1.0 Introduction and Description of the Proposed Facilities

1.1 Introduction

The identity of the applicant is TransCanada Keystone Pipeline, L.P. (Keystone), a limited partnership, organized under the laws of the State of Delaware, and owned by affiliates of TransCanada Corporation (TransCanada), a Canadian public company organized under the laws of Canada, and ConocoPhillips Company (ConocoPhillips), a Delaware corporation. Keystone's primary business address is 450 1st Street, S.W., Calgary, Alberta, Canada T2P 5H1.

Keystone is proposing to construct and operate a crude oil pipeline and related facilities from Hardisty, Alberta, Canada, to the Port Arthur and east Houston areas of Texas in the United States (US). The project, known as the Keystone XL Project (Project), will have a nominal capacity to deliver up to 900,000 barrels per day (bpd) of crude oil from an oil supply hub near Hardisty to existing terminals in Nederland near Port Arthur, and the Houston Ship Channel in Houston, Texas.

TransCanada PipeLines Ltd. (TransCanada PipeLines) will be the operator of the Project. TransCanada, the parent company of TransCanada PipeLines, has more than 50 years experience in the responsible development and reliable and safe operation of North American energy infrastructure including natural gas pipelines, power generation, gas storage facilities, and projects related to oil pipelines and liquefied natural gas facilities. TransCanada owns and operates a natural gas pipeline network of more than 36,500 miles, which taps into virtually all major natural gas supply basins in North America. TransCanada transports the majority of western Canada's natural gas production across the North American continent to markets in the US and Canada.

Further, Keystone is in the execution phase of the $5.2 billion Keystone Pipeline project, a major international crude oil pipeline project. The Mainline Segment of the Keystone Pipeline project, which extends from the North Dakota-Canada border to Wood River and Patoka, Illinois; and the Keystone Cushing Extension, which extends from Steele City, Nebraska, to Cushing, Oklahoma, are on schedule for completion in 2009 and 2010, respectively. In addition, TransCanada Corporation permitted and constructed the Express Oil Pipeline through Montana and Wyoming in the 1990s.

TransCanada has total assets of approximately US $30 billion. For the year ending December 31, 2007, TransCanada had a net income from continuing operations of approximately US $1.2 billion and a cash flow of approximately US $2.8 billion.

ConocoPhillips is the third-largest integrated energy company in the US, based on market capitalization, as well as reserves of oil and natural gas. Worldwide, of non-government-controlled companies, ConocoPhillips is the sixth-largest holder of proved reserves and the fifth-largest refiner. Headquartered in Houston, Texas, ConocoPhillips operates in nearly 40 countries, has approximately 33,100 employees worldwide and operates more than 11,000 miles of pipelines and more than 60 storage terminals in the US. ConocoPhillips transports both raw and finished petroleum products, including crude oil, propane and refined products such as gasoline, diesel and jet fuel. The company has assets of $190 billion.

The Project will require the issuance of a Presidential Permit by the US Department of State (DOS) to cross the US/Canada border. Issuance of the Presidential Permit is subject to environmental review pursuant to the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 et seq.). The Bureau of Land Management (BLM) will be responsible for issuing right-of-way (ROW) Grants and Temporary Use Permits for Project activities on federal lands. In Montana, the Project requires a certificate under the Montana Major Facilities Siting Act (MFSA), which includes environmental review under the Montana Environmental Policy Act

(MEPA). The Montana Department of Environmental Quality (Montana DEQ) has indicated that it also will use the federal Environmental Impact Statement (EIS) and process to satisfy its own process.

This application provides the Montana DEQ with adequate information to satisfy the requirements of the MFSA. This application includes an objective disclosure of environmental impacts, beneficial and adverse, resulting from the Project, as well as a set of reasonable alternatives.

1.2 Description of the Proposed Facilities

The Project will consist of three new pipeline segments plus two new pump stations on the Cushing Extension of the Keystone Pipeline Project. The Steele City Segment of the Project extends from Hardisty, Alberta, southeast through Montana and South Dakota to Steele City, Nebraska. The Gulf Coast Segment extends from Cushing, Oklahoma, south to Nederland, Texas. The Houston Lateral extends from the Gulf Coast Segment in Liberty County, Texas, southwest to Moore Junction, Harris County, Texas, near the Houston Ship Channel (**Figure 1-1**). In total, the Project will consist of approximately 1,702 miles of new, 36-inch-diameter pipeline, consisting of about 327 miles in Canada and 1,375 miles within the US. It will interconnect with the northern and southern termini of the 298-mile-long, 36-inch-diameter Keystone Cushing Extension. The Montana portion of the Steele City Segment will be approximately 282 miles in length. The Project is planned to be placed into service in phases. The Gulf Coast Segment and the Houston Lateral are planned to be in service in 2011 and the Steele City Segment is planned to be in service in 2012.

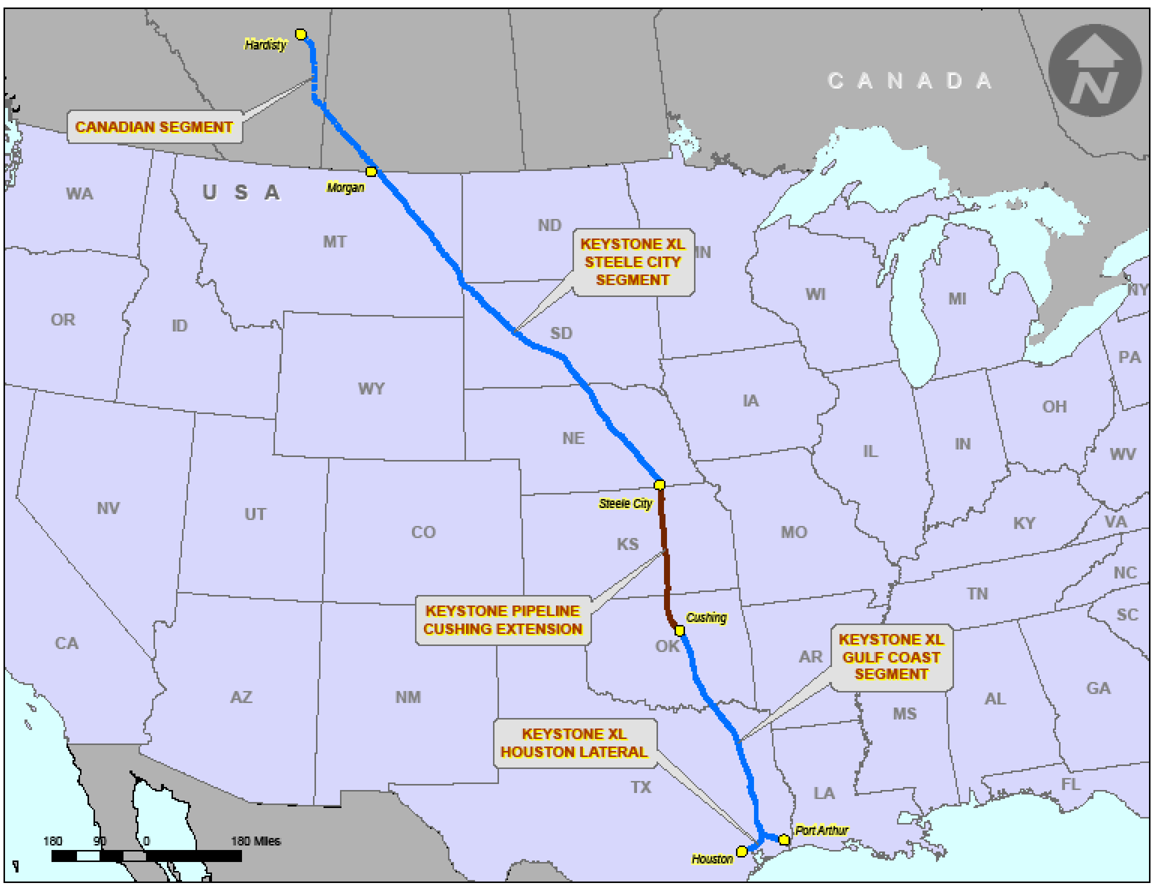

Figure 1-1 **Proposed Project Route**

In the US, the Project will be constructed as follows:

- 36-inch-diameter Steele City Segment, approximately 850 miles in length, from the US/Canada border at Morgan, Montana, to Steele City, Nebraska, which will be constructed with up to 10 mainline spreads, approximately 80 to 120 miles each, in 2011 and 2012.
- 36-inch-diameter Gulf Coast Segment, approximately 478 miles in length, from Lincoln County, Oklahoma, to Nederland, Texas, which will be constructed with five mainline spreads, varying in lengths from 65 to 122 miles each in 2010 and 2011.
- 36-inch-diameter Houston Lateral, approximately 47 miles in length, from Liberty County, Texas, to Harris County, Texas, which will be constructed with one main spread, in 2011.

A total of 30 new pump stations, each located on an approximate 5-acre site, will be constructed in the US; 18 on the Steele City Segment, 10 on the Gulf Coast Segment, and 2 along the Keystone Cushing Extension in Kansas. Seven of the 18 Steele City Segment pump stations are proposed for construction in Montana.

A tank farm will be located on an approximate 50-acre site near the junction of the Project with the Keystone Cushing Extension in Steele City, Nebraska. Three tanks, each with a design capacity of 350,000 barrels, will be constructed for the purpose of managing oil movements during operations. There are no tank farms in Montana.

Valves will be installed and located as dictated by the hydraulic profile of the pipeline, as required by federal regulations, and with the intent to enhance public safety and protect the environment as part of Keystone's integrity management practices. The spatial extent of each valve site will be contained within the permanent ROW and other aboveground facility sites (e.g., pump stations) along the Project route. Permanent access to each of these intermediate sites will be acquired.

Densitometer sites for detection of crude oil batch interfaces will be co-located at the last valve upstream of each delivery location as well as at each delivery location. There are no densitometer sites in Montana.

Delivery metering and proving facilities at Nederland, Texas, and Moore Junction, Texas, will measure the amount of product transported and delivered to terminals. There are no delivery metering facilities in Montana.

Temporary use access roads to the construction ROW and temporary use contractor yards or stockpile sites will be required during construction of the Project. Access roads will vary in length and will be required every 5 to 10 miles along the pipeline route and will be about 20 to 30 feet wide. Temporary construction pipe stockpile sites and contractor yards will be up to 30 acres in size. Pipe stockpile sites will be located at 30- to 80-mile intervals along the proposed route. Contractor yards are expected to be needed every 60 miles.

Electric power lines will be constructed, as required, by local power providers to provide power for the new pump stations and to power remotely operated valves and densitometers located along the pipeline route.

Power line and associated facility upgrades will be required in multiple locations along the route. Keystone will not construct nor be responsible for the permitting of new power lines and related facility construction. Local power providers will be responsible for obtaining any necessary approvals or authorizations from federal, state, and local governments for such facilities (subject to the exception noted below). Although the permitting process for the electrical facilities is an independent process, construction and operation of these facilities are considered connected actions under NEPA and MEPA. Moreover, these facilities are associated facilities under the MFSA and are evaluated within this application. Keystone will file a separate ROW Grant Application with BLM for power lines that cross BLM lands along the Steele City Segment. This is required by the BLM in order to ensure those ROWs are processed in parallel with the EIS. Keystone will transfer those ROW grants to the appropriate power providers once those power providers have been selected and have started their permitting processes.

1.3 Design Characteristics (ARM 17.20.1509)

The Project has been designed to transport crude oil from Canada to the US Gulf Coast. The pipeline will have a nominal capacity to deliver up to 900,000 bpd. The pipeline route and associated pump stations are shown in **Figure 1-2**. The pipeline system will be designed, constructed, and operated to meet or exceed all applicable regulatory requirements. Additional information with regard to specific elements of the Project design is provided in subsequent sections.

The 36-inch-diameter pipeline will be buried and placed in a 50-foot-wide permanent easement. During construction, an additional 60-foot-wide temporary easement generally will be required for the safe installation of the pipeline. As described later, under certain site-specific circumstances, additional or reduced temporary work space may be required.

Seven pump stations will be located in Montana. The pump station requirements to support this system capacity is shown in **Table 1-1**. Each pump will be driven by an air-cooled electric motor. Pig launchers and receivers, typically 200 miles apart, will be installed in Montana at Pump Stations 9 and 13. A typical plot plan of a pump station with a pig launcher and receiver is shown in **Figure 1-3**. Mainline valves will be installed at each pump station.

Table 1-1 Pump Stations in Montana

Pump Station Number	Milepost	County	Legal	Acres	Total Number of Pumps
PS 09	1.1	Phillips	4-37N – 32E	5	5
PS 10	49.3	Valley	1-31N – 36E	5	5
PS 11	97.9	McCone	1-25N – 42E	5	5
PS 12	148.6	McCone	18-19N – 49E	5	5
PS 13	198.6	Prairie	30-13N – 54E	5	5
PS 14	236.5	Fallon	11-8N – 58E	5	5
PS 15	280	Fallon	25-2N – 61E	5	5

Intermediate mainline valve sites located between the pump stations will be fenced and have a locked gate and be accessible by a permanent access road. On the downstream side of major river crossings, there will be a combination of a manually operated mainline valve and a check valve. This will prevent backflow from the downstream pipe section in the event of abnormal conditions. All other intermediate valves and those located at the pump stations will be remotely operated. Plot plans of the intermediate mainline valves are shown in **Figure 1-4**.

The exterior of the pipe will be coated with fusion-bonded epoxy (FBE) to protect the pipe from external corrosion. In addition to a FBE external coating system, an impressed current cathodic protection system will be installed.

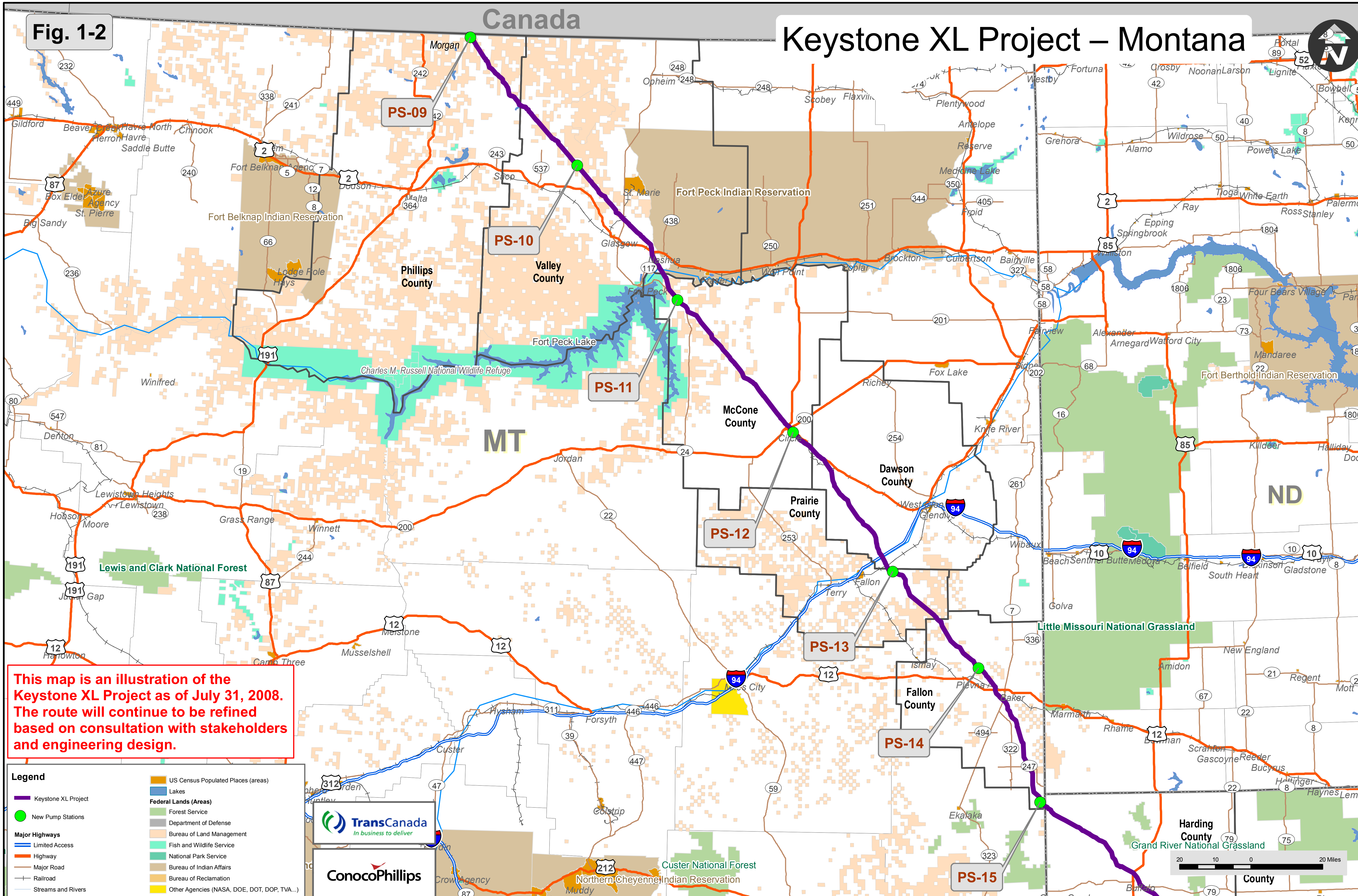

Fig. 1-2
Keystone XL Project – Montana
Canada
MT
ND
PS-09
PS-10
PS-11
PS-12
PS-13
PS-14
PS-15
Phillips County
Valley County
McCone County
Dawson County
Prairie County
Fallon County
Harding County
Fort Belknap Indian Reservation
Fort Peck Indian Reservation
Fort Berthold Indian Reservation
Northern Cheyenne Indian Reservation
Charles M. Russell National Wildlife Refuge
Lewis and Clark National Forest
Little Missouri National Grassland
Grand River National Grassland
Custer National Forest
Fort Peck Lake
This map is an illustration of the Keystone XL Project as of July 31, 2008. The route will continue to be refined based on consultation with stakeholders and engineering design.
Legend
Keystone XL Project
New Pump Stations
Major Highways
Limited Access
Highway
Major Road
Railroad
Streams and Rivers
US Census Populated Places (areas)
Lakes
Federal Lands (Areas)
Forest Service
Department of Defense
Bureau of Land Management
Fish and Wildlife Service
National Park Service
Bureau of Indian Affairs
Bureau of Reclamation
Other Agencies (NASA, DOE, DOT, DOP, TVA...)
TransCanada
In business to deliver
ConocoPhillips
20 10 0 20 Miles

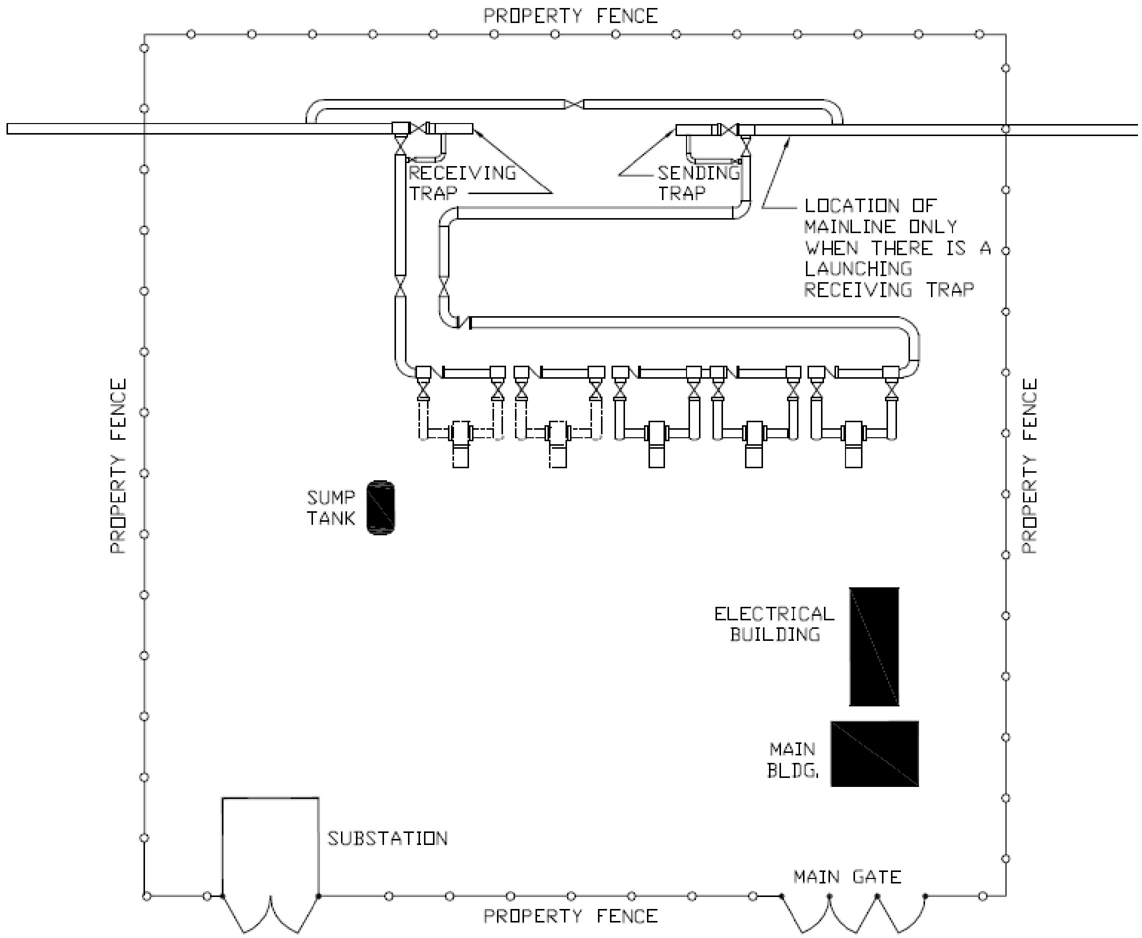

Figure 1-3 Plot Plan for Pump Station with Pig Launcher and Receiver

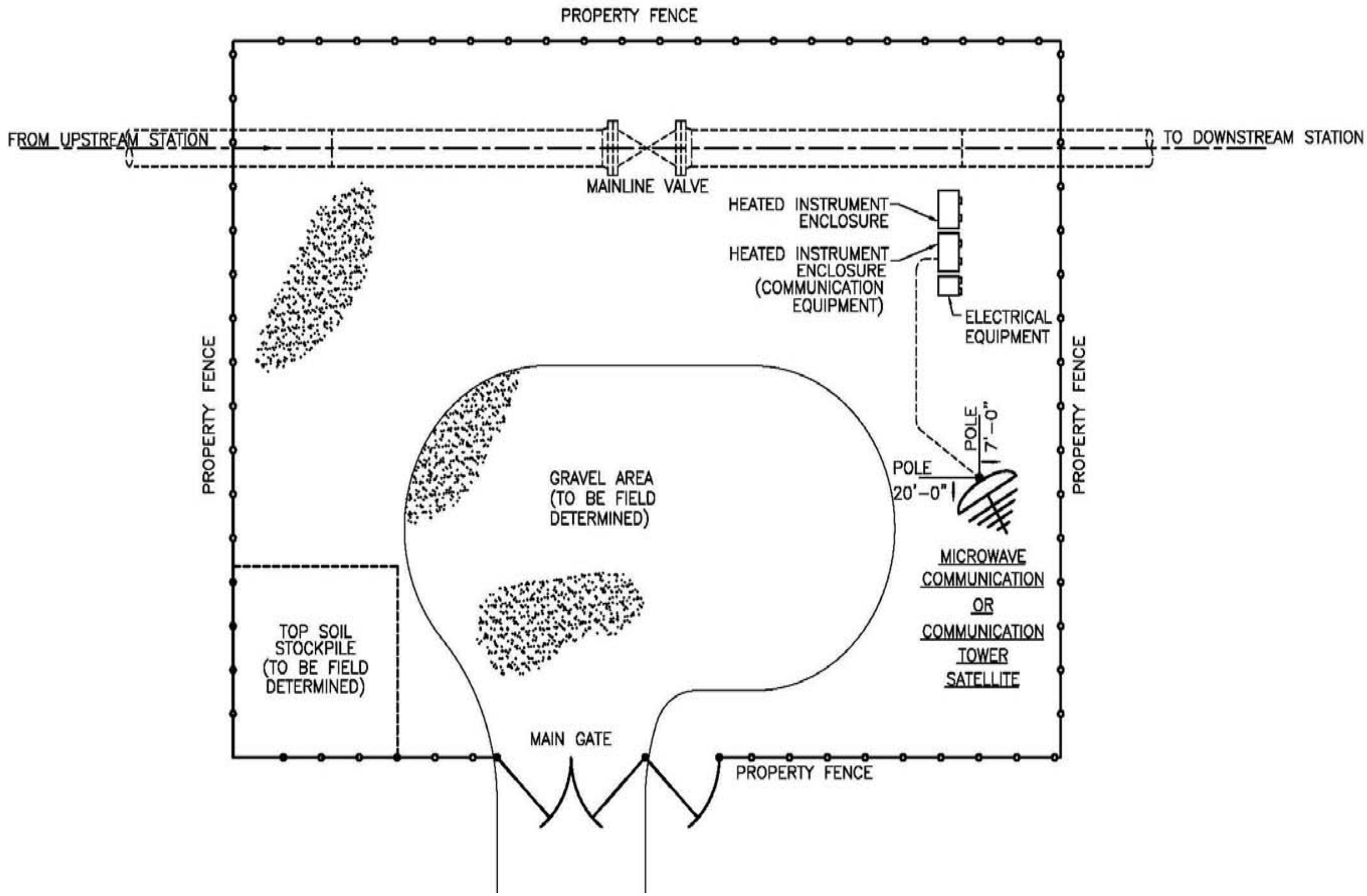

Figure 1-4 Plot Plan of Intermediate Mainline Valve

A Supervisory Control and Data Acquisition (SCADA) system managed from an Operations Control Center (OCC) located in Calgary, Alberta, Canada, will be used to operate the pipeline system and provide emergency system shutdown in the event of an abnormal condition.

The SCADA system will be satellite based with a land based telephone system as backup. Microwave radio signals may be used at some locations to provide the necessary supervisory control to mainline valve sites from a nearby pump station. In an emergency, the pipeline system is designed to be shut down remotely over a period of several minutes**.**

Aerial patrol of the entire pipeline route will occur a minimum of 26 times per year and not more than 3 weeks apart, as required by federal regulations. This allows a visual inspection of the ROW to check for potential encroachment or issues related to ROW reclamation, such as ditch subsidence or erosion. Any issue discovered will be dealt with in accordance with the appropriate operating and maintenance procedure.

1.3.1 Reports and Documents (ARM 17.20.1509(2))

1.3.1.1 Primary Codes and Regulations

The design, construction, and operation of the US section of the project will be in accordance with 49 Code of Federal Regulations [CFR] Part 195, Transportation of Hazardous Liquids. The project also will comply with other federal and state codes and regulations where applicable, except where variances, modifications or exceptions are requested by Keystone and approved by the appropriate regulatory agency.

49 CFR Part 195 invokes a series of industry standards and practices for materials, components, and construction. Section 195.3 lists reference publications and standards, which are supplemented and or qualified by 49 CFR Part 195.

These publications and standards are grouped by organizations, including the:

- American Society of Mechanical Engineers (ASME);
- American Petroleum Institute (API);
- American National Standards Institute (ANSI);
- American Society for Testing Materials (ASTM);
- US Environmental Protection Agency (USEPA);
- Manufacturer's Standardization Society;
- Montana Major Facilities Siting Act (MFSA);
- National Association of Corrosion Engineers (NACE);
- Occupational Safety and Health Administration 29 CFR Part 1 (1901 to 1910.441) and Part 2 (1910.000 to End) Safety and Health Standard;
- Pipeline and Hazardous Material Safety Administration (PHMSA); and
- Pipeline Research Council International, Inc. by in corporation American Gas Association.

ASME/ANSI B31.4, Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum, Gas, Anhydrous Ammonia, and Alcohols, is the primary industry standard for the design, construction, and operation of crude oil pipelines to be utilized in conjunction with 49 CFR Part 195.

1.3.1.2 List of Reports and Documents

A number of reports, documents, and calculations were prepared during preliminary engineering. These are listed below.

- Keystone XL Phase 1 – Route Analysis Report (October 5, 2007)
- Keystone XL Phase 2 – Route Analysis Report (November 26, 2007, Revision 1)
- Design Basis Memorandum – Keystone XL Pipeline Project
- Pump Station Design Basis
- Preliminary Hydraulic Design Basis
- Preliminary Engineering Hydraulic Study Report
- Mainline Pump Study
- Operating Margin Study (RAM)
- Facility Usage Data Report
- Pump Flushing Position Paper
- Pump Station Configuration Position Paper
- Pump Station Study – PCV/VFD Requirements
- HAZID Report
- HAZOP Plan Report
- Site Ambient Conditions Report
- Control and Pressure Protection Philosophy
- Design Basis SCADA Controls
- Batching Plan – Position Paper
- Mechanical Design Criteria (Tank Farms and Pump Stations)
- Civil/Structural Design Criteria
- Process Design Criteria
- Electrical Design Criteria
- Controls Design Criteria
- PHMSA Special Permit Application
- Emergency Response Plan – Table of Contents (**Attachment B**)
- Construction, Mitigation, and Reclamation Plan (CMRP) (**Attachment C**)
- Risk Assessment and Environmental Consequences Analysis (**Attachment D**)

1.3.2 Design Features (ARM 17.20.1509(3))

The Project facilities will be designed, constructed, tested, operated, and maintained in accordance with 49 CFR Part 195, Transportation of Hazardous Liquids by Pipeline; and 49 CFR Part 194, Response Plans for Onshore Oil Pipelines, as well as other applicable federal and state regulations. Therefore, most of the basic design features of the proposed facilities are dictated by regulation and are the state-of-the-art for ensuring safe and reliable operation of the facilities, which intrinsically will reduce the possibility of adverse environmental impacts. Specific design features that will mitigate the risk of environmental impacts are identified below. More comprehensive discussions of project design features are provided in subsequent sections.

Facility Location Analysis

Keystone undertook a route alternatives analyses to determine the preliminary routing for the Project. Once the preferred route was selected, ongoing studies, surveys, and field reconnaissance assisted with the refinement of the proposed route and facility location. Keystone is continuing to factor in environmentally sensitive areas, such as wetlands, waters, special-status species habitats, cultural resources, paleontological resources, and other environmental considerations during the ongoing route refinement effort, further reducing potential adverse environmental impacts.

Construction Plans and Schedule

A Project Construction, Mitigation, and Reclamation Plan (CMRP) has been prepared and includes specification and design for reclamation of disturbed land during and subsequent to construction. Construction schedules have been developed, taking into account the timing restrictions for a variety of sensitive species.

Emissions Mitigation

All pumps located at the pump stations will be electrically driven. Therefore, the pump stations will not produce combustion emissions, and operational emissions from each of the pump stations will consist exclusively of fugitive emissions. Normal maintenance operation will result in negligible amounts of fugitive emissions. Since negligible emissions are anticipated, no additional emissions mitigation, beyond meeting the required pipeline construction standards, is proposed.

Overpressure Protection

Mainline pipeline overpressure protection must be limited to a maximum of 110 percent Maximum Operating Pressure (MOP) consistent with 49 CFR Part 195.406(b), stated as:

"(b) No operator may permit the pressure in a pipeline during surges or other variations from normal operations to exceed 110 percent of the operating pressure limit established under (a) of this section. Each operator must provide adequate controls and protective equipment to control the pressure within this limit."

SCADA

Keystone will utilize a comprehensive SCADA system situated within TransCanada's OCC to remotely monitor and control the entire pipeline. This design incorporates a number of industry best practices. In addition, remotely operated mainline valves, including those associated with high consequence areas (HCAs), will be monitored by the SCADA system. In the event of a valve closure, the SCADA system generates an automated shutdown of pumping facilities at upstream pump station locations. Pressure transmitters will be installed (at specific locations) to ensure normal pipeline operation.

Keystone will develop a pipeline transient hydraulic system model during the detailed engineering stages of the Project. A comprehensive review of the entire pipeline system, under both steady state and transient hydraulic conditions, will be performed to ensure optional operation of the system.

Valve Placement

Keystone has evaluated the location of valves through an iterative process involving regulatory, environmental, and HCA considerations. While US Department of Transportation (USDOT) regulations stipulate the location of valves required to protect environmental resources, Keystone has added additional valves to further segment the pipeline, increasing Keystone's ability to isolate the pipeline in the unlikely event of a crude oil release.

Initially, valves were placed in locations as required by federal regulations (49 CFR Part 195), including placement on either side of large rivers and in areas to protect drinking water reservoirs. After initial valve locations were identified based on engineering considerations, Keystone conducted a preliminary evaluation of PHMSA-defined HCAs. This evaluation identified HCAs that potentially could be affected by a pipeline spill. Based on the HCA evaluation, valve locations were re-assessed to determine where relocation (while still complying with federal regulations) or the addition of new valves could mitigate potential risk to HCAs.

These revised locations were then compared to the location of shallow groundwater aquifers, source water protection areas, and wellhead protection areas. Valve locations were again re-assessed to determine where relocation or the addition of new valves could mitigate potential risk to potentially sensitive groundwater resources (while still complying with federal regulations and providing protection of HCAs). Finally, additional valves were added to reduce the length of pipe between isolating valves.

Leak Detection

Keystone will implement a number of complimentary leak detection methods and systems, which will be overlapping in nature and will progress in leak detection thresholds to reduce potential adverse environmental impacts. For more information, see Section 1.5.6.

1.3.3 Engineering Description of the Facilities (ARM 17.20.1509(8))

Table 1-2 provides various selected design parameters applicable to the proposed pipeline.

New steel pipe for the mainline will be mill inspected by an authorized owner's inspector and mill tested to Canadian Standard Association or API/ASTM specification requirements, at a minimum. While X70 pipe is the current design basis, approval of a Special Permit from PHMSA may also allow the use of X80 pipe without any reduction in public or environmental safety. Refer to Section 1.4.1.5, Pipe Stringing, Bending and Welding, for description of the joining process.

Table 1-2 Pipe Design Parameters and Specifications

Pipe/Design Parameters	Specification
Pipeline design code	ASME B31.4-2006
Outside diameter	36-inch
Line pipe wall thickness (0.80 design factor) (1,440 pounds per square inch gauge [psig])	0.463-inch (X70) or 0.405-inch (X80)
Line pipe wall thickness (0.72 design factor) PHMSA Special Permit areas, including highly populated area HCAs, and commercially navigable waterways (per 49 CFR Part 195.450) and station valving (1,440 psig)	0.515-inch (X70) or 0.450-inch (X80)
Heavy wall thickness (at 0.6 design factor) Bore road, cased railway crossings (1,440 psig)	0.619-inch (grade X70) or 0.540-inch (grade X80)
Heavy wall thickness (at 0.5 design factor) Uncased railway crossings, horizontal directional drillings (HDDs) (1,440 psig)	0.743-inch (X70) or 0.648-inch (X80)
Line pipe wall thickness (0.72 design factor) (1,600 psig)	0.572 inch (X70) or 0.500 inch (X80)
Material code	API 5L-PSL2
Material grade thousand pounds of pressure per square inch (yield strength)[1]	Grade X70 or X80

Table 1-2 Pipe Design Parameters and Specifications

Pipe/Design Parameters	Specification
Maximum pump station discharge	1,440 psig
Maximum Operating Pressure (MOP)	1,440 psig[2]
Minimum field test pressure	1.25 x MOP
Charpy impact test temperature (Joules at °C) Below grade = 5°C (41°F) Above grade = 45°C (-113°F)	85 percent (average) 75 percent minimum single specimen Charpy energy = 33 feet-lb (any heat); 74 feet-lb (all-heat) (average)
Corrosion allowance	None
Minimum average joint length (feet)	Nominal 80-foot (double-joint)
Field production welding processes	Mechanized – gas metal; arc welding (GMAW) Manual-shielded metal arc welding (SMAW)

1 Yield strength of the pipe is provided as yield strength, which is used primarily for design rather than tensile strength.

2 See Section 1.3.3.1.

1.3.3.1 Pipeline Maximum Operating Pressure

The design of the KXL pipeline system is based on a maximum 1,440 psig discharge pressure at each pump station. The result is that the MOP of the pipeline between pump stations is generally 1,440 psig. In liquid pipelines, some sections at lower elevations relative to the pump station discharge may be exposed to slightly higher pressures due to the combined station discharge pressure and hydrostatic head. This can occur during both normal and abnormal operating conditions. The design of the pipeline is based on a steady state and transient analysis to identify MOPs under normal and abnormal operating conditions.

For location-specific, low elevation segments downstream of pump stations, the MOP will be 1,600 psig as identified in **Table 1-3**. This allows a consistent maximum discharge pressure for all pump stations, optimized for efficiency at nominal flow capacity. All other segments in Montana will have a MOP of 1,440 psig.

Table 1-3 Pipe Segments with MOP of 1,600 psig

Pipe Segment	Milepost[1] Start	Milepost[1] End	Length (Miles) of Heavy Wall Pipe Required
US border	0.00	1.24	1.2
From PS 9 to PS 10	1.24	2.55	1.3
From PS 10 to PS 11	49.27	55.86	6.6
From PS 11 to PS 12	98.30	101.84	3.5
From PS 12 to PS 13	149.50	149.63	0.1
From PS 13 to PS 14	198.96	204.00	5.0
From PS 14 to PS 15	236.93	237.24	0.3

Table 1-3 Pipe Segments with MOP of 1,600 psig

Pipe Segment	Milepost[1] Start	Milepost[1] End	Length (Miles) of Heavy Wall Pipe Required
From PS 15 to PS 16	280.30	282.02	1.7

[1] Milepost 0 is at the US/Canadian border.

1.3.3.2 Pipe Burial Depths

Pipe burial depths are shown in **Table 1-4**. Additional depths of cover may be required subject to crossing agreements (e.g., with highways, counties, or other parties) and subject to permits.

Table 1-4 Minimum Pipeline Cover

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

Montana pump station location and size information is provided in **Table 1-1** in Section 1-3. Project valve location information is provided in **Table 1-5**.

Table 1-5 Project Valve Locations in Montana

Number	Milepost
1	11.3
2	27.3
3	63.5
4	71.7
5	81.2
6	83.8
7	90.7
8	122.7
9	177.6
10	194.0
11	203.1
12	227.4
13	244.6
14	264.9

1.3.3.3 Cathodic Protection

The components of a cathodic protection system include:

- Rectifiers;
- Anode ground beds;
- Conductive material; and
- Test leads.

Cathodic protection uses a rectifier to convert alternating current power to direct current power. The rectifier output is electrically connected to the pipe on one side and, on the other side, to anodes (metal rods). The rectifier is usually sited adjacent to existing power lines in the area. Anodes are buried in groups (referred to as ground beds) along the pipeline and are backfilled with a carbon-based conductive material to improve their effectiveness. As the electric current follows from the pipeline through the rectifier to the anode bed, exposed pipe-metal is protected from corrosion.

The distance between rectifier units depends on the current requirements of the system. Current requirements are based on different soil types. Typically, a rectifier and anode ground bed can protect 40 or more miles of pipeline from a single location. Efforts are made to co-locate the equipment at other facility sites, such as pump stations or valve sites.

The effectiveness of the cathodic protection system is measured using test leads. Test leads attached to the pipe allow the cathode protection system to be checked on a regular basis. These test leads are located at approximately 2-mile intervals, brought to the surface via wires, and attached to a supporting post.

1.3.4 Quality Control (ARM 17.20.1509(9))

The following quality assurance processes will ensure that TransCanada will meet industry and USDOT standards. Keystone will implement the following Quality Assurance/Quality Control rocesses to meet or exceed industry and USDOT standards:

1.3.4.1 Design QC

- The design of the facilities will meet or exceed Subpart C of 49 CFR Part 195.

1.3.4.2 Manufacturing QC

- Purchase pipe only from pre-qualified vendors according to TransCanada's vendor qualification procedures.
- All pipe mills selected will be subjected to a formal technical qualification program and an audit to ensure registered quality systems, inspection, and test plans are in place and followed.
- Specification review meetings will be held with each vendor prior to production to review the key specification requirements.
- During production, third-party surveillance will be present in the pipe mill to monitor and assess the manufacturing and stock pile of pipe.
- Recorded details of rolling practices and production heat numbers used for each pipe joint will be required to ensure root cause analysis can later be performed to determine the extent of potentially affected pipe in the event material deficiencies are discovered.

- TransCanada's experience has shown that following this proactive approach to preventing and detecting coating disbonding in the factory and the field results in pipelines with a high degree of integrity and safety. To date, TransCanada has not experienced integrity issues with FBE-coated pipelines, some of which have been in service for 28 years.
- Test coating systems to ensure they meet the strict material property requirements of NACE PR-0394 Application, Performance, and Quality Control of Plant-Applied, FBE External Pipe Coating. Cure, flexibility, impact resistance, blast profile, interfacial contamination, thickness and cathodic disbondment resistance are some of the properties evaluated.
- Perform a plant trial to ensure that the coating factory or application plant is capable of applying the coating such that the requirements of the above referenced specifications are met on a consistent basis in the finished product.
- Perform regular non-destructive and destructive tests during plan application on coated pipe samples obtained from the process to confirm the coated pipe meets the specified requirements. Unacceptable coated pipes are rejected and run through the process again until an acceptable product is produced.
- Inspect the coated pipe for "holidays" or coating defects prior to leaving the plant and repair any deficiencies found.

1.3.4.3 Construction Quality Control

- Use care in handling the pipe in stockpiling, transportation, and stringing to minimize any coating damage that may occur.
- Inspect the pipe after welding for "holidays" and again, all deficiencies are repaired prior to backfilling.
- Coat girth weld areas in the field using coating materials that have been previously tested and approved to provide acceptable levels of long-term performance. Welds with unacceptable cure or process parameters are cleaned off and recoated.
- Keystone will have qualified inspectors to ensure quality standards are maintained during pipe transportation, stringing, welding, bending, coating, lowering-in, and backfilling.
- Keystone will non-destructively inspect 100 percent of the welds using radiographic, ultrasonic, or other USDOT-approved method. Welds that do not meet established specifications will be repaired or removed.
- The pipeline will be hydrostatically tested in sections to ensure the system is capable of withstanding the operating pressure for which it is designed. The hydrostatic test will be conducted in accordance with Subpart E of 49 CFR Part 195. See Section 1.4.1.7 for further details on hydrostatic testing.

1.3.4.4 As Built Quality Control

- As built records of the completed facilities will be documented in accordance with Section 195.266 of 49 CFR Part 195 for the life of the facility.

1.3.5 Source of Power for Pump Stations (ARM 17.20.1509(10))

Table 1-6 details the location and size of new electrical power lines associated with the Project pump stations in Montana. Preliminary routing has been identified for each power line. Maps at a scale of 1:350,000 depicting the preliminary routing identified for the transmission lines that will supply the pump stations along the routes are included in **Attachment A.** Where feasible, the entire length of each of these preliminary power line routes has been placed along existing county roads, section lines, or field edges to minimize interference with adjacent agricultural lands. Additional information on power lines can be found in **Attachment O**.

Table 1-6 Location and Size of Proposed Electrical Power Lines in Montana

Pump Station Number	County	Kilovolt	Approximate Length (miles)	Typical Pole/Tower Spacing (feet)
PS 09	Phillips	115	57.0	500 to 600
PS 10	Valley	115	51.0	500 to 600
PS 11	McCone	115	11.9	500 to 600
PS 12	McCone	69	3.3	300 to 400
PS 13	Prairie	115	9.6	500 to 600
PS 14	Fallon	115	5.1	500 to 600
PS 15	Fallon	115	42.1	500 to 600

1.3.6 Communication Facilities (ARM 17.20.1509(11))

Keystone will use satellite as the primary form of communication and hard telephone line (telco) and microwave radio as back-up. Where feasible, microwave radio communication towers may be located at pump stations and valve sites. Location of these facilities will be determined during detailed design. All remotely operated valve sites and pump stations will have SCADA, which uses the above primary and back-up communication methods. The Project will not install fiberoptic cable.

1.3.7 Opportunities and Constraints on Sharing ROWs (ARM 17.20.1509(12))

The preferred route is co-located with the Northern Border pipeline ROW for most of the first 24 miles in Montana, before diverting southeastward, away from Northern Border. One of the original alternative routes examined for the Project was to co-locate with Northern Border to eastern North Dakota before meeting up with the Keystone Pipeline Project ROW and co-locating with it, southward to Steele City, Nebraska. However, that alternative route would have been approximately 120 miles longer and would have increased the environmental footprint and cost an additional $295,000,000 to construct. With the exception of Northern Border, there are no other co-location opportunities in eastern Montana that proceed in a northwest to southeast direction. It is not feasible from an engineering or economic perspective for a large-diameter pipeline to attempt to follow road ROWs while proceeding in a northwest to southeast direction.

Figure 1-5 is a typical construction ROW with the 25-foot minimum offset needed during construction on a shared ROW.

1.4 Construction Description (ARM 17.20.1511(1))

1.4.1 Overview

Keystone proposes to begin construction of the Steele City Segment in 2011. Construction is expected to be complete in 2012. Keystone expects to commence service on the Steele City Segment in 2012. There will be four construction spreads in Montana. The spreads are expected to range in length from 80 to 120 miles. Actual equipment used will depend upon construction equipment owned by selected contractors. The following

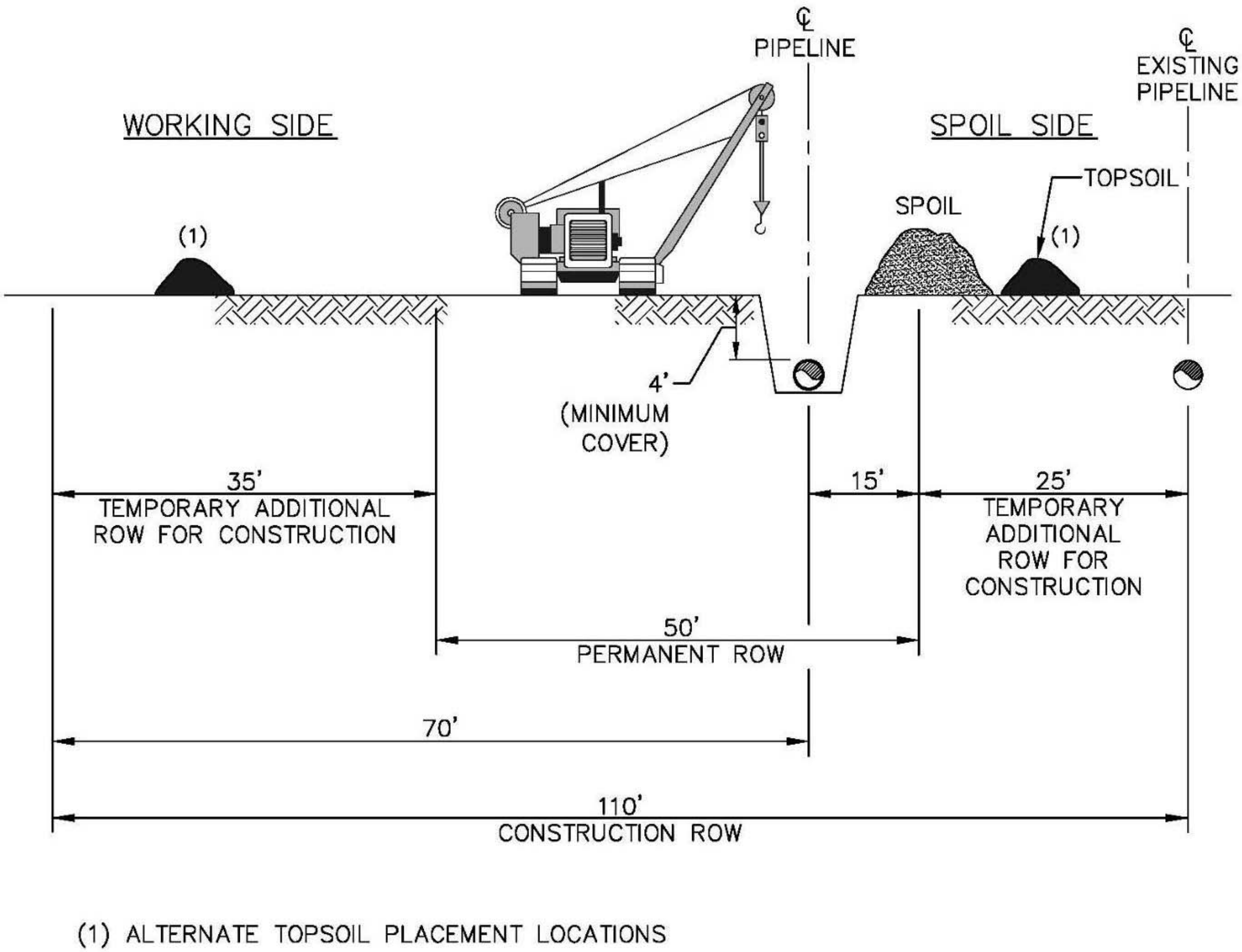

Figure 1-5 Typical Construction ROW with 25-foot Minimum Offset

provides the sequence of construction operations, approximate quantities of the typical construction equipment to be used per spread, and an estimate of the total equipment needs.

1.4.1.1 General Pipeline Construction Procedures

Before starting construction, Keystone will finalize engineering surveys of the ROW centerline and extra workspaces and substantially complete the acquisition of ROW easements and any necessary acquisitions of property in fee.

Overland pipeline construction generally proceeds as a moving assembly line as summarized below. Separate crews will be used for construction of the aboveground facilities.

Standard pipeline construction is composed of specific activities, including survey and staking of the ROW, clearing and grading, trenching, pipe stringing, bending, welding, lowering in, backfilling, hydrostatic testing, and cleanup. In addition to standard pipeline construction methods, Keystone will use special construction techniques where warranted by site-specific conditions. These special techniques will be used when constructing across rugged terrain, waterbodies, wetlands, paved roads, highways, and railways.

1.4.1.2 Survey and Staking

The first step of construction involves marking the limits of the approved work area (i.e., the construction ROW boundaries and any additional temporary workspace areas) and flagging the location of approved access roads and existing utility lines. Wetland boundaries and other environmentally sensitive areas also will be marked or fenced for protection at this time. Before the pipeline trench is excavated, a survey crew will stake the centerline of the proposed trench.

1.4.1.3 Clearing and Grading

Before clearing and grading activities commence, landowner fences will be braced, cut, and temporary gates and fences will be installed to contain livestock, if present. A clearing crew will follow the fence crew and will clear the work area of vegetation (including crops) and obstacles (e.g., trees, logs, brush, rocks). Temporary erosion control measures, such as silt fence or straw bales, will be installed prior to or immediately following vegetation removal down slopes into wetlands and riparian areas. Grading will be conducted where necessary to provide a reasonably level work surface. Where the ground is relatively flat and does not require grading, rootstock will be left in the ground. More extensive grading will be required on steep side slopes or vertical areas and, where necessary, to avoid excessive bending of the pipeline.

The minimum clearing and grading equipment per spread is as follows: six D8 dozers; one 330 backhoe (thumb and hoe pack); two 345 backhoes; two D8 ripper dozers; and one 140 motor grader. Two environmental crews will be required per spread installing silt fence and hay bale structures, as required.

1.4.1.4 Trenching

The trench will be excavated to a depth that provides sufficient cover over the pipeline after backfilling. Typically, the trench will be 7 to 8 feet deep and 4 to 5 feet wide in stable soils. In most locations, the depth of cover over the pipeline will be a minimum of 48 inches (see **Table 1-4**). Trenching may precede bending and welding or may follow, depending upon several factors, including soil characteristics, water table, presence of drain tiles, and weather conditions at the time of construction.

When rock or rocky formations are encountered, tractor-mounted mechanical rippers, or rock trenchers, will be used to fracture the rock prior to excavation. In areas where mechanical equipment cannot break up or loosen the bedrock, blasting (use of explosives) will be required (see Section 1.4.1.10). Excavated rock will be used to backfill the trench to the top of the existing bedrock profile. Topsoil will be separated from subsoil over the trench or over the trench and spoil side. Topsoil will be salvaged and conserved all excavation sites. Topsoil handling is discussed further in Section 1.4.4.

The minimum trenching equipment per spread is as follows: six 345 backhoes; one 345 backhoe with pecker hammer; and two ditching machines.

1.4.1.5 Pipe Stringing, Bending, and Welding

Prior to or following trenching, sections of externally coated pipe nominally 80 feet long (also referred to as "joints") will be transported by truck over public roads and along authorized private access roads to the ROW and placed or "strung" along the trench in a continuous line. After the pipe sections are strung along the trench and before joints are welded together, individual sections of the pipe will be bent to conform to the contours of the trench by a track-mounted, hydraulic pipe-bending machine. Where multiple or complex bends are required in a section of pipe, that section of the pipeline will be bent at the factory. After the pipe sections are bent, the joints will be welded together into long strings and placed on temporary supports.

The pipeline joints will be lined up and held in position until securely joined by welding. Keystone will non-destructively inspect 100 percent of the welds using non-destructive testing (NDT) methods, such as radiographic, ultrasonic, or other USDOT-approved method. Welds that do not meet established specifications will be repaired or removed. Once the welds are approved, a protective epoxy coating will be applied to the welded joints. The pipeline will then be electronically inspected or "jeeped" for faults or voids in the epoxy coating and visually inspected for any faults, scratches, or other coating defects. Damage to the coating will be repaired before the pipeline is lowered into the trench.

To minimize the impact on agricultural areas, livestock, and wildlife movements during construction, Keystone will 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 machinery, livestock, and wildlife to cross the trench safely. Soft plugs will be constructed with a ramp on each side to provide an avenue of escape for animals that fall into the trench.

Prior to lowering the pipe into the trench, multiple sections of pipe may be welded together above the trench. These welded lengths of pipe may be greater than 1 mile in length. Keystone will lower these sections of pipeline into the trench using side boom tractors.

The minimum stringing, bending, and welding equipment per spread is as follows: two 345 backhoes – one at pipe yard, one at ROW; one D7 dozer; eight string trucks; two bending machines; thirteen 572 side booms; one automatic welding machine with end-facing machine; one welding shack; eight ultrasonic testing units; one hand scanner; one sled; two heat rings; two coating rings; and one sled with generators.

1.4.1.6 Lowering in, Backfilling, and Tie-ins

Before the pipeline is lowered in, the trench will be inspected to be sure it is free of livestock or wildlife, as well as rock and other debris that could damage the pipe or protective coating. In areas where water has accumulated, dewatering may be necessary to permit inspection of the bottom of the trench. The pipeline then will be lowered into the trench.

On sloped terrain, trench breakers (stacked sand bags or foam) will be installed in the trench at specified intervals to prevent subsurface water movement along the pipeline. The trench will then be backfilled using the excavated material.

In rocky areas, the pipeline will 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 will be filled with padding material (e.g., finer grain sand, soil, or gravel) to protect the pipeline. No topsoil will be used as padding material.

The minimum equipment per spread for lowering in and backfilling is as follows: three 345 backhoes (1 equipped with long neck); five 583 side booms; two padding machines; and three D8 dozers.

Three tie-in crews per spread will be utilized to complete the tie-ins to the mainline. The minimum equipment per spread per tie-in crew is as follows: two welding machines; welding shacks, seven 572 side booms; eight ultrasonic testing units; hand scanner; sled; two heat rings; two coating rings; sled with generators; two 345 backhoes (1 equipped with shaker bucket); one 583 side boom; and one D8 dozer.

1.4.1.7 Hydrostatic Testing

The pipeline will be hydrostatically tested in sections of approximately 30 miles (with a maximum of 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 line with water, pressurizing the section to a pressure at least 1.25 times the MOP, and maintaining that pressure for a period of 8 hours. The hydrostatic test will be conducted in accordance with 49 CFR Part 195.

Keystone proposes to obtain water for hydrostatic testing from rivers and streams crossed by the pipeline and in accordance with federal, state, and local regulations. The pipeline will be hydrostatically tested after backfilling and all construction work that will directly affect the pipe is complete. If leaks are found, they will be repaired and the section of pipe retested until specifications are met. Water used for the testing will then be transferred to another pipe section for subsequent hydrostatic testing. The water will be returned to the original source. The water will be tested to ensure compliance with the general discharge permit in compliance with National Pollutant Discharge Elimination System (NPDES) requirements, treated if necessary, and discharged.

1.4.1.8 Cleanup and Restoration

During cleanup, construction debris on the ROW will be disposed of and work areas will be final graded and 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).

After permanent erosion control devices are installed and final grading is complete, all disturbed work areas, except annually cultivated fields, will be seeded as soon as possible. Seeding is intended to stabilize the soil, revegetate 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 dates and seed mixes specified by the landowner, land management agency, or Natural Resource Conservation Service (NRCS) recommendations.

On cultivated lands, seeding will be conducted only as agreed upon with the landowner. Keystone will restrict access along the ROW, using gates or other barriers to minimize unauthorized access by all-terrain vehicles in wooded areas if requested by the landowner. Pipeline markers will be installed at road and railroad crossings and other locations (as required by 49 CFR Part 195) to show the location of the pipeline. Markers will identify the owner of the pipeline and convey emergency information. Special markers providing information and guidance to aerial patrol pilots also will be installed.

The minimum cleanup and restoration equipment per spread is as follows: six D8 dozers; three 345 backhoes; and two tractors with mulcher spreaders (seed and reclamation).

1.4.1.9 Additional Construction Spread Requirements

In addition to the equipment described above, the following resources typically will be deployed on each spread:

- 450 to 500 construction personnel;
- 50 inspection personnel;
- 85 pickups, water trucks, tractor trailers;
- 7 equipment low-boys;
- 7 flat beds; and
- Five 2-ton bob tails.

1.4.1.10 Special Construction Procedures

In addition to standard pipeline construction methods, Keystone will use special construction techniques where warranted by site-specific conditions. These special techniques will be used when crossing paved roads, highways, railroads, steep terrain, waterbodies, wetlands, and when blasting through rock. These special techniques are described below.

<u>Road, Highway, and Railway Crossings</u>

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 railways will be crossed by boring beneath the road or railroad.

Figure 1-6 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.

Once the hole is bored, a prefabricated pipe section will be pulled through the borehole. 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. 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.

<u>Steep Terrain</u>

Additional grading may be required in areas where the proposed pipeline route will cross steep slopes. Steep slopes often need to be graded down to a gentler slope for safe operation of construction equipment and to accommodate pipe-bending limitations. Additional temporary workspace may be required for storage of graded material and/or topsoil during construction. In such areas, the slopes will be graded prior to pipeline installation and reconstructed as near as practicable to their original contours during restoration.

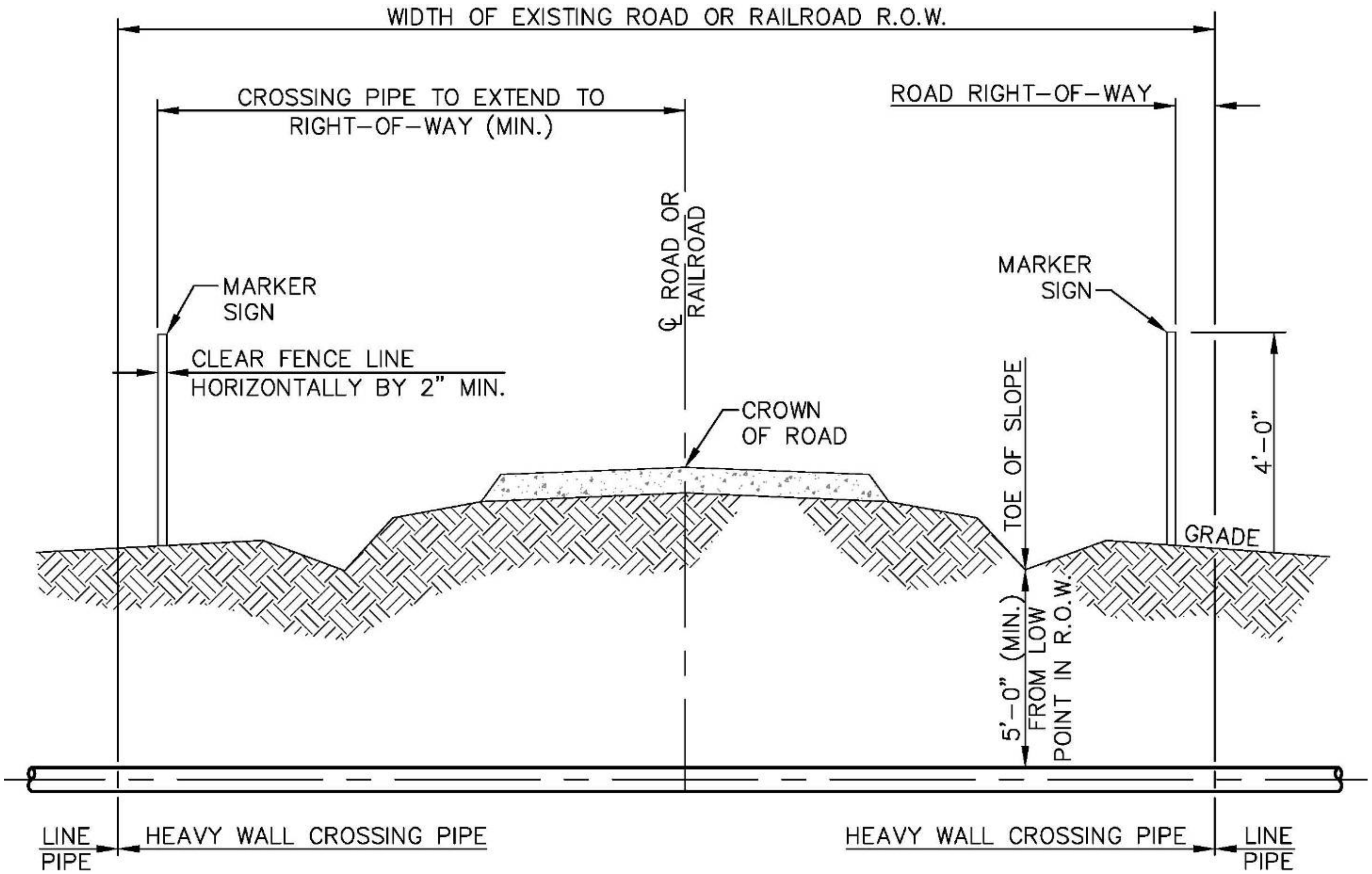

Figure 1-6 Typical Uncased Bored Road/Railway Crossing

In areas where the proposed pipeline route crosses laterally along the side of a slope, cut and fill grading may be required to obtain a safe, flat work terrace. Topsoil will be stripped from the entire ROW and stockpiled prior to cut and fill grading on steep terrain. Generally on steep slopes, soil from the high side of the ROW will 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 will be returned to the high side and the slope's original contours will be restored. Topsoil from the stockpile will be spread over the surface, erosion control features installed, and seeding implemented. In steep terrain, temporary sediment barriers such as silt fence and straw bales will be installed during clearing to prevent the movement of disturbed soil.

Temporary slope breakers consisting of mounded and compacted soil will be installed across the ROW during grading and permanent slope breakers will be installed during cleanup. Following construction, seed will be applied to steep slopes and the ROW may be mulched with hay or non-brittle straw or covered with erosion control fabric. Sediment barriers will be maintained across the ROW until permanent vegetation is established.

In Montana, the project will cross two areas of Cretaceous shales that could potentially be unstable on slopes over 15 percent, depending on precipitation. Keystone will develop separate construction/reclamation specifications for these areas that could include measures such as timing of construction in relation to precipitation conditions, soils handling, and pre- and post-construction erosion control measures such as grading, trench breakers, water bars, seed mix and seeding method, mulching or matting, and livestock control. These construction/reclamation specifications will be referenced on alignment sheets provided to the construction contractor, environmental inspectors and other appropriate personnel.

Waterbody Crossings

A total of 10 perennial streams and rivers will be crossed in Montana during the construction of the Project. All flowing waterbodies will be crossed using one of four techniques: the open-cut wet method (Keystone's preferred method); open-cut flume (dry) method; open-cut dam-and-pump (dry) method; or HDD method as described below.

Keystone's preferred crossing method will be to use the open-cut wet method. The open-cut wet method involves trenching through the waterbody while water continues to flow through the construction work area (CMRP Details 11 and 12). Pipe segments for the crossing will be fabricated adjacent to the waterbody. Generally, backhoes operating from one or both banks will excavate the trench within the streambed. In wider rivers, in-stream operation of equipment may be necessary. Hard or soft trench plugs will be placed to prevent the flow of water into the upland portions of the trench. Trench spoil excavated from the streambed generally will 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 will 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 will be carried, pushed, or pulled across the waterbody and positioned in the trench. When crossing saturated wetlands with flowing waterbodies using the open-cut method, the pipe coating will be covered with reinforced concrete or concrete weights to provide negative buoyancy. The trench will then be backfilled with native material or with imported material if required by applicable permits. Following backfilling, the banks will be restored and stabilized.

The Project will utilize dry flume or dry dam-and-pump methods (CMRP Details 13 and 14) where technically feasible on environmentally sensitive waterbodies as warranted by resource-specific sensitivities. The flume crossing method involves diverting the flow of water across the trenching area through one or more flume pipes placed in the waterbody. The dam-and-pump method is similar to the flume method except that pumps and hoses will be used instead of flumes to move water around the construction work area. In both methods, trenching, pipe installation, and backfilling are done while water flow is isolated from construction. Once backfilling is completed, the stream banks are restored and stabilized and the flume or pump hoses are removed.

Keystone plans to use the HDD method of construction to cross three waterbodies in Montana (**Table 1-7**). The HDD method involves drilling a pilot hole under the waterbody and banks, then enlarging the hole through successive reamings 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 will 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 will be staged and welded along the construction work area on the opposite side of the waterbody 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 waterbody being crossed (CMRP Detail 15). Keystone has prepared a plan to address an inadvertent release of drilling mud (see **Attachment P**).

Table 1-7 Waterbodies Crossed in Montana using the HDD Method

Waterbody	Number of Crossings	Approximate Milepost(s)
Milk River	1	82.7
Missouri River	1	88.8
Yellowstone River	1	196.0

<u>Wetland Crossings</u>

Data from wetland delineation field surveys, aerial photography, and National Wetland Inventory mapping were used to identify wetlands crossed by the proposed pipeline. Pipeline construction across wetlands will 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 soil structure.

The wetland crossing method used will 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 will occur in a manner similar to conventional upland cross-country construction techniques (CMRP Detail 8). Topsoil will be segregated over the trench line. In most saturated soils, topsoil segregation will not be possible. Additional temporary workspace areas will be required on both sides of particularly wide saturated wetlands to stage construction, fabricate the pipeline, and store materials. These additional temporary workspace areas will be located in upland areas a minimum of 10 feet from the wetland edge.

Construction equipment working in saturated wetlands will 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. In areas where there is no reasonable access to the ROW except through wetlands, non-essential equipment will be allowed to travel through wetlands only if the ground is firm enough or has been stabilized to avoid rutting.

Clearing of vegetation in wetlands will be limited to trees and shrubs, which will 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 will be limited to the area immediately over the trench line. During clearing, sediment barriers, such as silt fence and staked straw bales, will be installed and maintained on down slopes adjacent to saturated wetlands and within additional temporary workspace areas as necessary to minimize the potential for sediment runoff.

Where wetlands are located at the base of slopes, permanent slope breakers will be constructed across the ROW in upland areas adjacent to the wetland boundary. Temporary sediment barriers will be installed where necessary until revegetation of adjacent upland areas is successful. Once revegetation is successful, sediment barriers will be removed from the ROW and disposed of properly.

In wetlands where no standing water is present, the construction ROW will be seeded in accordance with the recommendations of the local soil conservation authorities or land management agency.

Blasting through Rock

Blasting may be required in areas where consolidated shallow bedrock or boulders cannot be removed by conventional excavation methods. If blasting is required to clear the ROW and to fracture rock within the ditch, strict safety precautions will be followed. Keystone will exercise extreme care to avoid damage to underground structures, cables, conduits, pipelines, and underground watercourses or springs. To protect residents, property, and livestock, Keystone will provide adequate notice to adjacent landowners or tenants in advance of blasting. Blasting activity will be performed during daylight hours and in compliance with federal, state, and local codes and ordinances and manufacturers' prescribed safety procedures and industry practices.

1.4.1.11 Preliminary Construction Schedule and Estimated Duration of Construction Activities

An industry rule-of-thumb for pipeline construction progress is a rate of approximately 20 completed miles per calendar month, which could be used for scheduling purposes. The construction schedule is estimated as follows per spread:

- 3 weeks (21 calendar days) of work on the ROW prior to the start of production welding. These activities would include clearing, grading, stringing, and ditching.
- Production welding, based on an average of 1.25 miles per working day and a 6-day work week (7 calendar days), will be completed at 7.5 miles per week, on average.
- 7 weeks (49 calendar days) of work after completion of production welding. These activities would include NDT of welds, field joint coating, lowering-in, tie-ins, backfill, ROW cleanup, hydrostatic testing, reseeding, and other ROW reclamation work.

Using this as a basis for determining the duration of construction activities on the ROW would yield the time requirements shown below for various spread lengths (**Table 1-8**).

Table 1-8 Resulting Construction Times Based on Estimates of Schedule (calendar days)

Spread Length	Pre-welding	Welding Time	Post-welding and Cleanup	Duration
80 miles	21 days	75 days	49 days	145 days (21 weeks)
90 miles	21 days	84 days	49 days	154 days (22 weeks)
100 miles	21 days	94 days	49 days	164 days (24 weeks)
120 miles	21 days	112 days	49 days	182 days (26 weeks)

In addition, about 1 month for contractor mobilization before the work is started and 1 month after the work is finished for contractor demobilization should be added to the overall construction schedule.

Staging areas are designated at the start of each construction spread (located at public road crossings) where access may be gained without necessitating use of private roads, wherever possible.

1.4.2 Explanation of the Work Area (ARM 17.20.1511(2))

The permanent ROW easement will be 50 feet wide, with an additional 60 feet of temporary workspace, resulting in a nominal 110-foot-wide construction ROW, which is considered the typical width of the level work pad required for construction. Additional temporary work space also will be required for road and stream crossings, sidehill cuts, and at other unique construction locations. ROW width will be narrowed in certain locations as discussed in the CMRP. Additional information about the work area is discussed in Section 1.4.6.

1.4.3 Ground Disturbance (ARM 17.20.1511(3))

An estimate of the area of ground disturbance that would result from construction activities along the preferred route in Montana is approximately 4,300 acres. An estimate of the mileage of flat terrain where no cut and fill excavation would be needed is approximately 111 miles. An estimate of the mileage of terrain where cut and fill excavation to construct a level work surface would be required is approximately 171 miles.

1.4.4 Topsoil Salvage and Rock Removal (ARM 17.20.1511(4))

Topsoil segregation will be based on site specific circumstances and shall implement one of the following mitigating measures. Topsoil will be separated from subsoil over the trench, over the trench and spoil side, or full width of ROW. When soil is removed from only the trench, topsoil will be piled on the near side of the trench and subsoil on the far side of the trench. This will allow for proper restoration of the soil during the backfilling process. When soil is removed from both the trench and the spoil side, topsoil will be stored on the edge of the near side of the construction ROW and the subsoil on the spoil side of the trench. In areas where the ROW will be graded to provide a level working surface and where there is another need to separate topsoil from subsoil, topsoil will be removed from the entire area to be graded and stored separately from the subsoil.

Topsoil will be piled such that the mixing of subsoil and topsoil will not occur. Gaps will be left between the spoil piles to prevent storm water runoff from backing up or flooding.

In agricultural land, rocks that are exposed on the surface due to construction activity will be removed from the ROW prior to and after topsoil replacement to an equivalent quantity, size, and distribution of rocks as that on adjacent, undisturbed lands. 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 ROW will 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.

1.4.5 Types of Roads for Construction and Operations and Maintenance (ARM 17.20.1511(5))

The Project will use approximately 112 miles of public and preexisting private roads to provide access to most of the construction ROW in Montana. Private roads and new temporary access roads will be used only with permission of the landowner or land management agency. A map of construction access roads is included in **Attachment A**. Three and one-half miles will become permanent roads to valve sites and pump stations.

As a part of its permanent aboveground facilities for operations and maintenance, the Project also will construct short, permanent access roads from public roads to the proposed pump stations, delivery facilities, and mainline valves. Prior to construction, Keystone will finalize the location of permanent access roads along with any additional temporary access roads. At a minimum, construction of new permanent access roads will require completion of cultural resources and biological surveys, along with the appropriate State Historical Preservation Officer (SHPO) and US Fish and Wildlife Service (USFWS) consultations and approvals. Other state and local permits also may be required prior to construction. Generally, permanent access roads will be 15 feet wide and temporary construction roads will be 30 feet in width. Roads will be used every day during construction and once a month for permanent roads to pump stations and valve sites.

1.4.6 Construction ROW (ARM 17.20.1511(6))

The minimum, nominal construction ROW width is 110 feet. Additional temporary work space will be required at road, railroad, and stream crossings, as well as areas of rugged terrain where side hill construction is required. In these areas, the ROW could approach a maximum width of up to 200 feet. The primary criterion used to determine the width of the nominal ROW width is safety. It is the minimum width within which a 36-inch-diameter pipe can be safely installed, given the size of the equipment, the need for passing lanes to maintain the construction sequence, and the need for spoil pile storage area. The 50-foot-wide permanent easement is the typical width negotiated with landowners to allow proper inspection and maintenance of the line. Certain activities are restricted or prohibited within the permanent easement with the primary goal of keeping the pipeline safe. Buildings and excavation are not allowed in the permanent ROW, but normal farming and cultivation practices are not restricted. There are no restrictions for crossing the ROW with normal farming equipment. If it is necessary for unusually heavy equipment to cross the ROW or to excavate near the pipeline, landowners will be requested to notify Keystone prior to such activity. The objective is to ensure the safety of all personnel, property, and equipment.

Figure 1-7 shows a cross section of a typical construction ROW for a 36-inch-diameter pipeline. The cross section is from the Interstate Natural Gas Association of American Foundation (ROW study). Notice the recommended width for the ditch, passing lane, spoil, and working sides.

1.4.7 Stream Crossing Alternatives (ARM 17.20.1511(7))

A complete discussion of the proposed and alternative methods of stream crossings is provided in the CMRP, Section 7, (**Attachment C**) and Section 1.4.1.10, Special Construction Procedures of this application.

All necessary equipment and materials will be on-site or readily available prior to commencing in-water work. For wet and dry crossings, the minimum equipment utilized to trench, handle pipe, backfill, and cleanup are: two D8 dozers; three 345 backhoes; one bending machine; four 583 side booms; sled with welding machines; ultrasonic testing units; hand scanner; one heat ring; one coating ring; sled with generators; and pumps and hoses as necessary. Actual equipment used will depend upon construction equipment owned by selected contractors. For HDD crossings, the minimum equipment required will typically include the following: HDD rig (one million pound thrust), reclaimer, mud pumps, water pumps, 6-inch drill stem, frac tanks, semi trucks, F250 or F350 pick-up trucks, D-8 dozer, and other miscellaneous equipment as required by the contractor.

Vehicle crossings will be established a sufficient distance from the trench to allow for a wide excavation. For both wet and dry crossings, the trench will be dug to a depth that will allow a minimum of 5 feet of cover below the streambed (8-foot deep trench) and allow 2-foot horizontal to 1-foot vertical taper on trench walls. The trench bottom will be approximately 5 feet wide, tapering to a top-of-ditch width approaching 30 feet, depending upon the soil conditions, as a minimum width trench will be dug to minimize spoil-piles. For HDD crossings, the work will typically be confined to the entry and exit workspaces. The pipe will be installed at the design trajectory with a minimum cover below the bottom of the waterway, typically 25 feet.

As part of detailed design, streams are evaluated for scour potential by comparison of the main-channel mean velocity to a critical velocity or by comparison of the main-channel bed shear stress to a critical sheer stress. These data are used to determine what the required depth of cover should be at each crossing.

For both wet and dry crossings, the water-crossing extra work space for a typical wet crossing is based on stream size: 1) waterways >50 feet wide will require 300 feet x 100 feet on the working sides; and 2) waterways <50 feet wide will require 150 feet x 50 feet on the working sides. The authorized work areas will be maintained with fencing or flagging to avoid unnecessary disturbance of vegetation. A 10-foot vegetation buffer strip between disturbed areas and the watercourse will be maintained as much as possible with silt fencing and/or straw bale barriers. Sediment control structures will be maintained along gradient sides of work

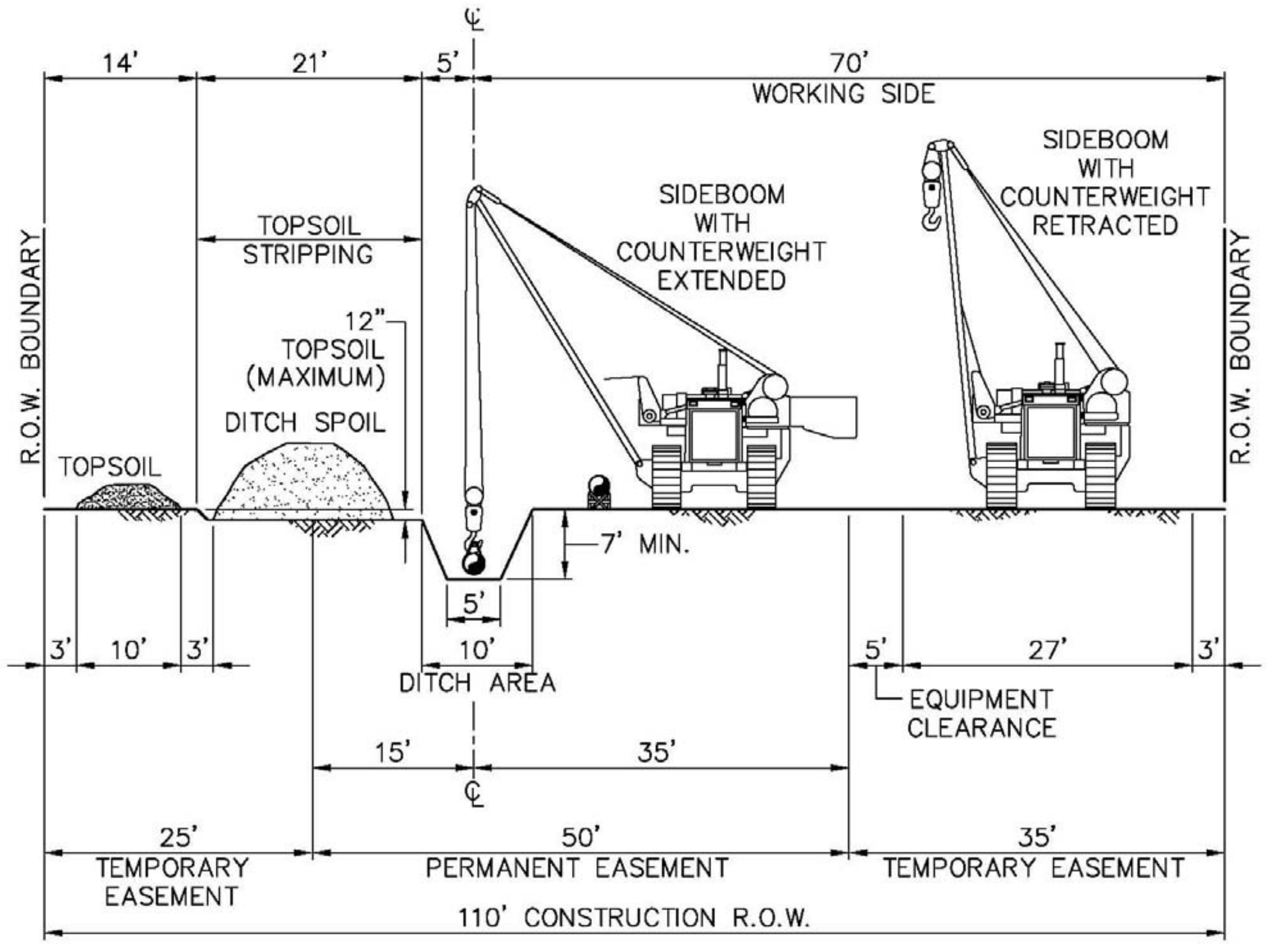

Figure 1-7 Cross Section of a Typical Construction ROW (Not to Scale)

areas and staging areas to prevent heavily silt-laden water from entering a waterbody. Excavated material will not be stockpiled within 10 feet of the watercourse and will be contained with berms and secondary silt fence containment. For HDD crossings, there will be entry and exit workspaces required in excess of the construction ROW. Entry workspaces are typically 250 feet x 40 feet, and exit workspaces are typically 150 feet x 40 feet.

1.4.8 Overhead Stream Crossings (ARM 17.20.1511(8))

No overhead stream crossings are planned.

1.4.9 Construction Camps (ARM 17.20.1511(9))

No construction camps are planned.

1.4.10 Reclamation Methods (ARM 17.20.1511(10))

A detailed description of the reclamation methods can be found in the CMRP (**Attachment C**). After construction, Keystone will monitor ROW reclamation and erosion control using aerial and visual surveillance. Any post-construction subsidence will be repaired and monitored. Sideslope reclamation is described here. In areas where the proposed pipeline route crosses laterally along the side of a slope, cut and fill grading will be required to obtain a gentler, flat work terrace for safe operation of construction equipment and to accommodate pipe bending limitations. Topsoil will be stripped from the entire ROW and stockpiled prior to cut and fill grading on the side slope. During construction, topsoil piles will be protected from erosion through matting, mulching, watering, or tackifying as deemed practicable, based on site-specific conditions.

After the pipeline is installed, the soil will be returned to the slope’s approximate contours as close as possible to the original pre-construction state. After construction, stabilization of the side slopes will utilize temporary and permanent erosion control features as follows:

- Installation of temporary erosion controls on slopes greater than 5% on all disturbed lands at the recommended spacing or wherever soils are highly erodible immediately after initial disturbance.
- Trench breakers to limit the potential for trench line erosion along the slope
- Permanent slope breakers to limit erosion and divert surface runoff to adjacent stable vegetated areas. In the absence of a stable area, energy-dissipating devices shall be constructed at the end of the slope breaker and beyond the area disturbed by construction.
- Mulch or tackifier application on areas with high erosion potential and on slopes greater than 8 percent unless otherwise approved, based on site-specific conditions.
- Erosion control matting may be applied based on site-specific conditions. The erosion control matting shall be made of biodegradable, natural fiber such as straw or coconut fiber.
- Seed mixes will be developed with input from local soil conservation offices and through collaboration with regional experts. In addition, other measures may be utilized to reestablish vegetation based on site-specific conditions.

Fencing the ROW from livestock, or alternatively, providing compensation to rest a pasture until vegetation can become established. Management concerns such as livestock access to water or movement within a pasture will be incorporated as necessary.

1.4.11 Fire Control (ARM 17.20.1511(11))

Fire prevention and control methods are described in the CMRP in Section 2.16 (**Attachment C**).

1.5 Operation and Maintenance Description (ARM 17.20.1512)

1.5.1 Overview (ARM 17.20.1512(1))

This section describes the operations and maintenance component of the Project and includes the processes and systems utilized within the areas of field operations and oil movements. Combined, these areas will carry overall responsibility and accountability to ensure the pipeline system is operated and maintained at a high level of safety, reliability, and efficiency.

1.5.1.1 Operating Procedures

To address both the routine and non-routine pipeline system maintenance, Keystone will use a comprehensive registry of TransCanada Operating Procedures (TOPs) and associated systems. TOPs are fundamentally designed to:

- Address and describe the work that needs to be done at Project facilities;
- Explain why the work needs to be performed;
- Document how often the work is to be done; and
- Describe how the work is to be accomplished (e.g., resources required, scheduling, work instructions, etc.).

TOPs are prepared in accordance with applicable US codes and regulations, as well as standards including: API, ANSI, ASME, Institute of Electrical and Electronics Engineers, National Electrical Manufacturers Association, International Electrotechnical Commission, and TransCanada Engineering Standards. Each TOP also is developed to incorporate critical elements of the Health, Safety, and Environment management process and designed to prevent workplace incidents. TransCanada currently has an inventory of 512 TOPs covering the operation and maintenance requirements for its operating facilities.

<u>Work Management for Field Operations</u>

TransCanada's Work Management process, which Keystone will implement, ensures that work is completed effectively and efficiently. This includes ensuring that regulatory, safety, commercial, and system operation requirements are met. The Work Management process specifies the identification, planning, scheduling, assigning, and execution of facility maintenance work. It also outlines the follow-up and performance analysis required for work completion and continuous process improvement. A computerized maintenance management system is used to manage this process.

<u>Pipeline Integrity Management Process</u>

Keystone will utilize TransCanada's comprehensive pipeline Integrity Management Process to monitor and ensure the integrity of all pipeline-related facilities. This process uses advanced inspection and mitigation technologies applied within a comprehensive risk-based methodology. Risk assessment is used to identify potential integrity threats and initiate inspection and mitigation activities, while results from advanced inspections for known or suspected integrity threats are used to develop specific integrity maintenance activities. The integrity management plan will be developed for use in the operating phase to:

- Protect the health and safety of the public;
- Avoid environmental impacts;
- Protect the installed pipelines and facilities; and
- Maintain reliability and adhere to regulatory requirements.

1.5.1.2 Operations Control Center

Facilities within Keystone's OCC will be utilized to accommodate the operation and control of the Project pipeline. The OCC will be staffed by operators on a 24-hour-per-day, 7-day-per-week basis and will use a comprehensive SCADA system to remotely monitor and control the pipeline system.

<u>OCC Procedures</u>

OCC emergency procedures and other necessary work instructions will be developed for the Project. TransCanada policies and procedures will be utilized and enhanced where necessary, to incorporate Project operations. Both the emergency procedures and work instructions will be completed in advance of the pipeline in-service date to allow the training of personnel in accordance with processes, procedures, and other requirements outlined.

TransCanada's Electronic Document Management System (EDMS), which Keystone will implement, will be used to manage these emergency procedures and work instructions. Use of the EDMS and associated internal web page links will ensure the relevant versions of applicable documents are available to OCC operators at all points of use. Key areas to be covered within the work instructions will include pipeline start up, shutdown, swing procedures, and response to local pumping station alarms, including fire and flammable vapor detection. Areas to be covered within the emergency procedures will include responses to leak detection system alarms; other observed suspected leak conditions; emergency conditions including bomb threats, civil disturbances, fires, explosions, and other natural disasters. These systems will ensure all events are managed consistently within the OCC and also ensure compliance with TransCanada Emergency Management System and Incident Management Process.

1.5.2 Ability to Withstand Natural Disaster and Human Caused Incidents (ARM 17.20.1512(2))

1.5.2.1 Natural Disasters

The National Pipeline Mapping System, maintained by the USDOT, categorizes potential natural disaster hazards to pipelines on a regional scale. **Table 1-9** quantifies these hazards for the Project in Montana.

Table 1-9 Quantification of Regional Natural Hazards in Montana

	Hazard Category[1]		
Natural Hazard	**Low**	**Medium**	**High**
Hurricane	282.3 miles	0	0
Earthquake	282.3 miles	0	0
Flood	206.8 miles	53.6 miles	21.9 miles
Landslide	175.1 miles	5.6 miles	101.6 miles

[1] PHMSA categories: 0 to 69 = low; 78 to 84 = medium; 85 to 100 = high.

While ground movement (earthquakes, landslides) can result in pipeline releases, research indicates that pipelines are robust to ground movement (O'Rourke and Palmer 1996) and ground movement is not a major cause of pipeline failures (PHMSA 2008). Federal regulations (49 CFR Part 195) require that an internal inspection be conducted to detect potential pipeline damage if an earthquake, landslide, or other ground motion is suspected of having caused abnormal movement of the pipeline.

Table 1-9 illustrates that the likelihood of earthquake or hurricane damage to the Project is low, since the entire project falls outside of the USDOT-defined high earthquake and hurricane hazard areas. Keystone also conducted a route-specific review of earthquake hazards, which confirms the low hazard.

Keystone has evaluated flooding and landslide hazards and has mitigated the risk posed by these hazards through routing and design. Keystone will avoid locating any aboveground facilities, such as valves and pump stations, in floodplains or areas of high landslide potential in Montana. Keystone also will construct all new aboveground facilities to current Uniform Building Code standards. When facilities are located in potential hazard areas, appropriate engineering methods will be implemented to minimize risk. Additionally, as part of Keystone's integrity management program, geotechnical slope monitoring programs would be implemented as necessary to minimize risk.

Landslides are discussed further in the geologic hazards portions of Section 4.3.6, Chapter 4.0. Both the baseline data deviation and impacts discussion give additional information.

Ice and high wind hazards are not applicable threats to the pipeline facilities. However, these may pose threats to associated powerlines and will be addressed separately by the electrical service providers.

1.5.2.2 Accidents

A major cause of pipeline incidents has historically been accidental third-party excavation damage, resulting from direct hits to the pipeline with sufficient force to puncture the pipe's wall or from damage to the pipe that results in delayed pipe failure. To reduce the probability of excavation damage, Keystone will implement the following mitigation measures:

- Burial depth of the pipeline to a minimum of 4 feet in most locations, which exceeds federal requirements per 49 CFR Part 195.248;
- An Integrated Public Awareness (IPA) program and encroachment management process;
- Participation in one call, Common Ground Alliance, and local damage prevention programs;
- Regular aerial patrols of the pipeline ROW that meet or exceed federal safety code requirements;
- The use of warning tape buried above the pipeline in select locations; and
- The use of closely spaced, visible signage in select locations; and

1.5.2.3 Integrated Public Awareness Program

Keystone will implement and utilize an IPA program. The IPA program will:

- Inform affected landowners and communities of the location of the facilities, the nature of the crude oil transported, contact information for the company, and what steps to take in the event of an emergency;
- Ensure emergency service agencies fully understand Keystone's emergency response procedures and responsibilities of each party during an emergency;
- Inform contractors of requirements for working on or near Keystone facilities; and
- Maintain contact with landowners, community groups, contractors, and emergency service agencies that are directly impacted by the Project facilities or operations.

The objectives of the program are to: protect the public from injury; prevent or minimize effects on the environment; protect Keystone facilities from damage from the public; and provide an opportunity for on-going public awareness. This program will meet or exceed the requirement for 49 CFR Part 195.440 and API RP 1162.

1.5.3 Description of Methods the Applicant will Employ to Control Land Uses on the ROW (ARM 17.20.1512(3))

Keystone will implement industry-best practices and federal requirements such as overflights and integrated public awareness as outlined by recognized organizations and associations like the Common Ground Alliance, API (guidelines for property development), and existing TransCanada Crossing and Encroachment Operating Procedures. By federal regulation, no permanent structures are allowed on the permanent ROW. Landowners and property developers can request permission to encroach on the ROW with non-permanent structures (e.g., fence lines, retaining walls) by providing plans to Keystone for review. Plans will be reviewed and recommendations provided to ensure the public safety, environmental protection, pipeline integrity, and access to normal and emergency maintenance.

1.5.4 Description of ROW Management Procedures Including Vegetation and Weed Control, Herbicide Use, and Scheduled Timing (ARM 17.20.1512(4))

The Project ROW will be managed in accordance with TransCanada's Operating Procedures for ROW Management, USDOT regulations, and other best management practices (BMPs) that are appropriate for conditions encountered on the ROW. The objective of ROW management will be to ensure safe operation of the pipeline while minimizing long-term alterations to pre-construction conditions and land use.

After construction is complete, all disturbed areas, except permanent aboveground facilities, will be rehabilitated and restored to the pre-construction land use, as described in the CMRP (**Attachment C**) and in accordance with 75-20-303 Montana Code Annotated and ARM 17.20.1901-1902; BLM ROW grant conditions; State of Montana permit conditions; and easement conditions. Land acquired for aboveground facilities and any private access roads associated with these facilities will be permanently maintained in a grass or graveled condition.

As discussed in Section 1.3, the pipeline will be periodically inspected from the air and/or ground no less frequently than required by 49 CFR Part 195 (i.e., a minimum of 26 aerial inspections per year). This surveillance will be used to locate and monitor possible encroachments on the ROW as well as nearby construction of other projects; erosion on or near the ROW, including the need for repair of permanent erosion control devices; exposed pipe; repair or replacement of pipeline markers; or other potential concerns that could affect the safety and operation of the pipeline. Any disturbances to the ROW as a result of such maintenance will be promptly rehabilitated in accordance with the CMRP (**Attachment C**). Aboveground facilities such as mainline control valves will be inspected twice annually or more frequently, if needed.

It is anticipated that cultivated lands affected by the ROW will be returned to pre-construction cultivation, depending on landowner agreements. Similarly, non-cultivated lands such as rangelands, shrublands, or forested habitats will be allowed to revert to pre-construction conditions. It will be necessary to maintain a strip of herbaceous vegetation over the pipeline centerline for surveillance purposes. Encroachment of woody vegetation within the 30-foot strip will be periodically controlled by mechanical means such as chain saws or brush hogs. Use of herbicides to control woody vegetation is not anticipated. If it becomes necessary to use herbicides to control woody vegetation encroachment, herbicide selection and use will be in accordance with all applicable federal, state, and local regulations, as well as TransCanada's Operating Procedures and/or other applicable BMPs.

Noxious weed infestations on the rehabilitated ROW will be monitored as described in Section 2.13 of the CMRP (**Attachment C**). Weed control will be assessed in comparison to unimpacted adjacent areas to ensure percent cover does not exceed what is found in adjoining areas. Keystone will confer with the weed board in each county crossed by the pipeline to ensure that noxious weed management practices enacted for the ROW are in compliance with county standards, in accordance with the Montana County Weed Control Act (MCWCA) (Title 7, Chapter 22 Part 21) and Montana Weed Control Act (MWCA) (Title 80, Chapter 7 Part 7). Noxious weed treatments may include mechanical, biological, or herbicidal methods, as appropriate, and will be implemented as needed.

1.5.5 Leak Frequency and Size (ARM 17.20.1512(5))

Pipelines are one of the safest forms of crude oil transportation and provide a cost-effective and safe mode of transportation for oil on land. Overland transportation of oil by truck or rail produces higher risk of injury to the general public than the proposed pipeline (USDOT 2002). The Project will be designed, constructed, and maintained in a manner that meets or exceeds industry standards.

A Project specific incident[1] frequency and spill volume analysis was conducted for the Project. This study assessed the US portion of the Project and estimated the frequency and volume of releases for five distinct and independent failure causes. The study is a quantitative assessment of spill potential for the entire pipeline system utilizing publicly available historical incident data collected from PHMSA incident reports. Based on the available information, the study produced a conservative incident frequency of 0.000119 incident per mile per year.[2] For any 1-mile segment, this probability is equivalent to one spill every 8,400 years.

Keystone believes that the actual number of incidents will be substantially lower than estimated for this analysis due to the safety measures that will be implemented by Keystone and industry improvements in pipeline safety. While the incident analysis was based on historical data, the number of spills on crude oil pipelines has substantially declined in recent years with the implementation of the USDOT Integrity Management Rule.

Maximum spill volumes were determined for a complete rupture of the Project, accounting for maximum throughput, time to isolate the leak (detection and system shutdown), and subsequent drain down from the affected pipeline segment. Maximum spill volumes are used for emergency response pre-planning purposes. Keystone is currently calculating maximum spill volumes for emergency planning purposes.

Actual incident data from the PHMSA indicate that spill volumes are significantly less than the maximum potential drain down volume. Analysis of the current PHMSA dataset (2002 to present) indicates that the vast majority of actual pipeline spills are relatively small, with 50 percent of the spills consisting of 3.0 barrels or less. In 85 percent of the cases, the spill volume was 100 barrels or less, and less than 1,000 barrels in over 95 percent of the time. Oil spills of 10,000 barrels or greater only occurred in 0.5 percent of cases. These data demonstrate that most pipeline spills are small and very large releases of 10,000 barrels or more are extremely uncommon.

1.5.6 Leak Detection (ARM 17.20.1512(6))

In the event a suspected pipeline leak is reported to the OCC, Keystone would implement its emergency pipeline shutdown procedures. After leak confirmation, an emergency pipeline shutdown would proceed. This would involve stopping pumping stations as appropriate. This line shutdown is estimated to take approximately 9 minutes. Once all the operating pumping units have been shutdown, the OCC operator would close the

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[1] An “incident” refers to a variety of abnormal pipeline events that are reportable to the PHMSA, including the release of oil greater than 5 gallons; a release resulting in an explosion or fire; and accident resulting in human injuries requiring hospitalization; fatality; or property damage (including operator costs, such as product loss, emergency response, and cleanup costs) in excess of $50,000.

[2] The state-specific incident rate was lower, but the national frequency was used since it was more conservative (i.e., overestimates risk).

sectionalizing or isolation valves in the vicinity of the leak to limit any further drain down at the leak site. Closure of these isolation valves would take an additional 3 minutes. Therefore, from when the leak was confirmed, it would take approximately 12 minutes to shutdown and isolate the pipeline.

Keystone also will have a number of complimentary leak detection methods and systems available within the OCC, which is manned on a 24 hours a day, 7 days a week basis. These methods and systems are overlapping in nature and progress in leak detection thresholds. 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 fed back to the OCC by the Keystone SCADA system. Remote monitoring is typically able to detect leaks down to approximately 25 percent 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 break the pipeline system into smaller segments and monitor each of these segments on a mass balance basis. The leak detection system will comply with 49 CFR Parts 195.134 and 195.444 and follow API 1130, Computational Pipeline Monitoring for Liquid Pipelines. These systems are typically capable of detecting leaks down to a level approximately 1.5 percent to 2 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.

Consistent with industry practice, and in accordance with regulations, including 49 CFR Part 194.115, Keystone response time in the event of a leak must be within 6 hours.

1.5.7 Spill Contingency Plan (ARM 17.20.1512(7))

Keystone has an internal and external notification procedure. In the event of an emergency, Keystone would make a call to the emergency response contact in the immediate vicinity of the incident. In addition, “local” calls are made to others such as City Administrators, etc., if the situation dictates. Response zones will be developed and equipment and personnel will be set up within each zone.

No current mutual aid agreements are in place; however, Keystone will seek out opportunities to join or form co-ops and mutual aid groups within its operating area.

Keystone will be filing its Emergency Response Plan (ERP) for the Project with the PHMSA prior to commencing operations and anticipates approval early in 2011. Items such as frequency of field training exercises and equipment testing procedures will be developed as part of the ERP (**Attachment B**).

1.5.8 Abandonment

Properly maintained, the proposed Project is expected to operate for 50 years or more. Keystone has no identified plans for abandonment of these facilities at this time. If abandonment of any facilities is proposed in the future, the abandonment will be subject to approvals by state and/or federal agencies having jurisdiction. Abandonment will be implemented in accordance with then-applicable permits, approvals, codes, and regulations, and industry best practices.

References

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