the permanent ROW are described in the CMR Plan.

The Project's Spill Prevention, Control, and Countermeasure (SPCC) Plan would be implemented to avoid or minimize the potential for harmful spills and leaks during construction. The plan describes spill prevention practices, emergency response procedures, emergency and personnel protection equipment, release notification procedures, and cleanup procedures. Keystone would use Environmental Inspectors on each construction spread. The Environmental Inspectors would review the Project activities daily for compliance with state, federal, and local regulatory requirements and would have the authority to stop specific tasks as approved by the Chief Inspector. The inspectors would also be able to order corrective action in the event that construction activities violate any provisions of the CMR Plan, landowner requirements, or any applicable permit requirements.

These measures would apply to the basic design and construction specifications applicable to lands disturbed by the Project. This approach would enable construction to proceed with a single set of specifications for lands being crossed. On private lands, these requirements may be modified slightly to accommodate specific landowner requests or preferences.

4.2.1. General Pipeline Construction Procedures

Before starting construction at a specific site, engineering surveys of the ROW centerline and additional TWAs would be finalized. Acquisition of ROW easements and any necessary acquisitions of property in fee would then be completed.

Pipeline construction generally proceeds as a moving assembly line and is summarized below. Keystone currently plans to construct the entire pipeline Project in 3 spreads, 1 of which is located in Oklahoma. Standard pipeline construction is composed of specific activities, including survey and staking of the ROW, clearing and grading, pipe stringing, bending, trenching, welding, lowering in, backfilling, hydrostatic testing, and cleanup. In addition to standard pipeline construction methods, special construction techniques would be used where warranted by site-specific conditions. These special

techniques would be used when constructing across rugged terrain, surface water features, wetlands, paved roads, highways, and railroads.

Normal construction activities would be conducted during daylight hours, with the following exceptions.

- Completion of critical tie-ins on the ROW may occur after daylight hours. Completion requires tie-in welds, non destructive testing, and sufficient backfill to stabilize the trench.
- HDD operations may be conducted after daylight hours, if determined by the contractor to be necessary to complete a certain location. In some cases, that work may be required continuously until the work is completed; this may last one or more 24-hour days. Such operations may include drilling and pull-back operation, depending upon the site and weather conditions, permit requirements, schedule, crew availability, and other factors.
- While not anticipated, certain work may be required after the end of daylight hours due to weather conditions, for safety, or for other Project requirements.

Survey and Staking

Before construction begins at any given location, the limits of the approved work area (i.e., the construction ROW boundaries and any additional TWAs) would be marked and the location of approved access roads and existing utility lines would be flagged. Landowner fences would be braced and cut and temporary gates and fences would be installed to contain livestock, if present. Wetland boundaries and other environmentally sensitive areas also would be marked or fenced for protection at this time. Before the pipeline trench is excavated, a survey crew would stake the centerline of the proposed trench and any buried utilities along the ROW.

Clearing and Grading

A clearing crew will follow the survey crew and will clear the work area of vegetation (including crops) and obstacles (e.g., trees, logs, brush, rocks). Standard agricultural implements would be used on agricultural lands and standard machinery used in timber clearing would be used in forested lands. The amount of top soil stripping would be determined in consultation with the landowner (based on agricultural use) and the NRCS. Full right-of-way stripping for forested lands would be avoided as practical. Temporary erosion control measures such as silt fence or straw bales would be installed prior to or immediately after vegetation removal along slopes leading to wetlands and riparian areas. Grading would be conducted where necessary to provide a reasonably level work surface. Where the ground is relatively flat and does not require grading, rootstock would be left in the ground. More extensive grading would be required in steep side slopes or vertical areas and where necessary to safely construct the pipe along ROW.

Trenching

The trench would be excavated to a depth that provides sufficient cover over the pipeline after backfilling. Typically, the trench would be seven to eight feet deep and four to five feet wide in stable soils. In most areas, the USDOT requires a minimum of 30 inches of cover and as little as 18 inches in rocky areas. To reduce the risk of third party damage Keystone proposes to exceed the depth of cover requirements in most areas. In all areas, except areas of consolidated rock, the depth of cover for the

pipeline would be a minimum of 48 inches (Table 1). In areas of consolidated rock, the minimum depth of cover would be 36 inches. Trenching may precede bending and welding or may follow based on several factors including soil characteristics, water table, and weather conditions at the time of construction.

Table 1: Minimum Pipeline Cover for Pipeline Installation

LOCATION	NORMAL COVER (inches)	ROCK EXCAVATION AREA COVER (inches)
Most Areas	48	36
Wetlands and Surface Water Features	60	36
Dry Creeks, Ditches, Drains, Gullies, etc.	60	36
Drainage Ditches @ Public Roads & Railroads	60	48

Generally, the crews on each construction spread are synchronized with the welding crews for efficiency. The amount of open trench is minimized to the extent possible.

Pipe Stringing, Bending, and Welding

Prior to or following trenching, sections of externally coated pipe approximately 80 feet long (also referred to as “joints”) would be transported by truck over public roads and along authorized private access roads to the ROW and placed or “strung” along the ROW.

After the pipe sections are strung along the trench and before joints are welded together, individual sections of pipe would be bent to conform to the contours of the trench by a track-mounted, hydraulic pipe-bending machine. For larger bend angles, fabricated bends may be used.

After pipe sections are bent, joints would be welded together into long strings and placed on temporary supports. During welding, pipeline joints would be lined up and held in position until securely joined. Keystone proposes to non-destructively inspect 100 percent of the welds using radiographic, ultrasonic, or other USDOT approved method. Welds that do not meet established specifications would be repaired or removed. Once welds are approved, a protective epoxy coating will be applied to the welded joints. The pipeline will then be electronically inspected for faults in the epoxy coating and visually inspected for any faults, scratches, or other coating defects. Damage to the coating would be repaired before the pipeline is lowered into the trench.

In rangeland areas used for grazing, construction activities can potentially hinder the movement of livestock. Construction activities may also hinder the movement of wildlife. To minimize the impact on livestock and wildlife movements during construction, Keystone would leave hard plugs (short lengths of unexcavated trench) or install soft plugs (areas where the trench is excavated and replaced with minimal compaction) to allow livestock and wildlife to cross the trench safely. Soft plugs would be constructed with a ramp on each side to provide an avenue of escape for animals that may fall into the trench.

Lowering In and Backfilling

Before pipe is lowered, the trench would be inspected to ensure it is free of livestock or wildlife, as well as rock and other debris that could damage the pipe or its protective coating. In areas where water has accumulated, dewatering may be necessary to permit inspection of the bottom of the trench. Discharge of water from dewatering would be accomplished in accordance with applicable discharge permits. The pipeline then would be lowered into the trench. On sloped terrain, trench breakers (e.g., stacked sand bags or foam) would be installed in the trench at specified intervals to prevent subsurface water movement along the pipeline. The trench would then be backfilled using the excavated material. In rocky areas, the pipeline would be protected with an abrasion resistant coating or rock shield (fabric or screen that is wrapped around the pipe to protect the pipe and its coating from damage by rocks, stones, and roots). Alternatively, the trench bottom could be filled with padding material (e.g., sand, soil, or gravel) to protect the pipeline. No topsoil would be used as padding material. Topsoil would be returned to its original horizon after subsoil is backfilled in the trench.

Hydrostatic Testing

The pipeline would be hydrostatically tested in sections of approximately 30 miles (with a maximum 50 miles) to ensure the system is capable of withstanding the operating pressure for which it is designed. This process involves isolating the pipe segment with test manifolds, filling the segment with water, pressurizing the segment to a pressure a minimum of 1.25 times the maximum operating pressure at the high point elevation of each test section, and maintaining that pressure for a period of 8 hours. Fabricated assemblies may be tested prior to installation in the trench for a period of 4 hours. The hydrostatic test would be conducted in accordance with 49 CFR 195.

Water for hydrostatic testing would generally be obtained from rivers, streams and municipal sources in close proximity to the pipeline and in accordance with federal, state, and local regulations. Intakes would be screened to prevent entrainment of fish and intake and discharge locations would be determined with construction contractors (no water will be obtained from Arkansas River Shiner habitat). A preliminary list of potential hydrostatic test water sources is included in Table 2. Generally the pipeline would be hydrostatically tested after backfilling and all construction work that would directly affect the pipe is complete. If leaks are found, they would be repaired and the section of pipe retested until specifications are met. There are no chemicals added to the test water. The water is generally the same quality as the source water since there are no additives to the water. Water used for the testing would then be returned to the source or transferred to another pipe segment for subsequent hydrostatic testing. After hydrostatic testing, the water would be tested to ensure compliance with the National Pollutant Discharge Elimination System (NPDES) discharge permit requirements, treated if necessary, and discharged.

The used hydrostatic test water would be discharged either to the source within the same water basin or to a suitable upland area near the test discharge. To reduce the velocity of the discharge to upland areas, energy dissipating devices would be employed.

Hydrostatic test water would not be discharged into state-designated exceptional value waters, waters which provide habitat for federally-listed threatened or endangered species, or waters designated as public water supplies, unless appropriate federal, state, or local permitting agencies grant written

permission. To avoid impacts from introduced species, no inter-basin transfers (discharge) of hydrostatic test water would occur without specific permitting approval to discharge into an alternative water basin. Discharge lines would be securely supported and tied down at the discharge end to prevent whipping during discharge. Hydrostatic testing is discussed further in the CMR Plan (Appendix A).

Table 2: Potential Hydrostatic Test Water Sources in the Plan Area

COUNTY(IES)	APPROXIMATE MILEPOST	STREAM NAME	MAX. WATER WITHDRAWAL (million gallons)
OKLAHOMA			
Creek	22.2	Deep Fork River	6.6
Okfuskee/Seminole	38.6	North Canadian River	0.3
Hughes	70.4	Little River	21.6
Atoka	126.9	Clear Boggy Creek	18.0
OKLAHOMA/TEXAS BORDER			
Bryan/Fannin	156.1	Red River	9.3

Pipe Geometry Inspection

The pipeline would be inspected prior to final tie-ins using an electronic caliper (geometry) pig to ensure the pipeline does not have any dents, bulging, or ovality that might be detrimental to the operation of the pipeline.

Final Tie-ins

Following successful hydrostatic testing, test manifolds would be removed and the final pipeline tie-in welds would be made and inspected.

Commissioning

After the final tie-ins are complete and inspected, the pipeline will be cleaned and dewatered. Commissioning involves verifying that equipment has been installed properly and is working, that controls and communications systems are functional, and that the pipeline is ready for service. In the final step, the pipeline would be prepared for service by filling the line with crude oil.

Cleanup and Restoration

During cleanup, construction debris on the ROW will be disposed of and work areas will be graded. Preconstruction contours will be restored as closely as possible. Segregated topsoil will be spread over the surface of the ROW and permanent erosion controls will be installed. After backfilling, final cleanup will begin as soon as weather and site conditions permit. Every reasonable effort will be made to complete final cleanup (including final grading and installation of erosion control devices) within approximately 20 days after backfilling the trench (approximately 10 days in residential areas), subject

to weather and seasonal constraints. Construction debris will be removed and taken to an appropriate disposal facility.

After permanent erosion control devices are installed and grading is complete, all disturbed work areas except cultivated fields will be seeded. Seeding is used to stabilize the soil, re-vegetate areas disturbed by construction, and restore native vegetation. Timing of the reseeding efforts will depend upon weather and soil conditions and will be subject to the prescribed rates and seed mixes specified by the landowner, land management agency, or Natural Resources Conservation Service (NRCS) recommendations. On agricultural lands, seeding will be conducted according to landowner requirements.

Keystone will repair or replace any breaches in fences required for access to the ROW. Keystone will also restrict access to the permanent easement using gates, boulders, or other barriers to minimize unauthorized access. Pipeline markers will be installed at road and railroad crossings and other locations (as required by 49 CFR 195) to show the location of the pipeline. Markers will identify the owner of the pipeline and provide emergency contact information. Special markers providing information and guidance to aerial patrol pilots will also be installed.

The ROW will be inspected after the first growing season to gauge the success of re-vegetation and noxious weed control. Eroded areas will be repaired and areas that were not successfully re-vegetated will be reseeded by Keystone or Keystone will compensate the landowner for reseeding. The CMR Plan (Appendix A) provides detailed information with regard to re-vegetation and weed control procedures which will be employed.

4.2.2. Non-Standard Construction Procedures

In addition to standard pipeline construction methods, special construction techniques would be used where warranted by site-specific conditions. These special techniques would be used when crossing roads, highways, and railroads; steep terrain; unstable soils; surface water features; wetlands; and residential and commercial areas. These special techniques are described below.

Road, Highway, and Railroad Crossings

Construction across paved roads, highways, and railroads would be in accordance with the requirements of road and railroad crossing permits and approvals. In general, all major paved roads, all primary gravel roads, highways, and railroads would be crossed by boring. Boring requires the excavation of a pit on each side of the feature, the placement of boring equipment in the pit, and boring under the road. Once the hole is bored, a prefabricated pipe section would be pulled through the borehole. For long crossings, sections can be welded onto the pipe string just before being pulled through the borehole. Each boring would be expected to take 1 to 2 days for most roads and railroads and 10 days for long crossings such as interstate or four-lane highways.

Most smaller, unpaved roads and driveways would be crossed using the open-cut method where allowed by local authorities or private owners. Most open-cut road crossings can be finished and the road resurfaced in 1 or 2 days.

Pipeline, Utility, and Other Buried Feature Crossings

Keystone and its pipeline contractors would comply with USDOT regulations, utility agreements, and industry best management practices (BMP) with respect to utility crossing and separation specifications. One-call notification would be made for all utility crossings so respective utilities are identified.

Unless otherwise specified in a crossing agreement, the contractor would excavate to allow installation of the pipeline across the existing utility with a minimum clearance of 12 inches. The clearance would be filled with sandbags or suitable fill material to maintain the clearance.

For some crossings, the owner of the utility may require the facility to be excavated and exposed by their own employees prior to the Keystone construction activities. In those cases, Keystone would work with owners to complete work to their specifications. Where the owner of the utility does not require pre-excavation, generally, the pipeline contractor would locate and expose the utility before conducting excavation.

Steep Terrain

Additional grading may be required in areas where the proposed pipeline route would cross steep slopes. Steep slopes often need to be graded for safe operation of construction equipment and to accommodate pipe-bending limitations. In such areas, slopes would be excavated prior to pipeline installation and reconstructed after installation is complete.

In areas where the pipeline route crosses along the side of a slope, cut and fill grading may be required to obtain a safe work area. Topsoil would be stripped from the entire ROW and stockpiled prior to cut and fill grading on steep terrain. Soil from the high side of the ROW would be excavated and moved to the low side of the ROW to create a safe and level work terrace. After the pipeline is installed, the soil from the low side of the ROW would be returned to the high side and the slope's contour would be restored as near as practical to preconstruction condition. Topsoil from the stockpile would be spread over the surface, erosion control features installed, and seeding implemented.

In steep terrain, temporary sediment barriers such as silt fences and straw bales would be installed during clearing to prevent the movement of disturbed soil into wetland, surface waters, or other environmentally sensitive areas. Temporary slope breakers consisting of mounded and compacted soil would be installed across the ROW during grading and permanent slope breakers would be installed during cleanup. Following construction, seed would be applied to steep slopes and the ROW would be mulched with hay, straw, or erosion control fabric. Sediment barriers would be maintained across the ROW until permanent vegetation is established. TWAs may be required for storage of graded material and/or topsoil during construction.

Unstable Soils

Construction in unstable soils, if encountered, would be in accordance with measures outlined in the CMR Plan (Appendix A). Construction in these areas could require extended TWAs. Special construction and mitigation techniques would be applied to areas with high potential for landslides, erosion-prone

locations, and blowouts. To facilitate reclamation, Keystone could implement measures such as the use of photodegradable mats and livestock controls.

Stream Crossings

Approximately 54 perennial streams would be crossed one or more times during construction in the Plan Area. Perennial streams would be crossed using either the open-cut method or HDD. These design methods are further described below. Stream crossings were assessed by qualified personnel with respect to the potential for channel aggradation or degradation and lateral channel migration. The level of assessment for each crossing varied based on the professional judgment of the qualified design personnel. The pipeline would be installed as necessary to address any hazards identified by the assessment. The pipeline would be installed at the design crossing depth for at least 15 feet beyond the design lateral migration zone of the channel. The design of the crossings also would include the specification of appropriate stabilization and restoration measures. The actual crossing method employed at a perennial stream would depend on permit conditions from the U.S. Army Corps of Engineers (USACE) and other relevant regulatory agencies, as well as additional conditions that may be imposed by landowners or land managers at the crossing location.

The preferred crossing method would be to use the open-cut crossing method. The open-cut method involves trenching through the stream while water continues to flow through the construction work area. Pipe segments for the crossing would be fabricated adjacent to the stream. Generally, backhoes operating from one or both banks would excavate the trench within the streambed. In wider rivers, in-stream operation of equipment may be necessary. Hard or soft trench plugs would be placed to prevent the flow of water into the upland portions of the trench. Trench spoil excavated from the streambed generally would be placed at least 10 feet away from the water's edge unless stream width is great enough to require placement in the stream bed. Sediment barriers would be installed where necessary to control sediment and to prevent excavated spoil from entering the water. After the trench is dug, the prefabricated pipeline segment would be carried, pushed, or pulled across the stream and positioned in the trench. When crossing saturated wetlands with flowing waterbodies using the open-cut method, the pipe coating would be covered with reinforced concrete or concrete weights to provide negative buoyancy. The need for weighted pipe would be determined by detailed design and site conditions at the time of construction. The trench would then be backfilled with native material or with imported material if required by applicable permits. Following backfilling, the banks would be restored and stabilized.

Keystone plans to use the HDD method of construction for 7 stream/river crossings in the Plan Area (Table 3). The HDD method involves drilling a pilot hole under the stream, then enlarging the hole through successive passes until the hole is large enough to accommodate a prefabricated segment of pipe. Throughout the process of drilling and enlarging the hole, slurry consisting mainly of water and bentonite clay would be circulated to power and lubricate the drilling tools, remove drill cuttings, and provide stability to the drilled holes. Pipe sections long enough to span the entire crossing would be staged and welded along the construction work area on the opposite side of the crossing and then pulled through the drilled hole. Ideally, use of the HDD method results in no impact on the banks, bed, or water quality of the feature being crossed.

Table 3: Surface Water Features Crossed using Horizontal Directional Drilling

SURFACE WATER FEATURE	APPROXIMATE MILEPOST
Deep Fork River	22.2
North Canadian River	38.6
Little River	70.4
South Canadian River	74.3
Fronterhouse Creek	122.8
Clear Boggy Creek	126.9
Red River	156.1

Approximately 96 intermittent streams would be crossed within the Plan Area. When crossing streams, Keystone would adhere to the guidelines outlined in Keystone’s CMR Plan (Appendix A) and the requirements of its Clean Water Act (CWA) Section 404 permit from the USACE.

Additional TWAs would be required on both sides of all surface water features to stage construction, fabricate the pipeline, and store materials. These workspaces would be located at least 10 feet away from the ordinary high water mark, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. Before construction, temporary bridges would be installed across all perennial surface water features to allow construction equipment to cross.

During clearing, sediment barriers such as silt fences and staked straw bales would be installed and maintained on drainages across the ROW to minimize the potential for sediment runoff. Silt fences and straw bales located across the working side of the ROW would be removed during the day when vehicle traffic is present and would be replaced each night. Alternatively, drivable berms could be installed and maintained across the ROW in lieu of a silt fence or straw bales.

In general, equipment refueling and lubricating near surface water features would take place in upland areas that are 100 feet or more from the water. When circumstances dictate that equipment refueling and lubricating would be necessary in or near streams or wetlands, Keystone would follow its SPCC Plan to address the handling of fuel and other hazardous materials and any such materials that would require secondary containment.

After the pipeline is installed, restoration would begin. Banks would be restored to preconstruction contours or to a stable configuration. Appropriate erosion control measures such as rock riprap, gabion baskets (rock enclosed in wire bins), log walls, or willow cuttings would be installed as necessary on steep banks in accordance with permit requirements. More stable banks would be seeded with native grasses and mulched or covered with erosion control fabric. Banks would be temporarily stabilized within 24 hours of completing in-stream construction. Sediment barriers, such as silt fences, straw bales or drivable berms would be maintained across the ROW at all approaches until permanent vegetation is established. Temporary equipment bridges would be removed following construction.

Wetland Crossings

Data from wetland delineation field surveys, aerial photography, and National Wetland Inventory mapping were used to identify wetlands crossed by the proposed pipeline. Wetland crossings will be facilitated according to the terms and conditions of Keystone's CWA Section 404 permit issued by the USACE. Pipeline construction across wetlands would be similar to typical conventional upland cross-country construction procedures, with several modifications where necessary to reduce the potential for pipeline construction to affect wetland hydrology and soils.

The wetland crossing method used would depend largely on the stability of the soils at the time of construction. If wetland soils are not excessively saturated at the time of construction and can support construction equipment without equipment mats, construction would occur in a manner similar to conventional upland cross-country construction techniques. Topsoil would be segregated over the trench line. In most saturated soils, topsoil segregation would not be possible. Additional TWAs would be required on both sides of particularly wide saturated wetlands to stage construction, fabricate the pipeline, and store materials. These additional TWAs would be located in upland areas a minimum of 10 feet from the wetland edge.

Construction equipment working in saturated wetlands would be limited to that area essential for clearing the ROW, excavating the trench, fabricating and installing the pipeline, backfilling the trench, and restoring the ROW.

Clearing of vegetation in wetlands would be limited to trees and shrubs, which would be cut flush with the surface of the ground and removed from the wetland. To avoid excessive disruption of wetland soils and the native seed and rootstock within the wetland soils, stump removal, grading, topsoil segregation, and excavation would be limited to the area immediately over the trench line to the extent practical. Trench width would be that required to provide an even, safe, work area which depends upon topography, soil moisture content, and groundwater levels. Saturated soils usually require a wider trench in order to maintain a safe ditch and to avoid unstable trench walls. During clearing, sediment barriers, such as silt fence and staked straw bales, would be installed to minimize the potential for sediment runoff.

Fences and Grazing

Existing fences will be crossed or paralleled by the construction ROW. Before cutting any fence for pipeline construction, each fence would be braced and secured to prevent the slacking of the fence. To prevent any livestock from escaping, the opening in the fence would be closed temporarily when construction crews leave the area. If gaps in natural barriers used for livestock control are created by pipeline construction, the gaps would be fenced according to the landowner's requirements. All existing improvements, such as fences, gates, irrigation ditches, cattle guards, and reservoirs would be maintained during construction and repaired to preconstruction conditions (or better) upon completion of construction activities.

4.2.3. Aboveground Facilities Construction Procedures

Construction activities at each of the new pump stations would follow a standard sequence of activities: clearing and grading, installing foundations for the electrical building and support buildings, and erecting the structures to support the pumps and/or associated facilities. A block valve is installed in the mainline with two side block valves; one to the suction piping of the pumps and one from the discharge piping of the pumps. Construction activities and the storage of building materials would be confined to the pump station construction sites.

The sites for the pump stations would be cleared of vegetation and graded as necessary to create a level surface for the movement of construction vehicles and to prepare the area for the building foundations. Foundations would be constructed for the pumps and buildings and soil would be stripped from the construction footprint.

After the completion of startup and testing, the pump station sites would be graded and a permanent security fence would be installed around each pump station site.

Where delivery and pigging facilities are co-located with a pump station, facilities will be located entirely within the facility.

Intermediate MLV construction would be carried out concurrently with the construction of the pipeline. Wherever practical, intermediate MLVs would be located near public roads to allow year-round access. If necessary, permanent access roads or approaches would be constructed to each fenced MLV site.

Construction Workforce and Schedule

Workforce

Keystone proposes to begin construction of the Project during 2012, with a target in-service date of November 2013. Keystone anticipates a peak work force of approximately 4,000 construction personnel for the entire Project. Construction personnel would consist of Keystone employees, contractor employees, construction inspection staff, and environmental inspection staff.

Keystone is planning to build the Project in one construction spread (Spread 1) in Oklahoma. This spread is 156.2 miles in length; 138.8 miles of which are located within the ABB range in Oklahoma. The construction schedule may affect the final spread configuration, which may result in the need for additional but shorter spreads.

It is anticipated that 700 construction workers and up to 40 inspection personnel would be required for each construction spread. The spread would require 6 to 8 months to complete installation of the pipeline and reclamation of the ROW. Construction of new pump stations would require 20 to 30 additional workers at each site. Construction of all pump stations would be completed in 18 to 24 months.

Keystone, through its construction contractors and subcontractors, would attempt to hire temporary construction staff from the local population. Provided qualified personnel are available, up to 50 percent may be hired from the local work force for the spread. This may not be possible in more rural areas.

Schedule

Construction within the Plan Area is anticipated to begin in November of 2012 and be completed by late 2013.

4.2.4. Future Plans and Abandonment

No plans for abandonment of these facilities have been identified at this time. If abandonment of any facility is proposed in the future, abandonment would be implemented in accordance with applicable federal and state permits, approvals, codes, and regulations.

4.3. OPERATIONS AND MAINTENANCE

The Project's facilities would be maintained in accordance with 49 CFR 194, 49 CFR 195, and Project-specific special conditions recommended by PHMSA and agreed to by Keystone, and other applicable federal and state regulations. Operation and maintenance of the pipeline system would be accomplished by Keystone personnel.

An annual Pipeline Maintenance Program (PMP) would be implemented by Keystone to ensure the integrity of the pipeline. The PMP would include valve maintenance, periodic inline inspections, and cathodic protection readings. Data collected in each year of the program would be fed back into the decision-making process. Additionally, the pipeline would be monitored 24 hours a day, 365 days a year from the oil control center (located in Calgary, Canada) using leak detection systems and supervisory control and data acquisition. During operations, Keystone would have a Project-specific Emergency Response Plan (ERP) in place to manage a variety of events.

4.3.1. Normal Operations and Routine Maintenance

The pipeline would be inspected regularly via aerial and ground surveillance at a frequency consistent with 49 CFR 195 and the Project-specific special conditions. These surveillance activities would provide information on possible encroachments of nearby construction activities, erosion, exposed pipe, and other potential concerns that may affect the safety and operation of the pipeline. Evidence of population changes would be monitored and High Consequence Areas identified. MLVs would be inspected twice annually and the results documented.

In order to maintain accessibility of the permanent easement and to accommodate pipeline integrity surveys, woody vegetation along the pipeline permanent easement would be periodically cleared. Cultivated crops would be allowed to grow in the permanent easement. Trees would be removed from the permanent easement. Keystone would use mechanical mowing or cutting along its permanent easement for normal vegetation maintenance. Trees along the paths of areas where the pipe was installed via HDDs would not normally require any maintenance activities.

The ROW will be monitored to identify any areas where soil productivity has been degraded as a result of pipeline construction. Reclamation measures would be implemented to address any such concerns. Applicable reclamation measures are outlined in the CMR Plan (Appendix A).

Multiple overlapping and redundant systems would be implemented to ensure pipeline integrity and safety. These measures include (1) a quality assurance program for pipe manufacture and pipe coating, (2) fusion-bonded epoxy coating for pipe, (3) cathodic protection, (4) non-destructive testing of 100 percent of the girth welds, (5) hydrostatic testing to 125 percent of the MOP, (6) periodic internal cleaning and high-resolution in-line inspection, (7) depth of cover exceeding federal standards, (8) periodic aerial surveillance, (9) public awareness program, (10) Supervisory Control and Data Acquisition (SCADA) system, and (11) Operations Control Center (OCC) (with complete redundant backup) providing monitoring of the pipeline every 5 seconds, 24 hours a day, every day of the year.

SCADA facilities would be located at all remotely operated pump stations and delivery facilities. The pipeline SCADA system would allow the control center to perform the following functions:

- Remote reading of automated MLV positions;
- Remote starting and stopping at pump stations;
- Remote reading of tank levels;
- Remote closing and opening of automated MLVs;
- Remote reading of line pressure and temperature at all automated intermediate valve sites, at all pump stations, and at delivery metering facilities; and
- Remote reading of delivery flow and total flow.

The Project will have an OCC manned by an experienced and highly trained crew 24 hours per day every day of the year. A fully redundant backup OCC would be constructed and available as needed.

Real time information communication systems, including backup systems, will provide up-to-date information from the pump stations to the OCC plus the ability to contact field personnel. The OCC will have highly sophisticated pipeline monitoring systems and multiple leak detection systems.

4.3.2. Abnormal Operations

The preparation of manuals and procedures for responding to abnormal operations would comply with 49 CFR Section 195.402. Section 195.402(a) requires a pipeline operator to prepare and follow a manual of written procedures for conducting normal operations and maintenance activities and handling abnormal operations and emergencies. Section 195.402(d) (Abnormal Operation) requires the manual to include procedures to ensure safety when operating design limits have been exceeded.

SCADA and Leak Detection

Keystone proposes to utilize a SCADA system to remotely monitor and control the pipeline system. Highlights of Keystone's SCADA system would include:

- Redundant fully functional backup system available for service at all times;
- Automatic features installed as integral components within the SCADA system to ensure operation within prescribed pressure limits;

- Additional automatic features installed at the local pump station level would also be utilized to provide pipeline pressure protection in the event communications with the SCADA host are interrupted; and
- Pipeline is monitored every 5 seconds, 24 hours a day, every day of the year.

Keystone also would have a number of complimentary leak detection methods and systems available within the OCC. These methods and systems are overlapping to ensure early detection of leaks. The leak detection methods are as follows:

- Remote monitoring performed by the OCC Operator, which consists primarily of monitoring pressure and flow data received from pump stations and valve sites, by the Keystone SCADA system. Remote monitoring is typically able to detect leaks down to approximately 25 to 30 percent of pipeline flow rate.
- Software based volume balance systems that monitor receipt and delivery volumes. These systems are typically able to detect leaks down to approximately 5 percent of pipeline flow rate.
- Computational Pipeline Monitoring or model based leak detection systems that divide the pipeline system into smaller segments and monitor each of these segments on a mass balance basis. These systems are typically capable of detecting leaks down to a level of approximately 1.5 percent of pipeline flow rate.
- Computer based, non-real-time, accumulated gain/loss volume trending to assist in identifying low rate or seepage releases below the 1.5 to 2 percent by volume detection thresholds.
- Direct observation methods, which include aerial patrols, ground patrols, and public and landowner awareness programs that are designed to encourage and facilitate the reporting of suspected leaks and events that may suggest a threat to the integrity of the pipeline.

Emergency Response Plan

A Project-specific ERP will be prepared for the Project. The ERP will be submitted and approved by the Office of Pipeline Safety (OPS) and PHMSA prior to operation. A comprehensive ERP for the first Keystone Pipeline Project has been reviewed and approved by PHMSA. That ERP would be used as the basis for preparation of an ERP specific to the Project. When finalized, Keystone will submit the ERP to PHMSA for approval prior to commencing operations.

The National Response Center (NRC) would be notified immediately in the event of a release of crude oil that: (1) violates water quality standards, (2) creates a sheen on water, or (3) causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines (40 CFR 112). In addition to the NRC, timely notifications would also be made to other agencies, including the appropriate local emergency planning committee, sheriff's department, appropriate state agencies, the U.S. Environmental Protection Agency (EPA), and affected landowners. Keystone must provide immediate notification of all reportable incidents in accordance with 49 CFR Part 195, and will notify the appropriate PHMSA regional office within 24 hours of any non-reportable leaks occurring on the pipeline.

Under the National Contingency Plan, the EPA is the lead federal response agency for oil spills occurring on land and in inland waters. The EPA would evaluate (1) size and nature of a spill, (2) its potential hazards, (3) the resources needed to contain and clean it up, and (4) the ability of the responsible party or local authorities to handle the incident. The EPA would monitor all activities to ensure that the spill is being contained and cleaned up appropriately. All spills meeting legally defined criteria (see criteria above per 40 CFR 112) must be monitored by the EPA, even though most spills are small and cleaned up by the responsible party. In the unlikely event of a large spill, Keystone and its contractors would be responsible for recovery and cleanup. The usual role of local emergency responders is to notify community members, direct people away from the hazard area, and address potential impacts to the community such as temporary road closings.

A fire associated with a spill is relatively rare. According to historical data (PHMSA 2008), only about 4 percent of reportable liquid spills are ignited. In the event of a fire, local emergency responders would execute the roles listed above and firefighters would take actions to prevent the crude oil fire from spreading to residential areas. Local emergency responders typically are trained and able to execute the roles described above without any additional training or specialized equipment. Keystone would also work with emergency response agencies to provide pipeline awareness education and other support.

Remediation

Corrective remedial actions would be dictated by federal regulations and enforced by the EPA. Required remedial actions may range from the excavation and removal of contaminated soil to allowing the contaminated soil to recover through natural environmental processes (e.g., evaporation, biodegradation). Decisions concerning remedial methods and extent of the cleanup would account for state mandated remedial cleanup levels, potential effects to sensitive receptors, volume and extent of the contamination, potential violation of water quality standards, and the magnitude of adverse impacts caused by remedial activities.

In the event of a spill, several federal regulations define the notification requirements and response actions, including the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300), the CWA, and the Oil Pollution Act. At the most fundamental level, these interlocking programs mandate notification and initiation of response actions in a timeframe and on a scale commensurate with the threats posed. The appropriate remedial measures would be implemented to meet federal and state standards designed to ensure protection of human health and environmental quality.

4.4. MAINTENANCE SCHEDULES

Aerial patrols will be conducted over the restored ROW at least 26 times a year at intervals not to exceed 3 weeks. Personnel will drive to pump stations and MLVs periodically to perform maintenance on these facilities. Pipeline ROWs will be mowed periodically to control brush and woody vegetation.

5. ANALYSIS OF IMPACTS

5.1. EFFECTS TO COVERED SPECIES AND IMPACT ANALYSIS

In this HCP, we provide a detailed analysis of predicted impacts to ABBs and their habitat resulting from the Covered Activities. These impacts generally include direct mortality of the species as a result of ground disturbance during construction and operation of the Project, temporary and permanent loss of habitat, and long-term effects of the Project such as habitat fragmentation. Quantification of ground disturbance activities was accomplished using ArcGIS software and spatial data derived from construction plans and drawings. Using ArcGIS, we were able to accurately determine the amount of potential ABB habitat impacted in acres. Impacts were assigned to 2 categories; permanent, temporary. An additional category of impact includes permanent change in cover type. This impact is used to describe permanent conversion of forested habitat to open habitat in forested areas that are not currently fragmented.

These impact types represent permanent loss of ABB habitat and areas of the Project ROW and TWAs that will return to their original or better condition within 5 years, respectively. Further, these impacts were categorized into two geographic areas; the current ABB range in Oklahoma (based on counties with confirmed ABB occurrences) and (2) the conservation priority area which is an area within the ABB range in Oklahoma with well-documented populations of ABBs and relatively higher quality habitat.

With regard to analyses of impacts to ABBs, it is important to consider that the Applicant is also taking measures focused on reducing impacts on the ABB and its habitat. These measures include a variety of activities focused on reducing take during the construction and operational phases of the Project, as well as addressing various indirect and long-term Project impacts by restoring habitat disturbed during the construction process. These efforts are further discussed in Section 6.3.1.

Potential impacts to the ABB from the Covered Activities are discussed in the following sections. These impacts include those that directly impact individual ABBs as well as indirect effects relating to habitat loss, alteration, or fragmentation. It is important to address ABB impacts in light of the species' current conservation status. Historically, the species is thought to have been present and locally common in a large part of the eastern United States. During the 20th century, populations of ABBs experienced rapid declines. Currently, ABB populations occur in only a few scattered areas around the periphery of the former range (USFWS 1991).

Although ABBs use forested habitat, population densities seem to reach their maximum in areas that can be described as savannas or early successional stages of regenerating forested habitats. In other words, ABBs appear to prefer habitats containing a mix of open areas, scattered trees, and patchy areas of brush or small saplings. The ABB is neither a prairie specialist (such as *Nicrophorus marginatus*) nor a forest specialist (such as *N. orbicollis*) (USFWS 1991; Creighton et al. 1993; Ratcliffe 1996; personal observations by Dr. David Williams). Rather the ABB appears to mainly utilize patchy habitat or ecotones representing the interface of these general habitat types (Lomolino et al. 1995).

Many hypotheses have been presented to provide a causal mechanism for the ABB's decline. These hypotheses include conversion of habitat, habitat fragmentation, increased competition for carrion, soil

compaction, pesticide use, light pollution, fire ants, and extinction of the passenger pigeon (Sikes and Raithel 2002; Schnell et al. 2007). Other causes have been proposed as well. Most of the proposed causal factors relate to anthropogenic habitat alteration or disturbance (i.e., landscape level changes in land use practices). It is likely that several of these factors have contributed to declines in ABB populations and drastic reductions in their distribution. Unfortunately, most of these causal mechanisms are difficult or impossible to reverse. Efforts to conserve the species must take these factors into account. Effective conservation strategies should focus on both reducing impacts to existing populations and protecting existing habitat.

A primary direct effect to the ABB is loss of individuals due to mortality caused by soil disturbing activities such as clearing and grading. Another direct impact associated with construction is temporary disruption of behavior patterns which may result in effects such as abandonment of suitable reproductive habitat or exposure to predators. These impacts clearly may occur, however, the number of individuals affected is assumed to be low. For past projects, diversionary baiting (bait away) and trapping and relocating have been used to minimize direct impacts in areas confirmed to support ABBs by presence-absence surveys. The Service is currently reviewing the use of these measures to reduce take prior to soil disturbance. If recommended by the Service, Keystone would implement one or both of these measures. Currently, our planned efforts to reduce take during the construction phase include (1) removing carrion from ROW areas immediately prior to clearing, (2) limiting the amount of nighttime work requiring artificial lighting, (3) down-shielding all lights used around constructed facilities or contractor yards, and (4) educational programs for construction personnel.

Although several years of presence-absence survey data has been collected by the Service and other project proponents near the Plan Area, to our knowledge, no ABB population density map or data set is available to estimate take directly. Collection of data to estimate population densities would likely require a longitudinal study because populations vary spatially and temporally. Because of these and other constraints, no practical method for estimating direct mortality resulting from the Project is available. Although attempts to model ABB habitat are ongoing (Crawford and Hoagland 2010), these models cannot accurately predict ABB population densities.

Accurate estimation of permanent ABB habitat loss is a relatively simple process; however, the long-term and indirect effects of the Project are much more difficult to estimate. Certain types of impacts, such as construction of pump stations, would be clearly detrimental to ABBs because they involve permanent loss of potential habitat. The long-term habitat effects of linear projects such as pipelines and electrical transmission lines in already-fragmented rural landscapes are less easily quantified. Because Keystone has committed to restoring ROWs following construction (ripping to relieve soil compaction and re-establishment of native vegetation), permanent loss of habitat has been greatly reduced. These activities will most likely result in relatively better ABB habitat because soil compaction and a prevalence of non-native grass species are common in many habitats within the Plan Area.

Because restoration will prevent permanent loss of large areas of habitat within the Plan Area, the greatest concern with regard to long-term effects of the Project is habitat fragmentation. Prevailing viewpoints are based on the idea that linear projects fragment habitat and result in increased edge habitat which is unfavorable to ABBs (USFWS 1991). Fragmentation is thought to have a negative effect

on ABBs because it usually results in increased numbers of vertebrate scavenger species, which leads to increased competition for carrion (Kozol 1995; Ratcliffe 1996; Amaral et al. 1997; Bedick et al. 1999) and direct predation by some of these vertebrate scavengers (Jerzenski and Hoback 2011). This is thought to directly interfere with the ABB's ability to feed and reproduce. Additionally, fragmentation can reduce the carrion prey base of appropriate size for ABB reproduction (Oxley et al. 1974) or increase invasive plant and animal species (Marvier et al. 2004).

Undoubtedly, fragmentation of large blocks of native habitat causes shifts in species composition and population levels. Certain species (i.e., skunks, opossums, coyotes) thrive in these habitats and likely compete directly with ABBs for carrion and, in limited opportunistic instances, may prey directly on ABBs. These effects are well-supported in the scientific literature; however, relatively little is known about the effects of projects that increase edge in habitat that is already fragmented. The prevailing viewpoint, although based on sound ecological theory, is most likely not applicable to projects that primarily create relatively narrow linear corridors across habitat that is naturally comprised of a patchy mosaic of plant communities and is already fragmented by numerous other linear corridors such as roads, transmission lines, and pipelines. More succinctly stated, the creation of additional edge in landscapes that are already fragmented does not necessarily lead to adverse impacts to the species.

For example, some of the highest ABB population levels on record occur at Fort Chaffee, Arkansas. ABBs clearly thrive under the habitat conditions present at the installation. Examination of habitats and levels of anthropogenic disturbance at the base can provide important information relative to long-term effects of habitat fragmentation on ABBs. Fort Chaffee has been impacted by habitat fragmentation in a pattern similar to that caused by pipeline projects, roads, and other land uses in the Plan Area. The base historically supported a patchy landscape comprised of upland forests, riparian forests, savannas, and prairies (a plant community structure similar to that of the Plan Area). The base now features a network of interior roads, firebreaks, maintained pipeline ROWs, firing ranges, and other training facilities. Habitats are also seasonally disturbed due to military training (including use of heavy mechanized equipment) and controlled burns which are conducted periodically. Given the high ABB population present, it is clear that habitat fragmentation and moderate anthropogenic disturbance alone are not likely to be limiting factors for the species.

Other characteristics of habitats at Fort Chaffee may be even more informative when considering the long-term effects of linear projects on ABB habitat. Most of Fort Chaffee (excluding the Cantonment Area) does not feature permanent human habitation, large areas illuminated by exterior lights, row crop agriculture, or cattle grazing. The base does support healthy populations of birds and small mammals, areas with suitable soils, and plant communities dominated by native species. Because the habitat is fragmented, it is likely that other habitat characteristics outweigh any negative effects relating to habitat fragmentation. Thus, the context in which habitat fragmentation occurs, rather than the fragmentation itself, appears to be an important factor which should be considered when analyzing the long-term effects of the Project. This information suggests that the effects of habitat fragmentation and other types of short duration anthropogenic disturbance alone do not necessarily lead to declines in ABB populations.

Fortunately, only limited amounts of additional habitat fragmentation will occur within the Plan Area (Figure 5). Most of the ROW crosses a landscape that was historically comprised of a patchy mosaic of forests, prairies, and savannas. Although plant community structure has been altered on a large scale, it continues to be comprised of a patchy mosaic of habitat types. In order to estimate the extent of habitat fragmentation that would result from the Covered Activities, high resolution aerial imagery was used to identify large, contiguous blocks of forested habitat that would be bisected by the ROW. Habitat fragmentation is assumed to not increase in areas where the ROW crosses open or scrubby habitat or where the ROW is co-located along existing ROWs, roads, or other interruptions in habitat.

In situations where accurate assessment of take or long-term effects is impractical or impossible, the Service has allowed project proponents to mitigate for impacts by using acres of habitat impacted as a proxy for individuals taken. The impact analysis presented in this HCP addresses impacts resulting from both the construction and operational phases of the Project. Impacts include direct impacts on ABBs such as mortality or disruption of behavior. Indirect impacts such as alteration or fragmentation of habitat are also addressed. Habitat impacts have been categorized as permanent and temporary for the purpose of quantification.

Use of Acres Impacted as a Proxy for Take

Measuring or accurately estimating the number of ABBs that may be taken is impractical because (1) the species is primarily active at night, (2) spends a large portion of its life underground, (3) has populations that vary temporally and spatially, and (4) direct observation of injured or killed ABBs is unlikely because they would be crushed or buried under soils. Furthermore, no practicable method for measuring take has been published. In situations where measuring or accurately estimating take is impracticable, the Service has agreed to an approach using acres of habitat impacted as a proxy for take.

A discussion of various impacts resulting in expected take of the species was considered during the development of this HCP.

5.1.1. Direct and Indirect Impacts to ABB

The Plan Area addressed in this HCP is comprised of the ABB range in Oklahoma. Land use and land cover in the Plan Area can be described as “patchy” and comprised of agricultural lands, improved grass pastures, native prairie, savannas, small woodlots, riparian forests, and forested uplands. The entire area features scattered residences, small urban areas, and numerous roads, pipelines, and transmission line ROWs. ABB habitat quality within these counties varies considerably. Similarly, ABB population density varies spatially and temporally within the Plan Area. A discussion of Covered Activities that may result in direct and indirect impacts to ABBs is provided in the following sections.

5.1.1.1. Construction Phase

Mortality of adult, larvae, and eggs of ABBs is likely to result from Covered Activities, especially during the construction phase. This phase of the Project will involve clearing ROW with heavy mechanized equipment, excavation of trenches for installation of pipe, building access roads, construction of pump stations, and various other ground disturbing activities as described in Section 4 of this document. This

phase of the Project will have a greater likelihood of causing direct mortality to ABBs when compared to the operation and maintenance phase. Similarly, increased human activity and other habitat effects, such as decreased soil moisture during the construction phase, will likely impact ABB behavior.

Mortality of Adults, Larvae, and Eggs

Death of ABBs at various life history stages may result from Covered Activities. During the ABB active period (late May through late September), adults which are not reproducing typically spend daylight hours buried in soils or leaf litter near the surface. Adults become active during hours of darkness and seek sources of carrion for feeding and potential reproductive sites. Sources of carrion can include birds, small mammals, and snakes (Bedick, Ratcliffe, and Higley 2004). When reproducing, ABB pairs bury a carcass and excavate a brood chamber several inches below the soil surface. The brood chamber houses eggs and developing larvae. The carcass provides a food source to nourish ABB offspring. Because a large part of the ABB's lifecycle takes place underground, areas suitable for burying (e.g., loose, sandy loam soils) are generally preferred over other soil types. Newly eclosed adults emerge from the brood chamber, disperse, and feed on carrion prior to overwintering buried a few inches below ground. Because of their unique life history, ABBs spend a large amount of time relatively immobile and buried a few to several inches below the soil surface.

Crushing or Exposure of Individuals or Brood Chambers by Construction Equipment

Although ABBs are robust beetles, they are susceptible to death or injury by crushing at all stages of their life cycle. This is particularly likely when vehicles and heavy equipment are operating in areas inhabited by reproducing ABBs. Adults that are not reproducing and are sheltering in soils or leaf litter during the day may be killed or injured by crushing. Clearing of ROW, excavation of trenches and similar ground disturbing activities may destroy brood chambers and adults, eggs, and larvae contained within by crushing. Mortality for ABBs in all of these life stages is possible, although quantification of take would be almost impossible. Similarly, uncovering or digging into or near brood chambers may result in exposure of the brood chamber and/or ABBs inside resulting in mortality caused by desiccation, heat stress, and/or predation by various scavengers and small mammals.

Fuel Spills

Heavy equipment used to construct the Project will require refueling at various times. Although unlikely, death of ABBs could result from fuel spills. Fuels such as diesel and gasoline could result in mortality of ABBs if the spill were to occur at a brood site or where adult (non-reproducing) ABBs were sheltering or overwintering. Construction BMPs will be used to minimize or avoid this hazard; however, the possibility of mortality resulting from fuel spills cannot be eliminated from consideration.

Behavior Disruption

ABBs may also be adversely affected by disruptions of their normal behavior resulting from increased human activity, vehicle traffic, noise, and use of artificial lighting for work taking place at night. Similarly, reductions in soil moisture and increases in soil temperature resulting from clearing and grading may

cause ABBs to alter their behavior patterns to avoid these areas. The effects of such disruption are not well-understood.

Increased Human Activity, Vehicle Traffic, and Noise

Although the behavior of ABBs is not completely understood, it is prudent to acknowledge that they may be (at least to some degree) adversely affected by intense human activity, elevated levels of vehicle traffic, and excessive noise. It is difficult to predict whether this effect would be positive or negative. It is possible that increased human activity could lead to a decrease in direct mortality because ABBs may abandon the area. An alternative viewpoint would be that human activity would result in negative effects because displacement of individual ABBs from the Plan Area may result in an increase in interspecific competition for resources as ABBs attempt to utilize new areas and a potential increase in exposure to avian and mammalian predators. Such effects are difficult to quantify and describe. Effects from these activities are expected to be minor and for a short duration, however. These disruptions should be considered temporary effects during the construction phase and would therefore be unlikely to have any long-term negative effect on the species.

Decrease in Soil Moisture and Increase in Soil Temperature

Clearing of vegetation and grading ROWs exposes soils to sun and wind and thereby may result in decreased soil moisture and elevated soil temperature. ABBs are known to be sensitive to changes in soil moisture and high temperature (Bedick et al. 2006). ABBs apparently seek out areas with relatively higher soil moisture and may cope with elevated air temperatures by remaining inactive and buried in soil. In some situations, mortality of ABBs could be caused by reduction of soil moisture and elevated temperature in areas near sheltering, brooding, or overwintering areas. Grading and clearing of ROWs therefore may result in mortality or temporary behavioral changes which may directly or indirectly adversely affect the ABB.

Disruption of Behavioral Patterns Caused by Artificial Lighting

ABBs, like many insects, are attracted to artificial lights (Bedick et al. 1999). This attraction may disrupt their normal feeding and reproductive behavior. In some instances, portions of the Project may be constructed at night. Construction at night would require supplemental lighting as well as use of vehicle mounted lights. Such uses of artificial light may result in temporary adverse impacts to the species by disrupting behavior. Disruption in behavior could expose the species to increased mortality by predation.

5.1.1.2. Operations and Maintenance Phase

The operations and maintenance phase of the Project will have a relatively lesser likelihood of directly impacting individual ABBs resulting in mortality, injury, or changes in behavioral patterns. Because the ROW will be restored following construction, there is a strong likelihood that ABBs will return to the Project area after the restoration phase is complete. One aspect of the operational phase that is not well-understood is the effect of increased soil temperatures caused by flowing oil through the pipeline. Evidence suggests that the transport of oil through the pipeline creates heat that is dissipated through

the soil to the ground surface. The TQUEST geothermal model was used to predict soil temperature changes at the ground surface and at various depths and distances from the center of the pipeline (Hazen 2011). Based on conversations with the Service and conclusions of this study, the effect of elevated soil temperatures is not likely to have any adverse effect on ABBs in the Plan Area. This effect is however believed to have a greater impact on ABBs in more northern latitudes. For the Plan Area, the effect of soil heating by the operational pipeline is generally agreed to be negligible.

Mortality of Adults, Larvae, and Eggs

The likelihood for mortality caused by crushing will be drastically reduced during the operation and maintenance phase of the Project. Vehicle traffic and other human activity will be limited to routine maintenance at various above-ground facilities and emergency repairs (as needed) along other parts of the ROW.

Crushing or Exposure of Individuals or Brood Chambers by Construction Equipment

Potential crushing of individual ABBs and disturbance or destruction of brood chambers would be limited to locations along the pipeline in need of repair. Since use of heavy equipment and excavation will be limited, the possibility for mortality caused by crushing will be greatly reduced. Such events are predicted to be infrequent over the timeframe of the Permit.

Crude Oil Spills

To the best of our knowledge, scientific literature addressing effects of crude oil spills on ABBs is unavailable. Our assumption is that crude oil spills would have a negative impact on ABBs. Mortality would almost certainly result from individuals or brood chambers being immersed in or exposed directly to crude oil. Impacts from spills are considered to be a remote possibility. However, potential impacts to ABBs during the cleanup phase of an oil spill are also a possibility. Emergency cleanup of a spill, if required, could involve use of heavy mechanized equipment and soil disturbance (i.e., removal of contaminated soils). This could result in mortality of ABBs from crushing. Reduction or elimination of spills has been addressed via engineering and design elements focused on reduction of that risk.

Effects on Behavior

The effect of the Project on ABB behavior during the operations and maintenance phase is also difficult to quantify. While the Project may result in an increase in ABB habitat quality in portions of the Project area (ROWS will be ripped to relieve soil compaction and re-vegetated following construction), they will also create increased edge habitat in certain areas. As discussed earlier, the effects of increased edge along certain portions of the ROW are difficult to estimate. Increased edge would mainly occur where the ROW crosses large forested areas (some areas the Project would be built parallel and immediately adjacent to existing pipeline ROWs or roads). Edge effects in open and semi-open habitats likely would have less adverse impacts when compared to increased edge in forested habitats. Additional edge would not be created in cleared areas, areas with savanna like conditions, or areas that are immediately adjacent to other ROWs.

Increased Edge Habitat

Fragmented areas by definition have larger amounts of edge habitat relative to large tracts of unfragmented habitat. Areas of increased edge often support large populations of small mammal scavenger species such as skunks, raccoons, foxes, and coyotes (Wilcove et al., 1986). These mammals are thought to (1) compete with ABBs for carrion and (2) opportunistically prey directly on ABBs. Additionally, fragmentation can reduce the carrion prey base of appropriate size for ABB reproduction (Oxley et al. 1974) or increase invasive plant and animal species (Marvier et al. 2004).

Disruption of Behavioral Patterns Caused by Artificial Lighting

The use of artificial lights will be reduced or eliminated from the Project area during the operation and maintenance phases. Lights at above-ground facilities will be down-shielded and only installed at the three pump station locations. Other artificial lights along the Project ROW would only occur in the event of emergency repairs or other unexpected maintenance activities.

5.1.2. Habitat Impacts

5.1.2.1. Temporary Habitat Loss

The Project will result in temporary loss of ABB habitat. Construction activities will result in (1) increased human activity, traffic, and noise, (2) reduction in soil moisture, (3) increase in soil temperature by removal of vegetation and increased exposure to sunlight, (4) removal of topsoil, and (5) use of artificial lighting. These impacts are considered temporary because the Project ROW will be restored following construction activities and minor local increases in human development or activity are expected to result from the Project.

5.1.2.2. Permanent Habitat Loss

The Project will also result in a limited amount of permanent habitat loss. This includes conversion of habitat at above-ground facilities such as pump stations, MLVs, and new permanent access roads. This impact, expressed in acres, represents a relatively small percentage of the entire Project footprint.

Habitat Fragmentation

As discussed previously, the effects of additional habitat fragmentation resulting from pipeline construction and operation in habitats that are already fragmented are not well-understood. Because the Project ROW crosses large areas of previously fragmented habitats, effects of habitat fragmentation would be greatest in areas that are currently not fragmented. Since the Project ROW and TWAs will be restored following construction, the only permanent habitat fragmentation resulting from the Covered Activities would be those associated with cleared corridors through forested areas that have not already been fragmented as agreed to with the Service. For quantification purposes, we examined recent aerial imagery to delineate areas where the ROW will cross uninterrupted blocks of forested habitat. We did not include areas of the ROW that are co-located parallel to existing pipelines, roads, or other cleared areas. Increased edge would not result in most of the Plan Area because the majority of these areas are

either (1) already fragmented due to anthropogenic disturbance or (2) naturally “fragmented” because they are comprised of a mosaic of forest, savanna, and prairie areas.

5.1.2.3. *Habitat Delineation Method*

Based on information presented in the preceding sections, it is clear that estimates of take of individual ABBs resulting from Covered Activities are impractical. We have presented all potential direct and indirect effects on the species that we anticipate. It is clear that take of the species may occur and that some habitat will be permanently lost, altered, or affected by fragmentation. We propose an approach that uses habitat impacts as a proxy for take. For the purposes of habitat delineation, the Service has identified an ABB conservation priority area (CPA) within the ABB range in Oklahoma (Figure 2). The CPA was delineated by the Service and is based on habitat quality, survey data, and general habitat models. Impacts were categorized as temporary, permanent cover change, and permanent. GIS layers were developed in order to quantify impacts based on impact type (temporary or permanent) and by geographical area (ABB range in Oklahoma and conservation priority area).

ABB Range in Oklahoma

The ABB range in Oklahoma is comprised of areas of the State known to support ABBs. This range is based on counties with confirmed ABB occurrences. The boundaries of the ABB range in Oklahoma are mapped using county boundaries (i.e., if a county has a confirmed ABB occurrence the entire county is considered to be within the ABB range). The Plan Area within the ABB range in Oklahoma includes portions of Atoka, Bryan, Coal, Creek, Hughes, Okfuskee, and Seminole counties (Figure 2).

Conservation Priority Area

The CPA is comprised of those portions of the Plan Area supporting high quality habitat or known populations of ABBs (Figure 2). This area was designated by Service biologists at the Oklahoma Field Office. Project impacts in the CPA portion of the Plan Area are anticipated to have a larger effect relative to impacts in the ABB range in Oklahoma due to the higher quality of habitat and more intensive use by ABBs within the CPA.

Summary of Permanent and Temporary Habitat Impacts

The following summary table (Table 4) quantifies permanent and temporary impacts by CPA and the ABB range in Oklahoma. Permanent change in cover type from forested to open habitat is expressed in acres of permanently altered cover type and miles of habitat fragmentation in forested areas that are not already fragmented.

Table 4: Impact Analysis for the ABB CPA and the ABB Range in Oklahoma

CONSTRUCTION IMPACT	CONSERVATION PRIORITY AREA (CPA) (acres)	ABB RANGE IN OK (acres)
PERMANENT IMPACTS		
Access Roads	0.44	0.61
Pump Stations	16.38	10.25
MLVs	0.40	0.27
TOTAL:	17.22	11.13
TEMPORARY IMPACTS		
Access Roads	4.11	11.99
Contractor Yards	39.18	--
TWAS	96.84	68.45
Permanent Easement	492.70	309.25
Pipe Yards	124.01	--
Rail Sidings	24.00	--
Shoofly Roads	0.99	0.91
Temporary Easement	580.78	365.24
TOTAL:	1,362.62	755.83

NOTE: For ease of calculating mitigation in different areas, this table does not include CPA areas in the ABB range. In addition, areas that are obviously unsuitable as habitat have been removed. The corresponding table in the EA (Table 2.3.3) includes the total number of acres, regardless of suitability for ABBs.

5.1.2.4. Total Direct and Indirect Habitat Impacts

Table 4 presents quantification of the total direct and indirect impacts on ABBs resulting from the Project. Habitat categorized as within the ABB range in Oklahoma and CPA was used as a proxy for estimates of take. The ABB range in Oklahoma and CPA data were supplied by the Service.

This impact results in:

- 17.22 acres of permanent habitat loss in the CPA
- 1,362.62 acres of temporary habitat loss in the CPA
- 28.98 acres of permanent change in cover type in the CPA (4.78 miles of fragmentation in forested areas)

- 11.13 acres of permanent habitat loss within the ABB range in Oklahoma (excluding CPA)
- 755.83 acres of temporary habitat loss within the ABB range in Oklahoma (excluding CPA)
- 6.15 acres of permanent change in cover type within the ABB range in Oklahoma (1.02 miles of fragmentation in forested areas) (excluding CPA)

5.2. FINAL PRECONSTRUCTION IMPACT ASSESSMENT

The assessment of impacts presented in this HCP is conservative in favor of the ABB. For example, the impact analysis presented in the previous section is based on the assumption that the entire plan area (with the exception of wetlands, surface water features, roads, and developed areas) currently supports ABB populations. We have accounted for all ground disturbing activities within the Plan Area and treated these as such. For this reason, the impacts set forth in this document represent the outer bounds of impacts to the species.

Current USFWS approved-methodology includes the use of presence-absence surveys to confirm ABB occupation of areas prior to ground disturbance activities. Keystone is currently in the process of planning this survey effort. Presence-absence surveys are tentatively scheduled to begin on August 13, 2012. This effort will consist of conducting 3-night surveys at approximately 137 survey sites within the Plan Area (3 sites associated with pump stations were already surveyed during 2012). These surveys will provide current documentation concerning which portions of the Plan Area actually support ABB populations at this time. Positive surveys will not add to the impacted area as presented in this HCP because of the assumption stated above; negative surveys, if they occur, will be used as the basis for reducing the amount of acreage impacted. Since the effective survey radius is 0.5 miles, 1 mile of impacts would be deducted for each negative survey location. Once the presence-absence surveys are completed and validated by the Service, Keystone will provide an updated impact table which will represent the final project impacts.

Presence-absence surveys conducted during the active season (May 20 – September 20) of one year are only valid until the beginning of the next active season. Because of this, any areas with additional soil disturbance after May 20, 2013 would require additional surveys and/or mitigation. Additional soil disturbance would include (1) construction involving ground disturbance after May 20, 2013 and (2) any maintenance or repair requiring ground disturbance in restored areas after the 5-year period of temporary impacts. The take associated with such additional disturbance has been included in the total amount of take requested.

5.3. EVALUATION SPECIES EFFECTS AND IMPACT ANALYSIS

Bald Eagle (*Haliaeetus leucocephalus*)

Direct and Indirect Impacts

The primary construction impacts would be disturbance of bald eagle habitat. Bald eagles in the Plan Area primarily hunt in aquatic habitats, although they could hunt in nearly any open habitat available.

The Covered Activities will largely be restricted to upland habitats. Only minimal loss of bald eagle habitat is expected from the Covered Activities.

The bald eagle is known to use reaches of the North Canadian River, South Canadian River, and Red River. No direct impacts to eagle nesting habitat are anticipated at these locations since river crossings would be completed using HDD. Minimal hand clearing of vegetation and human access would be required within the riparian areas of these rivers.

One active bald eagle nest, located approximately 1,203 feet west of the Project ROW, was identified during nesting surveys conducted for the Project during 2011 and 2012. This nest is located adjacent to the North Canadian River and, at its shortest length, has over 400 feet of mature deciduous forest separating it from the ROW. All major stream crossings will be completed by the HDD method which will also leave most of the riparian habitat intact.

Aerial surveillance would be conducted 26 times per year or no greater than once every 3 weeks. The aircraft will fly over an area at an altitude of about 1,000 feet during aerial patrols. Indirect impacts during aerial and ground surveillance are unlikely to disturb bald eagles during nesting periods.

The Covered Activities are not expected to result in harassment of any non-nesting bald eagles that may occur in the Plan Area. Because non-nesting eagles are fully mobile, they would be capable of avoiding any activities they perceive as a threat.

Only minimal indirect impact from habitat disturbance is expected. The Project is not expected to cause bald eagles to abandon any habitats that they might currently be using for hunting, nesting, or roosting. Clearing of woody vegetation from the ROW is not expected to decrease the amount of habitat available for eagles to use for hunting because the species typically hunts in aquatic and other open habitats (Campbell 2003). Any increase in the amount of open habitat available to eagles to use for hunting that may result from the clearing of ROW is expected to result in neutral or negligibly beneficial effects on the species.

Cumulative Impacts

A review to identify non-federal projects or activities in the vicinity of the Project was completed by searching publicly available sources, internet news announcements, permit application filings, and agency provided information. No future state, local, or private actions that are reasonably certain to occur in the Plan Area have been identified for the Project.

Conservation Measures

Keystone will notify all personnel performing Covered Activities within 1.3 miles of a bald eagle nest. They will be provided with training on how to identify bald eagles and instructed to avoid the nest and conduct their work as quickly and quietly as possible.

If any bald eagle nests are found within 600 feet of the ROW, Keystone will deploy a biological monitor to observe the eagles while construction activities are performed. To ensure that no harassment to eagles occurs, the biological monitor will halt construction if a bald eagle is seen to approach an activity that could present a hazard to the bird, or if construction activities appear to be preventing the eagles

from regularly attending the nest. In order for the latter determination to be made, the monitor will be deployed at least two days prior to the commencement of construction activities so that general eagle activity patterns can be established.

Effects to Bald Eagle

No impacts to the bald eagle or significant impacts to their habitat are anticipated.

Least Tern (*Sterna antillarum*)

Direct and Indirect Impacts

The primary construction impacts to least terns would be disturbance and potential exposure to fuel spills from construction machinery. The chance of construction related spills within least tern habitat is minimal because, according to Keystone's CMR Plan (Appendix A), hazardous materials, chemicals, fuels, and lubricating oils would not be stored, staged, or transferred (other than possible refueling) within 100 feet of any surface water feature, wetland, storm drain, drop inlet, or high consequence area. Refueling and lubrication of construction equipment would generally be restricted to upland areas at least 100 feet away from streams and wetlands. Where this is not possible, the equipment would be fueled by designated personnel with special training in refueling, spill containment, and cleanup. Keystone would mark and maintain a 100 foot area from these river crossings (a 300 foot area would be marked and maintained at the South Canadian River) free from hazardous materials, fuel storage, and vehicle fuel transfers. If interior least terns are found at these crossings, Keystone would adhere to the 0.25 mile buffer of no construction activity until young have fledged.

During the 2008 surveys, interior least terns were observed foraging at the Red River and the South Canadian River, but were not present at the North Canadian River. Currently, construction activities, including the HDD crossings of the North Canadian, South Canadian, and Red Rivers are scheduled to occur between November 2012 and April 15, 2013, which is outside of the timeframe when least terns are present at these river crossings. No direct impacts to least tern breeding habitat are anticipated at these locations, since pipeline placement across the rivers would be completed by the HDD method. Minimal hand clearing of vegetation and limited human access would be required within the riparian areas. Hydrostatic test water will not be withdrawn from the South Canadian River.

In the event construction related activities occur after April 15 at these surface water features, Keystone would conduct presence/absence surveys to identify occupied breeding territories and/or active nest sites to avoid impacts to this species. If occupied breeding territories and/or active nest sites are identified, the Service would be notified and appropriate protection measures would be implemented on a site-specific basis. These measures should limit any impacts to this species resulting from construction activities, increased noise, and human presence at work site locations.

Similar constraints and/or mitigation measures detailed above may apply to pipeline maintenance activities. It is highly unlikely that a leak in the pipeline would occur near these locations when least terns were present. In the event of a leak, crude oil would likely be contained by the soil covering it,

thereby reducing the risk of crude oil reaching the river. MLVs will be placed on both sides of crossings to shut off the flow of oil in the case of a spill.

Direct contact with crude oil could result in adverse effects to interior least terns due to oiling of plumage, ingestion of crude oil from contaminated plumage and prey, and transfer of crude oil to eggs and young. While this type of exposure has the potential to cause adverse effects to individuals, the probability of adverse effects to interior least terns is unlikely.

Aerial surveillance would be conducted 26 times per year or no greater than once every 3 weeks and the aircraft will fly over an area at an altitude of about 1,000 feet during those aerial patrols. Aerial and ground surveillance are unlikely to disturb terns during migration periods at stopover locations.

Cumulative Impacts

A review to identify non-federal projects or activities in the vicinity of the Project was completed by searching publicly available sources, internet news announcements, permit application filings, and agency provided information. No future state, local, or private actions that are reasonably certain to occur in the Plan Area have been identified for the Project.

Conservation Measures

Pre-construction surveys would occur within 0.25 mile from suitable breeding habitat at the North Canadian River and South Canadian River in Oklahoma and the Red River at the Oklahoma/Texas border, prior to any construction-related activities occurring at these rivers after April 15.

Construction would not be permitted within 0.25 mile from an occupied nest site during the breeding season or until the fledglings have left the nesting area.

Effects to Least Tern

Effect on Critical Habitat:

No critical habitat has been designated for this species. Therefore, the Project would have no impact on critical habitat for the interior least tern.

Effect on the Species:

The Project is not likely to adversely affect the interior least tern. This conclusion is based on Keystone's plan to HDD the North Canadian River, South Canadian River, and Red River, coordination with the Service, and Keystone's commitment to follow recommended conservation measures from the Service.

Piping Plover (*Charadrius melodus*)

Direct and Indirect Impacts

The primary construction impacts to piping plovers would be disturbance and potential exposure to small fuel spills and leaks from construction machinery. The chance of construction related spills within piping plover habitat is minimal. According to Keystone's CMR Plan (Appendix A), hazardous materials, chemicals, fuels, and lubricating oils would not be stored, staged, or transferred (other than possible

refueling) within 100 feet of any surface water feature, wetland, storm drain, drop inlet, or high consequence area.

All river crossings that provide migration stopover habitat for the piping plover (North Canadian River, South Canadian River, and Red River) would be performed using HDD, which poses a small risk of spills of drilling fluids. Drilling fluid spills are rare and are contained by the BMPs that are described within the HDD Contingency Plans required for drilling crossings. No direct impacts to the piping plover or piping plover migration habitats are anticipated from the construction and operation of the Project.

Indirect impacts could result from migrating individuals being flushed from the Plan Area during construction related activities. Since piping plovers are highly mobile, it is anticipated that individuals would move to other suitable resting and foraging habitats elsewhere in the area. Potential impacts from encountering and flushing a migrating piping plover from the Plan Area would be negligible. Habitat loss from construction would be negligible since the major rivers would be crossed using the HDD method.

There are no known occurrences of piping plovers nesting within the Plan Area. Indirect impacts during aerial and ground surveillance are unlikely to occur to migrating piping plovers at stopover locations. Aerial surveillance is conducted 26 times per year at intervals no greater than 3 weeks and the aircraft will fly over an area at an altitude of about 1,000 feet during those aerial patrols.

A spill resulting from a leak in the pipeline is unlikely to affect the piping plover. The major rivers that contain suitable habitat for migrating piping plovers would be crossed by HDD. In the unlikely event of a leak, crude oil would likely be contained by overburden before reaching the river, thereby reducing the risk of crude oil reaching the river and the potential for piping plover exposure. MLVs will be placed on both sides of crossings to shut off the flow of oil in the case of a spill.

Direct contact with a crude oil spill could result in adverse effects to piping plovers due to oiling of plumage or ingestion of crude oil from contaminated plumage and prey. While these exposure routes have the potential to cause adverse effects to individuals, the probability of adverse effects to piping plovers are unlikely due to (1) the low probability of a spill, (2) the low probability of the spill coinciding with the presence of piping plover individuals, and (3) the low probability of the spill reaching a major river in sufficient amounts to cause toxic effects. The magnitude of spill effects varies with multiple factors, the most significant of which include the amount of material released, the size of the spill dispersal area, the type of spills, the species assemblage present, climate, and the spill response tactics employed.

Aerial surveillance would be conducted 26 times per year or no greater than once every 3 weeks and the aircraft passes by an area quickly at an altitude of about 1,000 feet during those aerial patrols. Indirect impacts during aerial and ground surveillance are unlikely to disturb plovers during migration periods at stopover locations.

Cumulative Impacts

A review to identify non-federal projects or activities in the vicinity of the Project was completed by searching publicly available sources, internet news announcements, permit application filings, and

agency provided information. No future state, local, or private actions that are reasonably certain to occur in the Plan Area have been identified for the Project.

Conservation Measures

The Service has recommended that if this species is observed in close proximity to the ROW during construction, its presence would be documented.

Effects to Piping Plover

Effect on Critical Habitat:

Critical habitat is not currently designated for this population. Critical habitat for wintering piping plovers on the barrier islands outside of Galveston Bay, Texas are outside of the Plan Area. Therefore, the Project would have no impact on critical habitat for the piping plover.

Effect on the Species:

The Project is not likely to adversely affect the piping plover. This conclusion is based on Keystone's construction plan to HDD the North Canadian River, South Canadian River, and Red River, coordination with the Service, and Keystone's commitment to follow recommended conservation measures from the Service.

Whooping Crane (*Grus americana*)

Direct and Indirect Impacts

The primary construction 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 because according to Keystone's CMR Plan (Appendix A), hazardous materials, chemicals, fuels, and lubricating oils would not be stored, staged, or transferred (other than possible refueling) within 100 feet of any surface water feature, wetland, storm drain, drop inlet, or high consequence area.

No direct impacts to the whooping crane are anticipated from the construction of the Project. Suitable roosting and/or foraging habitats occur within the Plan Area at major river crossings including the North Canadian River, South Canadian River, and Red River. Habitats at these rivers would be crossed by HDD, so potential habitat loss, alteration, or fragmentation would be negligible. Based on the current migration pathway of this species, potential occurrence within or near the Plan Area could occur but would be extremely rare and would be limited to a few individuals or small groups of migrant birds (CWS and USFWS 2007).

Indirect impacts could result from migrating individuals being disturbed and displaced due to noise and human presence during construction, if it were to occur during spring or fall migrations.

Because Keystone proposes to use a small volume of water in comparison to the daily flow rate of the stream, and would return that water to the same source after hydrotesting, water use is unlikely to affect the amount of roosting or foraging habitat along the rivers used by whooping cranes.

Normal operation of the pipeline would not be expected to affect the whooping crane or habitats used during migration. Pipeline surveillance would involve routine low-level aerial flights 26 times per year or no less than every 3 weeks and/or ground based inspections once per year. Over flights during migration periods would have the potential to disturb whooping cranes during migration. To minimize this disturbance, pilots will be advised to coordinate with the Service to ensure that fly-overs do not occur when whooping cranes are in the Permit Area. Most over flights would normally be during late-morning or mid-day at an altitude of about 1,000 feet. Maintenance inspections that would require external examination of the pipeline would be unlikely to coincide with crane roosting or foraging habitats, but would have the potential to disturb migrant cranes.

Roosting habitats at rivers crossed by the HDD method would typically have 20 feet or more of overburden between the pipeline and river bottom. Therefore, heat dissipated from the pipeline would not affect riverine roosting habitats.

Direct contact with a crude oil spill could result in adverse effects to whooping cranes due to oiling of plumage and ingestion of crude oil from contaminated plumage and prey. While these exposure risks have the potential to cause adverse effects to individuals, the probability of adverse effects to whooping cranes are unlikely due to (1) the low probability of a spill, (2) the low probability of the spill coinciding with the presence of migrating whooping cranes or migration habitats, and (3) the low probability of a whooping crane contacting the spilled product. In the unlikely event of a pipeline leak, the crude oil would need to penetrate this significant amount of overburden before reaching the river, thereby reducing the risk of crude oil reaching the river. MLVs will be placed on both sides of crossings to shut off the flow of oil in the case of a spill. Further, if a significant spill event were to occur, federal and state laws would require cleanup.

Cumulative Impacts

A review to identify non-federal projects or activities in the vicinity of the Project was completed by searching publicly available sources, internet news announcements, permit application filings, and agency provided information. No future state, local, or private actions that are reasonably certain to occur in the Project area have been identified for the Project.

Conservation Measures

During spring and fall whooping crane migration periods, biological monitors would complete a brief survey of any wetland or riverine habitat areas potentially used by whooping cranes. If whooping cranes are sighted the biological monitor would contact the Service to coordinate avoidance measures. The Service would notify Keystone if whooping cranes are within the construction area through information gathered from the whooping crane tracking program.

Effects to Whooping Crane

Effect on Critical Habitat:

Designated critical habitat for the whooping crane is located at the Salt Plains National Wildlife Refuge in western Oklahoma which is well outside of the Plan Area. Therefore, the Project would have no impact on critical habitat for the whooping crane.

Effect on the Species:

The Project is not likely to adversely affect the whooping crane. This conclusion is based on the rarity of the species, its status as a migrant through the Plan Area, and Keystone's commitment to follow recommended mitigation measures from the Service. As a result, no direct impacts are expected to result from construction. Indirect impacts from disturbance of migrating whooping cranes during Project construction and hydrostatic testing are expected to be negligible.

Sprague's Pipit (*Anthus spragueii*)

Direct and Indirect Impacts

The primary construction impacts to Sprague's pipit would be disturbance and potential exposure to small fuel spills and leaks from construction machinery. The chance of construction related spills within Sprague's pipit habitat is minimal. Construction and reclamation activities would be conducted to allow for prompt and effective cleanup of spills of fuel and other hazardous materials. Each construction crew and cleanup crew would have on hand sufficient tools and materials to stop leaks including supplies of absorbent and barrier materials that would allow for rapid containment and recovery of spilled materials.

Indirect impacts could result from individuals being flushed from the Plan Area during construction related activities. Since Sprague's pipits are highly mobile, it is anticipated that individuals would move to other suitable habitats within the Project region. If this species happened to land in close proximity to the ROW during construction, its presence would be documented. Based on the linear nature of the Project and mobility of migrating individuals, potential impacts from encountering and flushing a Sprague's pipit from the Plan Area would be negligible. Habitat loss from construction would be negligible because they use a variety of grassland habitats and the ROW will be allowed to re-vegetate after the initial construction.

Sprague's pipits occur in the central and western two-thirds of Oklahoma and in the southern portion of the panhandle during migration, but they have not been observed in the eastern third of the state (Jones 2010) through which most of the proposed Project would cross.

Indirect impacts during aerial and ground surveillance are unlikely to occur to Sprague's pipits. Aerial surveillance is conducted 26 times per year at intervals no greater than 3 weeks and the aircraft will fly over an area quickly at an altitude of about 1,000 feet during those aerial patrols.

A spill resulting from a leak in the pipeline is unlikely to affect the Sprague's pipit. Direct contact with a crude oil spill could result in adverse effects to Sprague's pipits due to oiling of plumage, ingestion of crude oil from contaminated plumage and prey, and transfer of crude oil to eggs and young. While these

exposure routes have the potential to cause adverse effects to individuals, the probability of adverse effects to Sprague's pipits are unlikely due to (1) the low probability of a spill, and (2) the low probability of the spill coinciding with the presence of individual Sprague's pipits. The magnitude of spill effects varies with multiple factors, the most significant of which include the amount of material released, the size of the spill dispersal area, the type of spills, the species assemblage present, climate, and the spill response tactics employed.

Cumulative Impacts

A review to identify non-federal projects or activities in the vicinity of the Project was completed by searching publicly available sources, internet news announcements, permit application filings, and agency provided information. No future state, local, or private actions that are reasonably certain to occur in the Plan Area have been identified for the Project.

Conservation Measures

The Service has recommended that if this species is observed in close proximity to the ROW during construction, its presence would be documented.

Effects to Sprague's Pipit

No impacts to the Sprague's pipit or significant impacts to their habitat are anticipated.

Arkansas River Shiner (*Notropis girardi*)

Direct and Indirect Impacts

The Project would cross both the North Canadian and South Canadian rivers in Oklahoma using the HDD method. As recommended by the Service, a buffer of 300 feet from bank full width would be maintained on each side of these rivers. Minimal hand clearing of vegetation within a maximum 3-foot wide path would be required within this 300-foot zone in order to allow limited human access to place the Tru-Tracker cable that is associated with the drilling equipment. Keystone would use existing roads or easements within the 300-foot buffers, which would not require additional vegetation clearing in order to place the water pumps and intake structures for water withdrawals. ***Water withdrawal will not occur from the South Canadian River.*** HDD entry and exit locations will be outside the 300-foot buffer, some temporary workspaces (consisting of the existing roads and easements that would be used to access the rivers to place the pumps and intake structures) would however, be within the 300-foot buffer. Crossings of these rivers would be in compliance with the HDD Plan. Consequently, no direct impacts to this species habitat are likely to occur from construction. HDD poses a small risk of spills of drilling fluids. Drilling fluid spills are rare and are contained by the BMPs that are described within the HDD Contingency Plans required for drilling crossings. Most leaks of HDD drilling mud occur near the entry and exit locations for the drill and are quickly contained and cleaned up.

Routine pipeline operations are not expected to affect Arkansas River shiner. There would be no maintenance of vegetation within the designated critical habitat area along the South Canadian River or within riparian habitats along the North Canadian River.

In the unlikely event of a spill that would enter a river, exposure to crude oil could result in adverse toxicological effects to Arkansas River shiner. However, the probability of adverse effects to Arkansas River shiner are unlikely due to (1) the extremely low probability of a spill, (2) the low probability of a spill in a river reach where the Arkansas River shiner or critical habitat is present, and (3) the low probability of the spill reaching a stream in sufficient amounts to cause toxic effects. Intermediate MLVs will be placed on both sides of crossings to shut off the flow of oil in the case of a spill.

Cumulative Impacts

A review to identify non-federal projects or activities in the vicinity of the Project was completed by searching publicly available sources, internet news announcements, permit application filings, and agency provided information. No future federal, state, or local, or private actions that are reasonably certain to occur in the Project area have been identified for the Project.

Conservation Measures

- No water withdrawals from the South Canadian River (designated critical habitat for the Arkansas River shiner) will occur.
- At the North Canadian River, non-HDD construction activities in the river and any water withdrawal from the river would be prohibited during the spawning period (May 15 through August 15).
- Water would not be withdrawn if there is no flow in the North Canadian River at the time of the HDD operation.
- The water intake for the North Canadian River withdrawal would be screened to prevent entrainment or entrapment of larval fish or other organisms.
- Vegetation clearing for installation of the Tru-Tracker wire for the HDD crossings would be limited to hand clearing using a machete or hand power tools of a path no wider than 3 feet within the critical habitat area along the South Canadian River and the habitat along the North Canadian River.
- If the HDD crossing is unsuccessful and a different crossing method is required, the Service would be consulted to determine the measures that would be implemented to avoid and minimize adverse impacts to this species.
- Erosion control measures would be implemented as described in the CMR Plan (Appendix A). Erosion and sediment controls would be monitored daily during construction to ensure effectiveness, particularly after storm events, and only the most effective techniques would be used.

Effects to Arkansas River Shiner

Effect on Critical Habitat:

The Project is not likely to adversely impact designated critical habitat for the Arkansas River shiner at the South Canadian River crossing. This crossing will be constructed using HDD and no water for hydrostatic testing will be obtained from the South Canadian River.

Effect on the Species:

The Project is not likely to adversely affect the Arkansas River shiner. This conclusion is based on Keystone's plan to HDD the South Canadian and North Canadian rivers, Keystone's commitment to only remove a minimal amount of vegetation at these rivers, and Keystone's commitment to follow recommended mitigation measures from the Service. As a result no direct or indirect impacts are likely to result from construction and operation of the Project.

6. PROPOSED HABITAT CONSERVATION PLAN

Keystone is voluntarily seeking authorization from the Service for incidental take of the ABB while performing Covered Activities for the Project. The Section 10 (a)(1)(B) ITP will be applied for and used by Keystone. Keystone reserves the right to withdraw from the Permit at any time prior to the occurrence of take authorized by that Permit.

Sections 6.2. through 6.6. of this chapter present Keystone's habitat conservation plan. Section 10(a)(1)(B) of the ESA authorizes the Service to issue a permit allowing take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." The Service is required to issue an ITP where all requirements have been met. The applicant must submit an HCP that identifies or satisfies several substantive criteria (ESA § 10(a)(2)(A)):

- The impact that will likely result from the taking;
- The steps the applicant will take to minimize and mitigate the impacts and the funding available to implement those steps;
- What alternative actions to taking were considered and the reasons the alternatives were not selected; and
- Other measures that the Service may require as necessary or appropriate for purposes of the conservation plan.

Also, to issue a permit, after opportunity for public comment with respect to a permit application and the related conservation plan, the Secretary must find that (ESA § 10(a)(2)(B)):

- The taking will be incidental;
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;
- The applicant will ensure that adequate funding for the plan will be provided;

- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and
- Other measures, if any, will be met and he has received such other assurances as he may require that the plan will be implemented.

In addition, HCPs are also required to comply with the Five Points Policy (Addendum to the HCP Handbook: 5-Point Policy (65 FR 35242; June 1, 2000) by including:

1. Biological goals and objectives, which define the expected biological outcome for each species covered by the HCP;
2. Adaptive management, which includes methods for addressing uncertainty and also monitoring and feedback to inform management decisions regarding biological goals and objectives;
3. Monitoring for compliance, effectiveness, and effects;
4. Permit duration, which is determined by the time-span of the project and designed to provide the time needed to achieve biological goals and address biological uncertainty; and
5. Public participation according to NEPA.

The expected impact of the proposed Covered Activities on the Covered Species is described in the following section.

6.1. ASSESSMENT OF TAKE

This HCP presents a habitat-based approach to identification of potential impacts to the ABB. Using habitat as a proxy for take of individual ABBs, as well as for designing mitigation measures, is consistent with longstanding Service practice with respect to insects and other organisms with a life history that makes estimates of take impractical.

This approach is appropriate given the nature of the potential impact of the Covered Activities on the species. It is possible that activities carried out in connection with the Project will have a direct effect on ABBs such as injuring or killing individuals, larvae, or eggs. This result would most likely only occur in instances where sheltering or reproducing ABBs were present in the Project ROW during land clearing and excavation activities. During the operational phase of the Project, this would be even less likely. A small potential for take could occur in the event of an oil spill resulting from a leak or break in the line. Such an event would necessitate ground disturbance in order to uncover damaged pipe and provide for its replacement. Although direct take is possible, it is estimated to be relatively low because ABB populations are dispersed across a wide geographical area and the width of the ROW and TWAs are relatively small when viewed at the landscape level. Most of the potential impacts anticipated as a result of the Project are indirect effects stemming from the Covered Activities which may result in an adverse impact on ABB habitat. Thus, a portion of anticipated take relates to the possibility of Covered Activities eliminating or degrading the quality of ABB habitat in such a way as to significantly impair the ABB's ability to breed, feed, and/or seek shelter in the future.

Habitat impacts can be expressed in acres temporarily and permanently disturbed. Similarly, we have estimated the relative amount of existing habitat that would be fragmented as a result of the Project. For the purposes of this HCP, fragmentation will be expressed as acres of habitat disturbed resulting in permanent cover change within forested areas. Following this, acres of habitat preserved, restored, or protected is an appropriate metric for prescribing mitigation requirements to offset impacts to the species. Given that it is mainly habitat impacts that would lead to take and that habitat restoration or enhancement is how conditions could be improved, it is appropriate to use acres of habitat as the metric for both take and mitigation in this HCP. Acres of habitat impacted should, however, be modified to account for the degree of fragmentation that will result and restoration of ROWs after construction; similarly acres of required conservation should be modified based on the condition of land used, management activities proposed, and other factors relating to the intensity of restoration efforts employed.

As has been the case for other incidental take authorization issued for the species, there is no practical way to quantify take of individuals. While surveys for ABBs can provide valuable information for determining the extent of occupation of a given area, they do not provide a precise mechanism for predicting the number of ABBs that may actually be present in an area at a given time. The effectiveness of ABB surveys in estimating the number of individuals in an area is limited because populations of the species vary both temporally and spatially. Similarly, catch rates are affected by weather-related factors such as rain, wind, and temperature. Presence-absence surveys are designed for that goal, not to estimate population size.

In addition to being a scientific necessity, this approach is consistent with case law addressing the legality of using habitat as a proxy for take of individuals of a species. Courts have recognized that as a general matter “Congress wanted incidental take impact to be stated in numbers of animals, where practical, not in terms of habitat markers.” *Miccosukke Tribe of Indians or Florida v. US*, 566 F.3d 1257 [11th Cir. 2009]. Courts have also explained that “While Congress indicated its preference for a numerical value, it anticipated situations in which impact could not be contemplated in terms of a precise number...In the absence of specific numerical value, however, the Fish and Wildlife Service must establish that no such numerical value could be practically obtained.” *Arizona Cattle Growers’ Association v. U.S. Fish and Wildlife Service*, 273 F.3d 1229, 1249-50 [9th Cir. 2001]; see also *Oregon Natural Resources Council v. Allen*, 476 F.3d 1031, 1037 [9th Cir. 2007](the Service must explain why it was unable to numerically quantify the level of take of northern spotted owls). These criteria are satisfied here because there is no scientifically credible method for counting ABBs lost or gained in the future as a result of the impact and mitigation activities associated with the Permit.

As described in Section 5.1 the methodologies used to delineate and categorize ABB habitat into two categories (i.e., ABB range in Oklahoma and conservation priority area) was based on qualitative estimates of habitat quality, presence-absence survey data, and general habitat models. It was assumed that all areas within these portions of the Plan Area supported ABB habitat. This estimate was adjusted downward to deduct acres that clearly do not support ABB habitat. This methodology was based on Service guidance with regard to unsuitable ABB habitat. Because of time constraints, we were unable to exclude areas based on certain criteria (specifically exclusion criteria based on percentages of sand, clay,

and rock). We were however able to deduct other types of unsuitable habitat such as paved surfaces, roads, water features, row crop agricultural lands that are currently in production, wetlands, and developed areas. Because we could not exclude all areas of unsuitable ABB habitat, it is expected that the amount of habitat identified as being affected along the ROW will exceed the amount of actual ABB habitat impacted.

Most of the potential impacts to the Covered Species are expected to be indirect through the loss and disturbance of habitat; however, a possibility exists that some direct impacts could occur. This would most likely occur during the construction phase, when the vast majority of ground disturbing activities would be taking place. Limited direct impacts could also occur during the operations and maintenance phase. In this HCP, the amount of potential impact to the ABB based on calculated habitat impacts is an estimate of maximum potential impact. This estimate of maximum potential impact will result in a sufficient amount of permitted incidental take to cover any direct impacts to the species, should such impacts occur.

6.2. BIOLOGICAL GOALS AND OBJECTIVES

As defined by the Service, biological goals should be commensurate with the scope of the proposed action to ensure that they are consistent with conservation actions needed. Biological goals are the broad guiding principles for the operating conservation program and provide the rationale behind the minimization and mitigation strategies. Specific biological objectives are the measurable targets for achieving the biological goals.

The primary goals of this HCP are (1) to minimize and avoid potential impacts to the ABB during performance of the Covered Activities to the maximum extent practicable and (2) to provide permanent mitigation from impacts to the ABB in the form of off-site habitat conservation such as an approved conservation bank or, if conservation banks are not available, provision of funds to a third-party entity to be used for (1) purchase of land to provide habitat for ABBs and (2) provide for restoration and management of the property in perpetuity.

Either permanent mitigation approach would satisfy the objectives of this HCP, which is to facilitate the conservation and management of ABB habitat in perpetuity in order to compensate for any Project-related impacts to the species. As described below, measures will be implemented to minimize adverse effects from the Covered Activities which may result in impacts to the ABB.

6.3. IMPACT MINIMIZATION MEASURES

Keystone has identified several general and ABB-specific measures intended to minimize impacts to the proposed taking of the Covered Species as well as impacts to the Evaluation Species as a result of the Covered Activities. These measures are detailed below.

6.3.1. ABB Impact Avoidance and Minimization Measures

6.3.1.1. Removal of Carrion from ROWs Prior to Disturbance

Immediately prior to soil disturbing activities such as clearing and grading, teams of biologists will walk the ROW to search for and remove carrion. This effort is designed to decrease the number of ABBs using areas that will be disturbed. If carrion is encountered, it will be bagged and disposed of outside Plan Area. If carrion with ABBs on or under it is encountered, the carrion and ABBs would be relocated to areas outside the Plan Area by a biologist permitted under ESA 10(a)(1)(A).

6.3.1.2. Limited Clearing in Temporary Work Areas

To the degree possible, clearing of TWAs will be limited to decrease temporary habitat loss. Estimates of impacts for TWAs presented in this HCP likely represent the maximum area that will be disturbed by the Covered Activities.

6.3.1.3. Limited Use of Artificial Lighting

During the construction phase, most construction activity will take place in daylight hours. Construction activities taking place at night would require artificial lighting and could thereby have an impact on ABBs by disruption of normal behavior patterns. Construction at night and the use of lights would be limited to specific situations requiring this activity. Lighting required for above-ground facilities and contractor yards would be down-shielded in order to minimize the effect on ABBs.

6.3.1.4. Educational Program for Construction Personnel

Keystone will implement an education program for construction personnel engaged in the Project. This will include a presentation focused on identifying the ABB, explaining its life history, its current range, and its habitat requirements. Construction personnel will be instructed to report any sightings of ABBs or brood chambers if encountered. Signs will be placed at construction entrances identifying the area as potential ABB habitat.

6.3.1.5. Re-Establishment of Vegetation

Immediately following construction (which is scheduled to commence during the dormant season), disturbed areas will be temporarily stabilized by broadcasting cool season species such as annual rye grass or wheat seed. Where necessary, clean, weed-free wheat straw will be used as mulch to protect seed and increase soil moisture. These grasses are annual species that senesce when temperatures warm during summer; they will not become permanently established. During the spring, a mixture of native warm season grasses will be planted within the ROW. This will include species such as little bluestem, big bluestem, Indiangrass, and switchgrass. Natural recruitment of other native grasses and forbs will also likely occur. It should be noted that some portions of the ROW, in response to landowner requirements, will be re-vegetated using non-native species such as Bermudagrass. This type of re-vegetation will likely be restricted to areas that are currently dominated by improved grass pastures and will therefore not lead to a reduction of habitat dominated by native species. Keystone's CMR Plan provides further details with regard to restoration of ROWs following construction (Appendix A).

6.3.1.6. Relief of Soil Compaction

Immediately following construction, disturbed areas will be ripped to a depth of 24 inches to relieve soil compaction existing at the site from the use of heavy equipment while conducting the Covered Activities. This effort will improve or enhance ABB habitat by making soils easier for beetles to bury in. Keystone's CMR Plan provides further details with regard to relief of soil compaction within ROWs following construction (Appendix A).

6.3.1.7. Addition of Supplemental Soil

In limited areas, supplemental soils will be required to provide a minimal coverage of the ROW in areas with large amounts of rock or shale. This effort will allow vegetation to be established and improve soil texture for ABBs. Keystone's CMR Plan provides further details with regard to application of supplemental soils within ROWs following construction (Appendix A).

6.3.1.8. Erosion Control

Erosion control techniques such as silt fencing, hay bales, water bars, and other efforts will be used to prevent washing away of topsoil, formation of gullies, or other effects which would negatively impact ABB habitat through the action of surface water. Keystone's CMR Plan provides further details with regard to erosion control following construction (Appendix A).

6.3.2. Mitigation Approaches

Because of the inherently time-consuming nature of a conservation bank approval process, it is not expected that an ABB conservation bank will be operational prior to issuance of an ITP. To address this contingency, Keystone will work with a third party conservation entity. This effort will be funded by Keystone and the third party (approved by the Service) will assume the responsibility of acquiring and managing land for ABB habitat. Land would be purchased out-right and deed restricted to prevent unauthorized future development or secured in perpetuity by a conservation easement. Management and restoration activities to be employed at a third party mitigation site would be approved by the Service. Keystone will provide appropriate funding assurances in accordance with Section 8., to ensure that these land acquisition, management, and restoration activities would occur.

6.3.2.1. Mitigation Ratios

On July 31, 2012 the Service issued its draft Conservation Strategy for the American burying beetle, which included recommended mitigation ratios. Keystone will continue to work with the Service in developing appropriate mitigation ratios to be applied to the Project and included in this HCP. Keystone's commitment to habitat restoration in the Plan Area following construction and quantification of limited habitat fragmentation should be considered in developing appropriate mitigation ratios.

Draft mitigation ratios were provided by the Service and are intended to facilitate recovery of the ABB. These ratios are based on duration of negative impacts and proximity to areas important to beetle recovery. The Service believes ABB CPAs contribute more towards ABB recovery compared to areas not

within the CPA. Therefore, impacts occurring within the CPA would have a higher mitigation ratio than impacts occurring outside of a CPA.

Temporary impacts are defined as any impact that is restored to its previous condition within 5 years of the negative impact. Based on the climate and vegetation types of eastern Oklahoma, the Service expects most grass and shrub dominated cover types would be re-established to their previously undisturbed state within 5 years. Impacts of new rights-of-way (ROWs) immediately adjacent and paralleling existing ROWs are considered temporary.

For this HCP, permanent cover change refers to conversion of forested habitat to open habitat within forested areas that are not already fragmented. Because “permanent cover change” has additional impacts compared to “temporary impacts”, mitigation ratios for permanent cover change are higher.

Permanent impacts are defined as any impact that includes long-term removal of ABB habitat from use. Because these impacts occur over a longer time frame than temporary impacts and remove more ABB habitat than permanent cover change, mitigation ratios for permanent impacts are higher. Keystone’s compensatory mitigation actions, regardless of the option selected (i.e., acquisition of conservation bank credits or funding of third-party acquisition and restoration of ABB habitat) will more than offset and compensate for any incidental taking of ABB as a result of the Covered Activities.

6.3.2.2. ABB Conservation Bank

A long-term conservation strategy for the ABB could entail purchase of credits from a Service-approved ABB conservation bank. Conservation banking is often a preferred alternative when compared to isolated, individual mitigation projects because it has the potential to protect and manage large blocks of land and consolidates mitigation from various types of projects. A conservation bank would be deed-restricted to prevent future development or disturbance and would protect the site from such activities in perpetuity. This approach provides a mechanism to protect relatively large tracts of land; this is a strategy that is generally agreed upon by most ABB researchers and biologists. Protecting and ensuring sustained populations of ABBs is a specific goal of the species recovery plan (USFWS 1991). Conservation banks, if sited and managed properly, have the potential to result in sustainable populations of ABBs. Although no such conservation bank exists at this time, it is understood that a preliminary proposal for development of a bank has been presented to the Service.

Although the basic concept of a conservation bank is fairly simple, development of the conservation banking instrument can be a complex and time consuming process (a banking instrument typically sets up the operation of the bank; including details concerning what lands would be used, restoration techniques to be employed, long-term management, credit schedules, financial assurances, and other pertinent details). The amount of time required to develop a bank for a new species (no ABB conservation bank has been established to date) would likely be a relatively longer process. Because little research has been conducted to address the efficacy of various ABB habitat restoration techniques that have been proposed, decisions with regard to which techniques would be employed by a bank would likely require input and coordination from various species experts and habitat managers. Similarly, issues with regard to surface ownership of land and separate ownership of sub-surface minerals would likely pose a challenge with regard to restriction of ground disturbance activities at the

bank site. Though not necessarily insurmountable, this factor will likely require negotiations and modifications of the banking instrument to allow for limited future disturbance and operation of existing facilities that may be located within the conservation bank boundaries.

The Service's conservation bank guidelines for ABB are on the website at: <http://www.fws.gov/southwest/es/Oklahoma/>. Discussions with the Service indicate that banking credits would be based on a credit schedule where 1 credit would equal 1 acre of habitat preserved.

6.3.2.3. Provision of Funding to a Third-Party Entity for ABB Habitat Conservation

In the event that a Service-approved ABB Conservation Bank is not operational at the time Covered Activities commence, funding would be provided to a third-party conservation entity for the specific purpose of (1) acquiring land for ABB habitat conservation within the CPA (through purchase and deed restriction or conservation easement) and (2) providing for restoration and long-term management of the conservation area. This area would presumably be operated similar to an ABB conservation bank. It would be protected and managed in perpetuity for the express purpose of providing habitat for ABBs. Establishment of a conservation area such as this would also involve addressing the same challenges faced by ABB conservation banks. However, the Service has indicated that provision of funding to the third-party entity with appropriate financial assurances, before commencement of the Covered Activities, may allow Keystone to move forward with construction prior to actual acquisition and management of the land. The acquired land could potentially become the site of an ABB conservation bank.

6.3.3. Evaluation Species Impact Avoidance and Minimization Measures

Avoidance and minimization measures implemented for the Evaluation Species are described in detail in Section 5.2 and are also summarized in the following table.

site visits to ensure that restoration goals are being met. This process will provide a mechanism by which problem areas are identified and corrective actions implemented in a timely fashion. Keystone's monitoring plan is adequate to ensure restoration goals within the Plan Area are achieved. Further details concerning the monitoring plan are included in Keystone's CMR Plan (Appendix A). Monitoring for mitigation addressed via a conservation bank will be the responsibility of the entity operating the bank. Monitoring requirements will be developed and provided by the banking instrument. Keystone will not be required to monitor conservation bank lands nor will it be responsible for costs associated with corrective actions required.

Similarly, monitoring of third-party managed conservation areas will be the responsibility of the third-party. Keystone will consider the cost of monitoring and management in perpetuity and include this cost in the calculation of required funding, but ultimately, Keystone is responsible for monitoring and management in the event that the third-party fails to meet these obligations. This arrangement potentially could be modified depending on the partnership arrangement agreed upon by the Service, the third party, and Keystone.

Compliance Monitoring

The purpose of compliance monitoring is to provide a record accessible to the public and the Service demonstrating the Applicant's compliance with the terms and conditions of the ITP and HCP. The compliance monitoring process for the HCP will consist of the preparation and submittal of annual reports by the Applicant, as described below, to the Service for review and comment.

The intent of the compliance monitoring is to ensure that the HCP is fully functioning during the term of the ITP, as well as to provide a focus for minor modifications and adjustments to better meet the goals and objectives of the ITP.

6.4.1. Annual Reports

Keystone will submit an Annual Report of operational activities to the Service by 1 December of each year that the Permit is in effect. During the construction phase, the reports will include a summary of construction activities, identify the amount of known and potential ABB habitat cleared that year, identify whether any Covered or Evaluation Species were detected in or near the ROW, access roads, and substations of the Permit Area. This report will also identify mitigation actions performed that year and expected to be performed the following year.

Post-construction annual reports will include this same information except for the summary of construction activities. Post-construction reports will also provide a summary of maintenance activities performed that year, including any inspection activities resulting in ground disturbance or habitat alteration. These reports will also identify any mitigation credit purchased from an independently operated ABB conservation Bank or deducted from credits from a third-party ABB mitigation project. The amount of any credit deducted from a bank or mitigation project over the reporting year would be identified through prior coordination with the Service.

6.4.2. Adaptive Management Plan

Generally defined, adaptive management is a process by which mitigation measures or management actions are evaluated and subsequently modified in response to new information. According to the Service's policy [see 65 CFR 35242(June 1 2000)], adaptive management is defined as a formal, structured approach to dealing with uncertainty in natural resources management, using the experience of management and the results of research as an on-going feedback loop for continuous improvement. Adaptive approaches to management recognize that the answers to all management questions are not known and that the information necessary to formulate answers is often unavailable. Adaptive management includes, by definition, a commitment to change management practices when determined appropriate.

The primary reason for using adaptive management in HCPs is to allow for changes in the mitigation strategies that may be necessary to reach the long-term goals (biological objectives) of the HCP. Under adaptive management, the mitigation activities of the HCP can be monitored and analyzed to determine if they are producing the required results. If the desired results are not being achieved, then adjustments to the mitigation strategy should be considered.

As discussed, the Covered Activities are expected to result in limited direct mortality of individual ABBs as well as long-term indirect effects resulting from a small amount of permanent habit loss and habitat fragmentation in certain portions of the Plan Area. The proposed mitigation was designed to compensate for the impacts to ABBs using either credits in an approved ABB conservation bank or provision of funding to a third party for the specific purpose of acquisition and protection of land where ABB habitat would be restored, enhanced, and preserved in perpetuity. If a conservation bank is used, adaptive management would be addressed by the banking instrument (approved by the Service) for the bank. If a mitigation project specific to the Project is used and implemented by a third party, adaptive management strategies based on performance goals for that Project would be developed accordingly.

6.4.3. "No Surprises" Assurances

Under the "No Surprises" rule (63 FR 8859, codified at 50 CFR 17.22, 17.32), the Service provides participants in an approved HCP that is being properly implemented the assurance that the Service will not impose additional mitigation requirements in the event that unforeseen circumstances occur over time that negatively impacts the covered species. Unforeseen circumstances means changes in circumstances affecting a species or geographic area covered by an HCP that could not reasonably have been anticipated by the Applicant and the Service at the time of HCP development and Permit issuance, and that the result in a substantial and adverse change in the status of the Covered Species.

Similarly, the No Surprise rule also recognizes that the Applicant and the Service can reasonably anticipate that some circumstances affecting a species or geographic area covered by an HCP may change and such change can be planned for (e.g., the listing of new species or a fire or natural catastrophic events). To the extent such changed circumstances are provided for in the HCP, an applicant must implement the appropriate measures in response to the changed circumstances.

7. CHANGED AND UNFORESEEN CIRCUMSTANCES

7.1. CHANGED CIRCUMSTANCES

It is recognized by the Service and Keystone that many changes in human conditions and attitudes, development pressures, environmental conditions, and scientific understanding of ecological systems, among many other circumstances, could and very likely will occur over a 50-year Permit period. To address this situation, an ITP should contain a procedure by which the parties will deal with the changes in circumstances affecting a species or geographic area covered by the Permit that can be reasonably anticipated by Keystone and the Service.

7.1.1. *Drought*

One area of particular concern is the effect of drought during the restoration of areas disturbed during construction. Prolonged drought can have a negative effect on establishment of vegetation. In the event that drought decreases the success of restoration efforts, these efforts will be repeated as necessary to achieve the goals set forth in Keystone's CMR Plan.

7.1.2. *Construction Timing*

Construction involving ground disturbance will generally take place between November and May to avoid impacts to nesting migratory birds. If construction must take place during the nesting season, additional nest surveys will be conducted and active nests flagged and avoided. Patrolling the construction ROW prior to disturbance to remove carrion and other efforts to reduce take during construction as recommended by the Service may also be used. This may also reduce take of ABBs because they will be over-wintering underground, presumably outside of the Plan Area. If construction delays result in activity within the ABB range during the active season, Keystone will coordinate with the Service and implement any measures recommended to reduce or avoid take.

7.1.3. *Delisting During Permit Tenure*

If the Covered Species is delisted during the tenure of the Permit, it is expected that such delisting would be made partly in response to mitigation actions performed through funding provided by Keystone. Consequently, Keystone would not seek any mitigation funding refund and operation and maintenance of any established preserves would continue into perpetuity. However, delisting would remove the potential for Project related incidental take to occur, so maintenance activities involving the clearing of vegetation or ground disturbance within Keystone ROW would subsequently be performed without being subject to the prohibitions emplaced previously for the delisted species. Keystone would continue mitigation activities through the 5-year monitoring period for a delisted species so that if the species was subsequently re-listed, take would still be covered by the ITP.

7.1.4. *Listing During Permit Tenure*

If the bald eagle is relisted or any other species is newly listed, Keystone will continue to operate the HCP in the manner established in this document. In the event that any species not addressed in this HCP

is listed pursuant to the ESA, Keystone will evaluate the degree to which the species has potential to be taken by the Covered Activities and the degree to which the HCP, as it is being implemented, is providing conservation benefits to the species and what additional measures, if any, Keystone could implement through the HCP to provide conservation benefits for the species. Depending on this evaluation, Keystone will decide whether to seek coverage of the species through an amendment to the HCP.

7.1.5. Emergency Repairs Requiring Habitat Clearing

An emergency situation could arise that requires Keystone to clear Covered Species habitat from its ROW during the active season. If an oil spill occurs as a result of a pipeline rupture or breakage, cleanup efforts will be designed to avoid or minimize additional take associated with these activities. The location and aerial extent of any such clearing cannot be known prior to the occurrence of an emergency. The Service will be notified of any such emergency repairs. For those emergency repairs where time permits, a qualified biologist will inspect the area for carrion and remove it. Other methods, as recommended by the Service, to reduce direct take will also be implemented. For emergencies that demand the immediate removal of Covered Species habitat, Keystone will submit a report of the clearing of habitat to the Service within 48 hours of performance of the activity. The report will identify for Service concurrence the number of acres of habitat that were cleared directly, and the number of acres of habitat expected to be indirectly impacted by the clearing activity. The quantification would follow the methods used by the Service and presented in Section 5.

The only types of emergencies considered herein for which the clearing of Covered Species habitat by Keystone that would be considered a Changed Circumstance are those that create immediate risk to the safety and reliability of the pipeline or to the safety of humans and their property.

7.1.6. Wildfire in ROW

It is possible that a maintenance vehicle travelling the ROW could ignite a wildfire through contact between the catalytic converter or other hot metal parts and underlying grass. This would have a greater likelihood of occurrence during prolonged drought conditions. Such a wildfire could temporarily destroy habitat outside the Permit Area. Keystone is not seeking to cover such habitat fire damage under its Permit. Keystone will to the extent allowed by its control of land damaged by fire, allow habitat for the ABB that is damaged by fire to re-generate. It is assumed that these fires, if they occur, would occur randomly and infrequently. Such a pattern would be similar to natural fire regimes (pre-European colonization) and would therefore not likely lead to permanent habitat degradation. Keystone would report any such fires generated by performance of the Covered Activities to the Service.

If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and such measures were not provided for in this HCP, the Service will not require any conservation or mitigation measures in addition to those provided for in the HCP without consent of Keystone, provided the HCP is being properly implemented.

Addressing any changes in circumstance that might occur on lands preserved in response to the conservation measures provided by Keystone will be the responsibility of bank operators or the third-party conservation entity entrusted with purchase and management of lands funded by Keystone. It is

expected that changed circumstances in conservation areas will be addressed through conservation bank instruments or management plans for non-bank areas managed by a third-party conservation entity.

7.2. UNFORESEEN CIRCUMSTANCES

Unforeseen circumstances are changes in circumstances affecting a species or geographic area covered by an HCP that could not reasonably have been anticipated by the Applicant and the Service at the time of HCP development and Permit issuance, and that result in a substantial and adverse change in the status of the Covered Species. Under the No Surprise rule, with respect to a properly implemented HCP, Keystone will not be required to commit additional land, water, money, or financial compensation, or additional restrictions on land, water, or other natural resources to respond to such unforeseen circumstances beyond the level otherwise agreed upon for the species covered by this HCP without the consent of Keystone. Changes in circumstances not provided for in this document are considered unforeseen circumstances for purposes of this HCP.

No Surprises assurances apply to the listed species that are “adequately covered” under this HCP. Species are considered to be “adequately covered” if the HCP satisfied the Permit issuance criteria contained in Section 10(a)(2)(B) of the ESA with respect to that species. The species considered adequately covered under this HCP and therefore, covered by the Service’s No Surprises policy assurances is the ABB.

In the event that unforeseen circumstances occur during the term of the Permit and the Service concludes that the ABB is being harmed as a result, the Service may require additional measures from Keystone where the operating conservation plan is being properly implemented only if such measures are limited to modifications within the ROW of the Project and associated above-ground facilities, or to the conservation plan’s operating conservation program for the affected species, and maintain the original terms of the HCP to the maximum extent possible. Additional conservation measures will not involve the commitment of additional land, water, or natural resources otherwise available to Keystone under the original terms of the HCP without consent from Keystone.

7.2.1. Effects of Unforeseen Circumstances on Permit

Except as provided above, notwithstanding the occurrence of unforeseen circumstances, as long as Keystone continues to properly implement the provisions of the HCP and any additional measures required by the Service in accordance with Section 12 hereof, the Permit will remain in full force and effect. In the event that any future judicial decision or determination holds that any part of this HCP is unenforceable or enjoined for any reason or to any extent, this HCP shall be enforceable only to the degree allowed by any such decision or determination; provided that the remainder of the Permit and HCP shall remain in full force and effect to the maximum extent permitted by law.

7.2.2. *Notice of Unforeseen Circumstances*

The Service will have the burden of demonstrating that unforeseen circumstances exist, using the best scientific and commercial data available. The Service shall notify Keystone in writing of any unforeseen circumstances the Service believes to exist.

7.3. AMENDMENT PROCEDURES

It is necessary to establish a procedure whereby the Permit can be amended. However, it is important that the cumulative effect of any amendments will not jeopardize any endangered species or other rare species. Amendments must be evaluated based on their effect on the habitat as a whole. The Service must be consulted on all proposed amendments to operational plans for the Project that may affect any federally listed species. The types of proposed amendments and the applicable amendment procedures are described below.

7.3.1. *Minor Amendments*

Minor amendments involve routine administrative revisions, changes to operation and maintenance schedules, or minor changes in Project operations that do not diminish the level or means of mitigation or increase in anticipated rates of take. Such minor amendments do not materially alter the terms of the Keystone Permit. Upon written request of Keystone the Service is authorized to approve minor amendments to the HCP.

7.3.2. *All Other Amendments*

Other amendments may be considered major amendments to the Section 10(a)(1)(B) Permit, which would require additional steps be taken under both NEPA and the ESA.

7.4. REQUESTED PERMIT DURATION

This HCP is written in anticipation of issuance of a 10(a)(1)(B) ITP valid for 50 years covering the construction, operation, maintenance, and repair phases of the Covered Activities. The HCP will take effect when the Permit is issued, with take authorizations not valid until mitigation is provided in full for the Covered Species or as agreed upon by the Service and Keystone.

8. FUNDING ASSURANCES

8.1. IMPLEMENTATION COSTS

Prior to issuance of the ITP, Keystone will produce and submit to the Service an itemized summary of the ABB impact minimization and mitigation activities required by this HCP, together with the estimated financial cost required to carry out those activities (the "Implementation Costs"). Keystone will provide funding assurances, consistent with section 8.2 below, to ensure that the necessary financial resources are available to implement the HCP. With respect to the compensatory mitigation measures described in section 6.3.2 of the HCP, the itemized summary will include funding commitments of Keystone in the form of: A) a commitment to acquire credits from an ABB conservation bank, if such a bank is able to

provide Service-approved credits at the time such credits will be required, B) payment to a third party conservation entity to acquire land or restrictive conservation instruments (e.g. conservation easements) for ABB habitat conservation within the CPA and to provide restoration and long-term management of the land so acquired or restricted, or C) such other mitigation strategies that the Service may approve. The compensatory mitigation shall be designed to mitigate any incidental take of ABB by Keystone in connection with the Covered Activities. For the purposes of this HCP, Keystone will continue efforts to develop required cost estimates. This effort will involve coordination with the Service, discussions with potential conservation bankers, and input from third-party conservation entities.

8.2. FUNDING ASSURANCES

As further explained below, Keystone is financially capable of ensuring that all Implementation Costs will be funded through the Project's operating budget and Keystone's access to capital. In the event that Keystone's operating budget for the Project and available capital are insufficient to cover the Implementation Costs, funding will be assured through corporate credit facilities.

8.2.1. Operating Budget

Prior to issuance of an ITP, Keystone will estimate the Implementation Costs and will use funds within the Project's operating budget to pay for the Implementation Costs. Keystone's parent company, TransCanada Corporation ("TransCanada"), has allocated \$2.3 billion to the Project, and as of June 30, 2012, approximately \$900 million has been invested in the Project. Additional information about TransCanada's financial position is available on SEDAR at www.sedar.com, with the U.S. Securities and Exchange Commission on EDGAR at www.sec.gov/info/edgar.shtml and on the TransCanada website at www.transcanada.com. Keystone and TransCanada are ready, willing and able to fund the Implementation Costs.

8.2.2. Corporate Credit Facility

TransCanada has the capacity to fund the Project through internally-generated cash flow, access to capital markets (e.g. through the sale of stock or the issuance of bonds), and the ability to borrow funds through committed credit facilities that currently total more than \$4 billion. Should Keystone's cash from operations somehow become insufficient to fund the Implementation Costs, TransCanada expects to maintain access to credit facilities sufficient to assure funding of the Implementation Costs. Additional information about TransCanada's capital resources, including corporate credit facilities, is available through the resources referenced in Section 8.2.1.

9. ALTERNATIVES TO THE TAKING

Keystone considered various alternatives that would avoid take of the ABB. These alternatives included re-routing the Project to the west of the current proposed ROW. This alternative would have avoided take of the ABB but may have resulted in take of other listed species. Furthermore, re-routing to the west would have added significantly to the cost of the Project and would add significant miles to the route when the least environmental impact would be to reduce mileage. The exact cost of re-routes and

species that may have been affected cannot be accurately estimated because an alternative route has not been identified. The selection of pipeline routes is a complex process that involves consideration of a wide range of factors in addition to impacts to listed species. Design alternatives, such as elevating the pipeline, may have removed some minor negative effects (i.e., soil heating) but would not have significantly reduced ground disturbance associated with construction or fragmentation of habitat. Additionally, construction of an elevated pipeline would most likely have resulted in a greater area of permanent ABB habitat loss because of the placement of piers or other supports required to elevate the pipe. Similarly, elevated pipe may have resulted in take of other listed species. Elevating pipelines is not a construction technique typically employed for safety and reliability reasons. Finally, a “no action” alternative would be for Keystone to not construct the pipeline; however, this alternative would not meet Keystone’s purpose and need of the Project.

9.1. PROPOSED ALTERNATIVE

The proposed alternative is to construct and operate the Project as detailed in Section 2. Keystone considers this the only viable action alternative. Under this alternative, Keystone would submit this HCP along with an application for a Section 10 ITP. If issued, the ITP would cover take of ABBs resulting from the Covered Activities.

9.2. NO ACTION ALTERNATIVE

Under this alternative, Keystone would not construct the Project and therefore no take of the ABB would occur. This alternative would not require an HCP or ITP. In addition, this alternative would not provide preservation and management of ABB habitat in perpetuity.

10. SUCH OTHER MEASURES THAT THE SERVICE MAY REQUIRE

If a dead, injured, or sick ABB, bald eagle, or any other endangered or threatened species is discovered, Keystone is required to contact the Service’s Law Enforcement Office in Tulsa, Oklahoma for care and disposition instructions. Extreme care will be taken in handling sick or injured individuals to ensure effective and proper treatment. Care will also be taken in handling dead specimens to preserve biological materials in the best possible state for analysis for cause of death. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead specimen, Keystone and its contractor/subcontractor have the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

If during the tenure of this Permit the Covered Activities are altered such that there may be an increase in the anticipated take of the Covered Species, Keystone is required to contact the Service and obtain authorization and/or amendment of the Permit before commencing any construction or other activities that might result in take beyond that described in the HCP.

The authorization granted by the Permit will be subject to full and complete compliance with, and implementation of, the HCP and all specific conditions contained in the Permit. The Permit terms and conditions shall supersede and take precedence over any inconsistent provisions in the HCP or other Permit documents.

Acceptance of the Permit serves as evidence that Keystone understands and agrees to abide by the terms of the Permit and all applicable Sections of Title 50 Code of Federal Regulations Parts 13 and 17 pertinent to issued permits.

11. PUBLIC AND AGENCY PARTICIPATION

Keystone has been actively pursuing public and agency input on the Project. This includes meeting with concerned groups, individuals, public officials, and agencies to properly coordinate this proposed action with all potentially concerned entities. Public scoping meetings for the NEPA analysis were not required for this Project.

Additionally, the following agencies, organizations, and individuals have been or will be consulted or coordinated with during the process of addressing endangered species concerns for the Project.

- **exp** Energy Services, Inc., Tallahassee, FL and Houston, TX
- Enercon Services, Inc., Oklahoma City, OK
- USFWS, Albuquerque, NM
- USFWS, Tulsa, OK

This document was originally prepared by Enercon Services, Inc. and **exp** Energy Services, Inc. on behalf of Keystone and developed through coordination with the Service.

12. CONCLUSION

Keystone looks forward to working with the Service throughout the approval and long-term implementation of the HCP for the Project. Keystone is committed to minimizing and mitigating for the impacts of the taking to the Covered Species to the maximum extent practicable and to avoid and minimize impacts to Evaluation Species as evaluated and determined through the HCP process.

13. LITERATURE CITED

- Amaral, M., A.J. Kozol, and T. French. 1997. Conservation strategy and reintroduction of the endangered American burying beetle. *Northeastern Naturalist* 4(3): 121-132.
- Armbruster, M. J. 1990. Characterization of habitat used by whooping cranes during migration. *Biological Report* 90(4):1-16.
- Anderson, R.S. 1982. On the decreasing abundance of *Nicrophorus americanus* Olivier (Coleoptera: Silphidae) in eastern North America. *The Coleopterists Bulletin* 36: 362- 365.
- Austin, J. E. and A. L. Richert. 2001. A Comprehensive Review of the Observational and Site Evaluation Data of Migrant Whooping Cranes in the United States, 1943-99. U.S. Geological Survey, Northern Prairie Wildlife Research Center, Jamestown, North Dakota, and State Museum, University of Nebraska, Lincoln, Nebraska. 157 pp. Internet website <http://www.npwr.usgs.gov/resource/2003/wcdata/wcdata/.htm>. (Version 01JUL03).

- Backlund, D.C., and G.M. Marrone. 1997. New records of the endangered American burying beetle, *Nicrophorus americanus* Olivier, (Coleoptera: Silphidae) in South Dakota. *The Coleopterists Bulletin* 51:53-58.
- Bedick, J.C., B.C. Ratcliffe, and L.G. Higley. 2004. A new sampling protocol for the endangered American burying beetle, *Nicrophorus americanus* Olivier (Coleoptera, Silphidae). *The Coleopterists Bull.* 58:57-70.
- Bedick J. C., B. C. Ratcliffe, W. W. Hoback and L. G. Higley. 1999. Distribution, ecology and population dynamics of the American burying beetle [*Nicrophorus americanus* Oliver (Coleoptera, Silphidae)] in south-central Nebraska, USA. *Journal of Insect Conservation* 3: 171-181.
- Bedick, J.C., W. W. Hoback, and M.C. Albrecht. 2006. High water-loss rates and rapid dehydration in the burying beetle, *Nicrophorus marginatus*. *Physiological Entomology* 31: 23-29.
- Bent, A. C. 1929. Life Histories of North American Shorebirds (Part II). U.S. National Museum Bulletin 146. Washington, D.C.
- Campbell, L. 2003. Endangered and Threatened Animals of Texas: Their Life History and Management. Canadian Wildlife Service (CWS) and U.S. Fish and Wildlife Service (USFWS). 2005. Draft International Recovery Plan for the Whooping Crane. Ottawa: RENEW and USFWS, Albuquerque, New Mexico. 196 pp.
- Canadian Wildlife Service (CWS) and U.S. Fish and Wildlife Service (USFWS). 2007. International recovery plan for the whooping crane. Ottawa: Recovery of Nationally Endangered Wildlife (RENEW), and USFWS, Albuquerque, New Mexico. 162 pp.
- Collins, L. and R.H. Scheffrahn. 2005. Featured creatures: Red-imported fire ant. University of Florida, Dept. of Entomology and Nematology. Publ. no. EENY-195.
- Cornell Lab of Ornithology. All About Birds. <http://www.allaboutbirds.org/NetCommunity/Page.aspx?pid=1200>. [Accessed: 07/2012]
- Crawford, P. H. C. and B. W. Hoagland. 2010. Using species distribution models to guide conservation at the state level: the endangered American Burying Beetle (*Nicrophorus americanus*) in Oklahoma. *Journal of Insect Conservation* 14:511-521.
- Creighton, J. C., C. C. Vaughn, and B. R. Chapman. 1993. Habitat preference of the endangered American burying beetle (*Nicrophorus americanus*) in Oklahoma. *The Southwestern Naturalist* 38(3):275-306.
- Creighton, J.C. and G. Schnell. 1998. Short-term movement patterns of the endangered American burying beetle *Nicrophorus americanus*. *Biological Conservation* 86: 281-287.
- Gilbert, C. R. 1980. *Notropis girardi* Hubbs and Ortenburger Arkansas River Shiner. In: Lee, D. S.; C. R. Gilbert; H. Hocutt; R. E. Jenkins; D. E. McCallister; and J. R. Staufer. Atlas of North American Freshwater Fishes. North Carolina Biological Survey Publication No. 1980-12, North Carolina State Museum of Natural History, Raleigh, North Carolina. 854 pp.

- Godwin, W. B., and Minich, V. 2005. Status of the American Burying Beetle, *Nicrophorus americanus* Olivier, (Coleoptera: Silphidae) at Camp Maxey, Lamar County, Texas. Interagency Final Report to Texas Army National Guard. 19 pp.
- Haig, S. M. 1986. Piping Plover Species Distribution. U.S. Fish and Wildlife Service, Endangered Species Information System Workbook I.
- Haig, S. M. and J. H. Plissner. 1993. Distribution and abundance of piping plover: results and implications of the 1991 census. *Condor* 95:145-156.
- Hazen, B. 2011. Geothermal model predictions for the sandhills segment of the Keystone XL pipeline. Unpublished report, February, 2011. Model used: "TQUEST, A General Purpose, Finite-Element Program for One, Two and Three Dimensional Heat Transfer." Prepared for TransCanada Keystone Pipeline, LP by Northern Engineering and Scientific, Anchorage, Alaska. Hinton, H.E.
- Holloway, A.K. and G. D. Schnell. 1997. Relationship between numbers of the endangered American Burying beetle, *Nicrophorus americanus* Olivier (Coleoptera: Silphidae) and available food resources. *Biological Conservation* 81:145-152.
- Howe, M. A. 1987. Habitat Use by Migrating Whooping Cranes in the Aransas-Wood Buffalo Corridor. Pages 303-311, *In*: J. C. Lewis and J. W. Ziewitz, eds. Proc. 1985 Crane Workshop. Platte River Whooping Crane Habitat Maintenance Trust and USFWS, Grand Island, Nebraska.
- Johns, B. W., E. J. Woodsworth, and E. A. Driver. 1997. Habitat Use by Migrant Whooping Cranes in Saskatchewan. *Proceedings North American Crane Workshop* 7:123-131.
- Jones, S. L. 2010. Sprague's Pipit (*Anthus spragueii*) Conservation Plan. U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C.
- Jurzenski, J., and W.W. Hoback. 2011. Opossums and leopard frogs consume the federally endangered American burying beetle (Coleoptera: Silphidae). *The Coleopterists Bulletin* 65:88-90.
- Karr, J.R. 1982. Population variability and extinction in the avifauna of a tropical land bridge island. *Ecology* 63: 1975-1978.
- Kozol, A.J., M.P. Scott, and J.A. Traniello. 1988. The American burying beetle: studies on the natural history of an endangered species. *Psyche* 95: 167-176.
- Kozol, A.J. 1990. The natural history and reproductive strategies of the American burying beetle, *Nicrophorus americanus*. Report to the Service, Hadley, MA. Unpub. MS.
- Kozol, A.J. 1995. Ecology and population genetics of the endangered American burying beetle, *Nicrophorus americanus*. Dissertation, Boston University, Massachusetts.
- Lingle, G. R. 1987. Status of Whooping Crane Migration Habitat Within the Great Plains of North America. Pages 331-340 *In*: J. C. Lewis and J. Zewitz, eds. Proc. 1985. Crane Workshop. Platte River Whooping Crane Habitat Maintenance Trust and USFWS, Grand Island, Nebraska.

- Lingle, G. R., G. A. Wingfield, and J. W. Ziewitz. 1991. The Migration Ecology of Whooping Cranes in Nebraska, U.S.A. Pages 395-401 In: J. Harris, ed. Proc. 1987 International Crane Workshop, International Crane Foundation, Baraboo, Wisconsin.
- Lomolino, M. V., J. C. Creighton, G. D. Schnell and D. L. Certain. 1995. Ecology and conservation of the endangered American burying beetle (*Nicrophorus americanus*). *Conservation Biology* 9:605-614.
- Lomolino, M.V. and J.C. Creighton. 1996. Habitat selection, breeding success and conservation of the endangered American burying beetle, *Nicrophorus americanus*. *Biological Conservation* 77: 235-241.
- Marvier, M., P. Kareiva, M.G. Neubert. 2004. Habitat Destruction, Fragmentation, and Disturbance Promote Invasion by Habitat Generalists in a Multispecies Metapopulation. *Risk Analysis* 24, 869–878.
- Moore, G. A. 1944. Note on the Early Life History of *Notropis girardi*. *Copeia* 1944: 209-214.
- NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia (On-line).
- Nelson, D. L. 1998. Least Tern In: Colorado Breeding Bird Atlas. H. E. Kingery (ed.) Published by Colorado Bird Atlas Partnership; co-published by Colorado Division of Wildlife. pp. 192-193.
- Oklahoma State University. 1993. Oklahoma's Endangered and Threatened Species. Forestry Extension Report #6. Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, Oklahoma State University. 43 pp.
- Ortego, B., C. Gregory, D. Mabie, M. Mitchell, and D. Schmidt. 2009. Texas Bald Eagles. *Bulletin of the Texas Ornithological Society* 42(1-2):2009.
- Oxley, D.J., M.B. Fenton, and G.R. Carmody. 1974. The effects of roads on populations of small mammals. *J. Appl. Ecol.* 11:51-59.
- Peck, S.B. and M.M. Kaulbars. 1987. A synopsis of the distribution and bionomics of the carrion beetles (Coleoptera: Silphidae). *Proceedings of the Entomological Society of Ontario*. 118: 47-81.
- Pipeline and Hazardous Materials Safety Administration (PHMSA). 2008. PHMSA Pipeline Incident Statistics. Website: <http://primis.phmsa.dot.gov/comm/reports/safety/PSI.html>.
- Pimm, S.L., H.L. Jones, and J. Diamond. 1988. On the risk of extinction. *Am. Nat.* 132: 757- 785.
- Polivka, K. M. and W. J. Matthews. 1997. Habitat Requirements of the Arkansas River Shiner, *Notropis girardi*; August 1, 1994 - August 7, 1997. Final Report, Federal Aid Project No. E-33, Oklahoma Department of Wildlife Conservation, Oklahoma City, Oklahoma. 13 pp.
- Pukowski, E. 1933. Ökoloischeuntersuchungen an *Nicrophorus* F.Z. *Morphol. Ökol. Tiere* 27:518-586.
- Ratcliffe, B.C. 1996. The carrion beetles (Coleoptera:Silphidae) of Nebraska. *Bulletin of the University of Nebraska State Museum, University of Nebraska, Lincoln*. Volume 13. 100 pgs.

- Schnell, G.D., A. E. Hiott, J.C. Creighton, V.L. Smyth, and A. Komendat. 2007. Factors affecting overwinter survival of the American burying beetle, *Nicrophorus americanus* (Coleoptera: Silphidae). *Journal of Insect Conservation* DOI 10.1007/s10841-007-90865.
- Scott, M.P. and J.F.A. Traniello. 1987. Behavioral cues trigger ovarian development in the burying beetle *Nicrophorus tomentosus*. *J. Insect Physiol.* 33: 693-696.
- Sikes, D.S., and C.J. Raithel. 2002. A review of hypotheses of decline of the endangered American burying beetle (Silphidae: *Nicrophorus americanus*). *Journal of Insect Conservation* 6: 103–113.
- Trumbo, S.T. 1992. Monogamy to communal breeding: exploitation of a broad resource base by burying beetles (*Nicrophorus*). *Ecological Entomology* 17: 289-298.
- United States Department of Agriculture (USDA) -APHIS. 2003. Imported Fire Ants: An agricultural pest and human health hazard. March 2003 Fact Sheet.
- United States Fish and Wildlife Service (USFWS). 1985a. Determination of Endangered and Threatened Status for the Piping Plover: Final Rule. *Federal Register* 50(238): 50726-50734.
- _____. 1985b. Interior Population of Least Tern Determined to be Endangered. *Federal Register* 50:21784-21792.
- _____. 1987. Atlantic coast piping plover recovery plan. USFWS, Newton Corner, Massachusetts. 245 pp.
- _____. 1988. Recovery plan for piping plover breeding in the Great Lakes and Northern Great Plains. USFWS, Twin Cities, Minnesota. 160 pp.
- _____. 1989. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the American Burying Beetle. Final Rule. *Federal Register* 54(133):29652-29655.
- _____. 1990. Recovery plan for the interior population of the least tern (*Sterna antillarum*). U.S. Fish and Wildlife Service, Twin Cities, Minnesota. 90 pp.
- _____. 1991. American Burying Beetle (*Nicrophorus americanus*) Recovery Plan. Newton Corner, Massachusetts. 80 pp.
- _____. 1994. Draft revised recovery plan for piping plover, *Charadrius melodus*, breeding in the Great Lakes and Northern Great Plains of the United States. June 28, 1994. USFWS, Twin Cities, Minnesota. 85 pp. + appendices.
- _____. November 4, 1996. Habitat Conservation Planning and Incidental Take Permit Processing Handbook. <http://training.fws.gov/EC/Resources/HCP/HCP/HCPbook.pdf>.
- _____. 2005. Conservation Approach for the American Burying Beetle (ABB) in Counties Lacking or with Limited Recent Survey Data. Tulsa, Oklahoma. 4 pp.
- _____. August 2011a. American Burying Beetle (*Nicrophorus americanus*). http://www.fws.gov/southwest/es/Oklahoma/Documents/TE_Species/Species%20Profiles/American%20Burying%20Beetle.pdf.

- _____ August 2011b. Interior Least Tern (*Sterna antillarum*).
http://www.fws.gov/southwest/es/Oklahoma/Documents/TE_Species/Species%20Profiles/Least%20Tern.pdf.
- _____.2012. Unpublished Survey Data.
- Warriner , M.D. 2004. Survey for the American burying beetle (*Nicrophorus americanus*) On Arkansas Game and Fish Wildlife Management Areas (Coleoptera: Silphidae). Arkansas Nat. Heritage Comm. Unpubl rep. Little Rock, AR. 14 pp.
- Wiens, T. P. 1986. Nest-site tenacity and mate retention in the piping plover. M.S. Thesis. University of Minnesota, Duluth. 34 pp.
- Wilcove, D.S., C.H. McLellan, and A.P. Dobson. 1986. Habitat fragmentation in the temperate zone. In M.E. Soule (ed.), Conservation Biology: The Science of Scarcity and Diversity, pp. 237-256. Sinauer Associates, Sunderland, MA.
- Woods, A.J., J. M. Omernik, D.R. Butler, J.G. Ford, J.E. Henley, B.W. Hoagland, D.S. Arndt, and B.C. Moran. 2005. Ecoregions of Oklahoma. Reston, Virginia: U.S. Geological Survey.

FIGURES

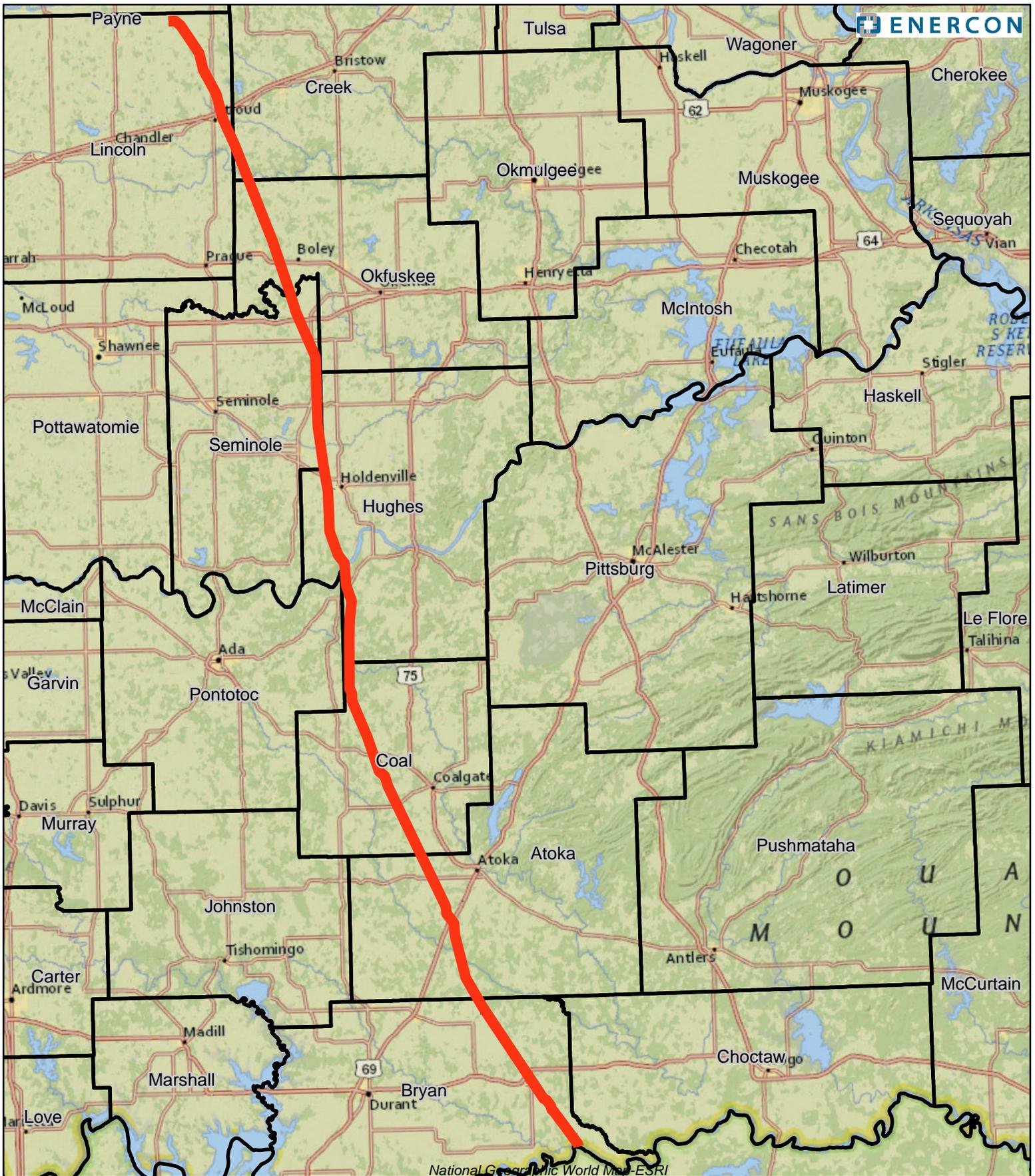


Figure 1. Project Area in Oklahoma

- Oklahoma Counties
- Project Area in Oklahoma



0 5 10 20 Miles



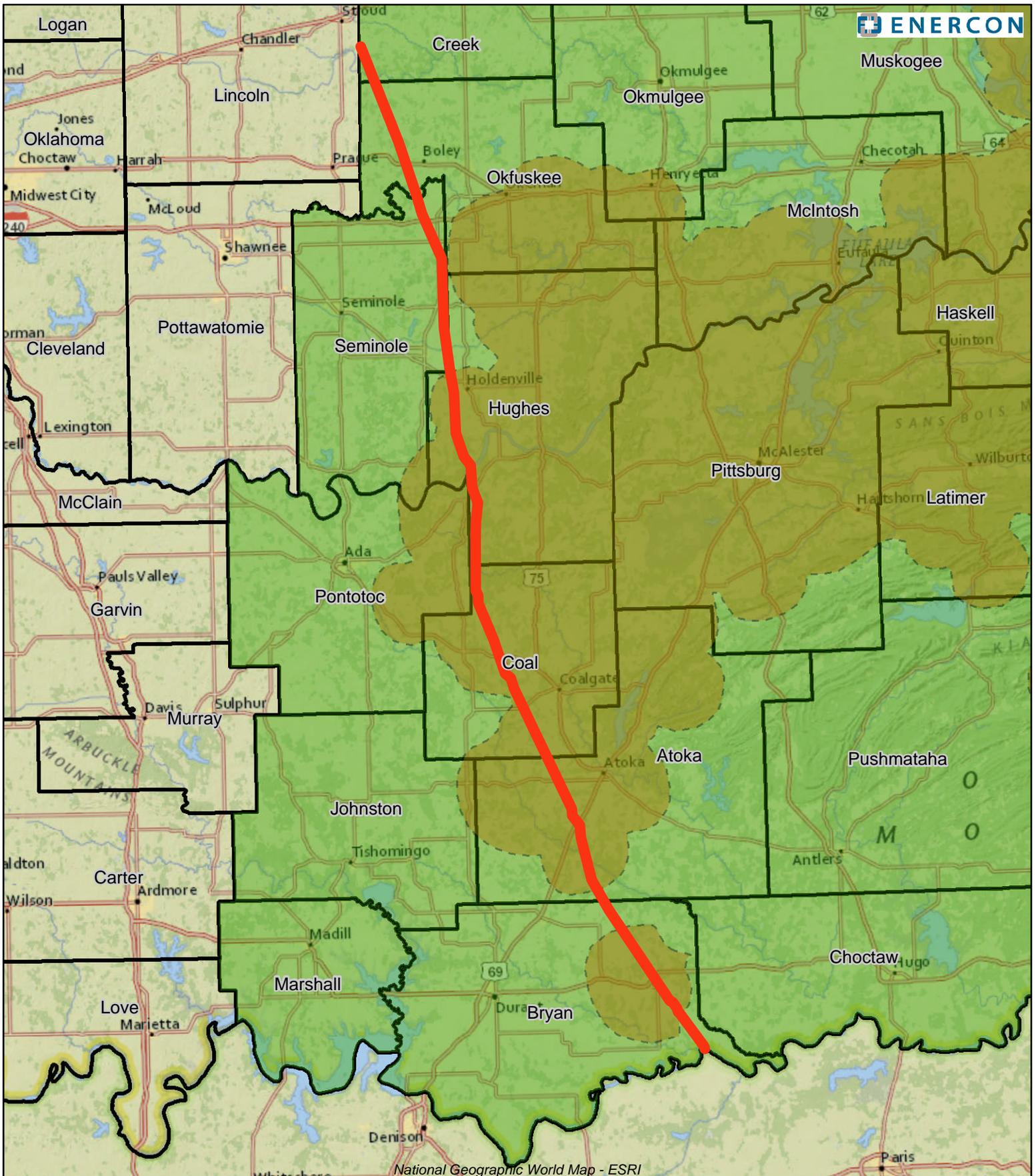


Figure 2. Plan & Permit Area with ABB Range and Conservation Priority Area

- Plan and Permit Area
- ABB Conservation Priority Area
- ABB Range in Oklahoma
- Oklahoma Counties



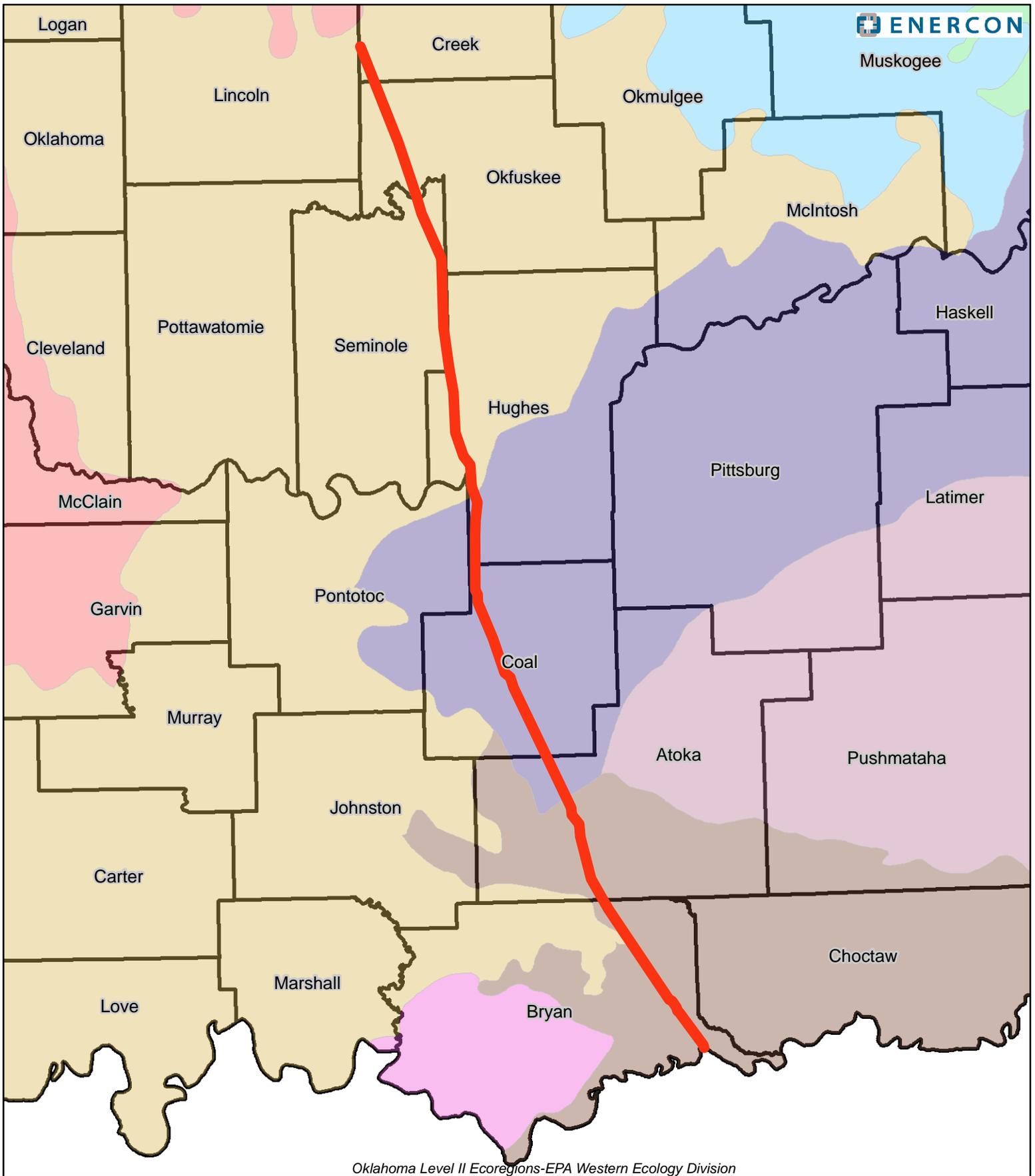
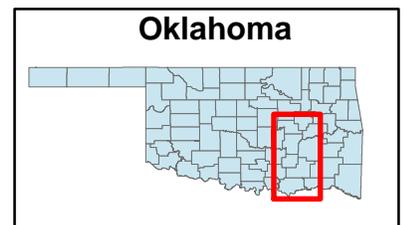


Figure 3. Level III Ecoregions Map

- Oklahoma Counties
- Plan and Permit Area
- Level III Ecoregion**
- Central Irregular Plains
- Cross Timbers
- East Central Texas Plains
- Arkansas Valley
- High Plains
- Boston Mountains
- Ouachita Mountains
- Central Great Plains
- South Central Plains



0 5 10 20 Miles



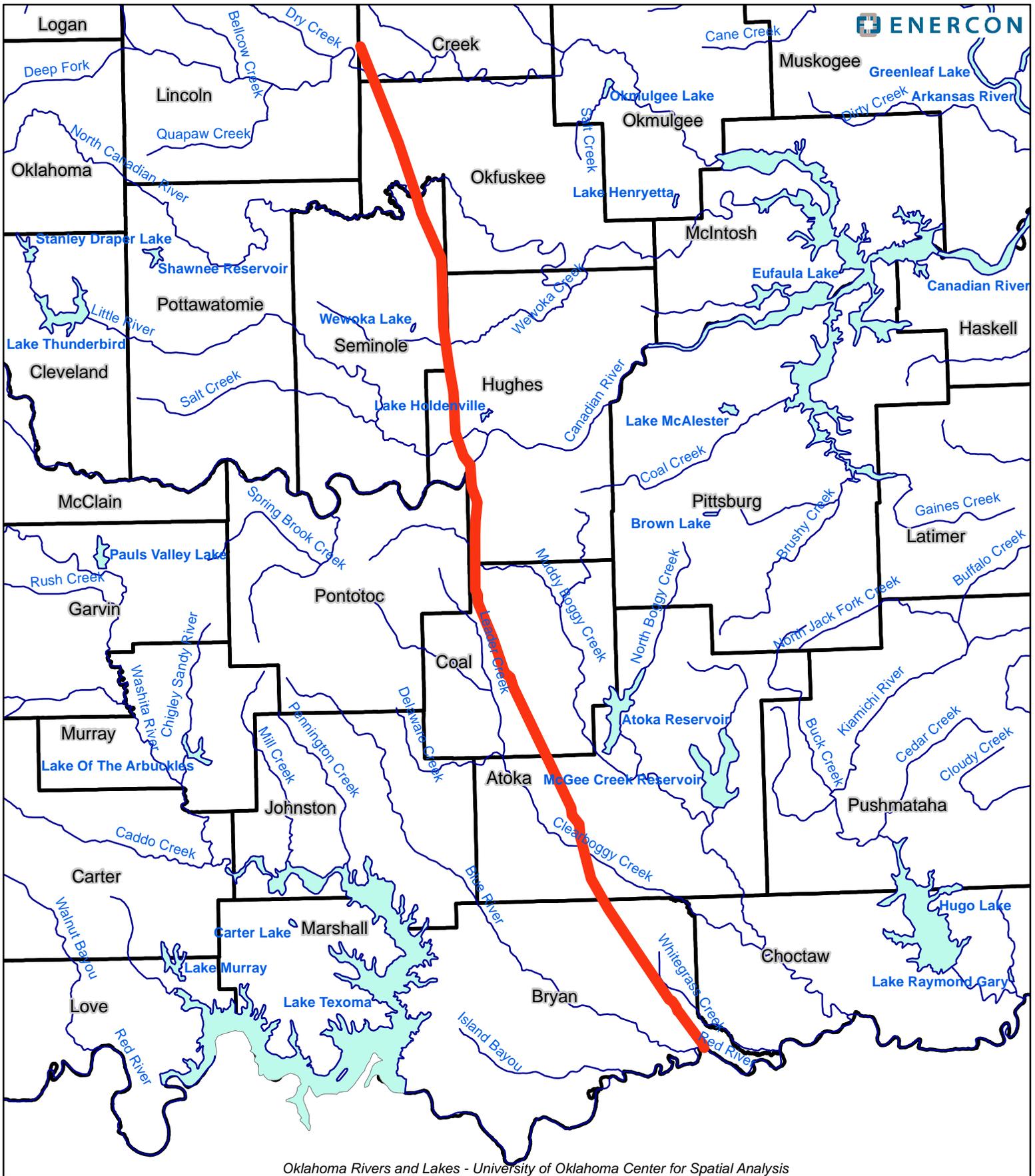
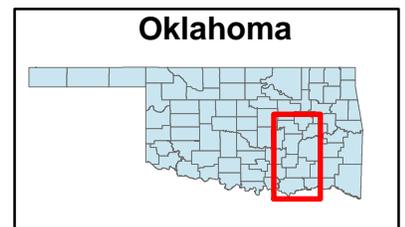


Figure 4. Major Surface Water Features Map

- █ Plan and Permit Area
- Oklahoma Rivers
- Oklahoma Counties
- Oklahoma Lakes



0 5 10 20
Miles



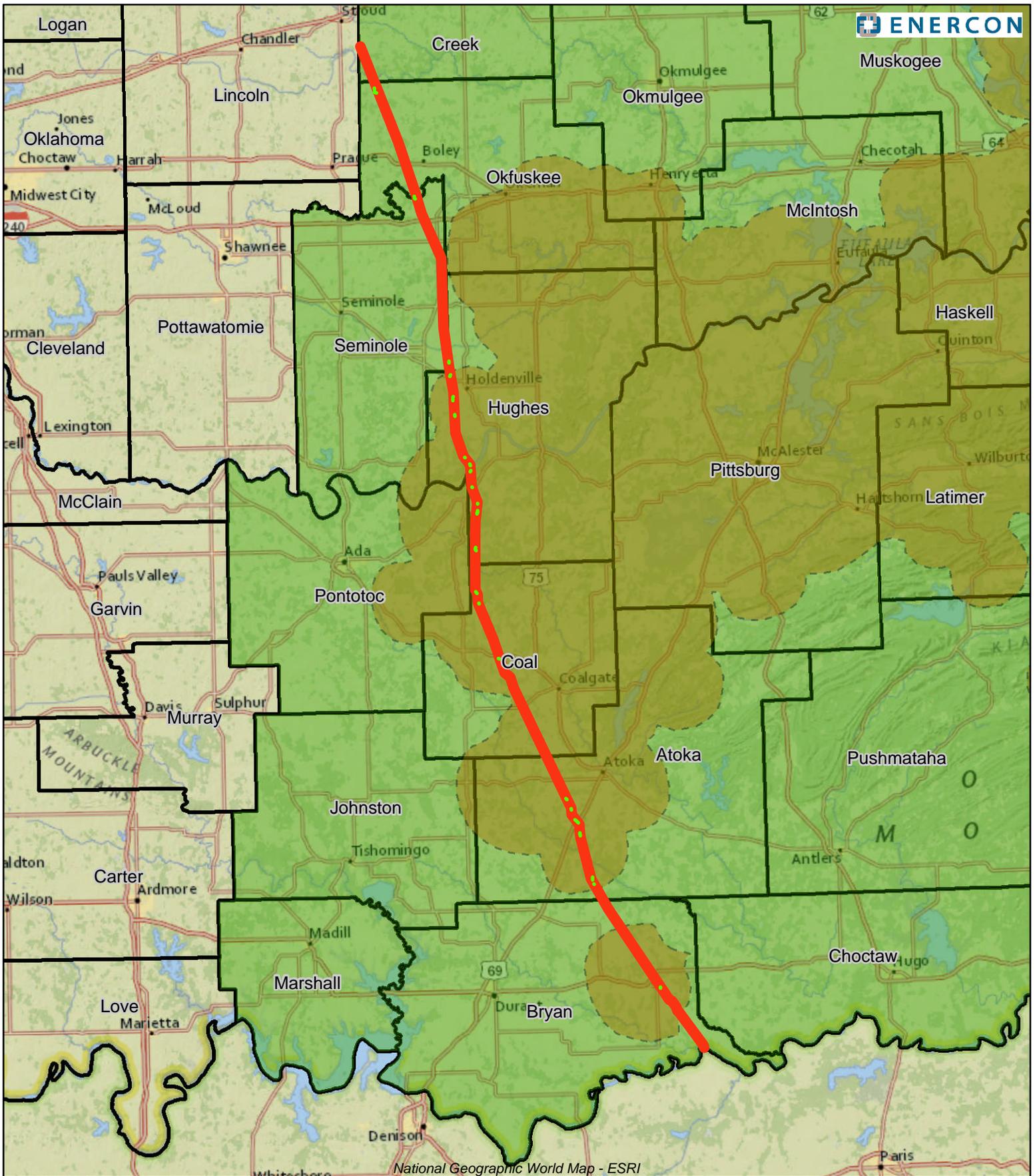
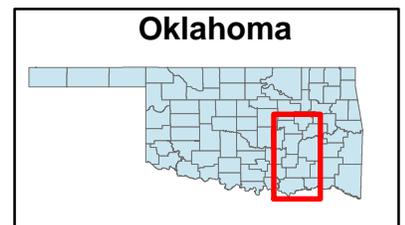


Figure 5. ABB Habitat Fragmentation in Plan Area

- ABB Habitat Fragmentation
- Plan and Permit Area
- ABB Conservation Priority Area
- ABB Range in Oklahoma
- Oklahoma Counties



0 5 10 20 Miles



APPENDIX A:

Construction, Mitigation, and Reclamation Plan



GULF COAST PROJECT

CONSTRUCTION, MITIGATION, AND RECLAMATION PLAN

March 2012
Rev. 1

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

1.0	INTRODUCTION	1
2.0	GENERAL CONDITIONS	2
2.1	Training	2
2.2	Environmental Inspection.....	2
2.3	Advance Notice of Access to Property Prior to Construction	3
2.4	Other Notifications.....	3
2.5	Damages to Private Property	4
2.6	Appearance of Worksite.....	4
2.7	Access.....	4
2.8	Aboveground Facilities.....	5
2.9	Minimum Depth of Cover	5
2.10	Non-Hazardous Waste Disposal	5
2.11	Hazardous Wastes	6
2.12	Noise Control.....	7
2.13	Weed Control.....	7
2.14	Dust Control.....	8
2.15	Off Road Vehicle Control.....	9
2.16	Fire Prevention and Control.....	9
2.17	Road and Railroad Crossings.....	10
2.18	Adverse Weather.....	11
2.19	Cultural Resources	11
3.0	SPILL PREVENTION AND CONTAINMENT	13
3.1	Spill Prevention	13
3.1.1.	Staging Areas	13
3.1.2.	Construction Right-of-Way	15
3.2	Contingency Plans	16
3.3	Equipment	16
3.4	Emergency Notification	17
3.5	Spill Containment and Countermeasures	17
4.0	UPLANDS (AGRICULTURAL, FOREST, PASTURE, RANGE AND GRASSLANDS)	19
4.1	Interference with Irrigation Systems.....	19
4.2	Clearing.....	19
4.3	Topsoil Removal and Storage.....	20
4.4	Grading	21
4.5	Temporary Erosion and Sediment Control.....	21
4.5.1.	General	21

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

4.5.2.	Sediment Barriers	22
4.5.3.	Trench Plugs.....	23
4.5.4.	Temporary Slope Breakers (Water Bars).....	23
4.5.5.	Drainage Channels or Ditches	24
4.5.6.	Temporary Mulching and Cover Crops	24
4.5.7.	Tackifier	25
4.6	Stringing	25
4.7	Trenching	25
4.7.1.	Trench Dewatering/Well Points.....	27
4.8	Welding, Field Joint Coating, and Lowering In.....	28
4.9	Padding and Backfilling.....	28
4.10	Cleanup	29
4.11	Reclamation and Revegetation	30
4.11.1.	Relieving Compaction	31
4.11.2.	Rock Removal.....	32
4.11.3.	Soil Additives.....	32
4.11.4.	Seeding	32
4.11.5.	Permanent Erosion and Sediment Control.....	34
4.11.6.	Fences.....	37
4.11.7.	Farm Terraces.....	37
4.11.8.	Right-of-Way and Pipeline Markers.....	38
4.12	Pasture and Range Lands.....	38
4.13	Forested Lands.....	39
4.14	Residential and Commercial/Industrial Areas.....	40
4.14.1.	Residential and Commercial Areas	40
4.14.2.	Site-Specific Plans	41
4.14.3.	Landowner Complaint Resolution Procedure.....	42
4.15	Operations and Maintenance	42
5.0	DRAIN TILE SYSTEMS	44
5.1	General	44
5.2	Identification and Classification of Drain Tile Systems.....	44
5.2.1.	Publicly Owned Drain Tiles	44
5.2.2.	Privately Owned Drain Tiles.....	44
5.3	Mitigation of Damage to Drain Tile Systems	45
5.3.1.	Non-interference with Drain Tile	45
5.3.2.	Non-disturbance of Drain Tile Mains.....	45

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

5.3.3.	Relocation or Replacement of Existing Drain Tiles Prior to Construction	45
5.3.4.	Future Drain Tiles/Systems.....	46
5.3.5.	Other Mitigation Measures.....	46
5.4	Responsibility for Repair of Drain Tile Systems	46
5.4.1.	Local Drain Tile Contractor Repair.....	46
5.4.2.	Pipeline Contractor Repair.....	47
5.4.3.	Landowner/Tenant Repair	47
5.5	Drain Tile Repairs	47
5.5.1.	Temporary Repairs During Construction	47
5.5.2.	Permanent Repairs.....	47
5.6	Inspection/Acceptance of Drain Tile Repairs	48
6.0	WETLAND CROSSING	49
6.1	General	49
6.2	Easement and Workspace	49
6.3	Vehicle Access and Equipment Crossing	50
6.4	Temporary Erosion and Sediment Control.....	50
6.5	Wetland Crossing Procedures	50
6.5.1.	Dry Wetland Crossing Method	52
6.5.2.	Standard Wetland Crossing Method	52
6.5.3.	Flooded Push/Pull Wetland Crossing Method	52
6.6	Restoration and Reclamation.....	52
7.0	WATERBODIES AND RIPARIAN AREAS	54
7.1	General	54
7.2	Easement and Work Space	55
7.3	Vehicle Access and Equipment Crossings.....	55
7.4	Waterbody Crossing Methods.....	56
7.4.1.	Non-flowing Open Cut Crossing Method	56
7.4.2.	Flowing Open Cut Crossing Method of Minor, Intermediate, and Major Waterbodies 57	
7.4.3.	Flowing Stream Crossing – Dry Flume Method	57
7.4.4.	Flowing Stream Crossing – Dry Dam-and-Pump Method.....	57
7.4.5.	Horizontal Directional Drill Crossings.....	58
7.4.6.	Horizontal Bore Crossings	58
7.5	Clearing.....	58
7.6	Grading	59
7.7	Temporary Erosion and Sediment Control.....	59

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

7.8	Trenching	60
7.9	Pipe Installation.....	60
7.10	Backfilling	61
7.11	Stabilization and Restoration of Stream Banks and Slopes	61
8.0	HYDROSTATIC TESTING	63
8.1	Testing Equipment Location.....	63
8.2	Test Water Source and Discharge Locations.....	63
8.3	Filling the Pipeline	64
8.4	Dewatering the Pipeline	65
8.4.1.	Splash Pup.....	66
8.4.2.	Splash Plate.....	66
8.4.3.	Plastic Liner	66
8.4.4.	Straw Bale Dewatering Structure.....	66

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

9.0 DRAWINGS AND FIGURES

Detail 1	Typical Silt Fence Barrier
Detail 2	Typical Straw or Hay Bale Barrier
Detail 3	Temporary/Permanent Slope Breaker Detail (Water Bars)
Detail 4	Erosion Control Matting Installation
Detail 5	Typical Dewatering Filter Bag
Detail 6	Typical Straw Bale Dewatering Structure
Detail 7	Typical Permanent Trench Breaker
Detail 8	"Dry" Wetland Crossing Method
Detail 9	Standard Wetland Crossing Method
Detail 10	Push/Pull Wetland Crossing Method
Detail 11	Typical Open Cut Wet Crossing Method Non-Flowing Waterbody
Detail 12	Typical Open Cut Wet Crossing Method Flowing Waterbody
Detail 12a	Typical Open Cut Wet Crossing Method Flowing Waterbody – Construction Procedure
Detail 13	Typical Dry Flume Crossing Method
Detail 13a	Typical Dry Flume Crossing Method – Construction Procedure
Detail 14	Typical Dam and Pump Crossing
Detail 14a	Typical Dam and Pump Crossing – Construction Procedure
Detail 15	Typical Horizontal Drill (HDD) Site Plan & Profile
Detail 16	Typical Temporary Bridge Crossing
Detail 16a	Typical Temporary Bridge Crossing – Construction Procedure
Detail 17	Typical Flume Bridge Crossing
Detail 18	Typical Railcar Bridge Crossing
Detail 18a	Typical Railcar Bridge Crossing – Construction Procedure
Detail 19	Flexible Channel Liner Installation
Detail 20	Typical Rock Rip-Rap
Detail 21	Typical Road Bore Crossing
Detail 22	Streambank Reclamation – Brush Layer In Cross Cut Slope
Detail 23	Streambank Reclamation – Log Wall
Detail 24	Streambank Reclamation – Vegetated Geotextile Installation
Detail 25	Typical ROW Layout/Soil Handling
Detail 26	Header/Main Crossovers of Pipeline
Detail 27	Relocate/Replace Drainage Header/Main
Detail 28	Temporary Drain Tile Repair
Detail 29	Permanent Repair Method of Drain Tiles
Detail 30	Equipment Cleaning Station Detail
Detail 31	Equipment Wash Station Detail
Detail 67	Topsoil Conservation Ditch & Spoil Stripping Triple Ditch
Detail 67a	Topsoil Conservation Ditch & Spoil Stripping Triple Ditch

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

1.0 INTRODUCTION

The construction, mitigation, and reclamation requirements described in this Plan apply to work on TransCanada Keystone Pipeline, L.P.'s (Keystone's) Gulf Coast 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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 Stockpile 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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).

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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,

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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);

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

(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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

4.0 UPLANDS (AGRICULTURAL, FOREST, PASTURE, RANGE AND GRASSLANDS)

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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 ROWas 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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 expeditiously 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

Sediment control barriers are not required at “dry” wetlands (Detail 8). Detail 8 is not applicable to the Gulf Coast Project.

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 driveable 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 upgradient 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 clean up 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:

<u>Slope (%)</u>	<u>Spacing (feet)</u>
5 - 15	300
>15 - 30	200

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

>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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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 hours 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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 resspreading 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 (NRCS) 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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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,

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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)

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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,

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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;

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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 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 expeditiously 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 expeditiously 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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 jumpovers as depicted on Detail 26, Header/Main Crossovers of Gulf Coast Project 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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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 endeavor 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

6.0 WETLAND CROSSING

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. Section 6.5.1 is not applicable to the Gulf Coast Project.

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

The contractor will be directed to use mats regardless of wetland moisture content on the Gulf Coast Project.

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 driveable 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

6.5.1. Dry Wetland Crossing Method

Not applicable to the Gulf Coast Project

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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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 MITIGATION AND RECLAMATION PLAN

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:

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

- 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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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, rock shield, 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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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.

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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 backflushing 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 backflush valve on the filter closed during the filling operation. The Contractor shall be responsible for the proper disposal of materials backflushed from the filter or filter cartridges. The Contractor shall not be allowed to backflush 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

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

mile per hour, except as limited by permits or the maintenance of adequate flow rates in the waterbody, as follows:

<u>Nominal OD</u>	<u>Max GPM</u>
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:

CONSTRUCTION MITIGATION AND RECLAMATION PLAN

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

Detail 1	Typical Silt Fence Barrier
Detail 2	Typical Straw or Hay Bail Barrier
Detail 3	Temporary/Permanent Slope Breaker Detail (Water Bars)
Detail 4	Erosion Control Matting Installation
Detail 5	Typical Dewatering Filter Bag
Detail 6	Typical Straw Bale Dewatering Structure
Detail 7	Typical Permanent Trench Breakers
Detail 8	"Dry" Wetland Crossing Method
Detail 9	Standard Wetland Crossing Method
Detail 10	Push/Pull Wetland Crossing Method
Detail 11	Typical Open Cut Wet Crossing Method Non-Flowing Waterbody
Detail 12	Typical Open Cut Wet Crossing Method Flowing Waterbody
Detail 12a	Typical Open Cut Wet Crossing Method Flowing Waterbody - Construction Procedures
Detail 13	Typical Dry Flume Crossing Method
Detail 13a	Typical Dry Flume Crossing Method - Construction Procedures
Detail 14	Typical Dam and Pump Crossing
Detail 14a	Typical Dam and Pump Crossing - Construction Procedures
Detail 15	Typical Horizontal Drill (HDD) Site Plan & Profile
Detail 16	Typical Temporary Bridge Crossing
Detail 16a	Typical Temporary Bridge Crossing - Construction Procedures
Detail 17	Typical Flume Bridge Crossing
Detail 18	Typical Railcar Bridge Crossing
Detail 18a	Typical Railcar Bridge Crossing - Construction Procedures
Detail 19	Flexible Channel Liner Installation
Detail 20	Typical Rock Rip-Rap
Detail 21	Typical Road Bore Crossing
Detail 22	Streambank Reclamation - Brush Layer in Cross Cut Slope
Detail 23	Streambank Reclamation - Log Wall
Detail 24	Streambank Reclamation - Vegetated Geotextile Installation
Detail 25	Typical ROW Layout/Soil Handling
Detail 26	Header/Main Crossovers of Pipeline
Detail 27	Relocate/Replace Drainage Header/Main
Detail 28	Temporary Drain Tile Repair
Detail 29	Permanent Repair Method of Drain Tiles
Detail 30	Equipment Cleaning Station Detail
Detail 31	Equipment Wash Station Detail
Detail 67	Topsoil Conservation Ditch & Spoil Stripping Triple Ditch
Detail 67A	Topsoil Conservation Ditch & Spoil Stripping Triple Ditch

2010-10-11 REVISED TITLE BLOCK

03

2010-10-08 REVISED TITLES

02

2008-11-05 REVISED TITLES, ADDED/DEL. DETAILS

01

REVISIONS

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



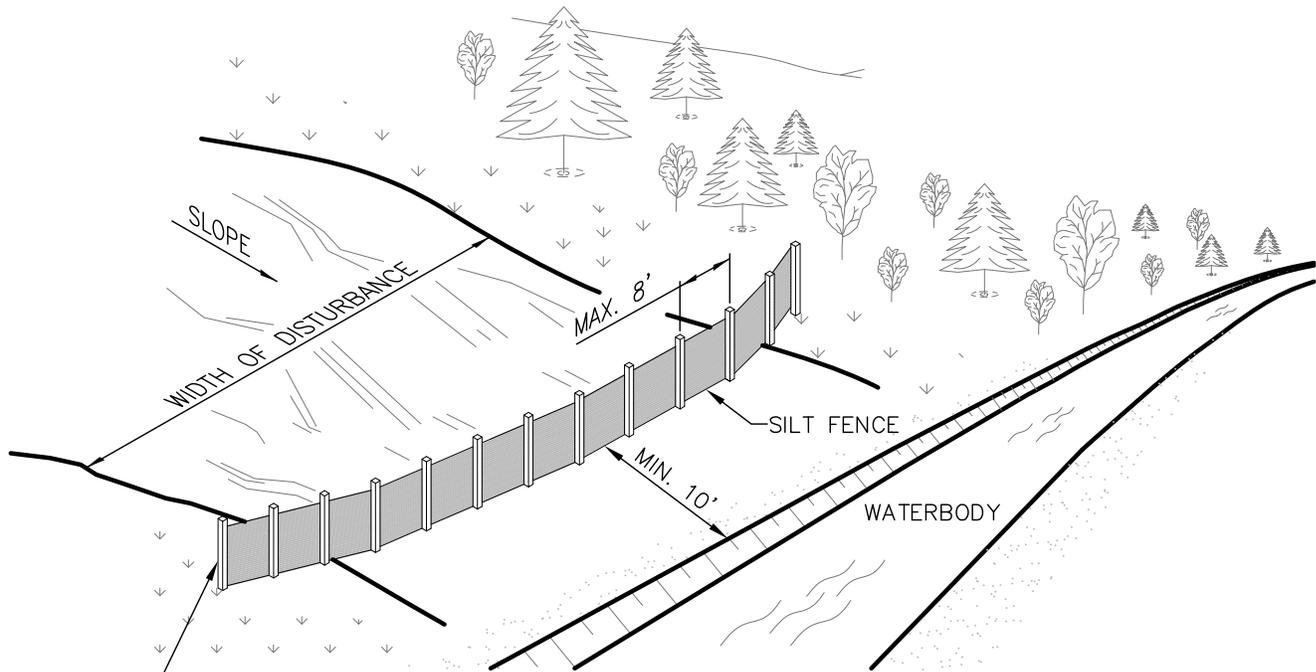
exp Energy Services Inc.
 In business to deliver
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA



www.exp.com

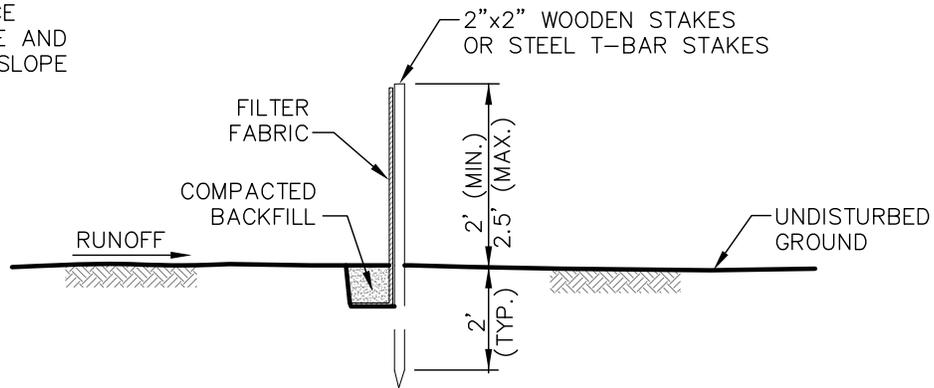
DESIGNER:		KEYSTONE PIPELINE GULF COAST PROJECT		
JMP NAME	2010-10-21 DATE	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
		TITLE		
		DETAIL INDEX		
CHECKED BY:	DESIGN CHECKER:	SCALE	DWG No	REV
WSF	RW P7100	N.T.S.	4359-03-ML-00-700	03

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



EXTEND SILT FENCE BEYOND THE WIDTH OF DISTURBANCE IF APPROPRIATE AND TURN ENDS UPSLOPE

PLAN



SECTION "A-A"

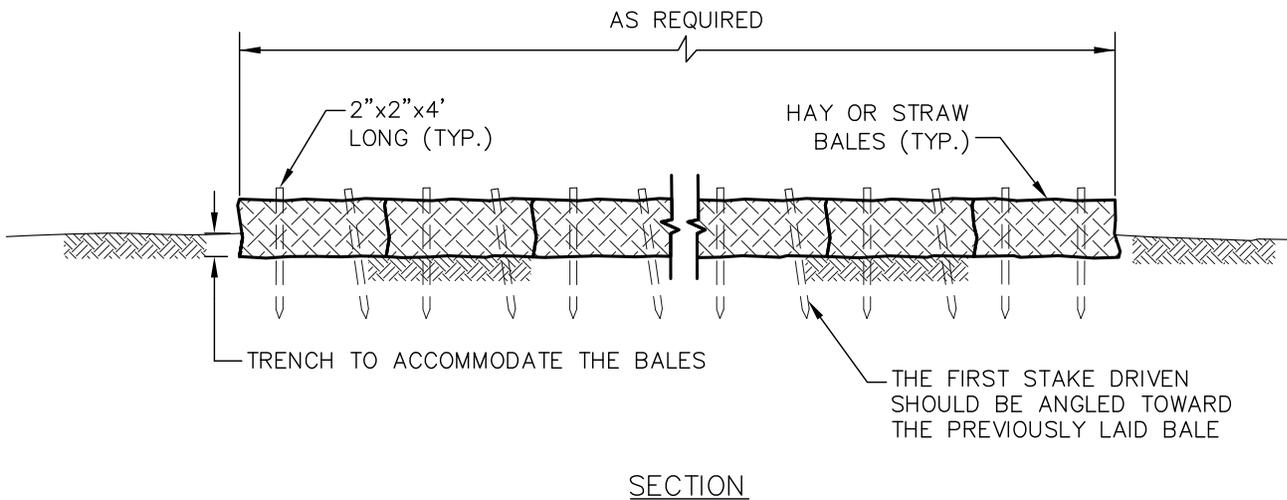
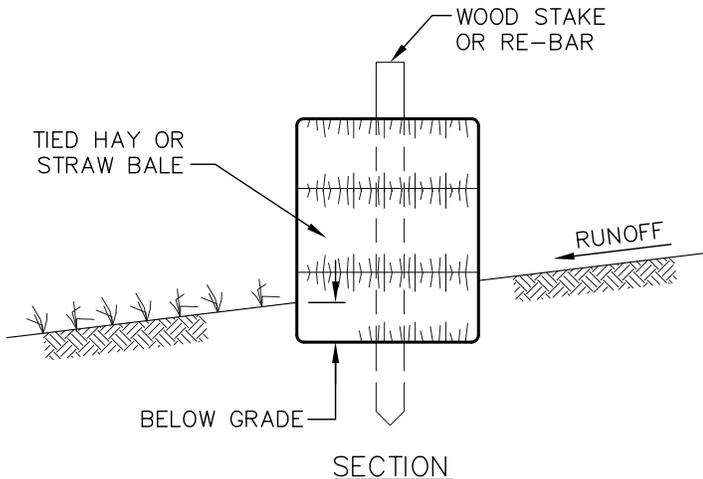
NOTES:

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

TransCanada <i>In business to deliver</i> exp Energy Services Inc. t: +1.850.385.5441 f: +1.850.385.5523 1300 Metropolitan Blvd Tallahassee, FL 32308 USA www.exp.com	DESIGNER:	KEYSTONE PIPELINE GULF COAST PROJECT			
	JMP NAME	2010-10-21 DATE	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
			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

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



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.

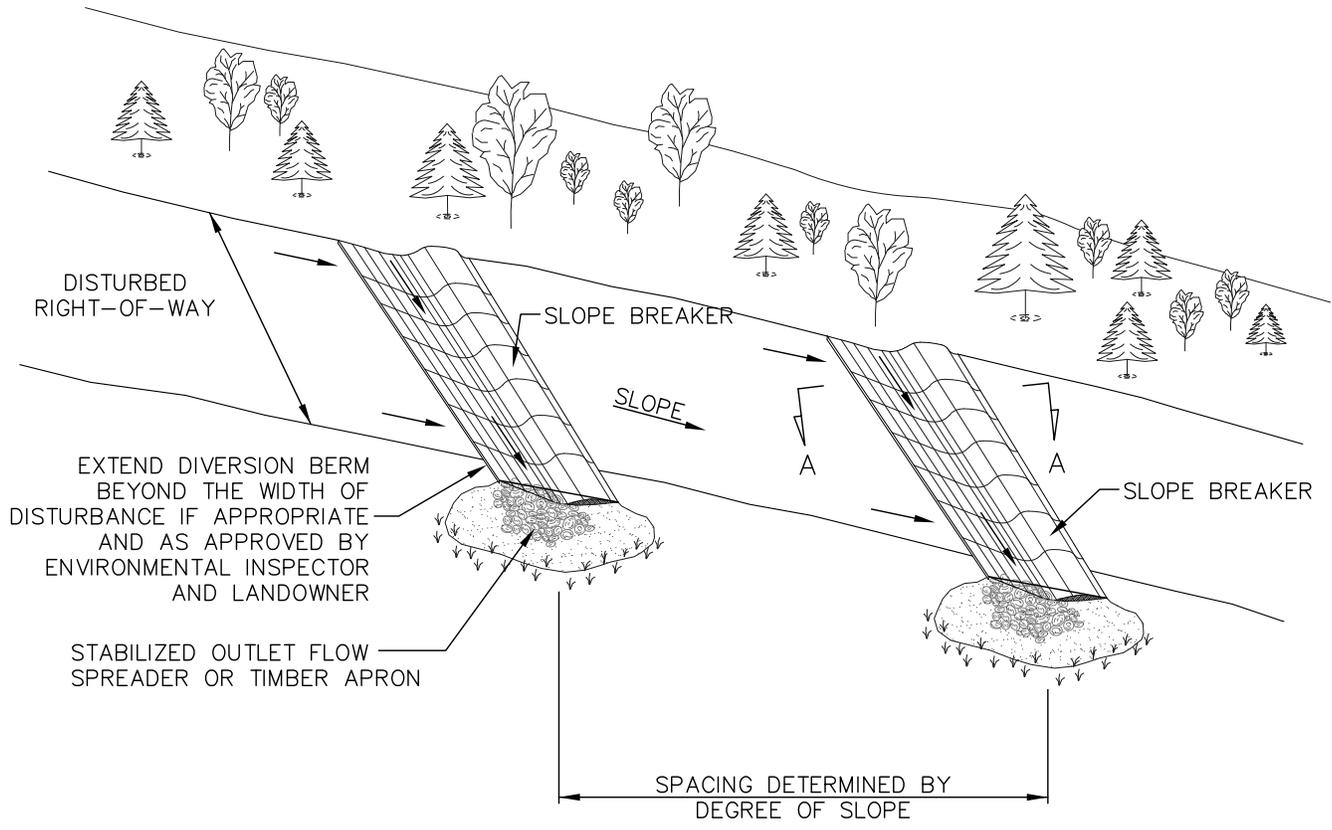
exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

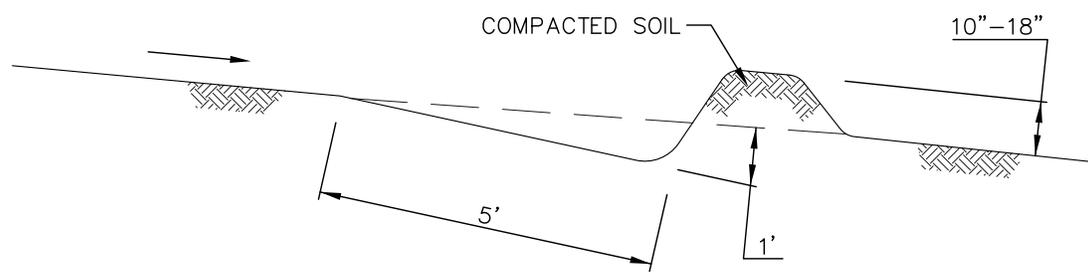
DESIGNER:	
JMP NAME	2010-10-21 DATE
CHECKED BY:	DESIGN CHECKER:
WSF	RW P7100

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 2 TYPICAL STRAW OR HAY BALE BARRIER		
SCALE N.T.S.	DWG No 4359-03-ML-05-702	REV 03

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



PLAN



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

exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

DESIGNER: _____

JMP NAME 2010-10-21 DATE

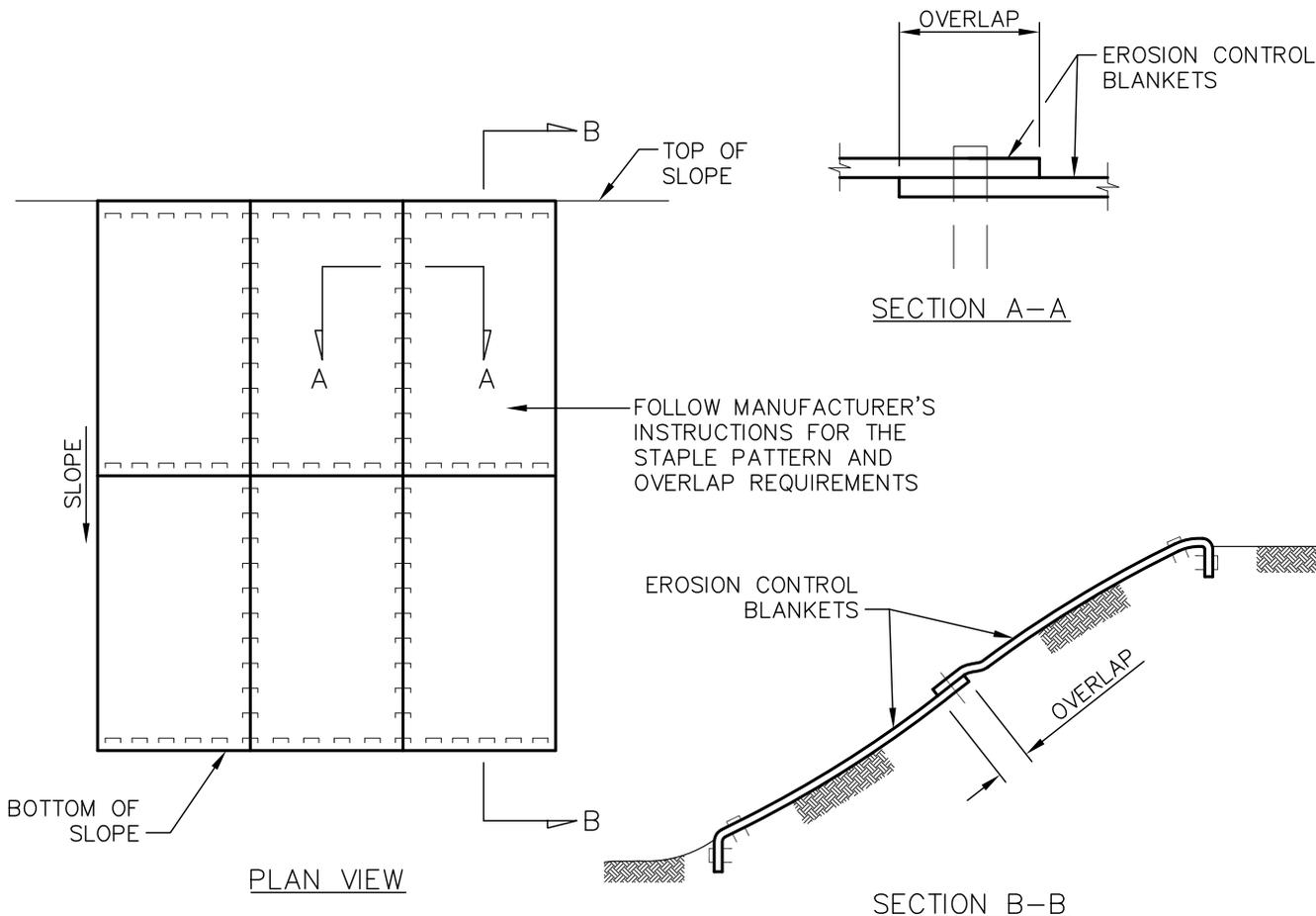
CHECKED BY: _____ DESIGN CHECKER: _____

WSF RW P7100

KEYSTONE PIPELINE GULF COAST PROJECT

FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE DETAIL 3 TEMPORARY/PERMANENT SLOPE BREAKER DETAIL (WATER BARS)		
SCALE N.T.S.	DWG No 4359-03-ML-05-703	REV 03

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



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-DEGRADABLE 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
 02 2010-10-08 UPDATED DRAWING NOTES
 03 2010-10-11 REVISED TITLE BLOCK

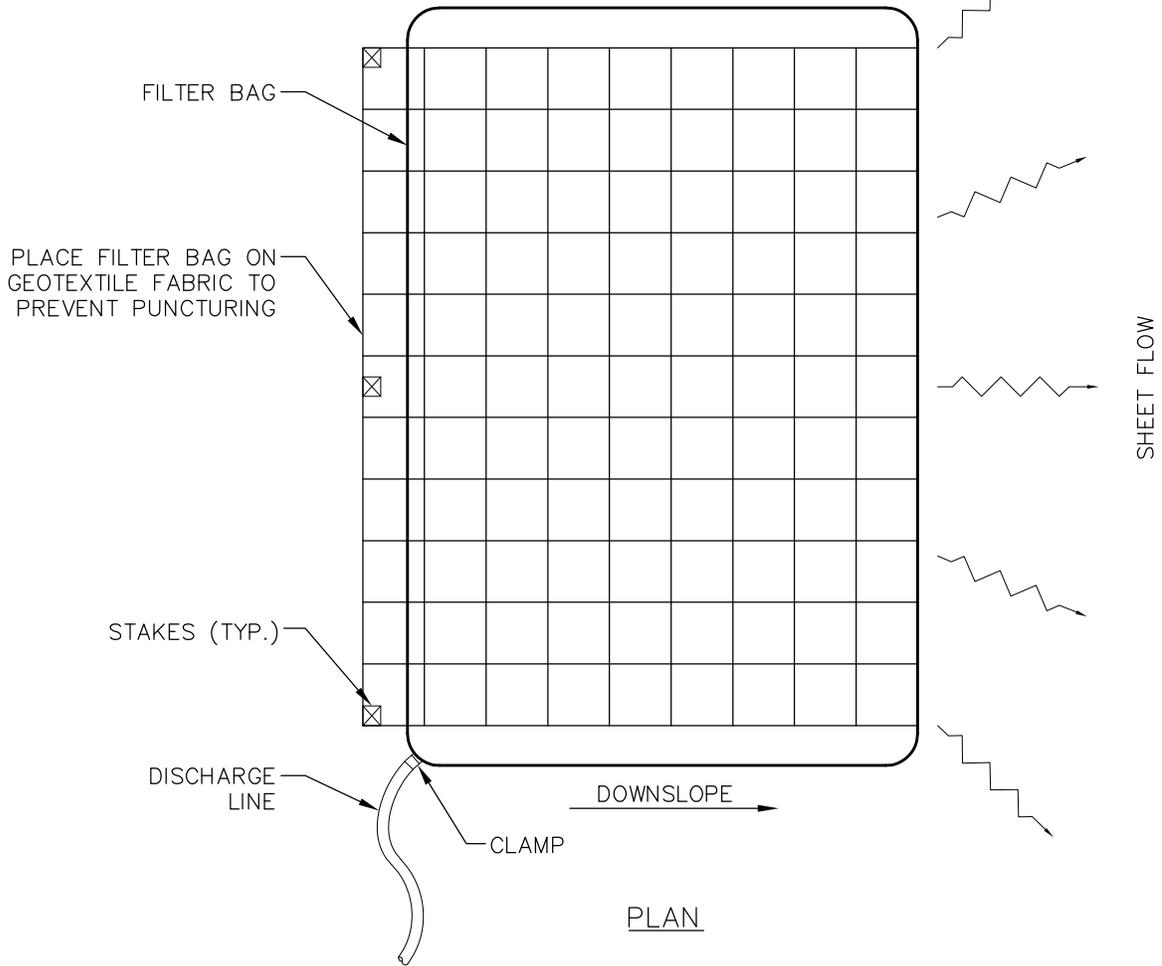
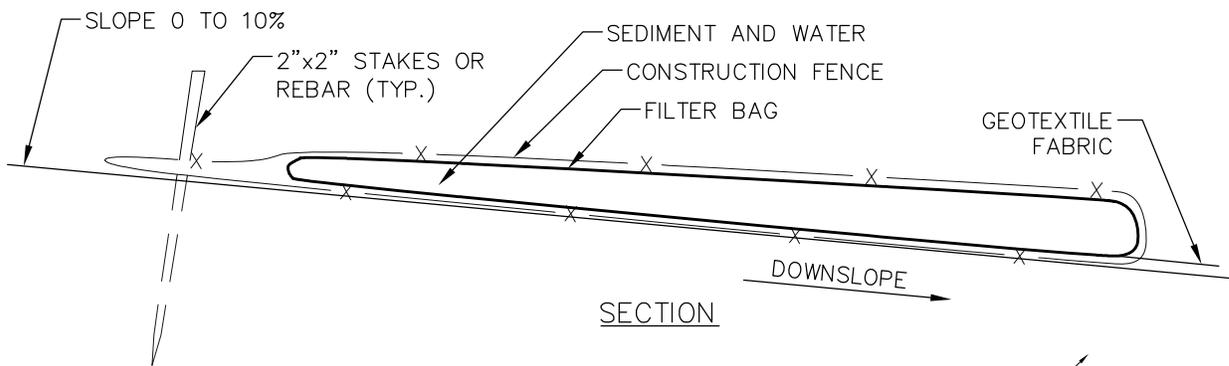
exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 4 EROSION CONTROL MATTING INSTALLATION		
SCALE N.T.S.	DWG No 4359-03-ML-05-704	REV 03

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



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

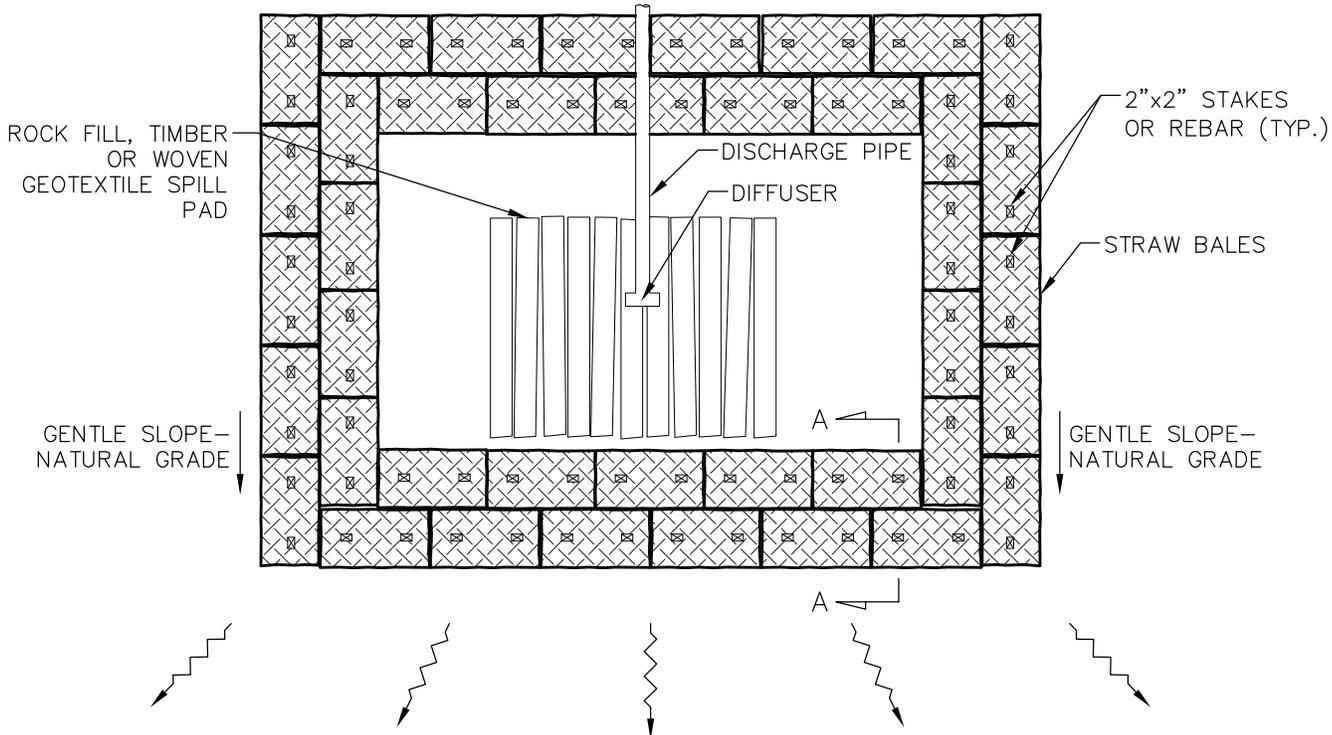
exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

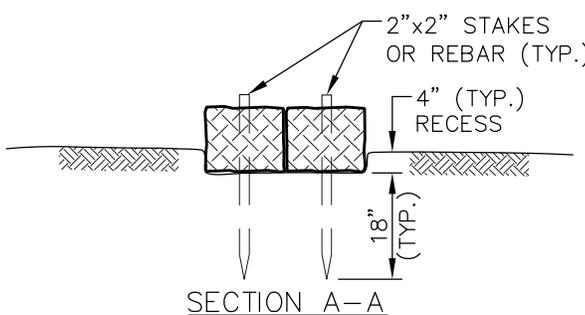
DESIGNER:	
JMP	2010-10-21
NAME	DATE
CHECKED BY:	DESIGN CHECKER:
WSF	RW P7100

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 5 TYPICAL DEWATERING FILTER BAG		
SCALE N.T.S.	DWG No 4359-03-ML-05-705	REV 02

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



SHEET FLOW 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.

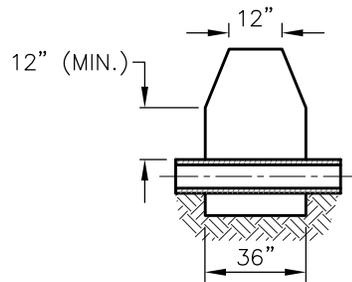
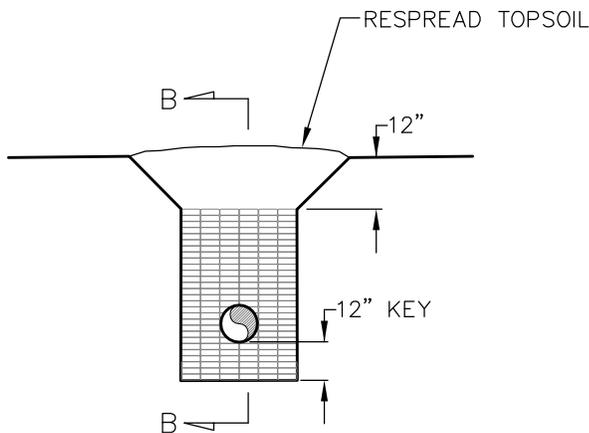
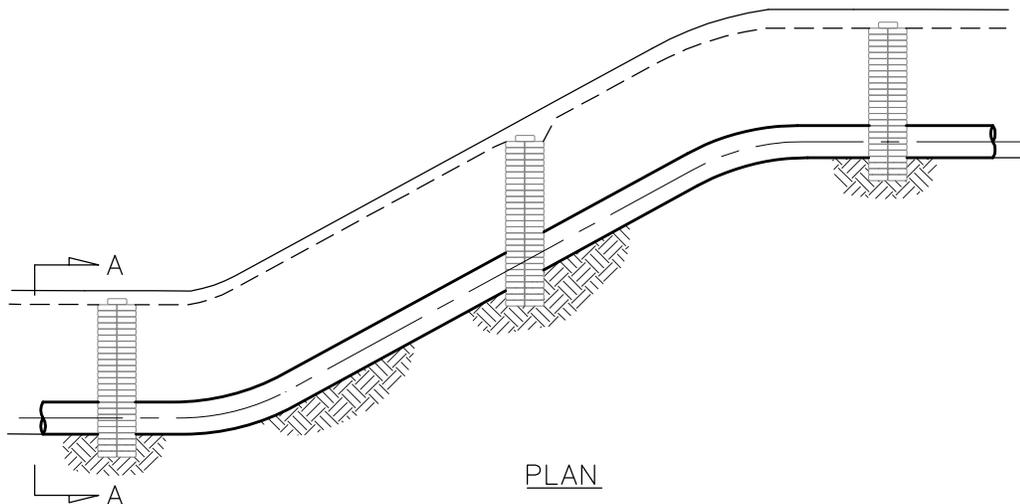
REVISIONS 01 2008-11-04 MODIFIED DRAWING NOTES 02 2010-10-08 UPDATED DRAWING NOTES 03 2010-10-11 UPDATED DRAWING NOTES

exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

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

KEYSTONE PIPELINE GULF COAST 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



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

TransCanada
In business to deliver

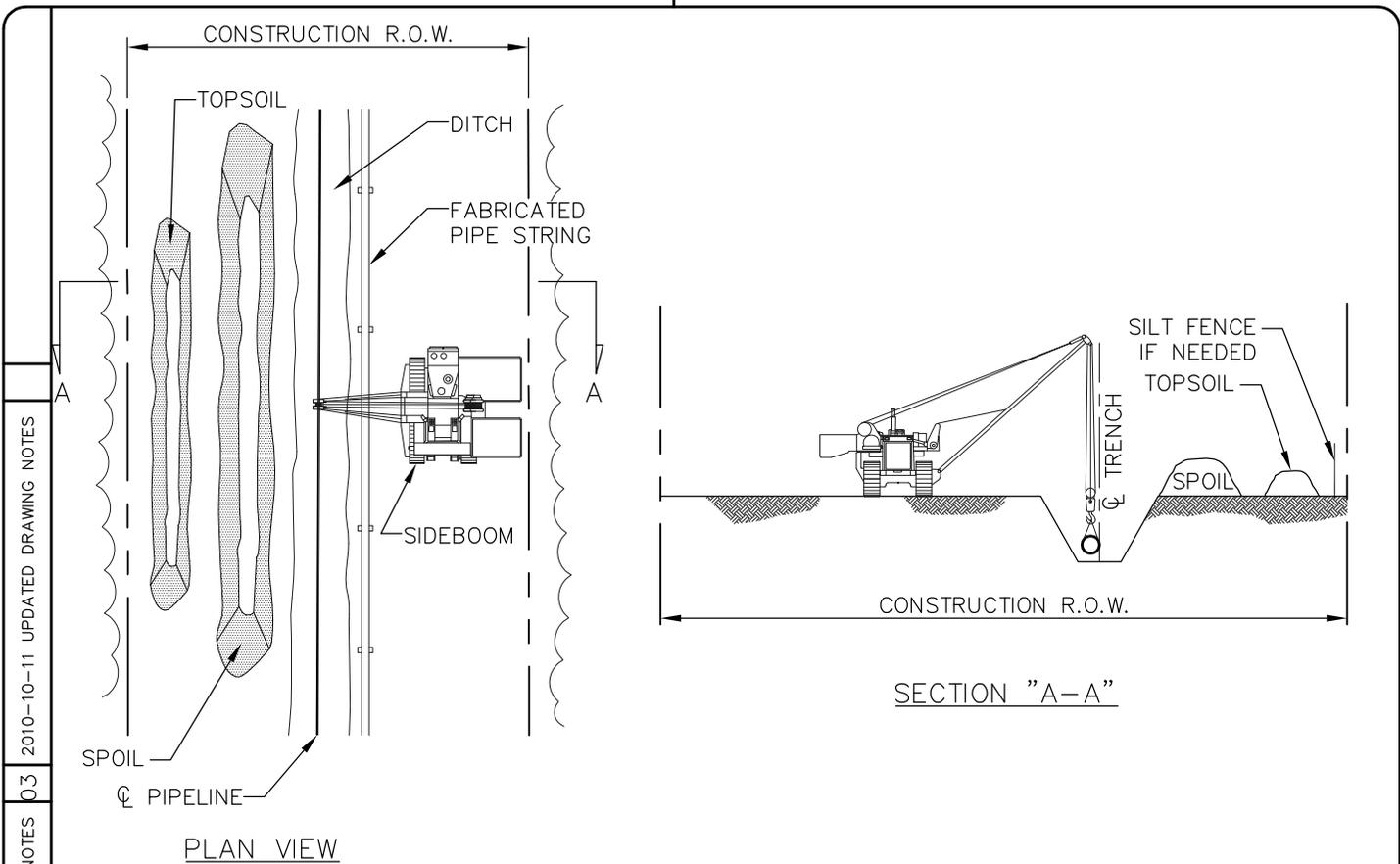
exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 7 TYPICAL PERMANENT TRENCH BREAKER		
SCALE N.T.S.	DWG No 4359-03-ML-05-707	REV 02

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



PLAN VIEW

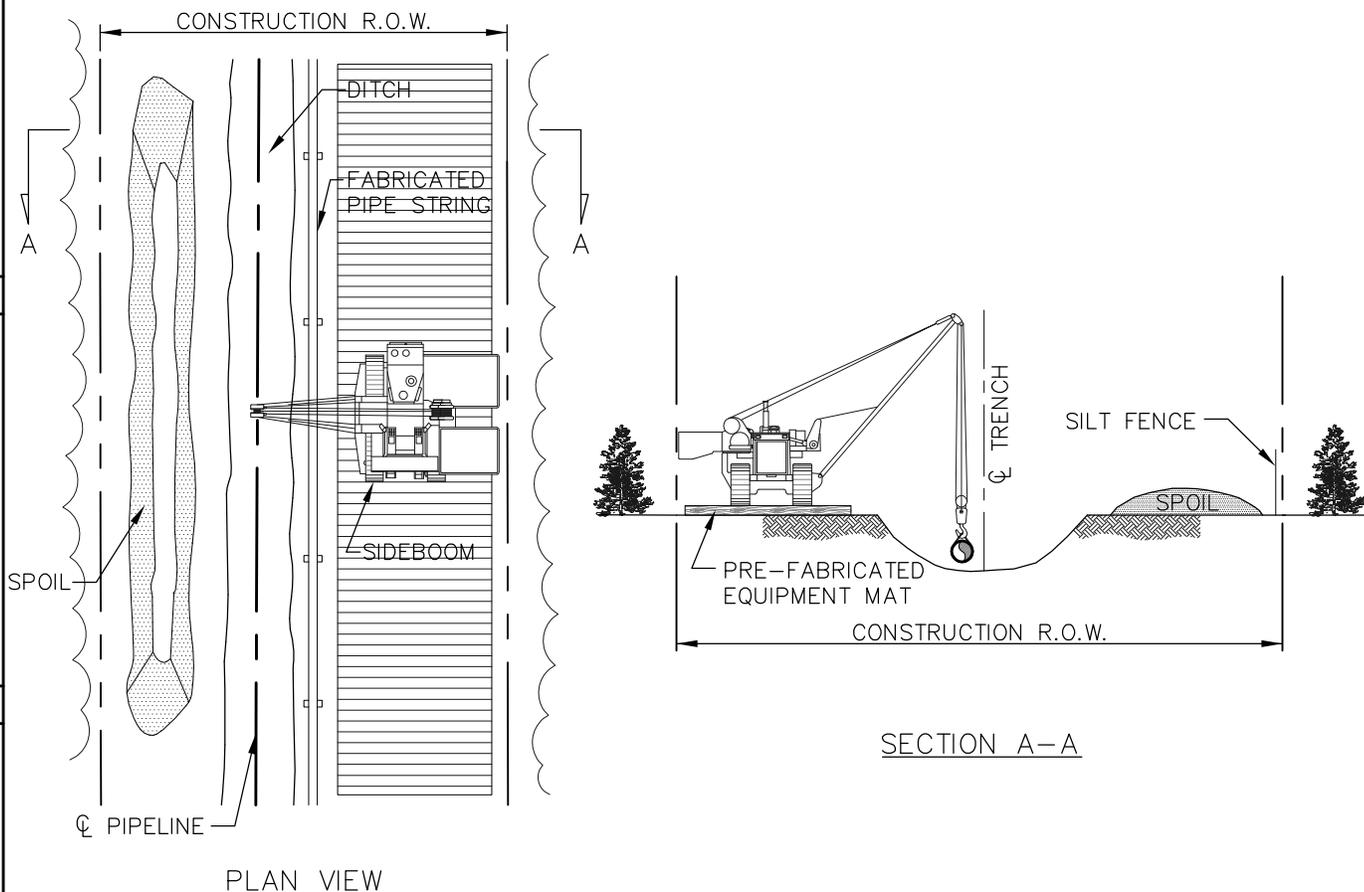
SECTION "A-A"

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

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.

 In business to deliver exp Energy Services Inc. t: +1.850.385.5441 f: +1.850.385.5523 1300 Metropolitan Blvd Tallahassee, FL 32308 USA  www.exp.com	DESIGNER:	KEYSTONE PIPELINE GULF COAST PROJECT			
	JMP NAME	2010-10-21 DATE	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
	CHECKED BY: WSF		DESIGN CHECKER: RW P7100		
			TITLE DETAIL 8 "DRY" WETLAND CROSSING METHOD		
		SCALE N.T.S.	DWG No 4359-03-ML-03-701	REV 03	



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

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.

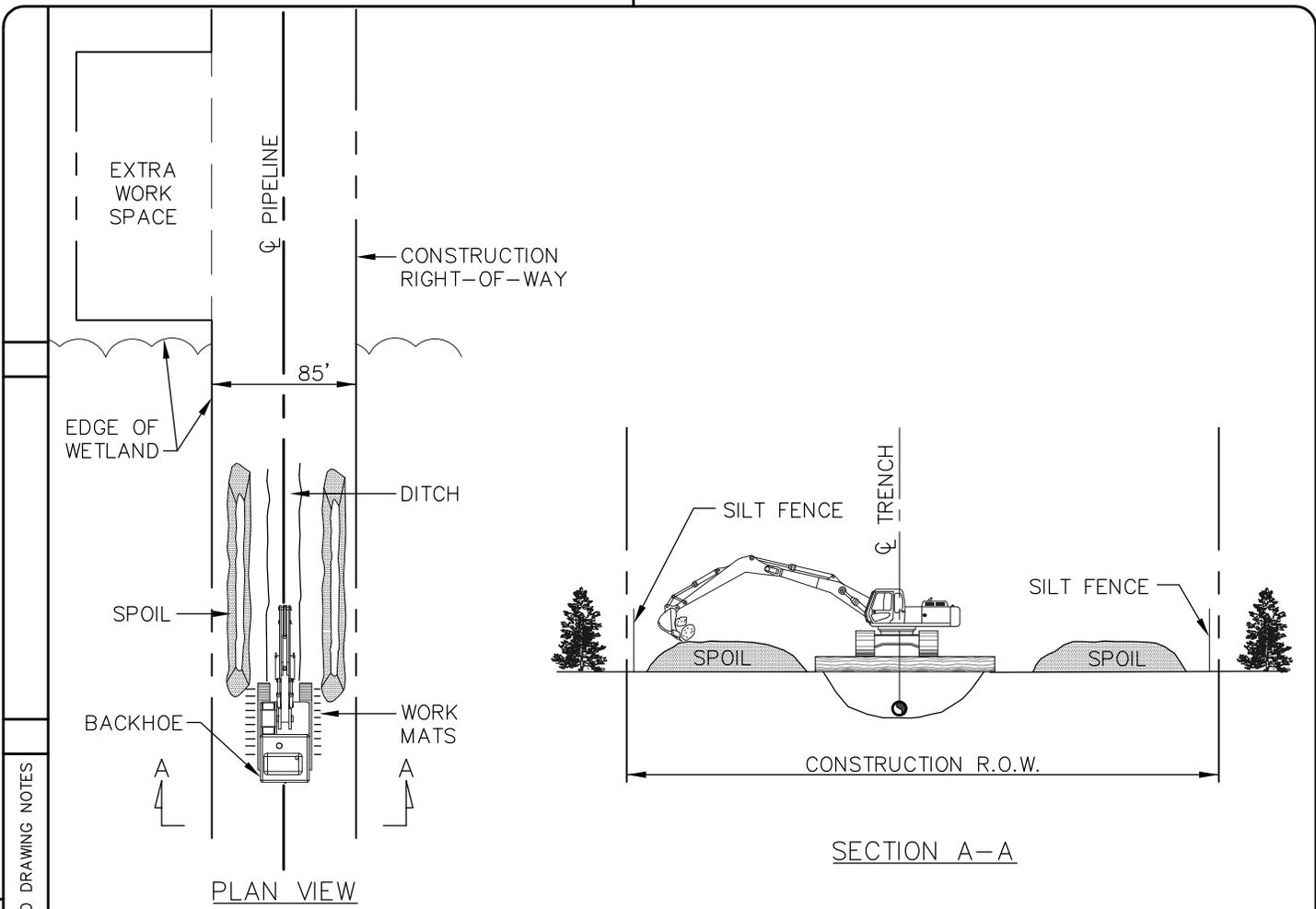

TransCanada
In business to deliver
exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

 www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 9 STANDARD WETLAND CROSSING METHOD		
SCALE N.T.S.	DWG No 4359-03-ML-03-702	REV 02

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



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.

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

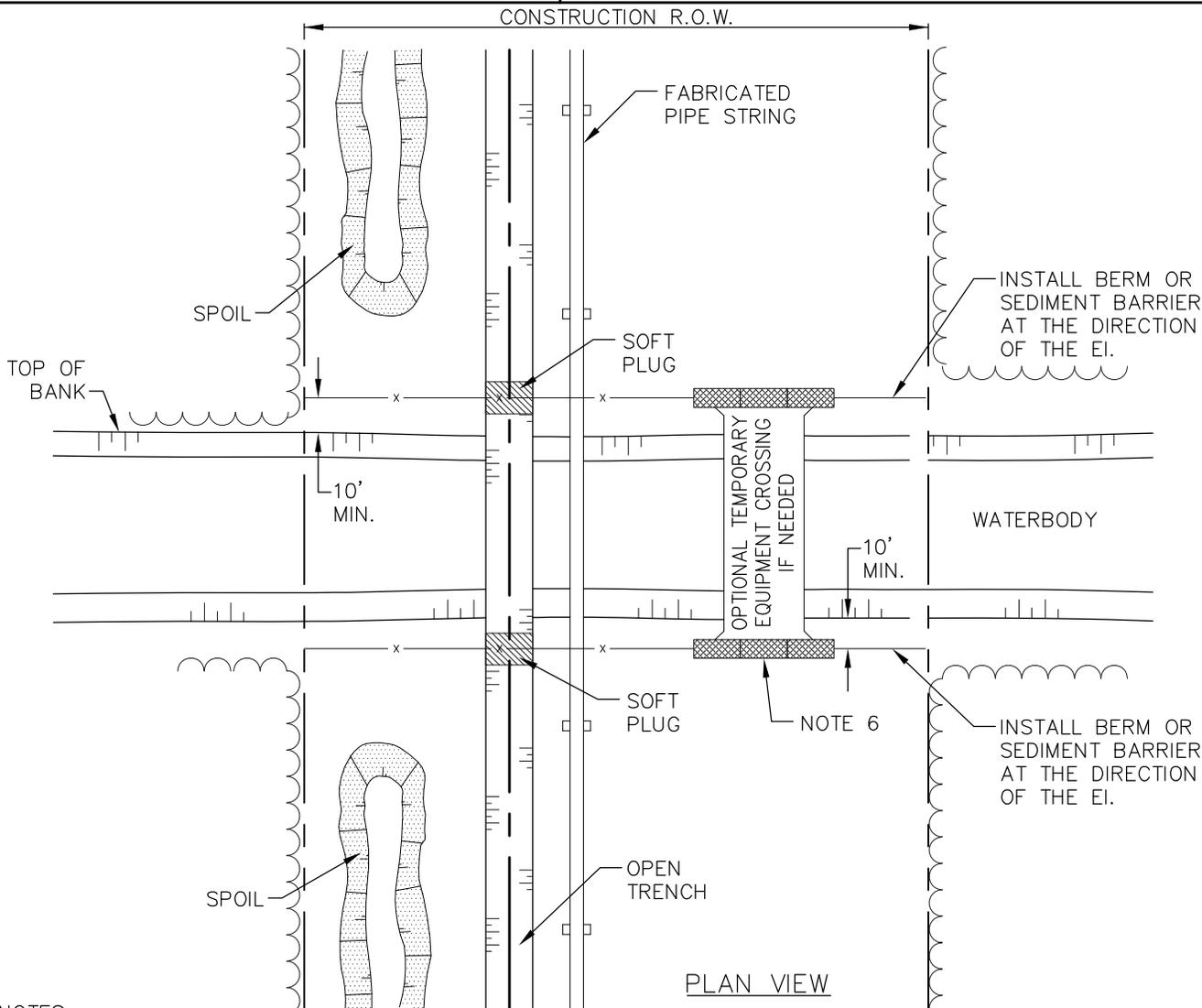
TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 10 PUSH/PULL WETLAND CROSSING METHOD		
SCALE N.T.S.	DWG No 4359-03-ML-03-703	REV 02



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.

2010-10-11 UPDATED DRAWING NOTES

2010-10-08 UPDATED DRAWING NOTES

03

02

01

REVISIONS

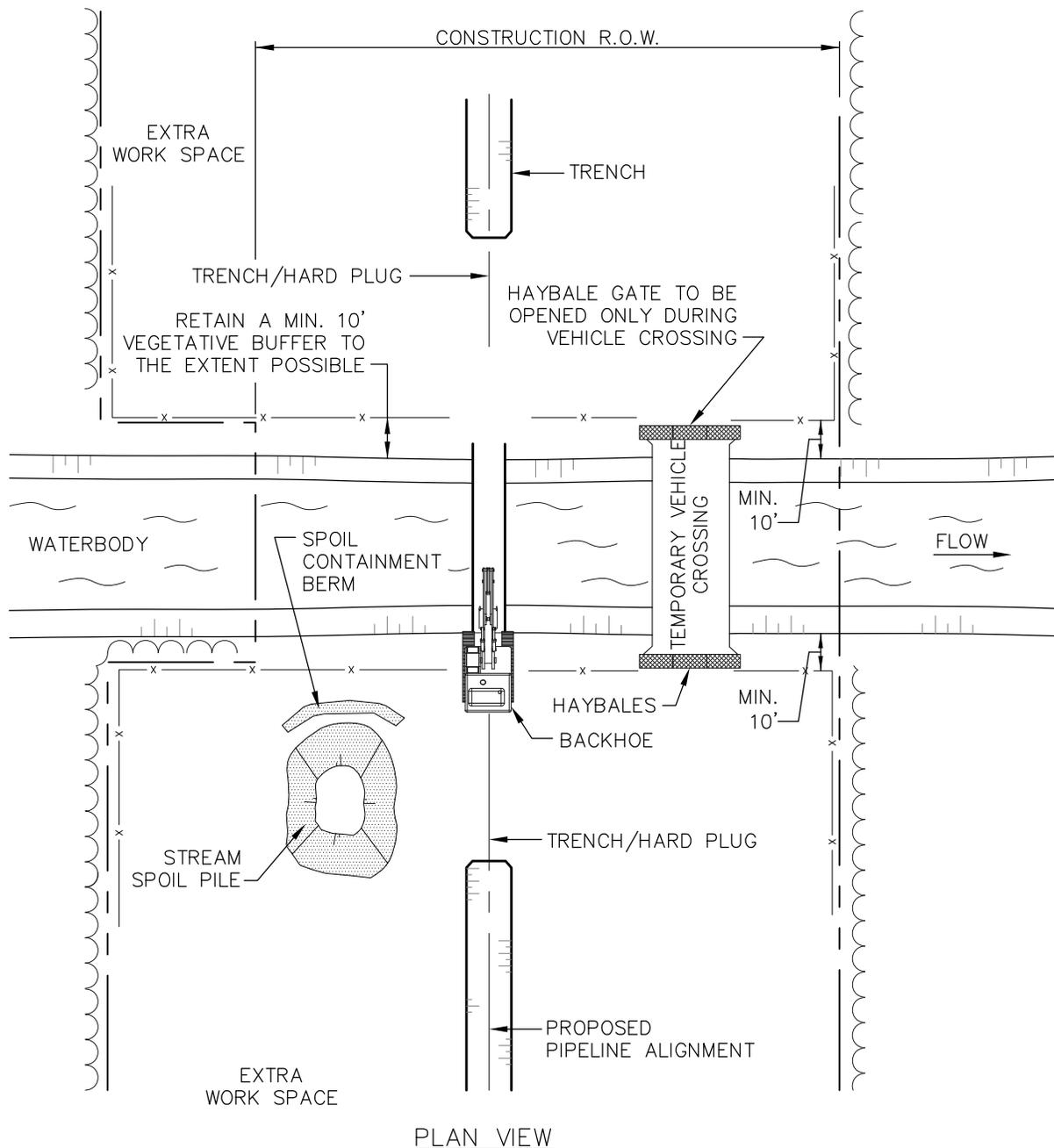
exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

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

KEYSTONE PIPELINE GULF COAST 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

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



PLAN VIEW

2010-10-11 REVISED TITLE BLOCK

02

UPDATED DRAWING NOTES

01

REVISIONS

TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

exp.
www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 12		
TYPICAL OPEN CUT WET CROSSING METHOD		
FLOWING WATERBODY		
SCALE N.T.S.	DWG No 4359-03-ML-03-705	REV 02

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.

REVISIONS 01 2010-10-11 REVISED TITLE BLOCK



TransCanada
In business to deliver

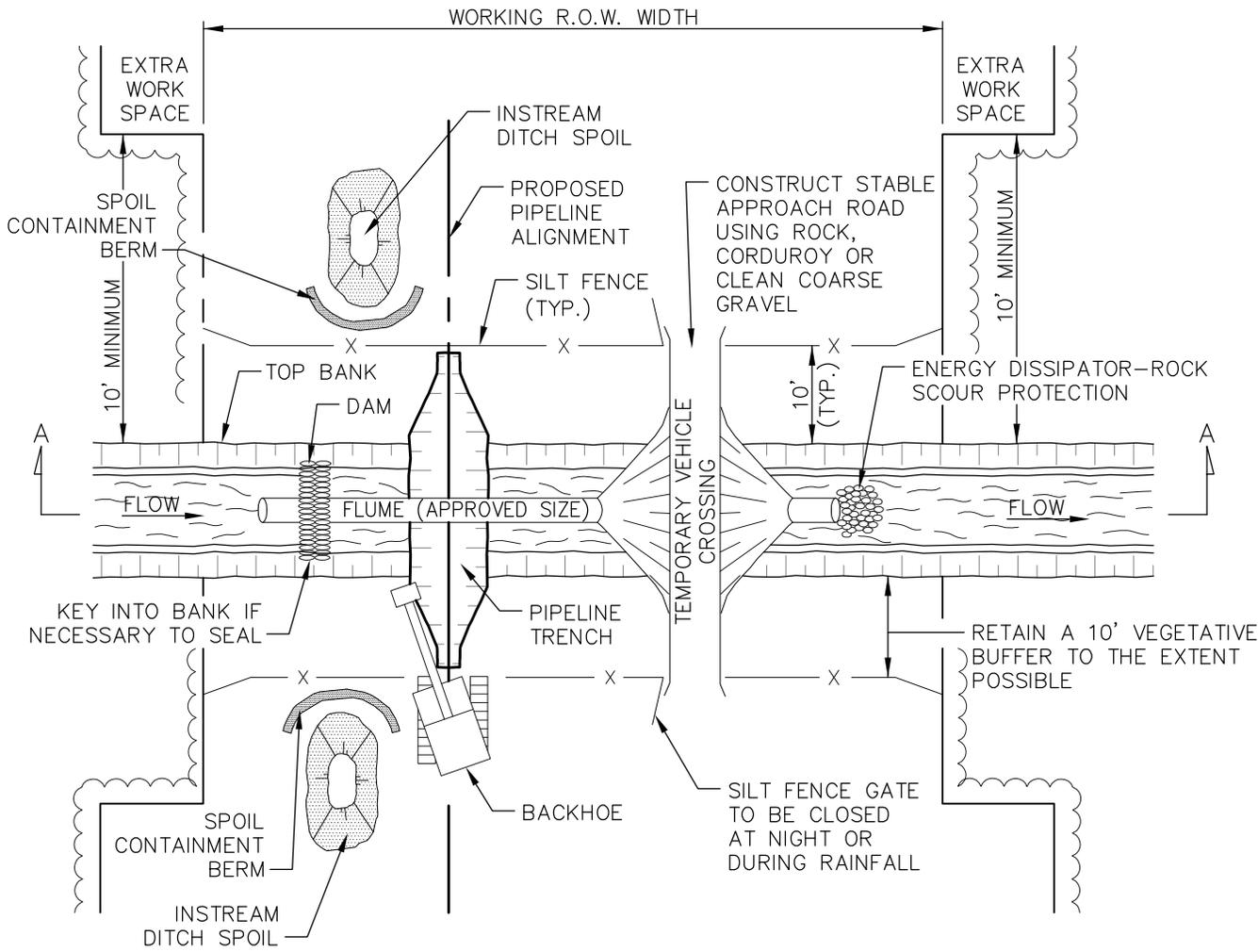
exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA



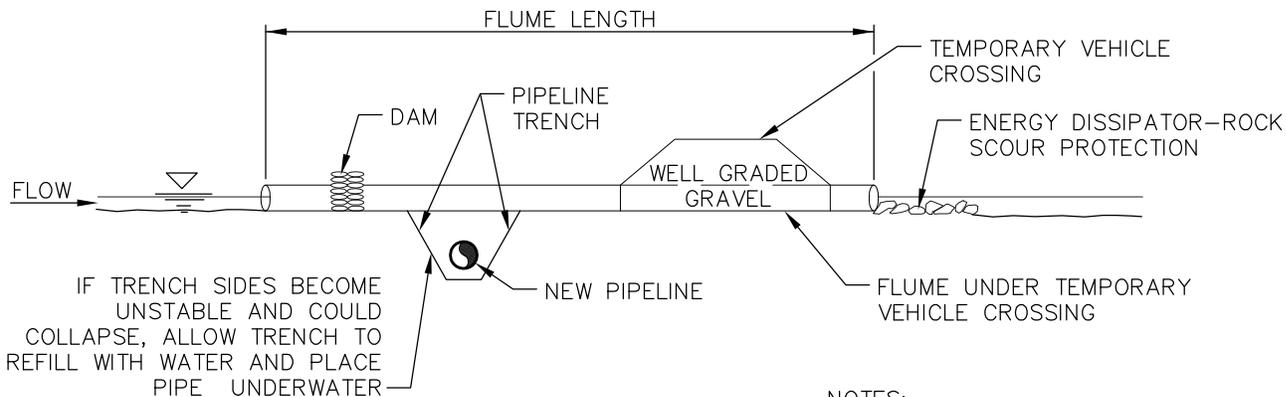
www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
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



PLAN VIEW



SECTION A-A

NOTES:

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

2010-10-11 REVISED TITLE BLOCK

REVISIONS 01

TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

www.exp.com

DESIGNER:
JMP
NAME DATE 2010-10-21

CHECKED BY: WSF
DESIGN CHECKER: RW P7100

KEYSTONE PIPELINE GULF COAST PROJECT

FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 13		
TYPICAL DRY FLUME CROSSING METHOD		
SCALE N.T.S.	DWG No 4359-03-ML-03-707	REV 01

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.

2010-10-11 REVISED TITLE BLOCK

02 REVISED TITLE

01 REVISIONS



TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

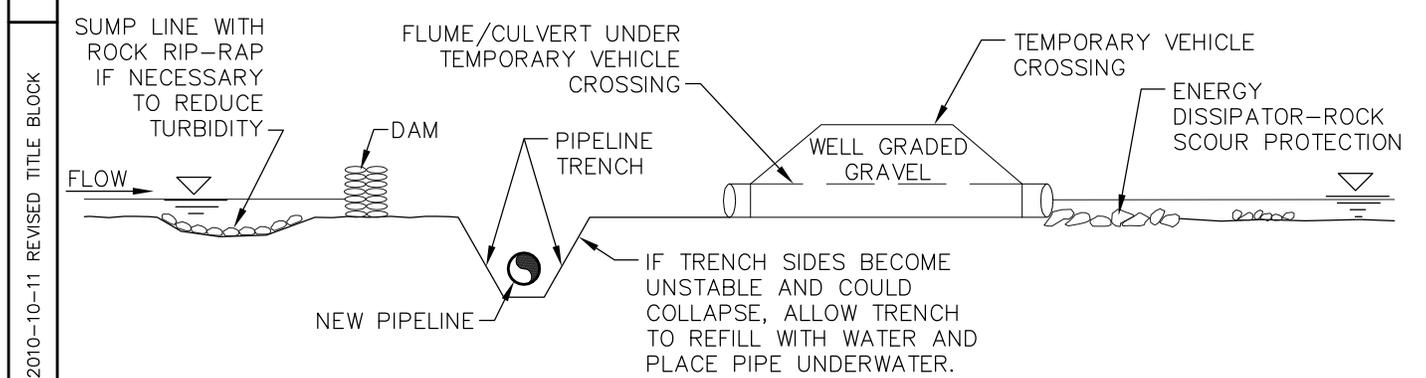
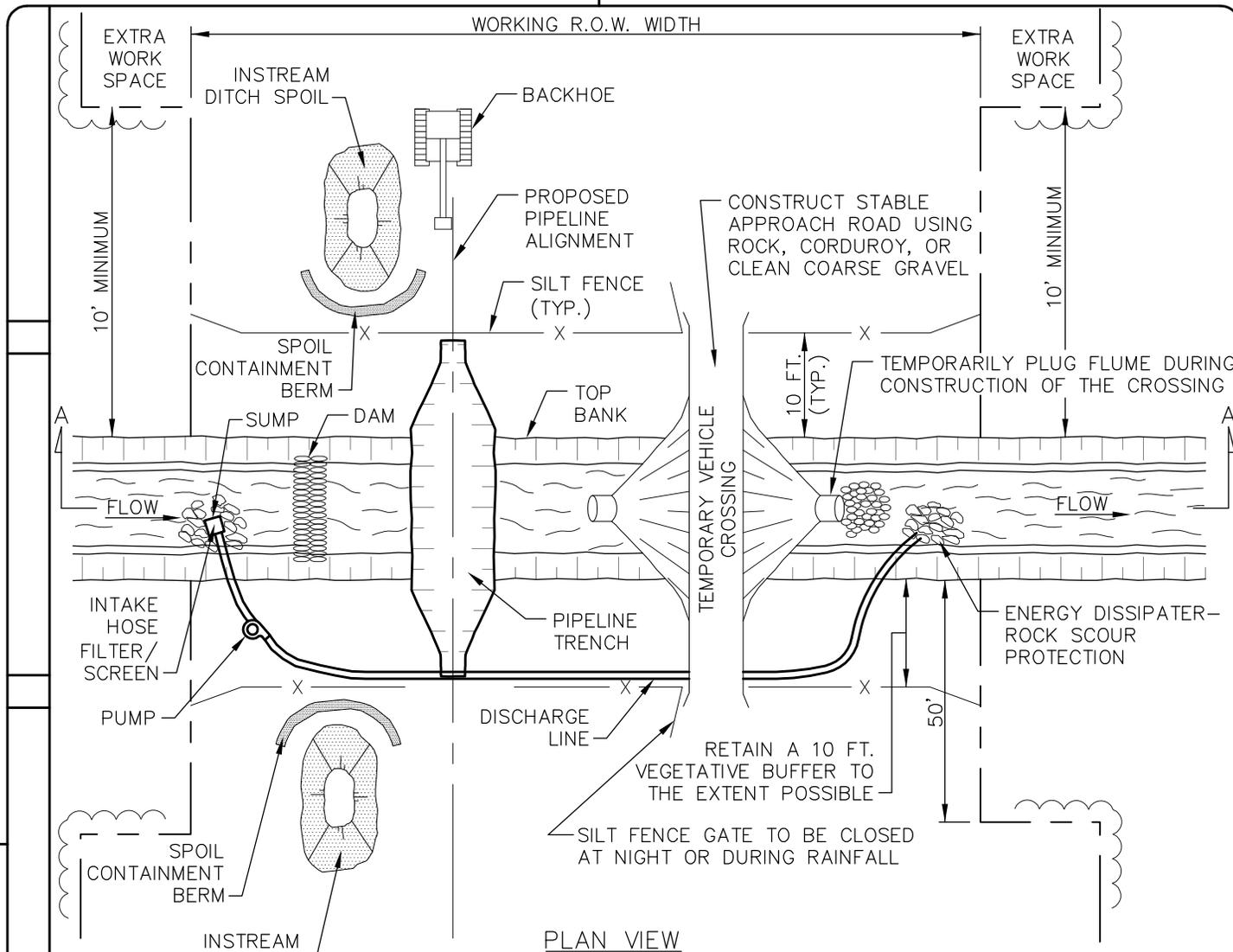


www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 13A		
TYPICAL DRY FLUME CROSSING METHOD –		
CONSTRUCTION PROCEDURES		
SCALE	DWG No	REV
N.T.S.	4359-03-ML-03-708	02

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



NOTES:

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

REVISIONS 01 2010-10-11 REVISED TITLE BLOCK	<p>TransCanada In business to deliver</p> <p>exp Energy Services Inc. t: +1.850.385.5441 f: +1.850.385.5523 1300 Metropolitan Blvd Tallahassee, FL 32308 USA</p> <p>www.exp.com</p>	DESIGNER: JMP NAME 2010-10-21 DATE	KEYSTONE PIPELINE GULF COAST PROJECT		
	CHECKED BY: WSF	DESIGN CHECKER: RW P7100	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
	TITLE DETAIL 14 TYPICAL DAM AND PUMP CROSSING				
	SCALE N.T.S.		DWG No 4359-03-ML-03-709	REV 01	

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.

2010-10-11 REVISED TITLE BLOCK

02

REVISED TITLE

01

REVISIONS



TransCanada
In business to deliver

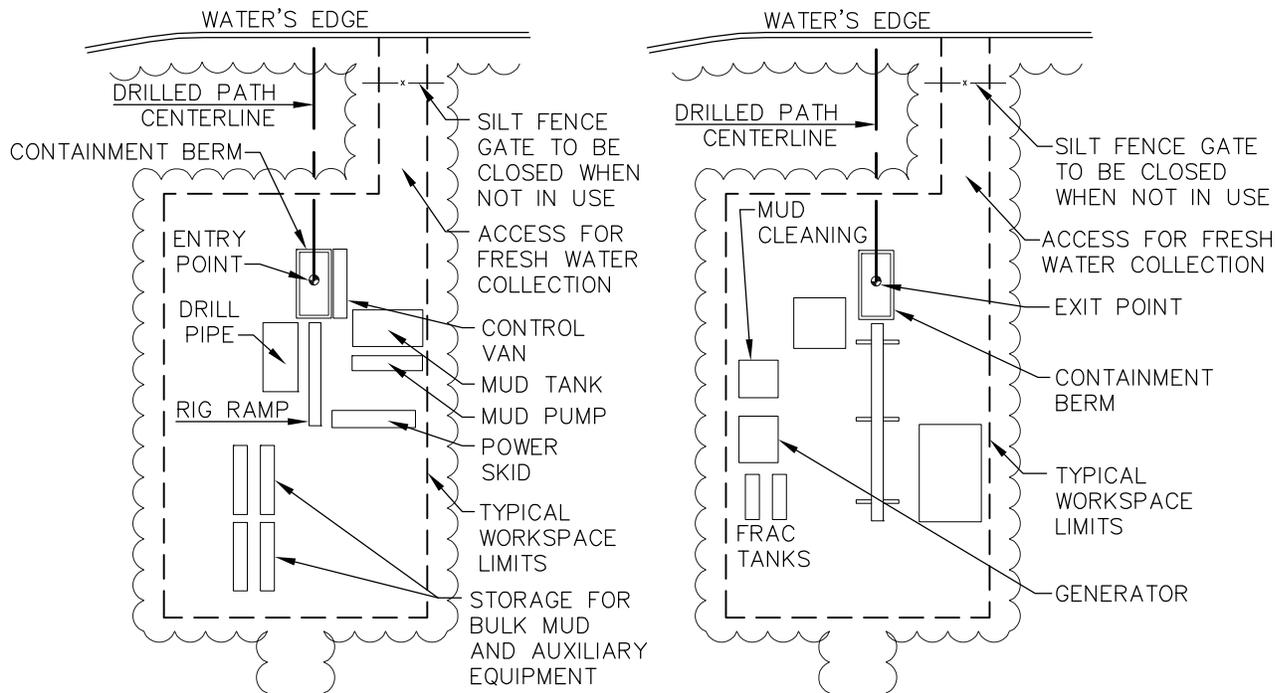
exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA



www.exp.com

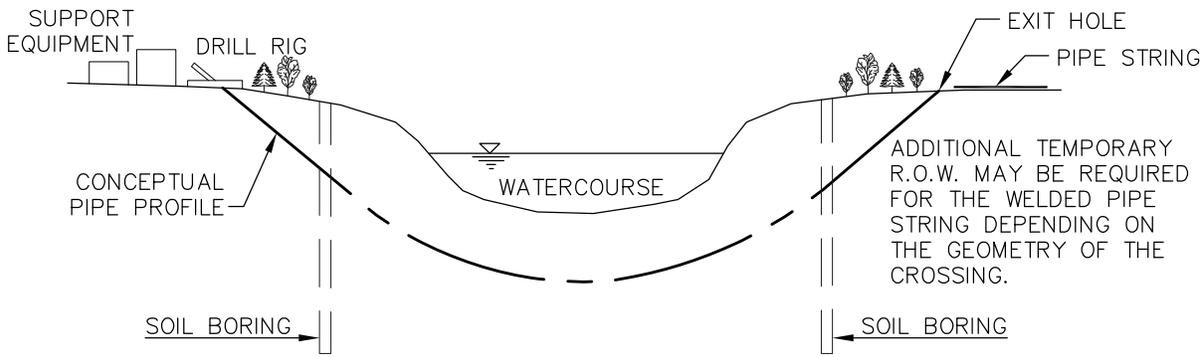
DESIGNER:	
JMP	2010-10-21
NAME	DATE
CHECKED BY:	DESIGN CHECKER:
WSF	RW P7100

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 14A		
TYPICAL DAM AND PUMP CROSSING –		
CONSTRUCTION PROCEDURES		
SCALE	DWG No	REV
N.T.S.	4359-03-ML-03-710	02



SITE PLAN ENTRY SIDE

SITE PLAN EXIT SIDE



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.

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

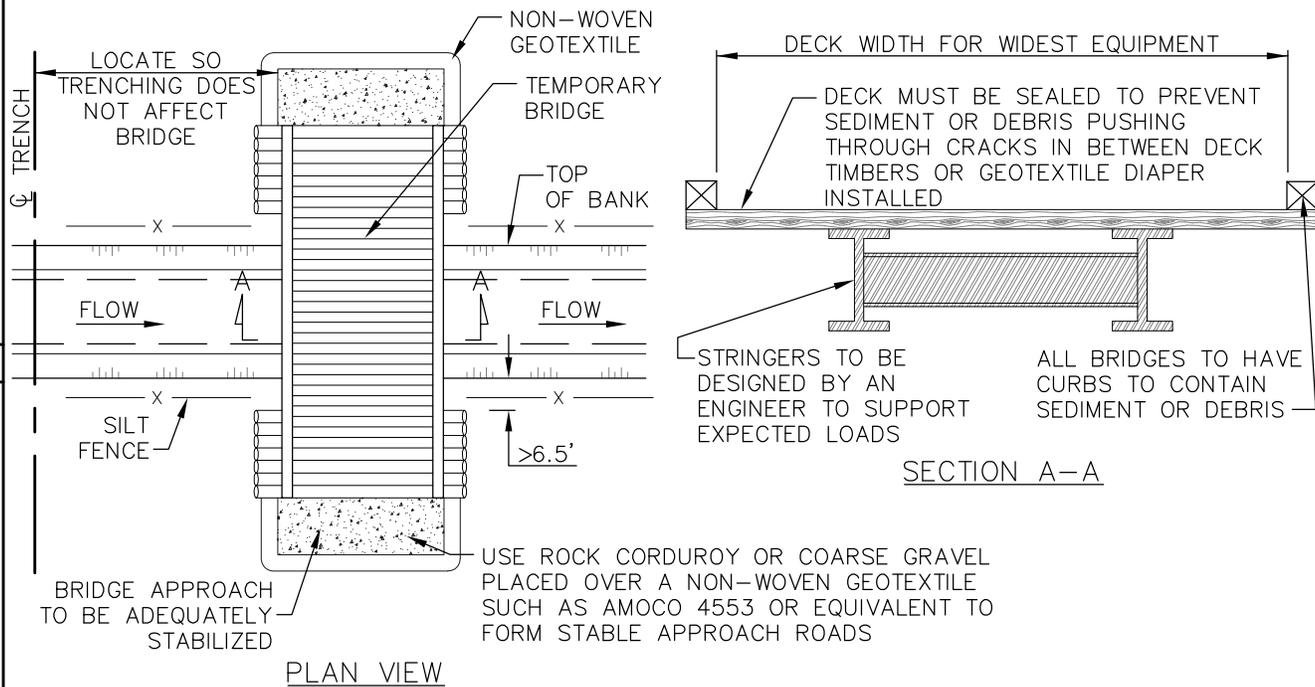
exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

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

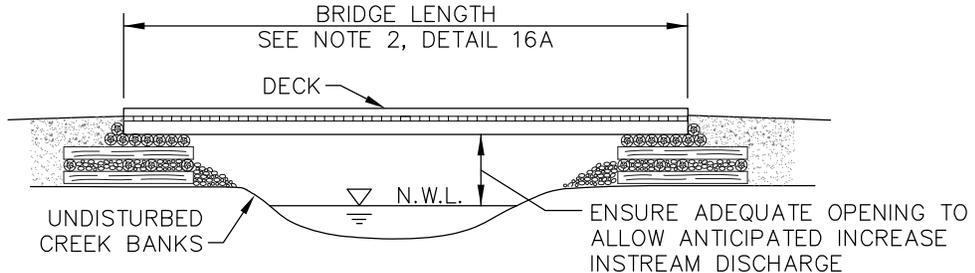
KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 15		
TYPICAL HORIZONTAL DRILL (HDD) SITE PLAN & PROFILE		
SCALE N.T.S.	DWG No 4359-03-ML-03-711	REV 02

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.

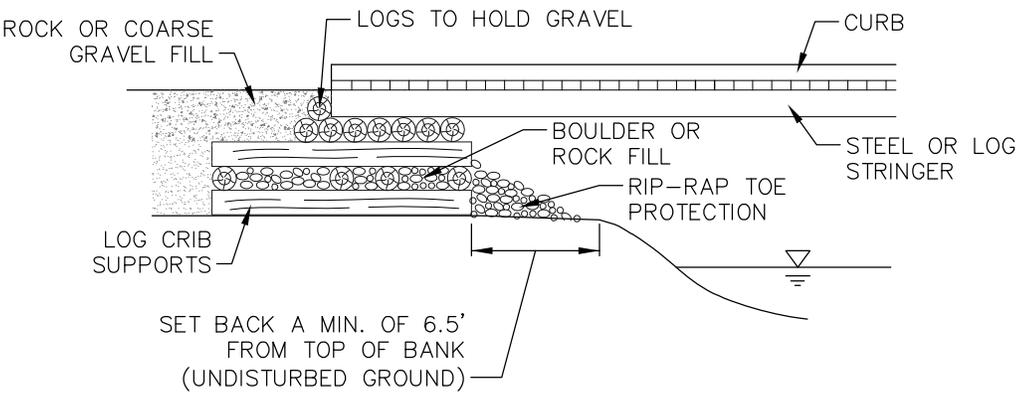


PLAN VIEW

SECTION A-A



BRIDGE PROFILE



TYPICAL TEMPORARY CRIB ABUTMENT

REVISIONS 01 2010-10-11 REVISED TITLE BLOCK

exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 16 TYPICAL TEMPORARY BRIDGE CROSSING		
SCALE N.T.S.	DWG No 4359-03-ML-03-712	REV 01

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.

2010-10-11 REVISED TITLE BLOCK

REVISIONS 01



exp Energy Services Inc.
 In business to deliver
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

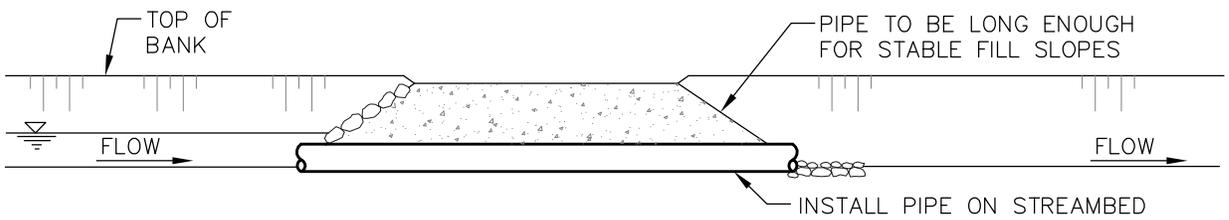
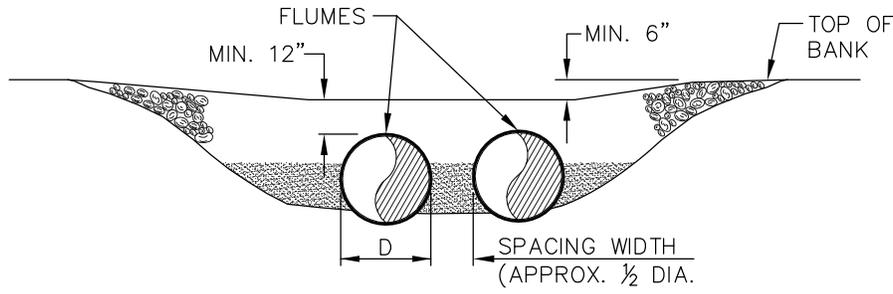
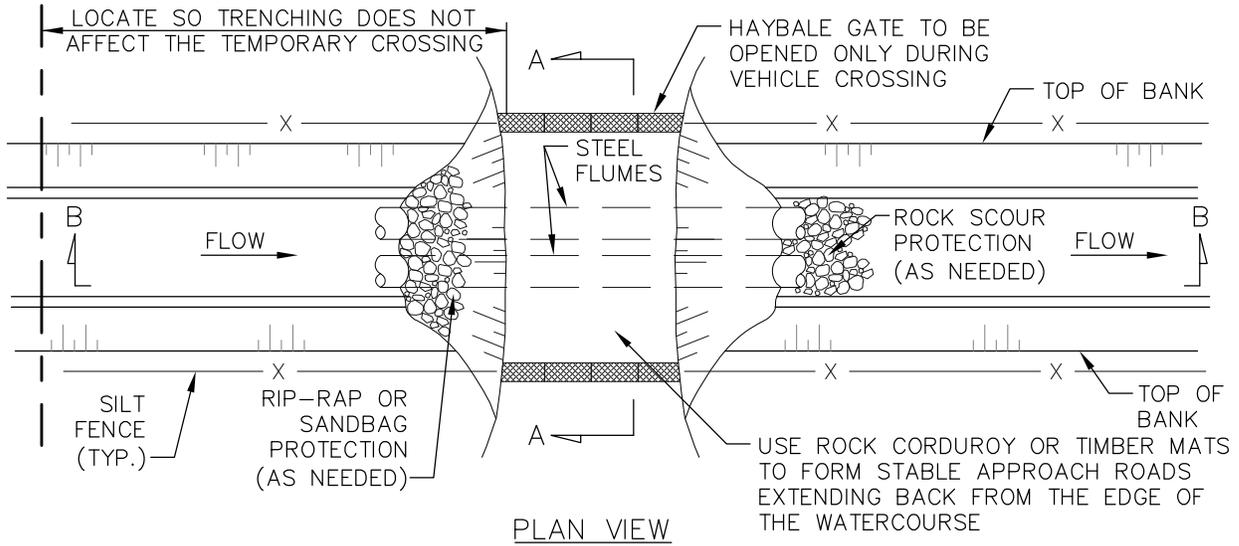


www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE DETAIL 16A TYPICAL TEMPORARY BRIDGE CROSSING - CONSTRUCTION PROCEDURES		
SCALE N.T.S.	DWG No 4359-03-ML-03-713	REV 01

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



PLAN VIEW

SECTION A-A

SECTION B-B

REVISIONS 01 2010-10-11 REVISED TITLE BLOCK

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.

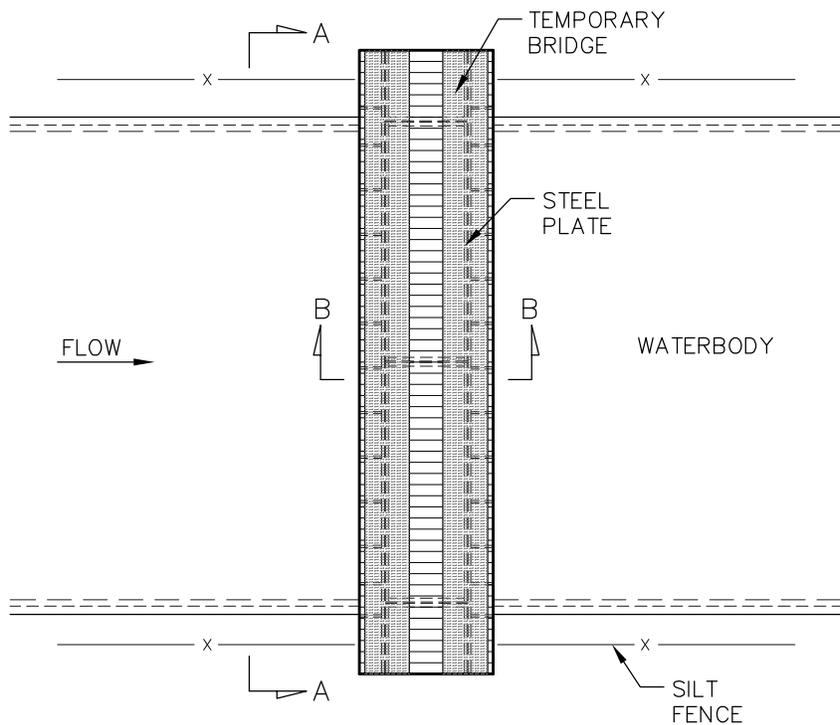
exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

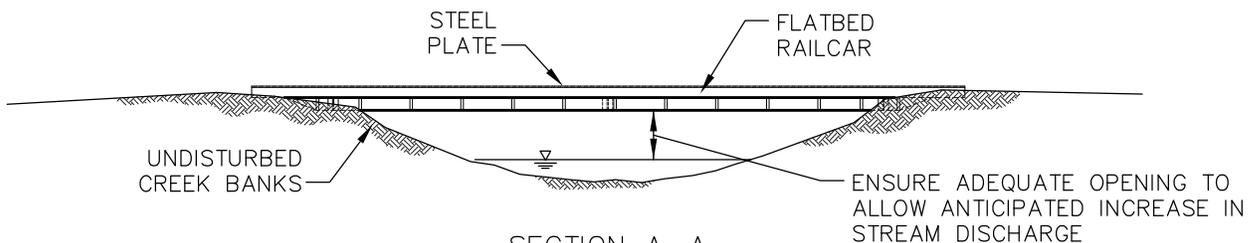
DESIGNER:	
JMP	2010-10-21
NAME	DATE
CHECKED BY:	
WSF	RW
DESIGN CHECKER:	
	P7100

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 17 TYPICAL FLUME BRIDGE CROSSING		
SCALE N.T.S.	DWG No 4359-03-ML-03-714	REV 01

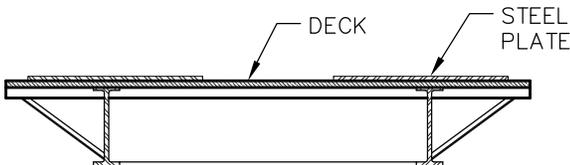
THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



PLAN VIEW



SECTION A-A



SECTION B-B

REVISIONS 01 2010-10-11 REVISED TITLE BLOCK

TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

exp.
www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 18 TYPICAL RAILCAR BRIDGE CROSSING		
SCALE N.T.S.	DWG No 4359-03-ML-03-715	REV 01

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.

REVISIONS 01 2010-10-11 REVISED TITLE BLOCK



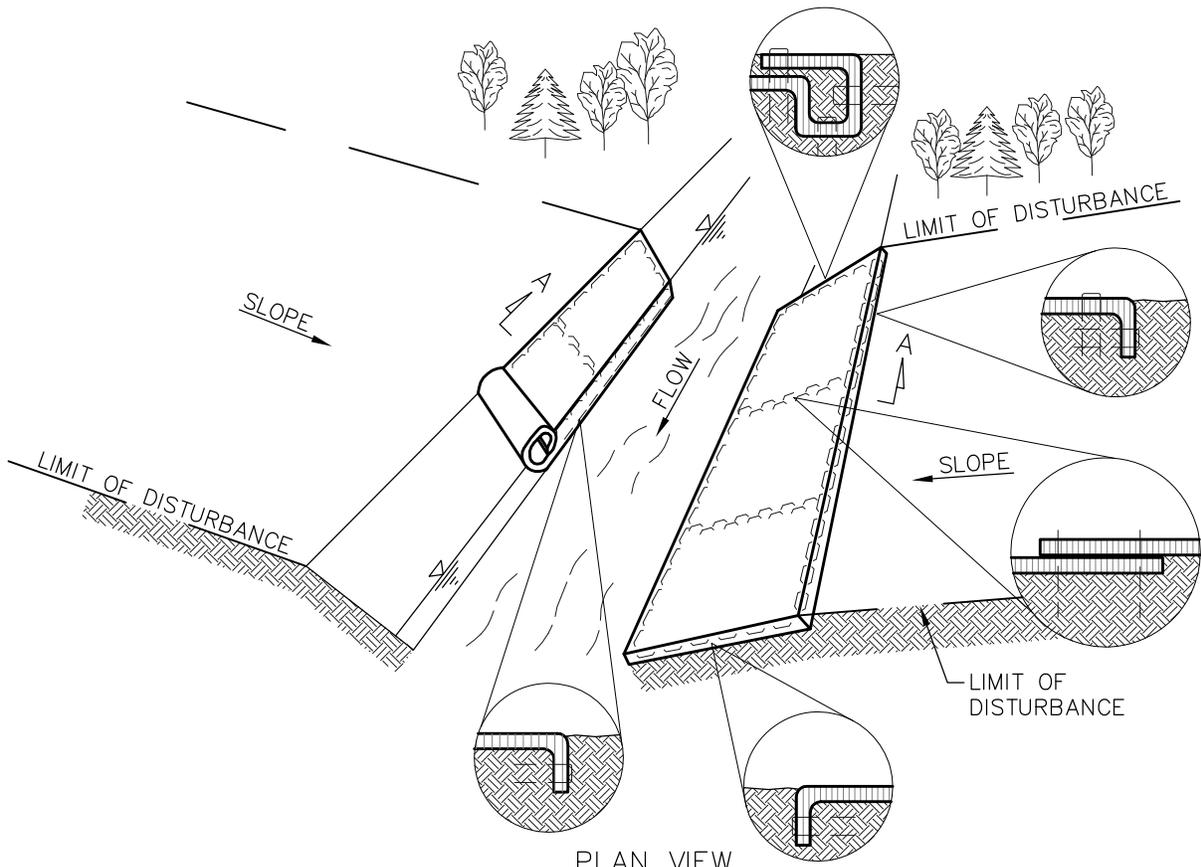
exp Energy Services Inc.
In business to deliver
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA



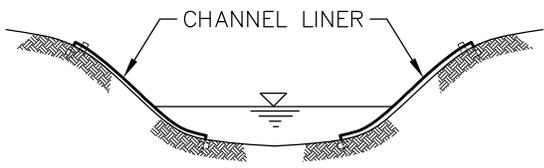
www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE DETAIL 18A TYPICAL RAILCAR BRIDGE CROSSING – CONSTRUCTION PROCEDURES		
SCALE N.T.S.	DWG No 4359-03-ML-03-716	REV 01



PLAN VIEW



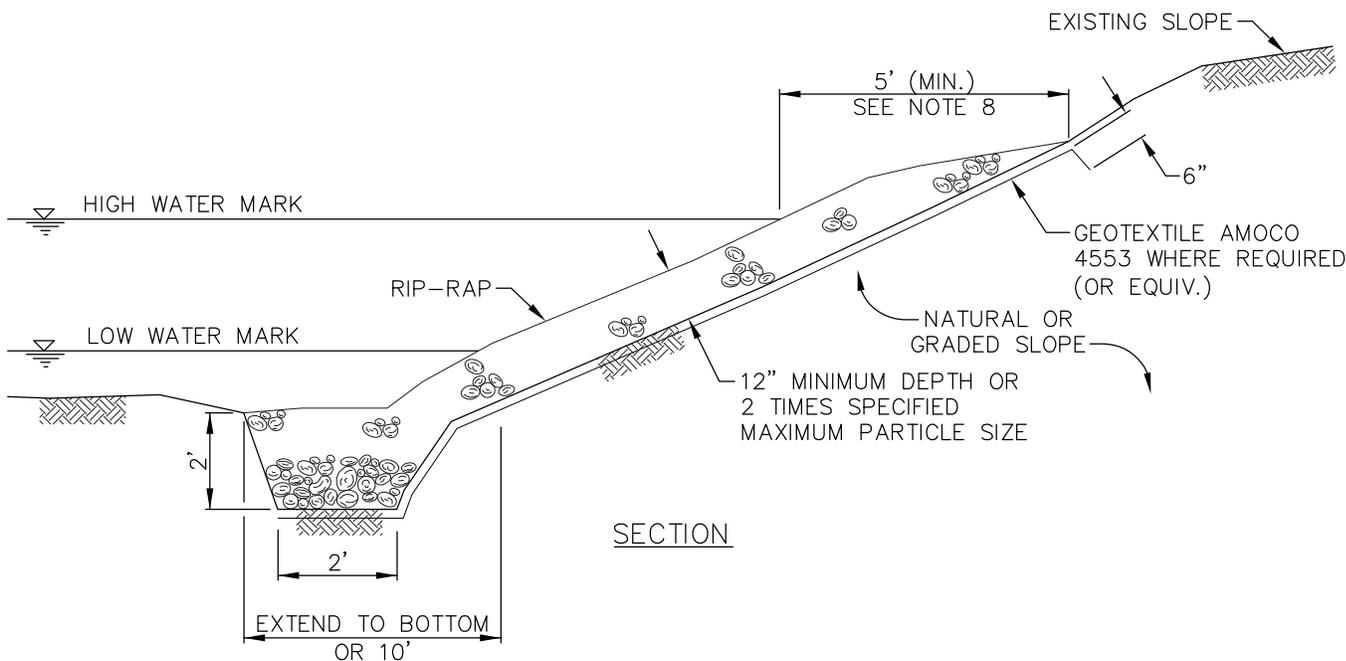
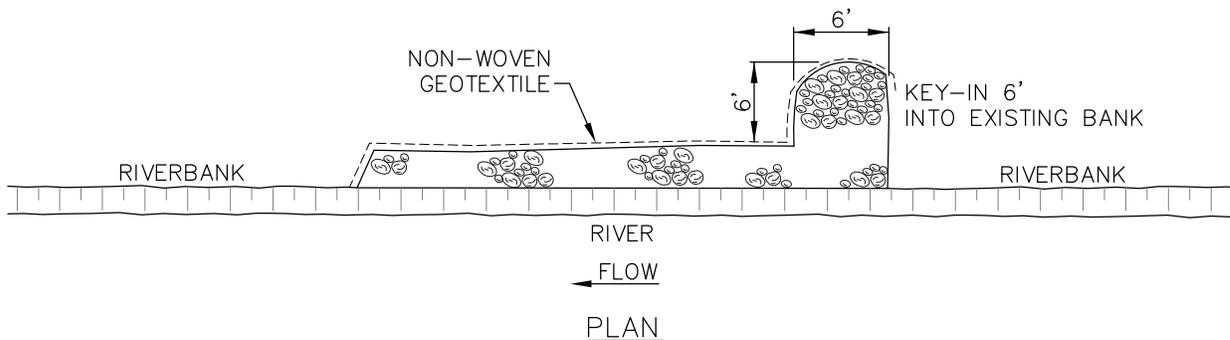
SECTION A-A

NOTES:

1. INSTALL AND ANCHOR LINERS FOLLOWING MANUFACTURER'S INSTRUCTIONS.
2. PREPARE SOIL BEFORE INSTALLING CHANNEL LINER, INCLUDING THE APPLICATION OF SEED.
3. 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

 exp Energy Services Inc. t: +1.850.385.5441 f: +1.850.385.5523 1300 Metropolitan Blvd Tallahassee, FL 32308 USA www.exp.com	DESIGNER:		KEYSTONE PIPELINE GULF COAST PROJECT			
	JMP NAME		2010-10-21 DATE	FIA # 4359	CHAINAGE:	DISCIPLINE # 03
	CHECKED BY: WSF		DESIGN CHECKER: RW	TITLE DETAIL 19 FLEXIBLE CHANNEL LINER INSTALLATION		
	SCALE N.T.S.		DWG No 4359-03-ML-05-708	REV 02		



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 | 02 | 2010-10-11 REVISED TITLE BLOCK

TransCanada
In business to deliver

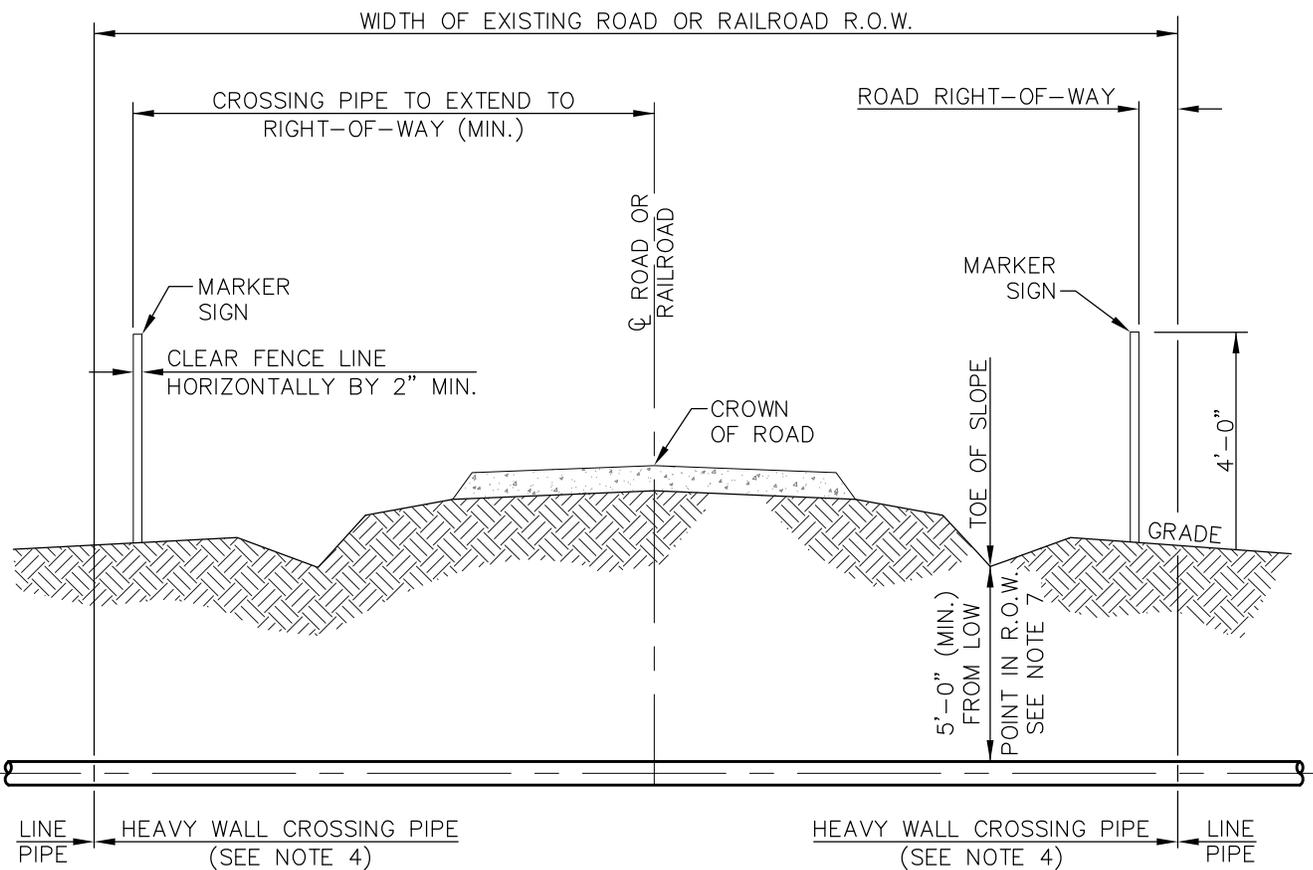
exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

www.exp.com

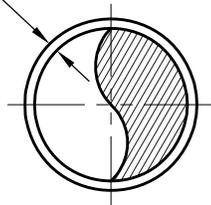
DESIGNER:	
JMP NAME	2010-10-21 DATE
CHECKED BY:	DESIGN CHECKER:
WSF	RW P7100

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 20 TYPICAL ROCK RIP-RAP		
SCALE N.T.S.	DWG No 4359-03-ML-05-709	REV 02

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



BORE ANNULUS TO BE NO LARGER THAN 1" GREATER THAN COATED LINE PIPE



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.

2010-10-11 REVISED TITLE BLOCK

02

REVISION DIMENSION

01

REVISIONS

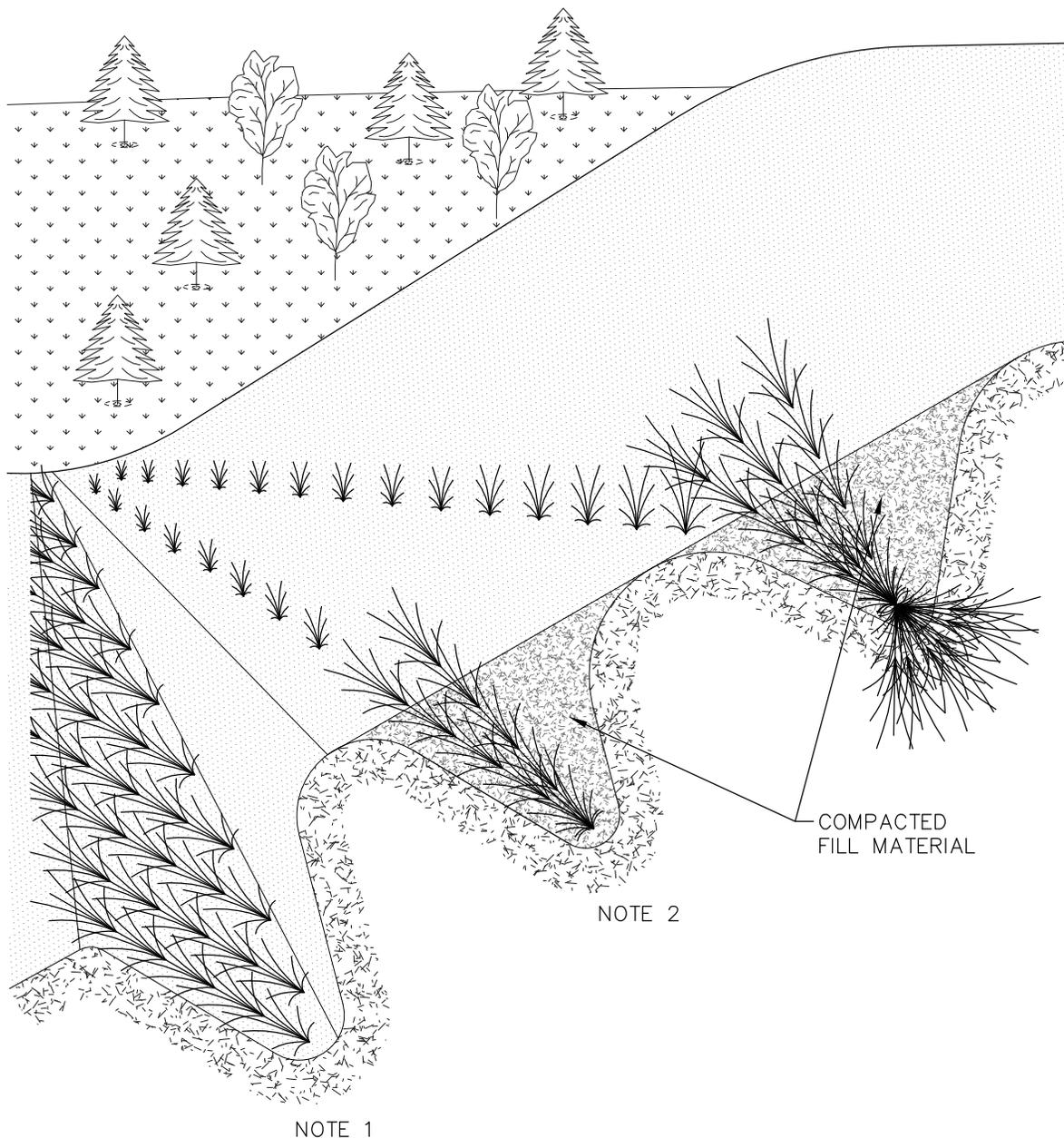
TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

exp.
www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 21		
TYPICAL UNCASSED ROAD/RAILROAD CROSSING BORE DETAIL		
SCALE N.T.S.	DWG No 4359-03-ML-03-717	REV 02



NOTES:

1. CUT TRENCH ACROSS SLOPE. FILL WITH DORMANT WOODY PLANT MATERIAL.
2. FILL IS PLACED ON TOP OF BRUSH LAYER AND COMPACTED.
3. INSTALLATION SPECIFICATIONS TO BE MODIFIED AS NECESSARY TO SUIT SITE CONDITIONS.

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



exp Energy Services Inc.

 t: +1.850.385.5441 | f: +1.850.385.5523

 1300 Metropolitan Blvd

 Tallahassee, FL 32308

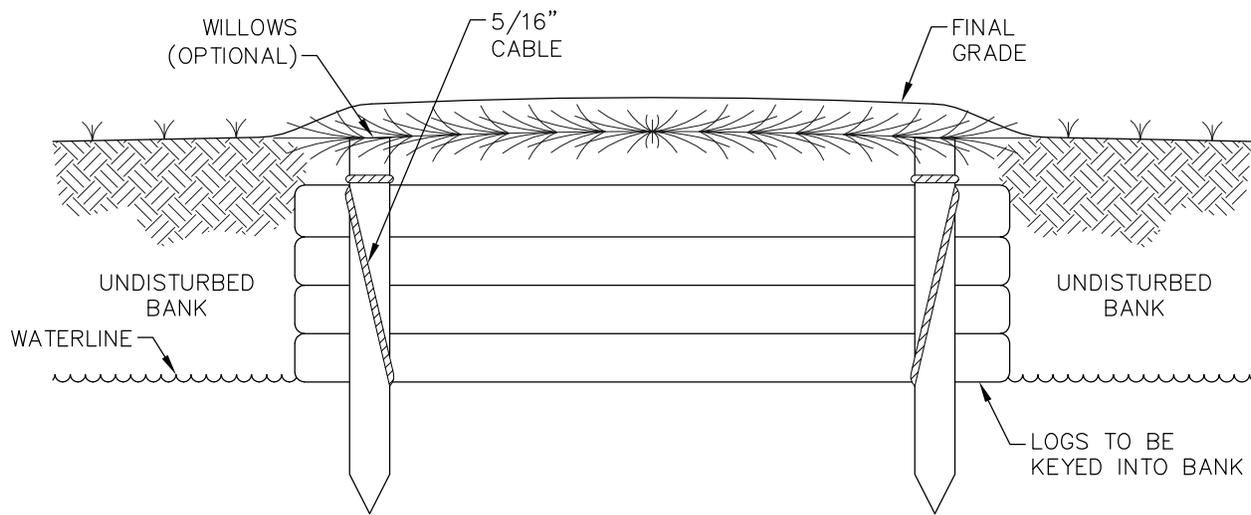
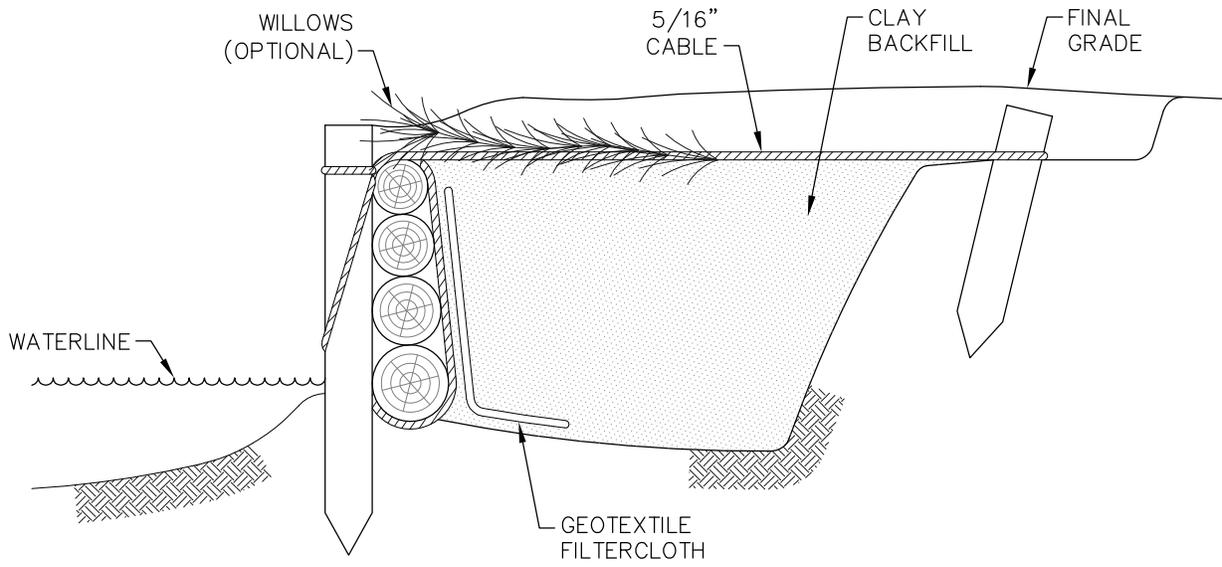
 USA



www.exp.com

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

KEYSTONE PIPELINE GULF COAST 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

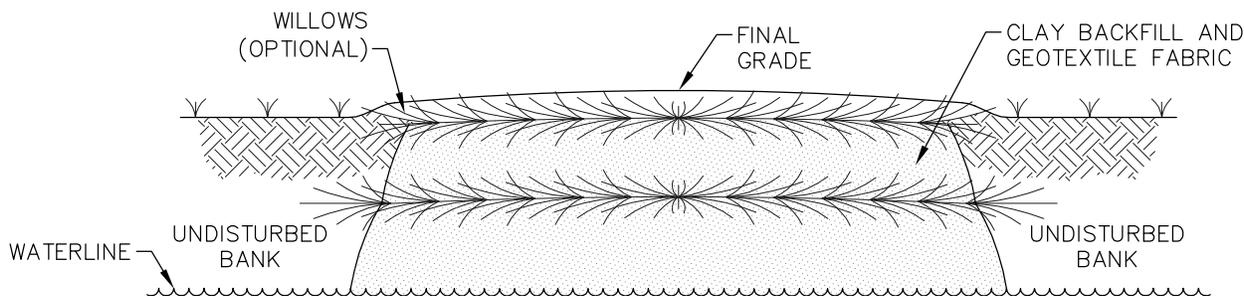
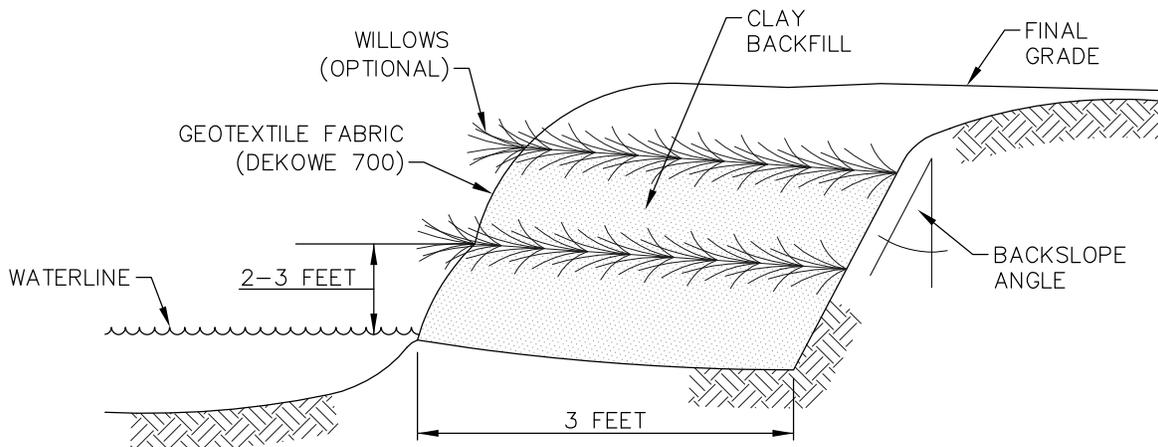


NOTES:

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

 <p>TransCanada <i>In business to deliver</i></p> <p>exp Energy Services Inc. t: +1.850.385.5441 f: +1.850.385.5523 1300 Metropolitan Blvd Tallahassee, FL 32308 USA</p>  <p>www.exp.com</p>	DESIGNER:		KEYSTONE PIPELINE GULF COAST PROJECT				
	JMP NAME		2010-10-21 DATE		FIA # 4359	CHAINAGE:	DISCIPLINE # 03
	CHECKED BY:		DESIGN CHECKER:		TITLE		
	WSF		RW P7100		DETAIL 23 STREAMBANK RECLAMATION -- LOGWALL		
				SCALE N.T.S.	DWG No 4359-03-ML-05-711	REV 02	



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

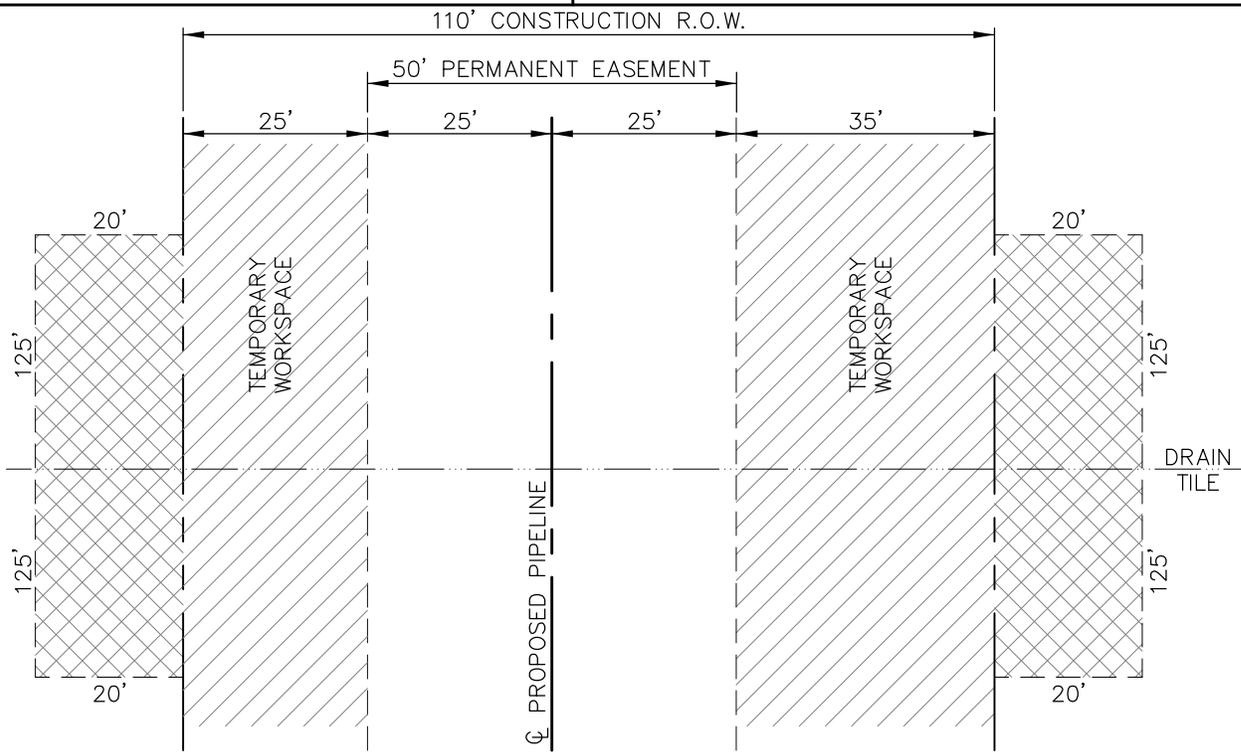

TransCanada
In business to deliver
exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

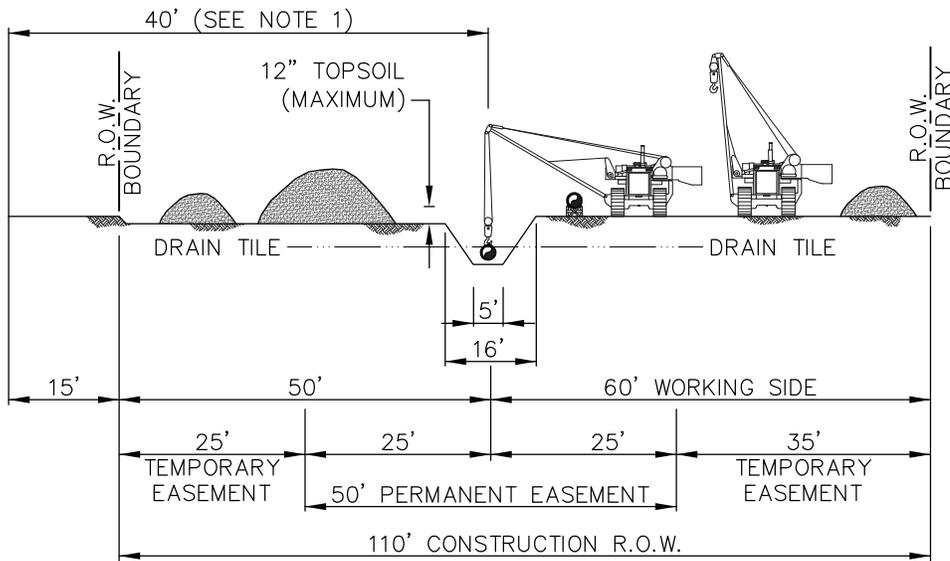
DESIGNER:	
JMP NAME	2010-10-21 DATE
CHECKED BY:	DESIGN CHECKER:
WSF	RW P7100

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 24 STREAMBANK RECLAMATION – VEGETATED GEOTEXTILE INSTALLATION		
SCALE N.T.S.	DWG No 4359-03-ML-05-712	REV 02

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



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.

2010-10-11 REVISED TITLE BLOCK

02

DELETED DIMENSION

01

REVISED NOTE 3:

REVISIONS

TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

www.exp.com

DESIGNER:
JMP
NAME DATE 2010-10-21

CHECKED BY: WSF
DESIGN CHECKER: RW P7100

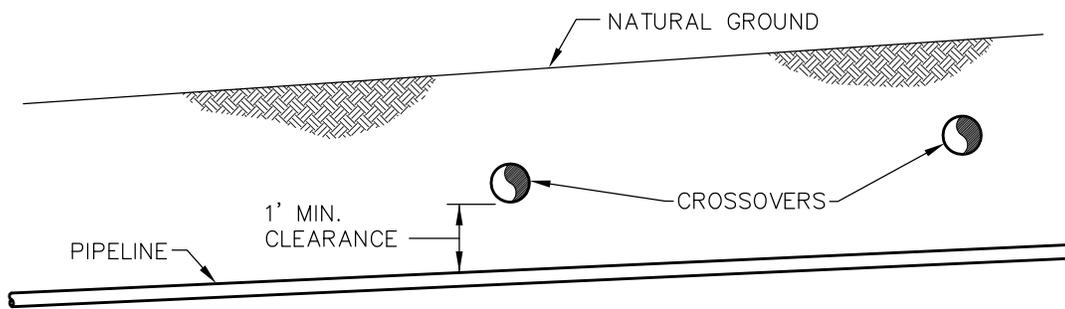
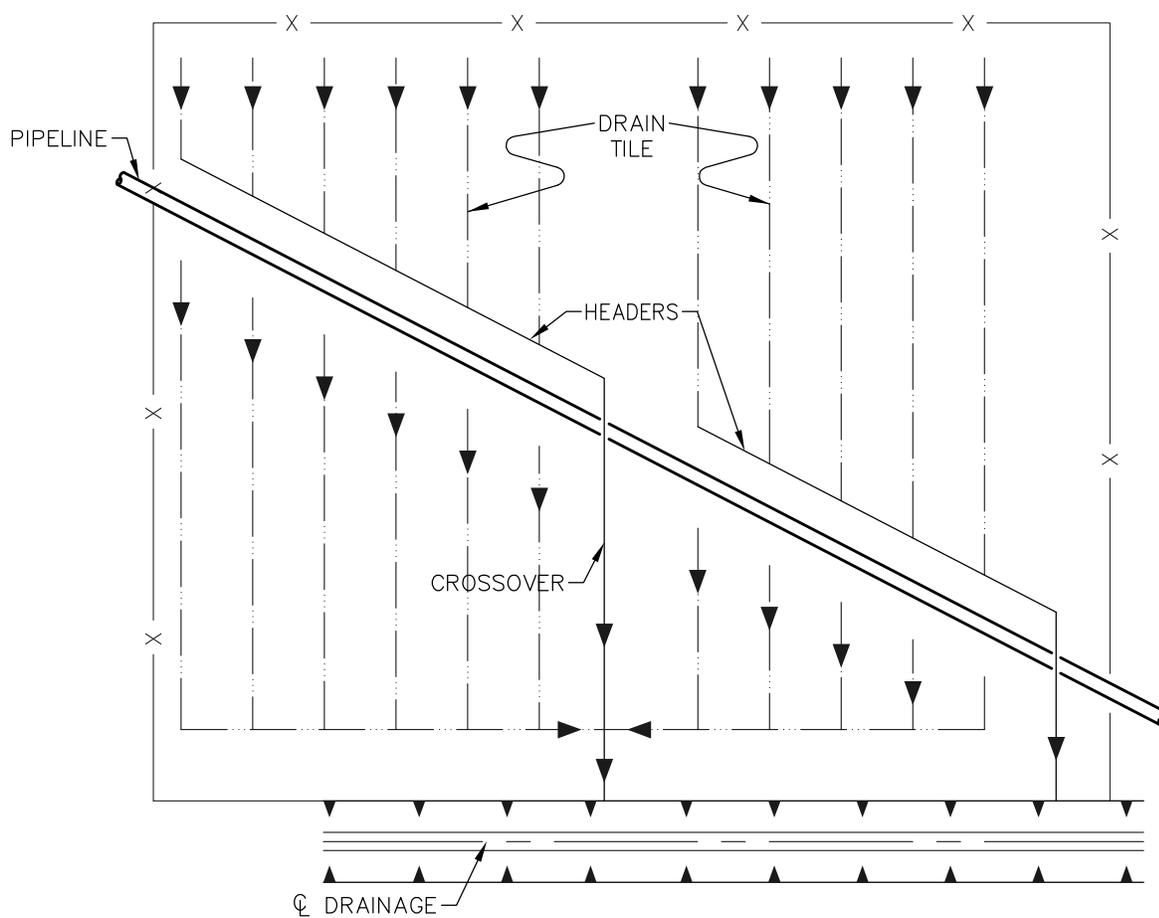
KEYSTONE PIPELINE GULF COAST PROJECT

FIA # 4359 CHAINAGE: DISCIPLINE # 03

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

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



PROFILE

2010-10-11 REVISED TITLE BLOCK

02

ADDED DIMENSION

01

REVISIONS

TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

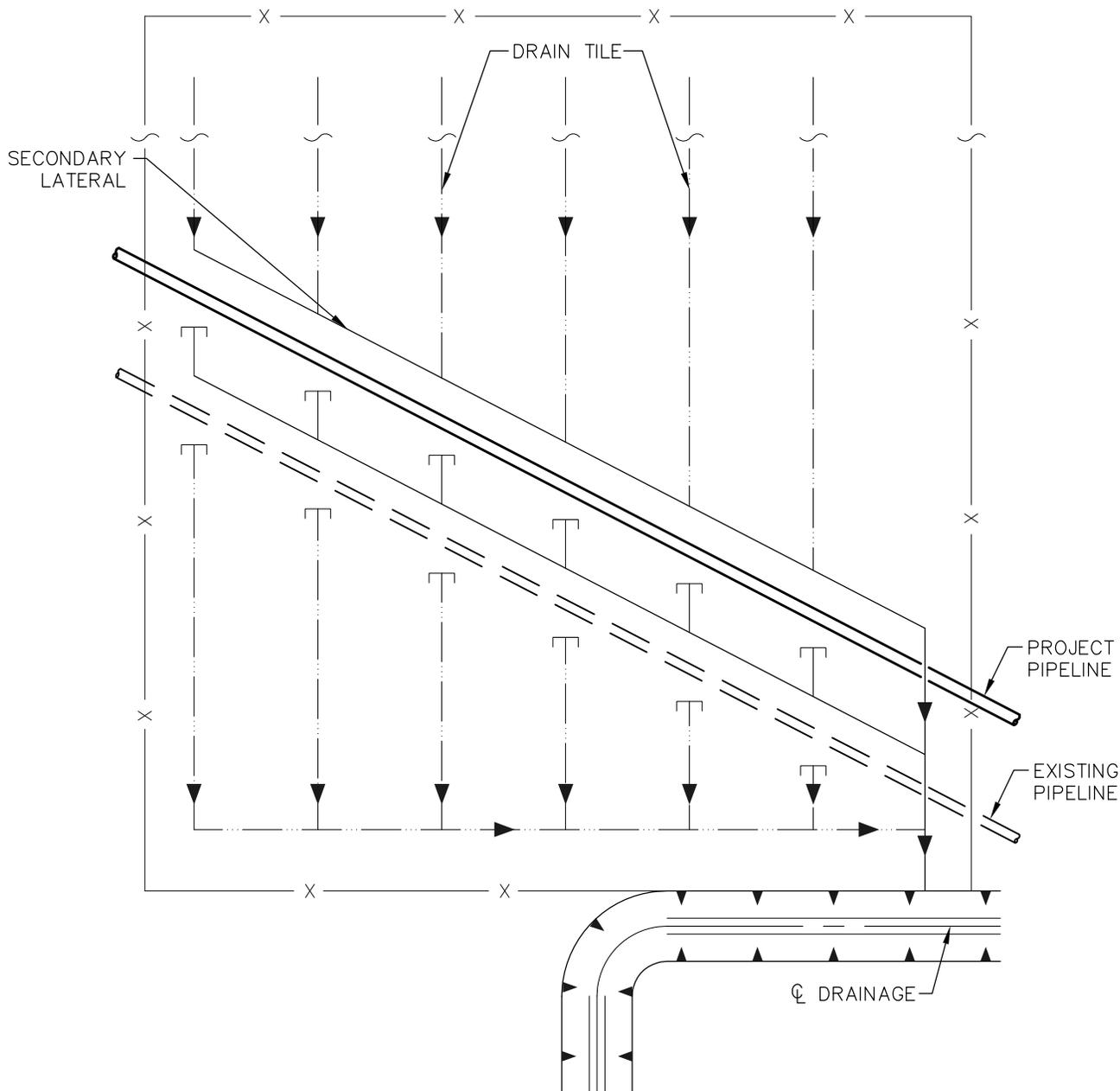
exp.
The new identity of True Engineering Consultants, Inc.

www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 26		
HEADER/MAIN CROSSOVERS OF PIPELINE		
SCALE N.T.S.	DWG No 4359-03-ML-03-719	REV 02

RELOCATE/REPLACE DRAINAGE HEADER/MAIN



2010-10-11 REVISED TITLE BLOCK

02

REVISED LABELS

01

REVISIONS

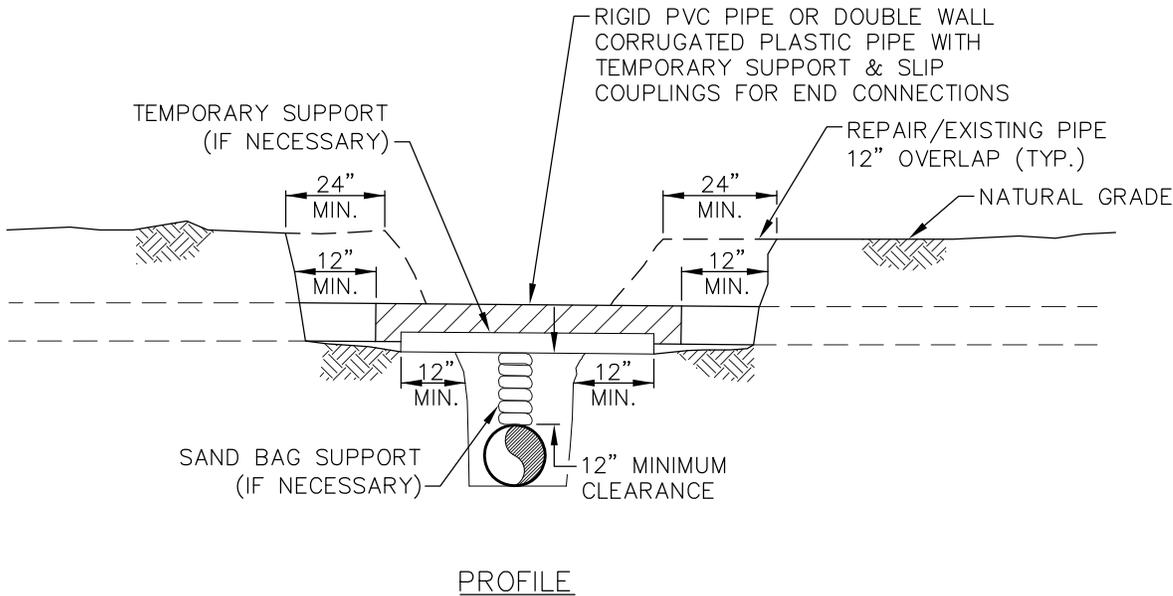
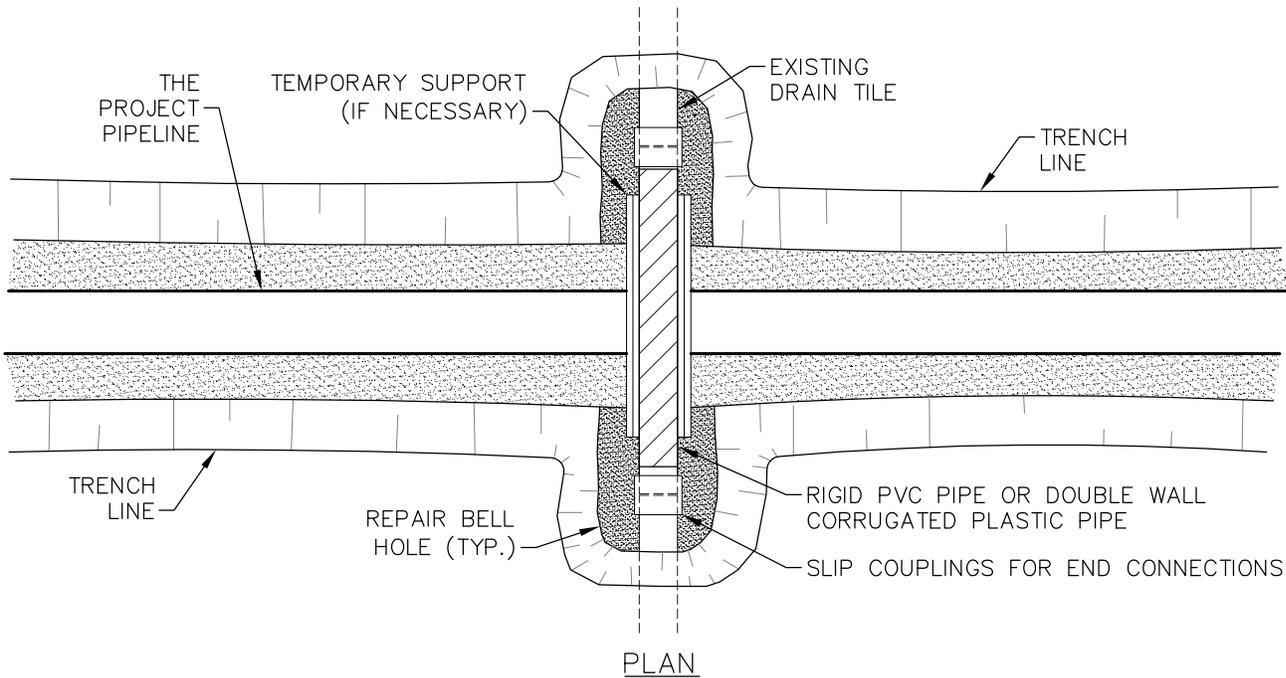
TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

exp.
www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE		
DETAIL 27 HEADER/MAIN CROSSOVERS OF PIPELINE		
SCALE N.T.S.	DWG No 4359-03-ML-03-720	REV 02



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

TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

www.exp.com

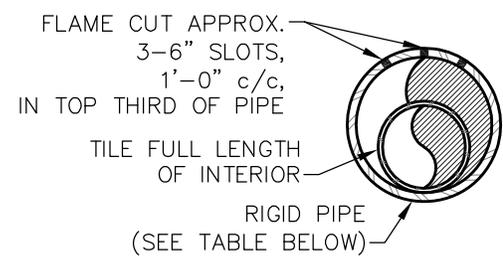
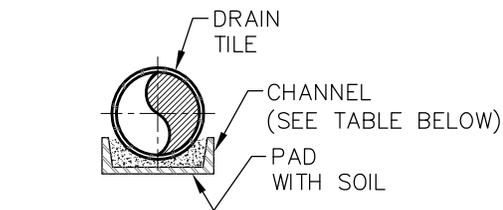
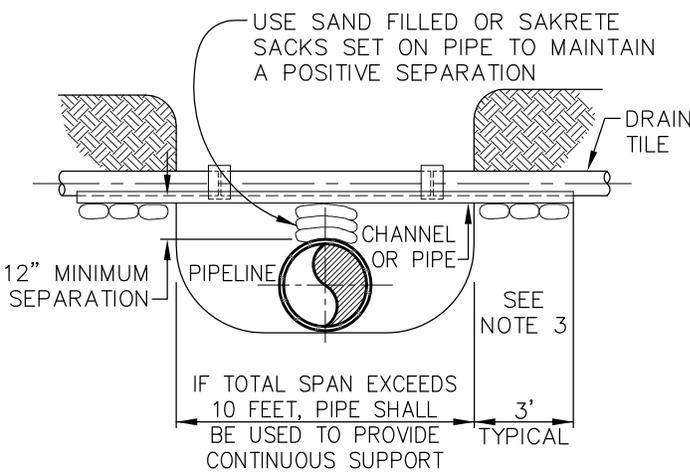
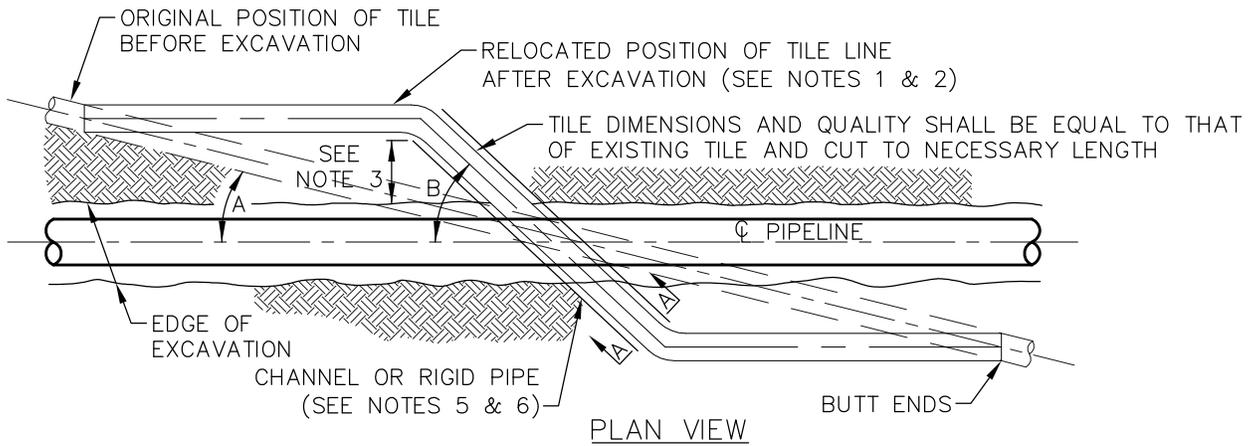
DESIGNER:
JMP
NAME DATE 2010-10-21

CHECKED BY: WSF
DESIGN CHECKER: RW P7100

KEYSTONE PIPELINE GULF COAST PROJECT

FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE DETAIL 28 DRAINAGE AND IRRIGATION TEMPORARY DRAIN TILE REPAIR		
SCALE N.T.S.	DWG No 4359-03-ML-03-721	REV 02

THESE ARE TYPICAL DRAWINGS; ACTUAL SITE CONDITIONS MAY VARY FROM THE SITE GRAPHICALLY REPRESENTED.



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

NOTES:

- 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.
- 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 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).
- DRAINAGE TILE SHALL BE REPLACED SO THAT ITS FORMER GRADIENT AND ALIGNMENT ARE RESTORED.
- 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.
- 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.
- ALL MATERIAL TO BE FURNISHED BY CONTRACTOR.
- 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.
- "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

exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

DESIGNER: JMP 2010-10-21

NAME DATE

CHECKED BY: WSF DESIGN CHECKER: RW

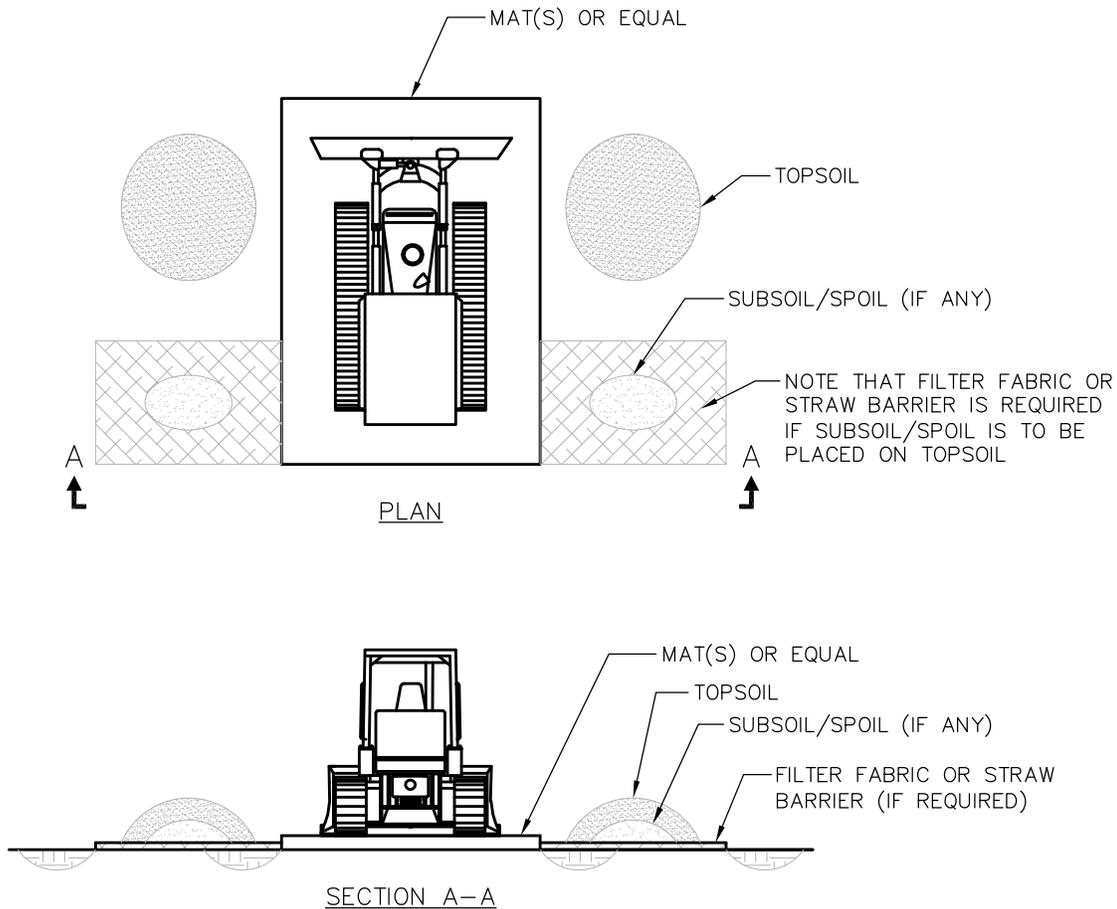
P7100

KEYSTONE PIPELINE GULF COAST 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



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 DOES 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.

2010-10-11 REVISED TITLE BLOCK

02

REVISED LABELS

01

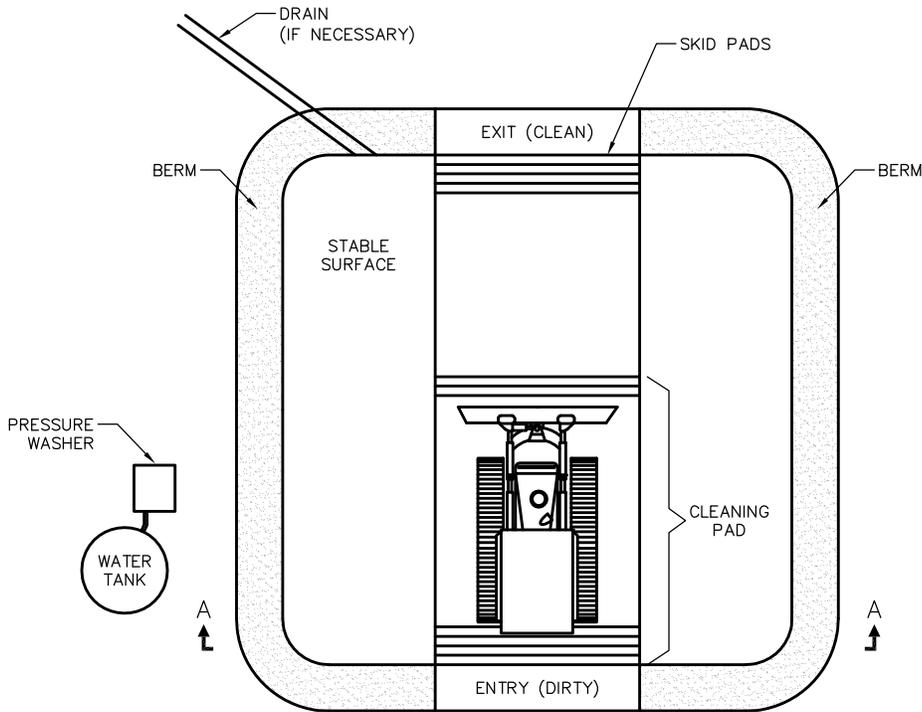
REVISIONS

exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

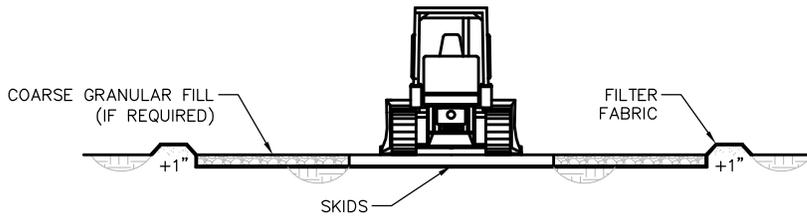
www.exp.com

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

KEYSTONE PIPELINE GULF COAST 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



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.

2010-10-11 REVISED TITLE BLOCK

02

REVISED LABELS

01

REVISIONS

exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

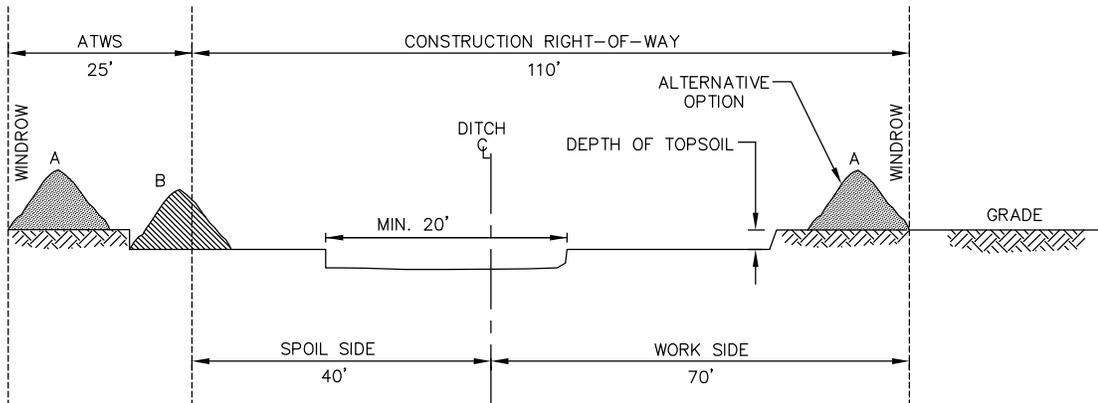
DESIGNER:
 JMP NAME 2010-10-21 DATE

CHECKED BY: DESIGN CHECKER:
 WSF RW P7100

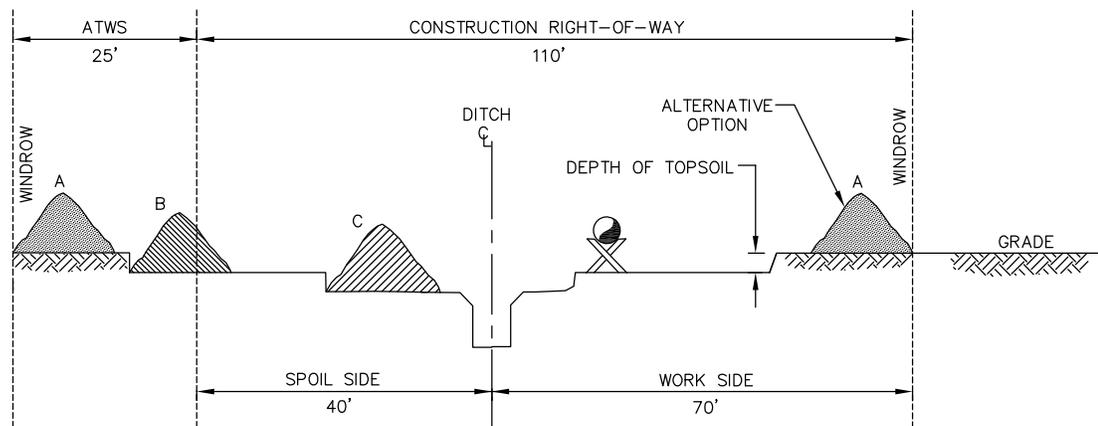
KEYSTONE PIPELINE GULF COAST PROJECT

FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE DETAIL 31 EQUIPMENT WASH STATION DETAIL		
SCALE N.T.S.	DWG No 4359-03-ML-05-714	REV 02

- 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.
- 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.



- 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.



2010-10-11 REVISED TITLE BLOCK

03

2010-10-08 REVISED DETAIL

02

REVISED LABELS

01

TransCanada
In business to deliver

exp Energy Services Inc.
t: +1.850.385.5441 | f: +1.850.385.5523
1300 Metropolitan Blvd
Tallahassee, FL 32308
USA

www.exp.com

DESIGNER:
JMP
NAME DATE 2010-10-21

CHECKED BY: WSF DESIGN CHECKER: RW P7100

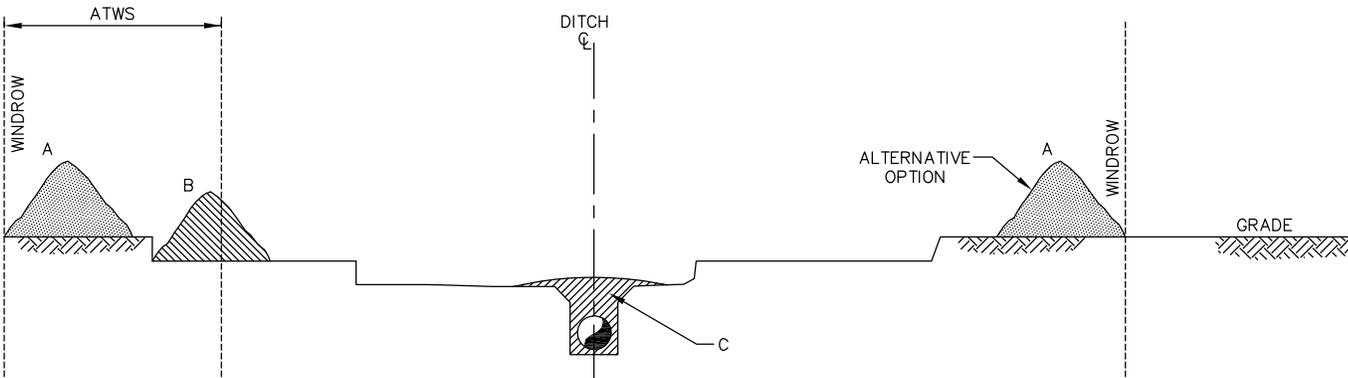
KEYSTONE PIPELINE GULF COAST PROJECT

FIA # 4359 CHAINAGE: DISCIPLINE # 03

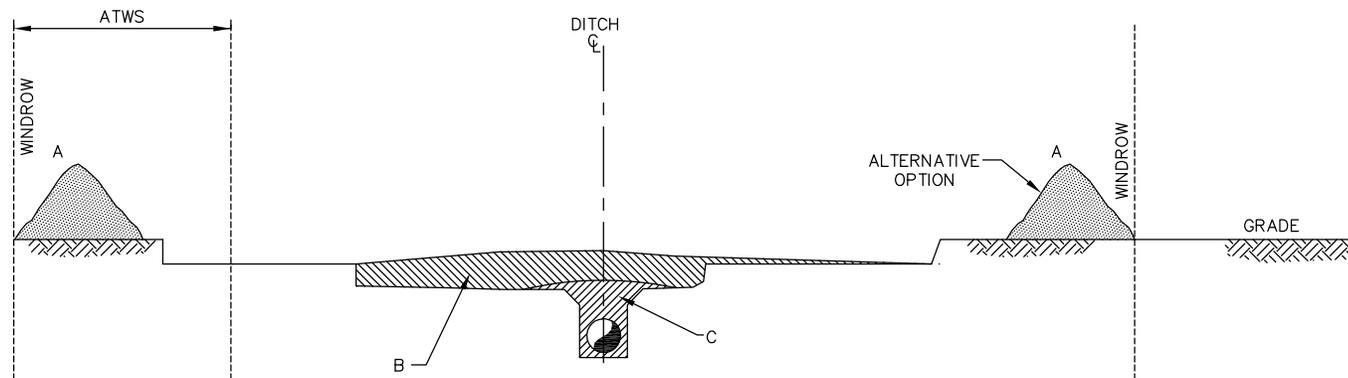
TITLE
**DETAIL 67
TOPSOIL CONSERVATION DITCH & SPOIL
STRIPPING TRIPLE DITCH**

SCALE N.T.S. DWG No 4359-03-ML-05-724 REV 03

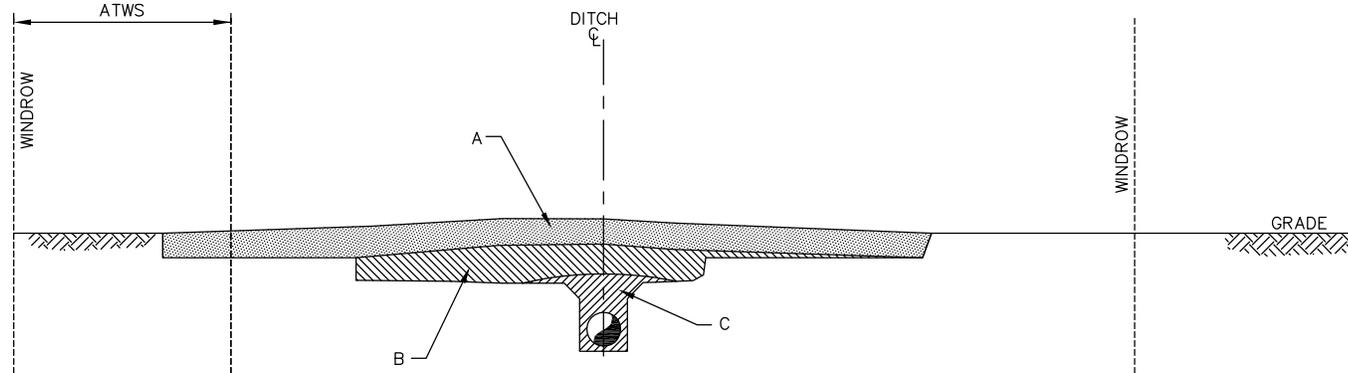
4. BACKFILL TRENCH AND COMPACT AS PER APPROVED PROCEDURE.. PLACE THE SOIL HORIZONS BACK IN THEIR ORIGINAL SEQUENCE IN THE TRENCH.



5. RELIEVE AREAS OF COMPACTION AND FEATHER (B) MATERIAL EVENLY OVER STRIPPED AREA.



6. REPLACE "A" HORIZON PILE EVENLY OVER STRIPPED AREA.



REVISIONS 01
 02
 03
 2010-10-08 REVISED DETAIL
 2010-10-11 REVISED TITLE BLOCK

exp Energy Services Inc.
 t: +1.850.385.5441 | f: +1.850.385.5523
 1300 Metropolitan Blvd
 Tallahassee, FL 32308
 USA

www.exp.com

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

KEYSTONE PIPELINE GULF COAST PROJECT		
FIA # 4359	CHAINAGE:	DISCIPLINE # 03
TITLE DETAIL 67A TOPSOIL CONSERVATION DITCH & SPOIL STRIPPING TRIPLE DITCH		
SCALE N.T.S.	DWG No 4359-03-ML-05-725	REV 03