2.0 PROPOSED ACTION

Gulf Crossing and Gulf South propose to construct, own, operate, and maintain an interstate natural gas pipeline and associated ancillary facilities in Texas, Oklahoma, Louisiana, and Mississippi as described below and depicted in Figure 2.1-1.

2.1 PROPOSED FACILITIES

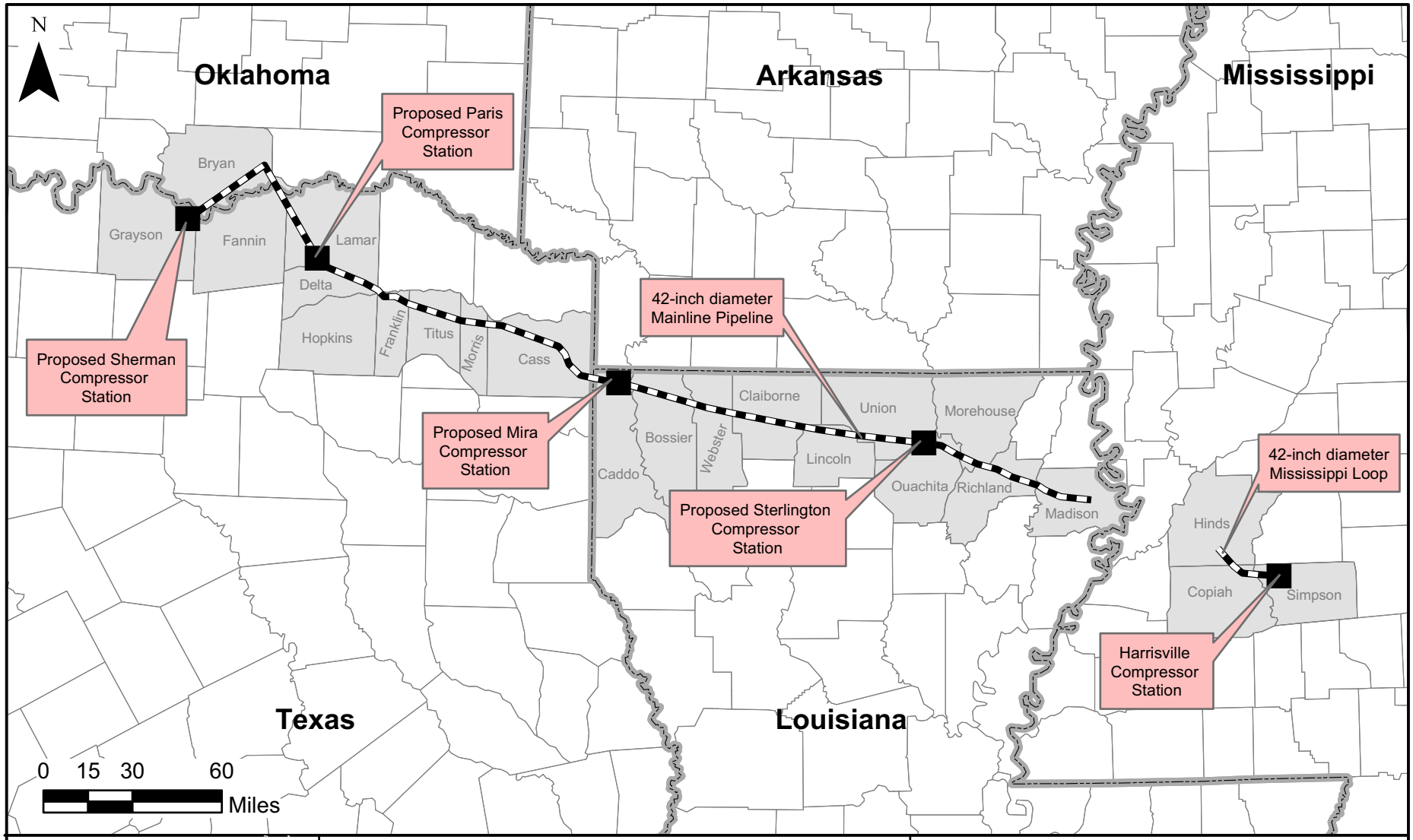
Gulf Crossing proposes to construct, own, operate, and maintain approximately 356.3 miles of new interstate natural gas pipeline, including four new compressor stations, and associated ancillary facilities. Gulf South proposes to construct, own, operate, and maintain an approximately 17.8-mile-long natural gas pipeline (Mississippi Loop), and to upgrade the Harrisville Compressor Station. The proposed Gulf Crossing pipeline Project would receive gas from receipt points that would collect natural gas from the Barnett Shale, Bossier Sand, Caney Woodford Shale and other producing areas.

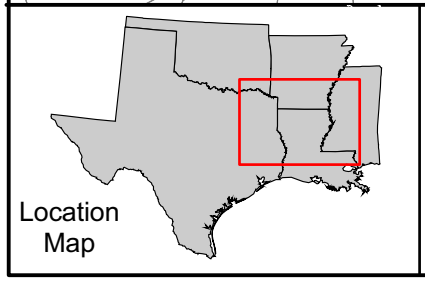
The proposed 42-inch-diameter pipeline would originate at a new interconnect with Enterprise Texas Pipeline LP (Enterprise) near Sherman, Texas (MP 0.0) and end at the proposed Gulf South Tallulah Compressor Station near Tallulah, Louisiana (MP 353.2). The proposed Project would have interconnects with Enterprise, Enogex, Crosstex North Texas Pipeline (Crosstex), Texas Gas Transmission, LLC (Texas Gas), Columbia Gulf Transmission Company (CGT), Southeast Supply Header, LLC (SESH), and Gulf South. The maximum allowable operating pressure (MAOP) of the proposed Project would be 1,480 pounds per square inch gauge (psig). During operation of the proposed facilities, the proposed Project would receive, transport, and deliver up to 1.73 billion cubic feet per day (Bcf/d) of natural gas.

The general location of the proposed Project facilities is shown in Figure 2.1-1, and Appendix B of this EIS provides more detailed facility location maps. Throughout this EIS, the locations of specific features along the proposed pipeline, such as project facilities and environmental resources, are identified by milepost (MP). Table 2.1-1 provides the location, MP, and length information for the pipeline facilities associated with the proposed Project. The Companies have made minor adjustments to the route since the issuance of the draft EIS. These adjustments were based on discussions with landowners, resource stewards, project engineers, and FERC staff in an effort to avoid or minimize impacts to natural or cultural resources, reduce or eliminate engineering and constructability concerns, and/or avoid or minimize conflicts with existing land uses. Therefore, to easily identify these locations in the text and figures they have been assigned separate milepost references that include individual prefixes signifying that they occur along a route variation.

In addition to the proposed pipeline, Gulf Crossing would construct and operate four new compressor stations, and add seven new meter/regulator (M/R) stations, 18 mainline valves (MLVs), and six pig launcher/receiver facilities. Additionally, Gulf South would add compression to its existing Harrisville Compressor Station, as well as a pig launcher at the beginning of its proposed Mississippi Loop and a pig receiver within the Harrisville Compressor Station. Table 2.1-2 identifies and describes the aboveground facilities associated with the proposed Project, and provides location and other information for these facilities.

The proposed Sherman Compression Station would contain two Solar Taurus 70 turbine compressors and one Caterpillar 3616 engine compressor, providing 25,339 hp of compression. The Paris Compressor Station would contain two Solar Taurus 60, one Solar Taurus 70, and one Caterpillar 3612 engine driven compressors providing 29,452 hp of compression. The new Mira Compressor Station would contain two Solar Taurus 70 units, providing 20,604 hp. The new Sterlington Compressor Station





Legend

Proposed Project Route

Compressor Station

Gulf Crossing and Gulf South Pipeline Companies
Proposed Gulf Crossing Project

GENERAL LOCATION MAP

DATE: February 2008

Figure 2.1-1

TABLE 2.1-1
Pipeline Facilities for the Proposed Gulf Crossing Project

County/Parish	Milepost Begin	Milepost End	Length (miles)[a]
Texas			
Grayson County	0.0	3.7	3.7
Fannin County	3.7	4.1	0.4
Oklahoma			
Bryan County	4.1	41.3	37.6
Texas			
Fannin County	41.3	48.8	7.5
Lamar County	48.8	93.8	45.1
Delta County	93.8	94.4	0.6
Hopkins County	94.4	94.5	0.1
Franklin County	94.5	105.9	11.6
Titus County	105.9	125.5	20.2
Morris County	125.5	135.0	9.5
Cass County	135.0	174.9	40.0
Louisiana			
Caddo Parish	174.9	188.8	13.9
Bossier Parish	188.8	210.1	22.0
Webster Parish	210.1	224.7	14.7
Claiborne Parish	224.7	252.9	28.2
Lincoln Parish	252.9	268.3	15.5
Union Parish	268.3	291.7	23.6
Ouachita Parish	291.7	305.4	13.8
Morehouse Parish	305.4	317.0	11.7
Richland Parish	317.0	334.1	17.2
Madison Parish	334.1	353.2	19.4
Subtotal			**356.3**
Mississippi			
Hinds County	L0.0	L8.8	8.8
Copiah County	L8.8	L11.5	2.7
Simpson County	L11.5	L17.8	6.3
Subtotal			**17.8**
Total			**374.1**

Note:
[a] Length may not equal the difference between beginning and ending milepost due to route variations.

TABLE 2.1-2
Aboveground Facilities for the Proposed Gulf Crossing Project

Facility	County/Parish	Milepost[d]	Description
Pipeline			
Compressor Stations			
Sherman Compressor Station	Grayson County, TX	0.0	Construct new station with 25,339 hp of gas-fired compression.
Paris Compressor Station	Lamar County, TX	71.4	Construct new station with 29,452 hp of gas-fired compression.
Mira Compressor Station	Caddo Parish, LA	182.7	Construct new station with 20,604 hp of gas-fired compression.
Sterlington Compressor Station	Ouachita Parish, LA	294.8	Construct new station with 25,339 hp of gas-fired compression.
Meter and Regulation (M/R) Stations			
Enterprise M/R Station	Grayson County, TX	0.0	Install M/R facilities and tie-in at Sherman, Texas.
Enogex M/R Station	Bryan County, OK	BD32.6	Install M/R facilities and tie-in at Bennington, Oklahoma.
Crosstex M/R Station	Lamar County, TX	71.4	Install M/R facilities and tie-in at Paris, Texas.
Texas Gas M/R Station	Ouachita Parish, LA	299.5	Install M/R facilities and tie-in at Sterlington, Louisiana.
CGT M/R Station and interconnecting pipeline	Madison Parish, LA	335.8[a]	Install M/R facilities and tie-in at North Delhi, Louisiana.
SESH M/R Station	Madison Parish, LA	353.2	Install M/R facilities and tie-in at Tallulah, Louisiana.
Gulf South M/R Station	Madison Parish, LA	353.2	Install M/R facilities and tie-in at Tallulah Louisiana.
Mainline Valves (MLVs)			
MLV #1	Bryan County, OK	D18.3	Install MLV within the permanent pipeline right-of-way.
MLV #2	Lamar County, TX	49.7	Install MLV within the permanent pipeline right-of-way.
MLV #3	Lamar County, TX	64.8	Install MLV within the permanent pipeline right-of-way.
MLV #4	Lamar County, TX	88.2	Install MLV within the permanent pipeline right-of-way.
MLV #5	Titus County, TX	107.9	Install MLV within the permanent pipeline right-of-way.
MLV #6	Morris County, TX	U125.9	Install MLV within the permanent pipeline right-of-way.
MLV #7	Cass County, TX	141.1	Install MLV within the permanent pipeline right-of-way.
MLV #8	Cass County, TX	160.1	Install MLV within the permanent pipeline right-of-way.
MLV #9	Cass County, TX	173.2	Install MLV within the permanent pipeline right-of-way.
MLV #10	Bossier Parish, LA	201.3	Install MLV within the permanent pipeline right-of-way.

TABLE 2.1-2 (continued)
Aboveground Facilities for the Proposed Gulf Crossing Project

Facility	County/Parish	Milepost[d]	Description
MLV #11	Webster Parish, LA	219.1	Install MLV within the permanent pipeline right-of-way.
MLV #12	Claiborne Parish, LA	234.9	Install MLV within the permanent pipeline right-of-way.
MLV #13	Claiborne Parish, LA	244.0	Install MLV within the permanent pipeline right-of-way.
MLV #14	Lincoln Parish, LA	262.3	Install MLV within the permanent pipeline right-of-way.
MLV #15	Union Parish, LA	279.4	Install MLV within the permanent pipeline right-of-way.
MLV #16	Morehouse Parish, LA	313.6	Install MLV within the permanent pipeline right-of-way.
MLV #17	Richland Parish, LA	AV323.2	Install MLV within the permanent pipeline right-of-way.
MLV #18	Madison Parish, LA	337.8	Install MLV within the permanent pipeline right-of-way.
Pig Launchers/Receivers			
Launcher Site	Grayson County, TX	0.0	Install launcher within the yard of Gulf Crossing's proposed Sherman Compressor Station.
Launcher/Receiver Site	Bryan County, OK	BD32.6	Install launcher/receiver within the yard of Gulf Crossing's proposed Enogex M/R Station.
Launcher/Receiver Site	Lamar County, TX	71.4	Install launcher/receiver within the yard of Gulf Crossing's proposed Paris Compressor Station.
Launcher/Receiver Site	Caddo Parish, LA	182.7	Install launcher/receiver within the yard of Gulf Crossing's proposed Mira Compressor Station.
Launcher/Receiver Site	Ouachita Parish, LA	294.8	Install launcher/receiver within the yard of Gulf Crossing's proposed Sterlington Compressor Station.
Receiver Site	Madison Parish, LA	353.2	Install receiver within the yard of Gulf South's proposed Tallulah Compressor Station[b].

TABLE 2.1-2 (continued)
Aboveground Facilities for the Proposed Gulf Crossing Project

Facility	County/Parish	Milepost[d]	Description
Mississippi Loop			
Compressor Stations			
Harrisville Compressor Station (additional compression only)	Simpson County, MS	L17.8	Expand existing stations with an additional 30,000 hp of gas-turbine-driven compression.
Pig Launchers/Receivers			
Launcher Site	Hinds County, MS	L0.0	Install launcher within the permanent pipeline right-of-way.
Receiver Site	Simpson County, MS	L17.8	Install receiver within the yard of Gulf South's proposed Harrisville Compressor Station[c].

NOTES:

[a] The CGT M/R Station would be located approximately 1,650 feet southwest of the proposed pipeline. The milepost reference provided in the table is the closest approximate milepost to the M/R station. An underground, 24-inch-diameter interconnecting pipeline would be constructed to connect the M&R station with the proposed mainline. Because it is integral to the M/R station, the interconnecting pipeline in being included with the aboveground facilities rather than as part of the proposed mainline.

[b] Gulf South's Tallulah Compressor Station is part of its recently approved East Texas to Mississippi Expansion Project and is currently under construction.

[c] Gulf South's Harrisville Compressor Station is part of its recently approved Southeast Expansion Project and is anticipated to be constructed and in operation prior to construction of the Gulf Crossing Project.

[d] Milepost designations, not including the Mississippi Loop, with prefixes indicate locations associated with minor pipeline re-routes proposed since the issuance of the draft EIS..

would contain two Solar Taurus 70 units and one Caterpillar 3616 engine, providing a total of 25,339 hp. Two Solar Mars 100 units would be added to the Harrisville Compressor Station, providing an additional 30,000 hp. All of the new Solar Taurus turbines would be equipped with Solar's "SoLoNox" system, which significantly reduces emissions of oxides of nitrogen (NO_x).

The new compressor units and associated equipment at each compressor station would be housed in new buildings. Each compressor station also would include an emergency generator to provide back-up electrical power at the facility as well as a new office/control building. Additional facilities at the new or expanded compressor stations would include filter-separators installed on the suction-side of the station to clean gas prior to compression, a fuel gas heater, and two station blow-down vents equipped with silencers. Other aboveground facilities would include pig launchers/receivers, MLV sites, and side valves. Most natural gas piping at the facilities would be installed below grade, and the perimeter of the compressor stations would be fenced. Portions of these sites may be paved, covered with gravel, or landscaped, depending on facility operations and maintenance requirements.

Metering and flow control for natural gas delivered to the proposed Project would be accomplished via the M/R facilities provided at the Sherman M/R Station. Similarly, the facilities at the proposed M/R stations located at interconnects with the Enterprise, Enogex, Crosstex, Texas Gas, CGT, SESH, and Gulf South pipelines would be used to meter the flow and adjust the pressure of natural gas delivered to those systems. Each M/R station would include separate buildings for metering and regulator equipment, flow/pressure control, and a customer facility housed within a fenced perimeter. The CGT

M/R Station, which would be located approximately 1,650 feet southwest of the proposed pipeline, would also include a 24-inch-diameter interconnecting pipeline.

Eighteen mainline valves (MLV) would be installed along the proposed pipeline to enable portions of the pipeline to be shut down or isolated, if necessary. The MLVs would be installed in areas easily accessible to operating personnel and at intervals specified in U.S. Department of Transportation (DOT) safety standards for natural gas pipelines. Each MLV assembly would consist of a 42-inch below-ground valve with 12-inch piping, with valving extending aboveground for emergency venting (blowdowns) and bypass. These sites typically would have security fencing and a lockable gate around the aboveground piping and valves.

The proposed Enogex M/R Station and proposed Paris, Mira and Sterlington Compressor Stations would include new pig launcher and receiver facilities. A pig launcher site would also be installed within the proposed Sherman Compressor Station at the pipeline's origin, and a pig receiver would be installed at the pipeline's terminus at the proposed Tallulah Compressor Station (which is part of Gulf South's East Texas to Mississippi Expansion Project).

2.2 LAND REQUIREMENTS

The land requirements of the proposed Project are summarized in Table 2.2-1. This summary identifies the construction and operational land requirements of the proposed pipeline, aboveground facilities, and extra work areas. Temporary land requirements for the proposed Project during construction would total approximately 6,108.8 acres, including the proposed pipeline construction right-of-way, construction areas for aboveground facilities, extra workspaces, pipe storage and contractor yards, and access roads. Of this total, approximately 2,798.4 acres would be retained as permanent easements associated with operation of the proposed pipeline and aboveground facilities. Following construction, the remaining 3,310.4 acres would be restored to its preconstruction condition or allowed to revert to its former use. The land requirements of the proposed Project facilities are discussed further below, and additional information is provided in Section 3.8.

TABLE 2.2-1
Locations and Land Requirements for the Proposed Gulf Crossing Project

Facility	Location - Parish/County	Land Affected during Construction (acres)	Land Affected during Operation (acres)
Pipeline Facilities[a]			
	Grayson County, TX	44.8	26.9
	Fannin County, TX	95.7	57.5
	Bryan County, OK	455.7	273.5
	Lamar County, TX	546.6	328.0
	Delta County, TX	7.3	4.4
	Hopkins County, TX	1.2	0.7
	Franklin County, TX	139.8	84.4
	Titus County, TX	244.7	146.9
	Morris County, TX	115.1	69.1
	Cass County, TX	481.8	290.9
	Caddo Parish, LA	159.5	101.1
	Bossier Parish, LA	261.1	160.0
	Webster Parish, LA	164.1	106.9

TABLE 2.2-1 (continued)
Locations and Land Requirements for the Proposed Gulf Crossing Project

Facility	Location - Parish/County	Land Affected during Construction (acres)	Land Affected during Operation (acres)
	Claiborne Parish, LA	337.6	205.1
	Lincoln Parish, LA	181.3	112.7
	Union Parish, LA	274.6	171.7
	Ouachita Parish, LA	147.3	100.4
	Morehouse Parish, LA	130.2	85.1
	Richland Parish, LA	198.4	125.1
	Madison Parish, LA	233.1	141.1
Subtotal Pipeline Facilities		**4,220.0**	**2,591.5**
Mississippi Loop[a]			
	Hinds County, MS	106.7	64.0
	Copiah County, MS	32.7	19.6
	Simpson County, MS	76.3	45.9
Subtotal Mississippi Loop Pipeline Facilities		**215.7**	**129.5**
Aboveground Facilities			
Pipeline			
Compressor Stations			
Sherman Compressor Station	Grayson County, TX	20.0	10.0
Paris Compressor Station	Lamar County, TX	20.0	10.0
Mira Compressor Station	Caddo Parish, LA	20.0	10.0
Sterlington Compressor Station	Ouachita Parish, LA	20.0	10.0
Meter/Regulator (M/R) Stations			
Enterprise M/R Station	Grayson County, TX	0.0	0.0
Enogex M/R Station	Bryan County, OK	3.0	1.4
Crosstex M/R Station	Lamar County, TX	0.0	0.0
Texas Gas M/R Station	Oucahita Parish, LA	3.0	1.4
CGT M/R Station and	Madison Parish, LA	6.6	4.3
CGT Interconnecting Pipeline[a]		3.6	2.3
SESH M/R Station	Madison Parish, LA	0.0	0.0
Gulf South M/R Station	Madison Parish, LA	0.0	0.0
Mainline Valve Sites[b] (18)	various	0.0	0.0
Pig Launcher Sites[c] (5)	various	0.0	0.0
Pig Receiver Sites[c] (5)	various	0.0	0.0
Subtotal Aboveground Facilities		**96.2**	**49.4**
Mississippi Loop			
Compressor Stations			
Harrisville Compressor Station (additional compression only)	Simpson County, MS	0.0	0.0
Pig Launcher Sites[c] (1)	Hinds County, MS	0.0	0.0
Pig Receiver Sites[c] (1)	Simpson County, MS	0.0	0.0

TABLE 2.2-1 (continued)
Locations and Land Requirements for the Proposed Gulf Crossing Project

Facility	Location - Parish/County	Land Affected during Construction (acres)	Land Affected during Operation (acres)
Subtotal Mississippi Loop Aboveground Facilities		**0.0**	**0.0**
Extra Work Areas			
Pipeline			
Extra Workspace	various	722.0	0.0
Access Roads	various	216.6	24.4
Contractor/staging yards	various	603.0	0.0
Subtotal Pipeline Extra Work Areas		**1,541.6**	**24.4**
Mississippi Loop			
Extra Workspace		17.7	0.0
Access Roads		3.6	3.6
Contractor/staging yards		14.0	0.0
Subtotal Mississippi Loop Extra Work Areas		**35.3**	**3.6**
	Total	**6,108.8**	**2,798.4**

Notes:

LA = Louisiana
MS = Mississippi
OK = Oklahoma
TX = Texas

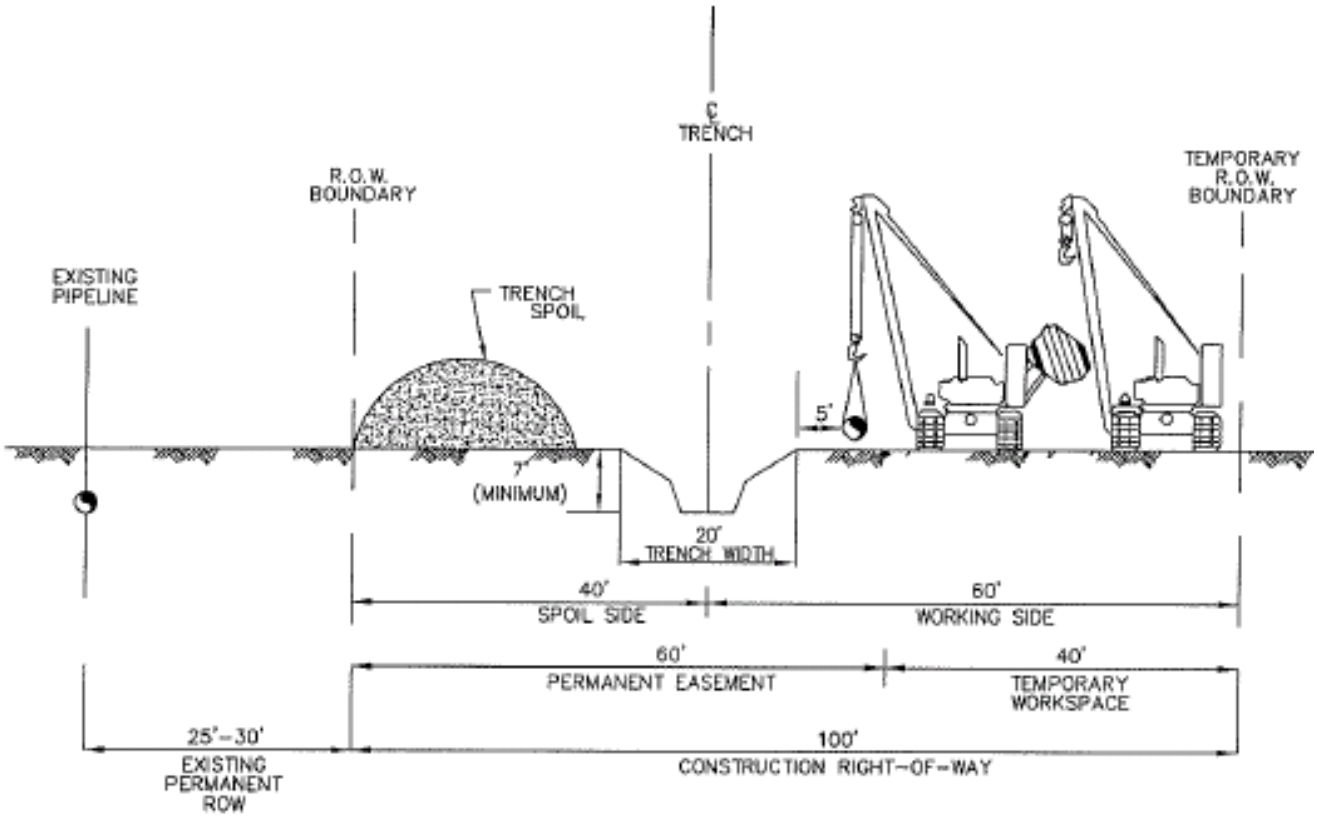
[a] Acreages reflect a nominal 100-foot-wide construction right-of-way in uplands, a 75-foot-wide construction right-of-way in wetlands, and a 60-foot-wide permanent easement that would be maintained along the entire pipeline following construction. (Note: We are recommending that Gulf Crossing's permanent right-of-way be limited to a width of 50 feet.) Acreage for the CGT M/R Station interconnecting pipeline is also based on a 100-foot-wide construction right-of-way (excluding portion of construction right-of-way that overlaps with temporary workspace for the M/R station) and a 50-foot-wide permanent easement.

[b] Minor land requirements associated with these facilities would be contained entirely within compressor station sites or the construction and/or permanent pipeline rights-of-way and are thus already included in the acreage estimates for those facilities.

[c] All pig launcher/receiver facilities would be contained within the Project's pipeline right-of-way or within existing above ground facility yards.

2.2.1 Pipeline Facilities

The Companies have proposed a nominal construction right-of-way width of 100-feet along upland sections of the proposed pipeline that would be installed using conventional, open-cut trenching techniques (see Section 2.3.1). In wetland areas the construction right-of-way width would be reduced to 75-feet. These construction right-of-way widths would encompass a proposed 60-foot-wide permanent right-of-way with 40 feet on the spoil side (side adjacent to any foreign pipelines) and 60 feet on the working side (reduced to 35 feet in wetlands). The typical proposed pipeline construction right-of-way requirements in upland and wetland areas are illustrated in Figure 2.2.1-1 (typical upland right-of-way parallel to existing pipelines), Figure 2.2.1-2 (typical upland right-of-way in greenfield areas), Figure 2.2.1-3 (typical wetland right-of-way parallel to existing pipelines), and Figure 2.2.1-4 (typical wetland right-of-way in greenfield areas).



PROFILE

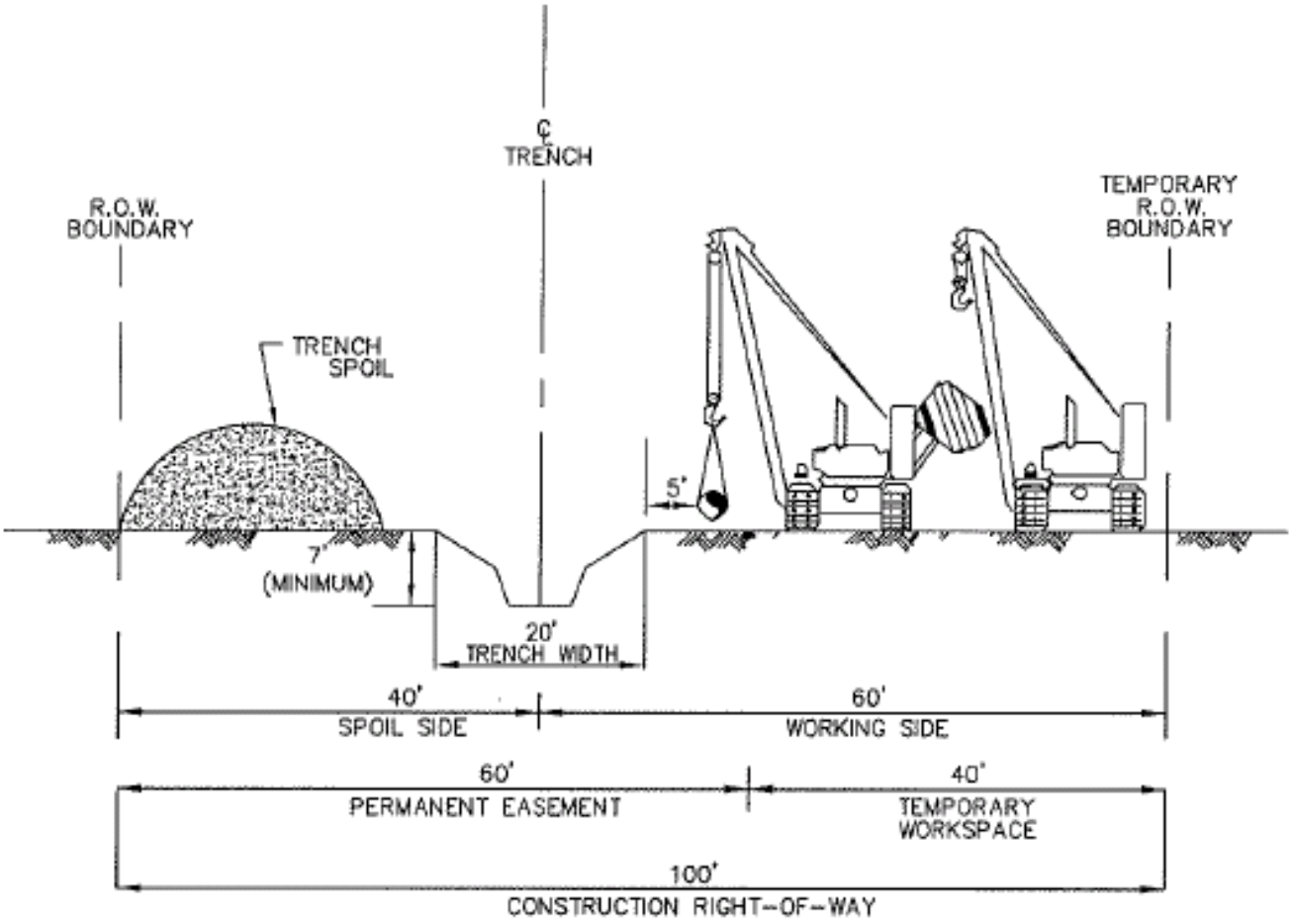
Not to Scale

GULF CROSSING PIPELINE PROJECT

Typical Upland Right-of-Way Cross Section
Parrallel to Existing Pipelines

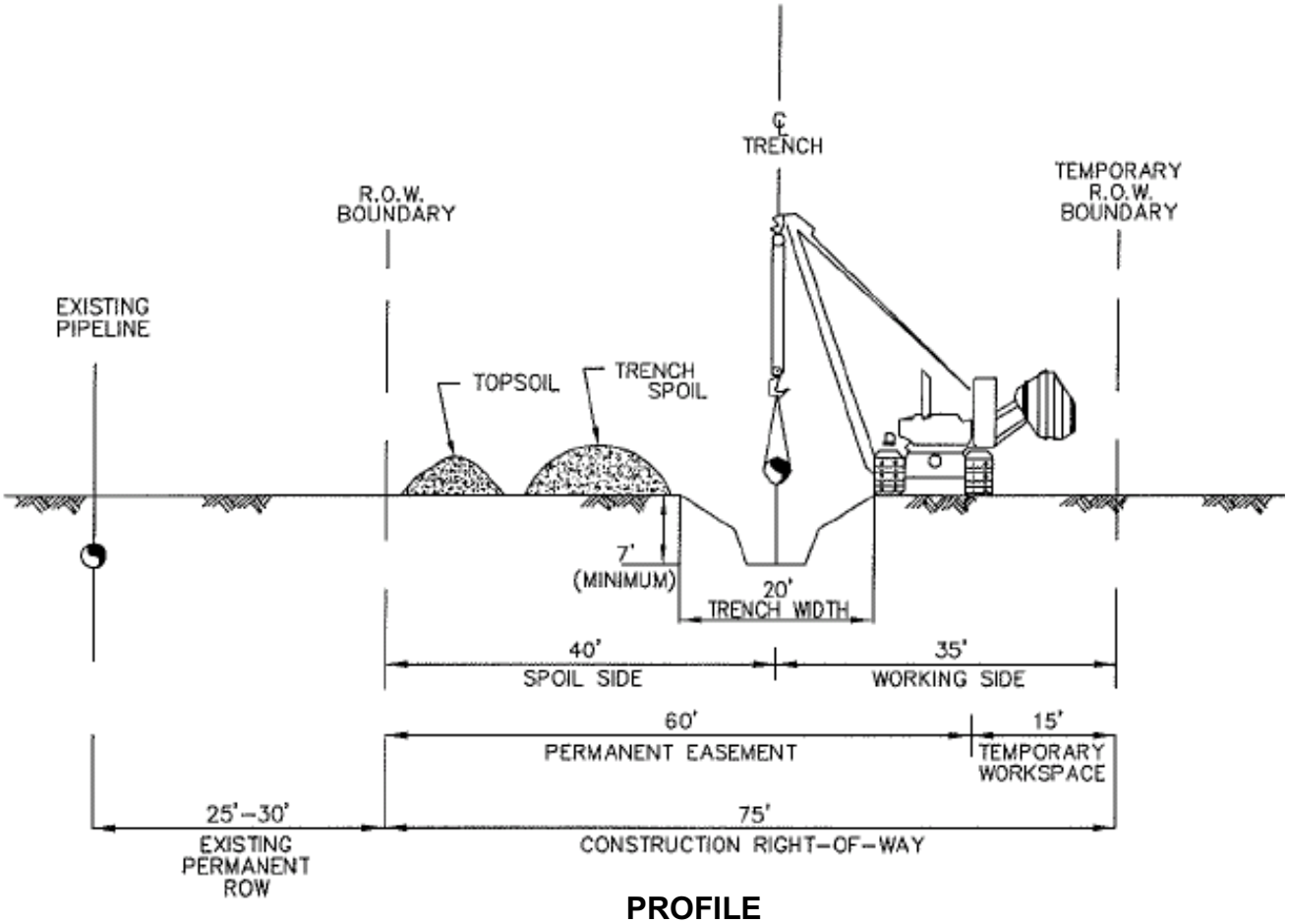
DATE: February 2008

FIGURE: 2.2.1-1



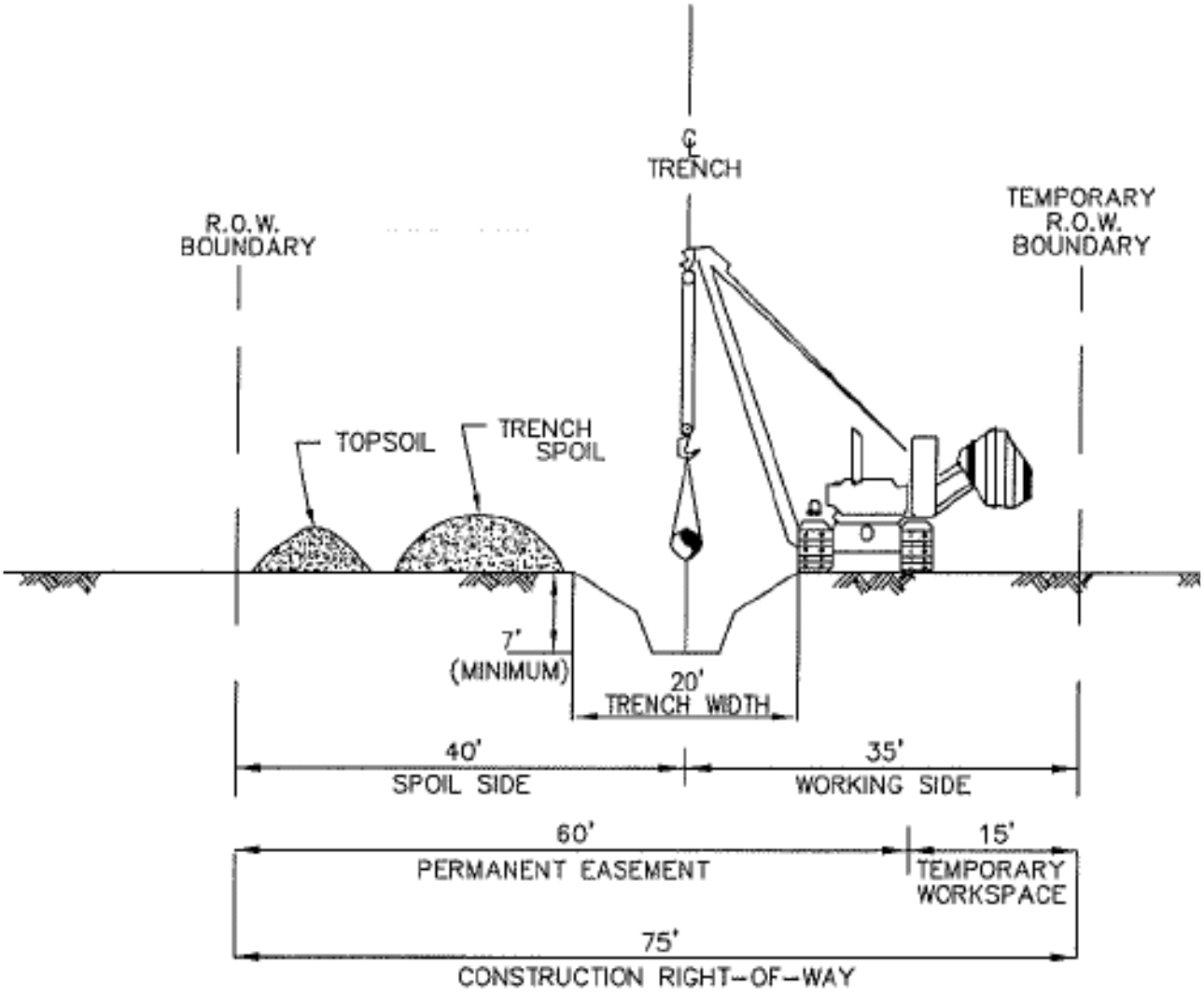
PROFILE

Not to Scale	**GULF CROSSING PIPELINE PROJECT** Typical Upland Right-of-Way Cross Section in Greenfield Area
	DATE: February 2008 | FIGURE: 2.2.1-2



PROFILE

Not to Scale	**GULF CROSSING PIPELINE PROJECT** Typical Wetland Right-of-Way Cross Section Adjacent to Existing Pipelines
	DATE: February 2008 | FIGURE: 2.2.1-3



PROFILE

Not to Scale	**GULF CROSSING PIPELINE PROJECT** Typical Wetland Right-of-Way Cross Section in Greenfield Areas
	DATE: February 2008 / FIGURE: 2.2.1-4

Along some sections of the proposed Project route (some major waterbody, road, and railway crossings), pipeline installation would be accomplished via horizontal directional drill (HDD) or bored crossings (see Section 2.3.2). In these areas, land requirements would consist of the proposed permanent 60-foot-wide right-of-way, as well as additional temporary construction work areas if required.

Land requirements for the pipeline construction right-of-way, including the Mississippi Loop, would total approximately 4,435.7 acres (Table 2.2-1). Following construction and restoration of the construction right-of-way, the proposed 60-foot-wide permanent right-of-way retained by the Companies along the length of the proposed pipeline and the Mississippi Loop would encompass approximately 2,721.0 acres.

2.2.2 Right-of-way Considerations

The FERC regulations (18 CFR, Section 380.15[d][1]) give primary consideration to the use, enlargement, or extension of existing rights-of-way over developing a new right-of-way in order to reduce potential impacts on potentially sensitive resources. In general, installation of new pipeline along existing, cleared rights-of-way (e.g., pipeline, powerline, road, or railroad) may be environmentally preferable to construction along new rights-of-way. Where possible, the Companies' proposed construction right-of-way would collocate with or parallel existing utility rights-of-way.

The Companies propose to maintain a 60-foot-wide permanent right-of-way. Based on our experience and review of similar projects, as well as our understanding of pipeline operations, maintenance procedures and equipment requirements; we believe that a permanently maintained 50-foot-wide right-of-way is sufficient to safely and efficiently operate a 42-inch-diameter pipeline. Additionally, we have received numerous requests and comments from property owners, and federal and state agencies expressing an interest in minimizing permanent impacts associated with the operation of the proposed pipeline, particularly in the instances where multiple rights-of-way may occur within a common corridor. Therefore, to minimize permanent impacts associated with the operation of the proposed pipeline; **we recommend that:**

- **The Companies should not utilize or maintain a permanent right-of-way greater than 50 feet in width.**

Limiting the permanent right-of-way to 50 feet in width would allow the Companies to acquire sufficient land to operate their proposed pipeline, and would minimize permanent impacts to adjacent resources and land uses.

Overlapping rights-of-way would substantially reduce the amount of clearing required as compared to construction in greenfield or other areas where overlapping was not possible. Approximately 182.3 miles (51 percent) of the proposed 42-inch-diameter mainline would be adjacent to or overlapping with existing utility corridors, as well as the entire 17.8 miles of the Mississippi Loop. Gulf Crossing has agreed to include a 10-foot overlap of right-of-way with the Natural Gas Pipeline Company of America (NGPL) from approximate MP 34.0 to MP 157.4. Additional details regarding collocation of the pipeline with other utility corridors is provided in Section 3.8.

As stated above, Gulf Crossing proposes to use a portion of NGPL's existing permanent right-of-way as part of the construction right-of-way for the proposed Project. We believe that the Companies would also be able to use a portion of other existing permanent rights-of-way parallel to the proposed pipeline; therefore, to further minimize environmental impacts, **we recommend that:**

- **Prior to construction, the Companies should file with the Secretary, for review and written approval by the Director of OEP, revised alignment sheets, plans, and associated agreements indicating the use of at least 10 feet of adjacent pipeline rights-of-way as part of their 100 foot-wide nominal construction right-of-way and for any additional temporary workspaces that are needed. Where this is not possible, the Companies should identify the locations by milepost and provide site-specific justification explaining why the adjacent right-of-way cannot be used.**

2.2.3 Aboveground Facilities

The land requirements for the proposed aboveground facilities would total 96.2 and 49.4 acres during construction and operation, respectively (Table 2.2-1). The proposed aboveground facilities include expansion of compression capacity at one existing compressor station, construction of 4 new compressor stations, 7 new M/R stations (including one interconnecting pipeline), 18 MLVs, and 8 pig launcher and/or receiver facilities.

Gulf South's proposed expansion of its existing Harrisville Compressor Station would occur completely within the existing compressor station site which occupies a previously cleared, maintained, and fenced area. Gulf Crossing would purchase 20 acres each for the proposed Sherman, Paris, Mira, and Sterlington Compressor Stations. The permanent, fenced station at each location would encumber approximately 10 acres. The land within the fenced perimeter of the compressor station facilities would be occupied by buildings, piping, and other equipment. Portions of these sites may be paved, covered with gravel, or landscaped, depending on facility operations and maintenance requirements. A pig launcher and receiver would be located within the fenced perimeter of the Paris, Mira, and Sterlington Compressor Stations, and within the Enogex M/R Station. In addition, the Sherman Compressor Station would have a launcher site, and the Tallulah Compressor Station (constructed as part of Gulf South's East Texas to Mississippi Expansion Project) would have a receiver site. Construction and operational land requirements of the seven M/R Stations are listed in Table 2.2-1.

The MLV sites would be installed within the confines of the permanent pipeline right-of-way. Thus, construction and operation of those facilities would not result in land requirements beyond that already noted for the permanent pipeline right-of-way.

2.2.4 Other Work Areas

In addition to the proposed land requirements associated with the aforementioned pipeline and aboveground facilities, land would be required during construction and operation of the proposed Project for additional temporary work spaces, contractor/staging yards, and access roads. These requirements are described below. Should these requirements change prior to or during construction, the Companies would be required to file a variance request with the Secretary of the Commission (Secretary) for review and approval prior to using or impacting new areas.

2.2.4.1 Additional Temporary Work Spaces

Additional construction areas, or temporary extra work spaces, would be required for construction at road crossings, railroad crossings, crossings of existing pipelines and utilities, tie-ins with existing pipeline facilities, stringing truck turnaround areas, wetland crossings, HDD entrance and exit pits, open-cut waterbody crossings, areas where storage of stripped topsoil is needed, and side-slope construction techniques. These extra workspaces would be located adjacent to the construction right-of-way and could be used for spoil storage, staging, equipment movement, material stockpiles, and pull string assembly associated with HDD installation. The proposed Project would require approximately

1,582 extra workspaces totaling 739.7 acres, and individual extra workspaces would range in size from less than 0.1 to 9.01 acres. Extra workspaces would be allowed to return to the preconstruction condition and former usage following completion of construction activities. Additional information on extra workspace areas is provided in Section 3.8.

2.2.4.2 Pipe Storage and Contractor Yards

The Companies have proposed the use of 22 offsite pipe storage and contractor yards in areas consisting of existing pastures and fields, as well as currently or previously used commercial or industrial areas. The identified yards would range in size from 10 to 67 acres, and the total land requirements for these facilities would be approximately 617 acres. All yards would be leased from willing landowners, and upon completion of construction activities, the proposed pipe storage and contractor yards would be returned to their preconstruction condition and former usage.

If additional pipe storage and contractor yards were identified as necessary, prior to or during construction, the Companies would be required to file a request under Recommendation No. 5 with the Secretary for review and approval prior to use.

2.2.4.3 Access Roads

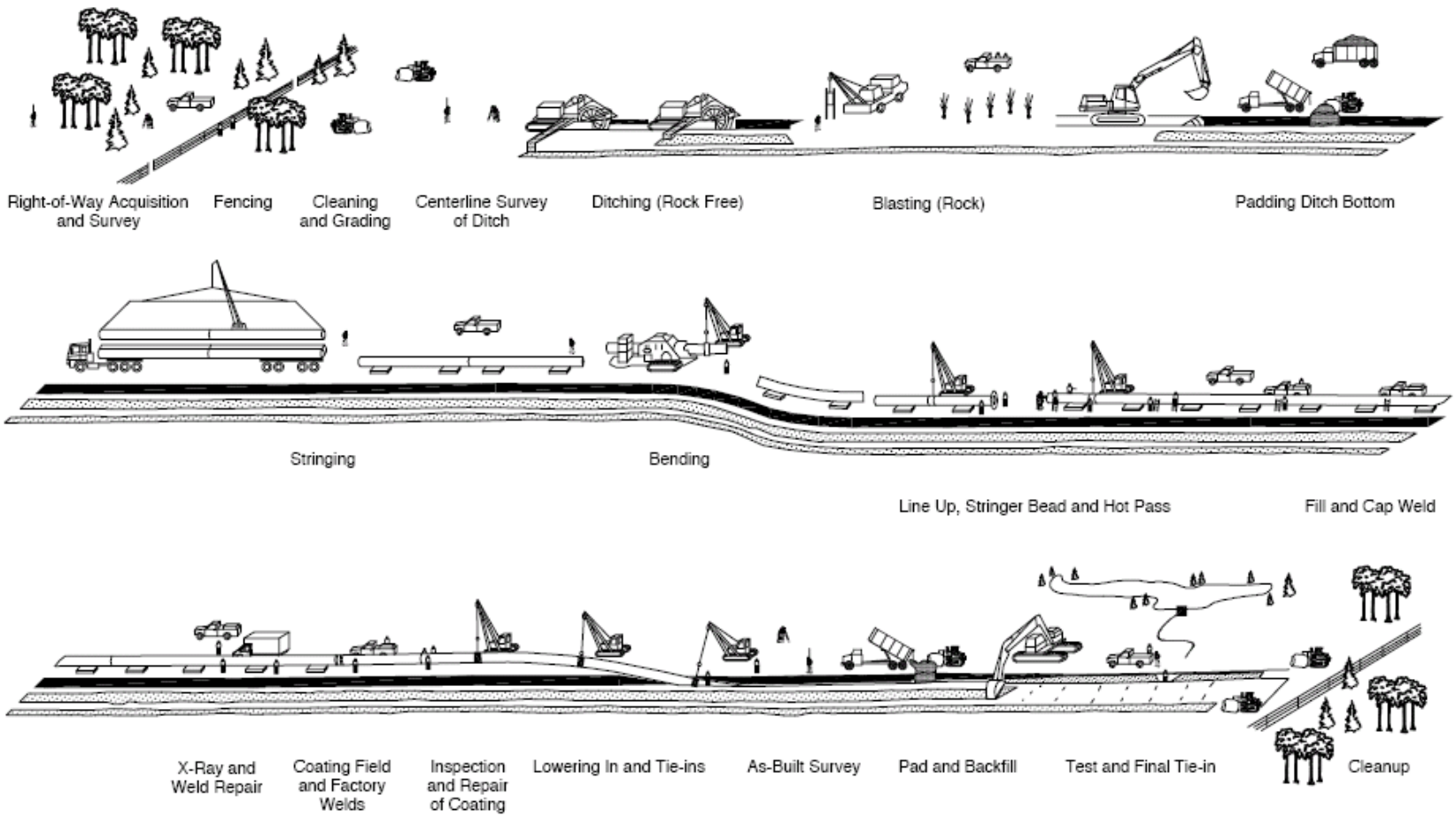
The Companies would use existing roads to the extent possible to facilitate equipment and material access along the proposed Project route. The Companies indicated that construction of the proposed pipeline and aboveground facilities would require the use of 241 access roads of varying lengths and construction. The Companies report that 139 of these access roads would be new roads or existing roads that would require upgrades to support construction-related traffic. Upgrades that could be required include grading, placement of gravel for stability, replacing or installing culverts, clearing of overhead vegetation, and minor widening. The Companies estimated that construction of new access roads and modification of existing access roads would affect approximately 220.3 acres. Following construction, 28 access roads would be maintained and used to provide long-term access to aboveground facilities, affecting approximately 28.0 acres. Additional information on access roads is provided in Section 3.8, and the facility location maps provided as Appendix B of this EIS depict the general locations of these roads.

2.3 CONSTRUCTION PROCEDURES

The proposed pipeline facilities would be designed, constructed, operated, and maintained in accordance with the DOT regulations under 49 CFR Part 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*; and other applicable federal and state regulations. Among other design standards, these regulations specify pipeline material selection; minimum design requirements; protection from internal, external, and atmospheric corrosion; and qualification procedures for welders and operations personnel. More detailed safety information is provided in Section 3.12. In addition, the Companies would comply with the siting and maintenance requirements in 18 CFR 380.15 and other applicable federal and state regulations.

2.3.1 General Pipeline Construction Procedures

Conventional overland installation of pipeline is best represented as a moving assembly line with a construction spread (crew and equipment) proceeding along the construction right-of-way in a continuous operation, as depicted in Figure 2.3.1-1. Construction at any single point along the pipeline, from right-of-way surveying and clearing to backfill and finish grading, would last about 6 to 10 weeks.



Not to Scale

GULF CROSSING PIPELINE PROJECT

Typical Pipeline Construction Sequence

DATE: February 2008

FIGURE: 2.3.1-1

The entire process would be coordinated to limit the time of disturbance to an individual area, thereby minimizing the potential for erosion and the loss of normal use. The Companies indicated that construction of the pipeline would entail the simultaneous activity of six individual construction spreads over the proposed Project route.

Right-of-way Survey and Fence Crossings

After right-of-way easements have been obtained, the pipeline centerline, construction right-of-way, and additional temporary workspaces would be surveyed and staked. The Companies would contact the appropriate state One-Call system so that existing underground utilities could be located, identified, and flagged to prevent accidental damage during pipeline construction. Other sensitive resources such as wetland boundaries, cultural resources, and any areas of protected species habitat also would be marked.

Where fences are encountered along the construction right-of-way, a fence crew would install temporary fences to confine livestock to existing areas off the right-of-way and to prohibit or otherwise control public access across the right-of-way. This work would include installing new posts to brace the areas on either side of the proposed cut to avoid damage to the existing fence or wall. Temporary gates would be installed, as necessary.

Clearing and Grading

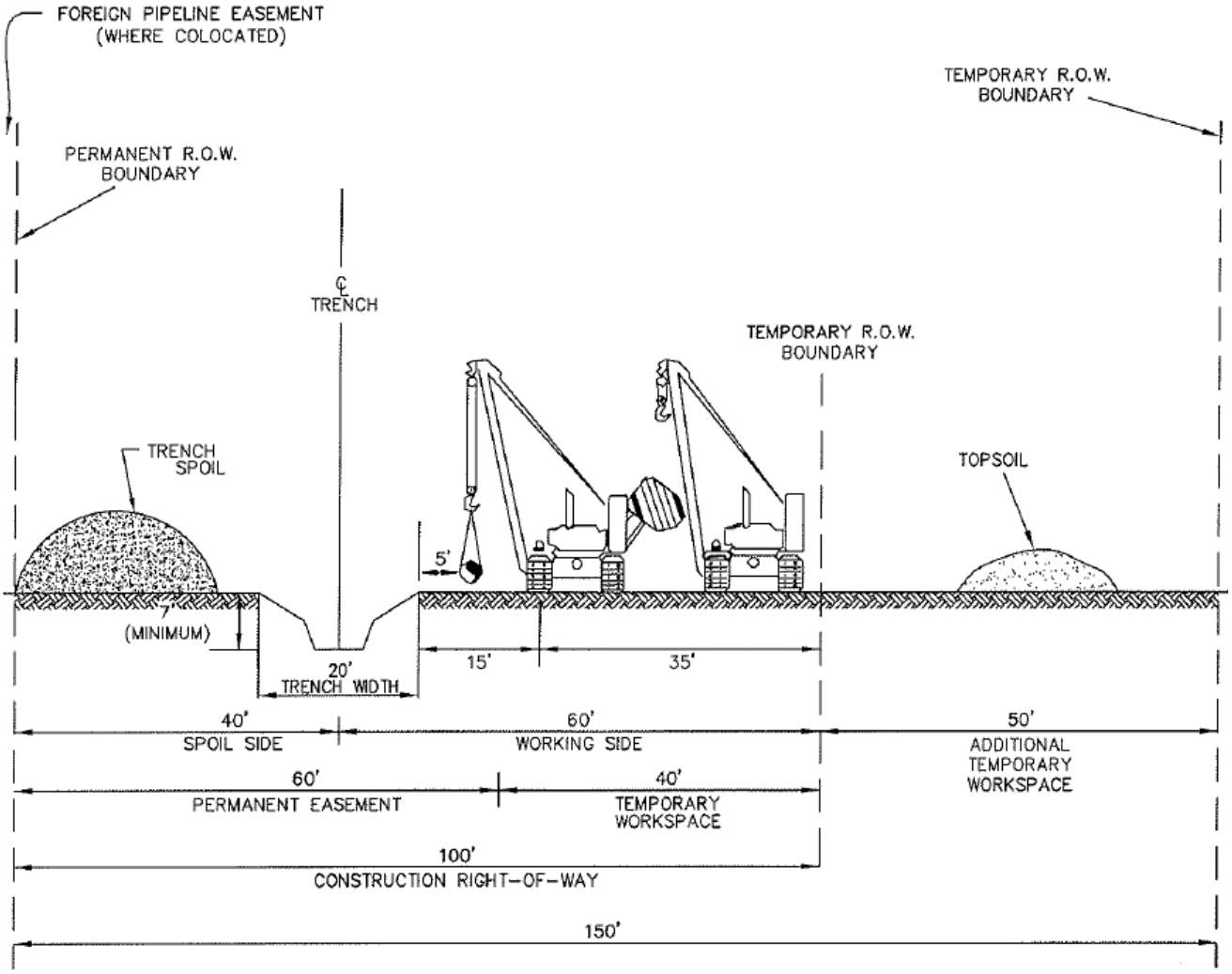
The construction right-of-way and temporary extra workspaces would be cleared and graded, where necessary, to provide a relatively level surface for trench-excavating equipment and movement of other construction equipment, but natural drainage patterns would be preserved to the extent possible. Brush, trees, roots, and other obstructions such as large rocks would be cleared from all construction work areas. Where appropriate in construction right-of-way, stumps would be cut flush with the ground and left in place although tree stumps would be removed from within the permanent right-of-way. Cleared woody debris may be burned (in accordance with state and local burning requirements), chipped (except in wetlands), and distributed over the disturbed area as mulch, or transported offsite to an appropriate disposal facility.

Topsoil would be stripped and segregated according to the Companies' Plan and Procedures in residential areas, actively cultivated or rotated croplands, pastures, hayfields, and other areas where requested by a land management agency or landowner. Topsoil would be removed to its actual depth, up to a maximum depth of 12 inches, and stockpiled separately from the subsoil excavated from the pipeline trench. Typically, topsoil would be stripped from directly over the pipeline ditch and the adjacent subsoil spoil storage area (Figure 2.3.1-2), but landowners would be provided with the option of topsoil segregation across the full construction work area. Additional information on topsoil segregation is provided in Section 3.2.

To contain disturbed soils in upland areas and minimize the potential for sediment loss to wetlands and waterbodies, temporary erosion controls would be installed immediately after initial disturbance of soils and would be maintained throughout construction. Erosion and sedimentation control devices would be installed in accordance with the Companies' Plan.

Trenching

A trench would be excavated, using a trenching machine or backhoe-type equipment. Excavated materials normally would be stored on the non-working side of the trench (Figure 2.3.1-2).



PROFILE

Not to Scale	**GULF CROSSING PIPELINE PROJECT** Typical Trench and Spoil Area Topsoil Stripping
	DATE: February 2008 / FIGURE: 2.3.1-2

Temporary trench plugs (or barriers) would be used to create segments within the open trench to reduce erosion and allow access across the trench. Trench plugs typically would consist of either compacted subsoil or sandbags placed across the ditch (soft plugs) or short, unexcavated portions of trench (hard plugs). Trench dewatering also may be required along portions of the route.

The trench would be excavated to a depth that would allow space for the pipeline, pipeline bedding, and the minimum amount of top cover required by DOT specifications. The trench typically would be excavated to a depth of 7 feet to enable the proposed pipeline to be installed at a minimum depth of 3 feet (measured from the top of the pipeline) below the ground surface. The depth of the pipeline would vary and would range from these minimum depth requirements to that depth required for safe crossing of a feature such as a road, highway, railroad, or waterbody. At crossings of utilities or foreign pipelines, the proposed pipeline also generally would be installed at a greater depth, to provide for a minimum clearance of 12 inches, or that depth that may be required by state or local regulations, whichever provides greater protection.

Areas of bedrock that might be encountered along the proposed Project route should be easily workable with standard construction equipment and techniques, and the need for blasting is not anticipated. However, if blasting were to be required, such work would be accomplished in accordance with the Companies' Plan and Procedures, as well as all other applicable regulations (see Section 3.1).

Pipe Stringing, Bending, and Welding

Sections of pipe from 40 to 80 feet long would be delivered to the job site and temporarily placed or "strung" along the excavated pipeline trench, where they would be bent as necessary to follow the natural grade and direction changes of the right-of-way. Following stringing and bending, the ends of the pipeline would be carefully aligned and welded together. The welds would be visually and radiographically (i.e., x-ray) inspected to ensure structural integrity. Welds that do not meet established specifications would be repaired or replaced.

An external coating would cover and protect the delivered pipeline sections. Following welding, the previously uncoated ends of the pipe at all joints would be coated with material compatible with a factory-applied coating, as applicable, in preparation for installation. The coating on the remainder of the completed pipe section would be inspected for defects, and repairs would be made to any damaged areas prior to lowering the pipe into the trench. At some locations, it may be necessary to provide negative buoyancy in the form of concrete weights, a concrete coating, pipe sacks, and/or soil anchors to ensure that the pipeline does not float during times of high groundwater.

Lowering-in and Backfilling

Prior to lowering the pipeline, the trench would be cleaned of debris and foreign material and would be dewatered as necessary. Trench dewatering, which would entail pumping accumulated groundwater or rainwater from the trench to stable upland areas, would be performed in accordance with applicable local, state, and federal permitting requirements, as well as the Companies' Procedures. In areas of rock, the bottom of the trench may be padded with sand, gravel, screened soils, sandbags, or support pillows to protect the pipe coating. However, topsoil would not be used as padding material. The pipeline then would be lowered into the trench by appropriately spaced, sideboom tractors working in unison to avoid buckling of the pipe. Trench breakers would be installed at regular intervals where appropriate to prevent subsurface erosion and flow of water between the trench and crossed waterbodies, wetlands, and near-surface groundwater.

After the pipeline is lowered into the trench and adequately protected, previously excavated materials would be used to backfill the trench. Any excess excavated materials or materials deemed unsuitable for backfill would be evenly spread over the right-of-way, or disposed of in accordance with applicable regulations and landowner requirements. Backfilling over the trenchline would occur to approximately 6 inches above the original elevation to accommodate future soil settlement.

Hydrostatic Testing

Once installation and backfilling are completed and before the Project begins operation, the pipeline would be hydrostatically pressure tested in accordance with DOT safety standards (49 CFR Part 192), to verify its integrity and to ensure its ability to withstand the MAOP. Hydrostatic testing consists of installing a hydrostatic test cap and manifold, filling the pipeline with water, pressurizing the pipeline to its MAOP, and maintaining that test pressure for a specified period of time. The entire pipeline would be tested, but long segments of pipeline typically would be tested individually. Any leaks detected during the test would be repaired, and the pipeline would be re-tested.

Water used for hydrostatic testing would be obtained from surface water sources and municipal supplies, and no biocides or other hydrostatic test water additives would be added to the test water. After hydrostatic testing is completed, the test water either would be pumped to the next segment of pipeline to be tested or would be discharged in upland areas, using energy dissipation devices to minimize erosion. No direct discharges to waterbodies would occur. Hydrostatic test water would be obtained and discharged in accordance with applicable regulations, as well as the Companies' Procedures. Additional information on hydrostatic testing is provided in Section 3.3.

Once a segment of pipe has been successfully tested, it would be cleaned and dried using mechanical tools (pigs) moved through the pipeline with pressurized, dry air. The hydrostatic test cap and manifold then would be removed, and the pipe would be connected to the remainder of the pipeline, using the welding and inspection procedures described above.

Cleanup and Restoration

Within 20 days, or as soon as possible, of completion of backfilling the trench, all remaining trash, debris, surplus materials, and temporary structures would be removed from the right-of-way and disposed of in accordance with applicable federal, state, and local regulations. All disturbed areas would be finish-graded and restored as closely as possible to preconstruction contours. Permanent erosion control measures also would be installed during this phase in accordance with the Companies' Plan and Procedures. Topsoil previously segregated from the trench material in all agricultural and residential areas would be spread uniformly across the construction right-of-way, and the topsoil and subsoil in these areas would be tested for compaction along the disturbed corridor.

Vegetation restoration would be accomplished according to the Companies' Plan and Procedures, and would begin within 6 days of final grading. After the soil is readied for planting or seeding in areas where the Companies and landowners have negotiated agreements, the Companies would reseed or replant according to those agreements. To provide permanent erosion control along the right-of-way, all other upland areas disturbed by construction would be fertilized, limed, and seeded in accordance with the prescribed dates and seed mixes specified by the local soil conservation authorities or land management agencies. Wetland areas would not be fertilized, limed, or mulched unless the Companies are directed to do so by state or local regulatory agencies.

Disturbed pavement and other road surfaces along access roads would be restored to preconstruction or better conditions, unless otherwise specified by the property owner and approved by

applicable regulatory agencies. Likewise, any private or public property damaged during construction, such as fences, gates, and driveways, also would be restored to original or better condition, consistent with individual landowner agreements.

Pipeline markers and/or warning signs would be installed along the pipeline centerline at specified intervals to identify the pipeline location, specifying Gulf Crossing or Gulf South as the operator of the pipeline, and provide telephone numbers for emergencies and inquiries.

Minimization Measures

To minimize construction-related effects, the Companies have agreed to adopt the January 2003 versions of our *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and our *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), with some requested variances as described in Section 3.4. The FERC Plan and Procedures are available for review on the FERC internet website at www.ferc.gov/industries/gas/enviro/guidelines. The intent of the Plan is to identify baseline mitigation measures for minimizing erosion and enhancing revegetation in upland areas, and the major aspects of the Plan are described in Section 3.2. The intent of the Procedures is to identify baseline mitigation measures for minimizing the extent and duration of construction-related disturbance on wetlands and waterbodies. In Sections 3.3 and 3.4, we describe the major components of our Procedures and evaluate the appropriateness of the Companies' requested variances. The Companies would construct and operate the proposed Project in accordance with their Plan and Procedures, as modified in this EIS.

The Companies have developed several Project-specific plans to avoid or minimize environmental impacts during construction. The Companies prepared a general Spill Prevention, Containment, and Countermeasure (SPCC) Plan, which describes the management of hazardous materials, such as fuels, lubricants, and coolants that would be used during construction. Site-specific plans would be developed for each construction spread once the construction contractors have been selected. The Companies have also developed a HDD Contingency Plan, which describes the procedures that would be implemented to monitor for, contain, and clean up any inadvertent releases of drilling fluid during HDD operations. Additionally, the Companies developed their Plan for the Unanticipated Discovery of Historic Properties, Human Remains, or Potential Paleontological Evidence during Construction (see Section 3.10) and their Plan for the Unanticipated Discovery of Contaminated Environmental Media (Section 3.2).

2.3.2 Specialized Pipeline Construction Procedures

2.3.2.1 Waterbody Crossings

A total of 896 waterbodies would be crossed by the proposed Project. The Companies have proposed the use of either open-cut or HDD techniques for most of these crossings, however, flume and bore crossing methods have also been proposed for select waterbodies. In addition, the Companies may elect to use the flume or dam-and-pump method at select waterbodies proposed for open cut depending on the amount of flow and site-specific conditions at the time of construction or as agreed to in discussions with state agencies.

Additional information on the proposed waterbody crossing procedures and potential environmental consequences is presented in Section 3.3.

Open-cut Crossing

In general, an open-cut waterbody crossing would be conducted using methods similar to conventional open-cut trenching. The open-cut construction method would involve excavation of the pipeline trench across the waterbody, installation of a prefabricated segment of pipeline, and backfilling of the trench with native material, with no effort to isolate flow from construction activities. Excavation and backfilling of the trench generally would be accomplished using backhoes or other excavation equipment operating from one or both banks of the waterbody. If required, the use of equipment operating in the waterbody would be limited to that needed for construction of the crossing. All other construction equipment would cross the waterbody using equipment bridges.

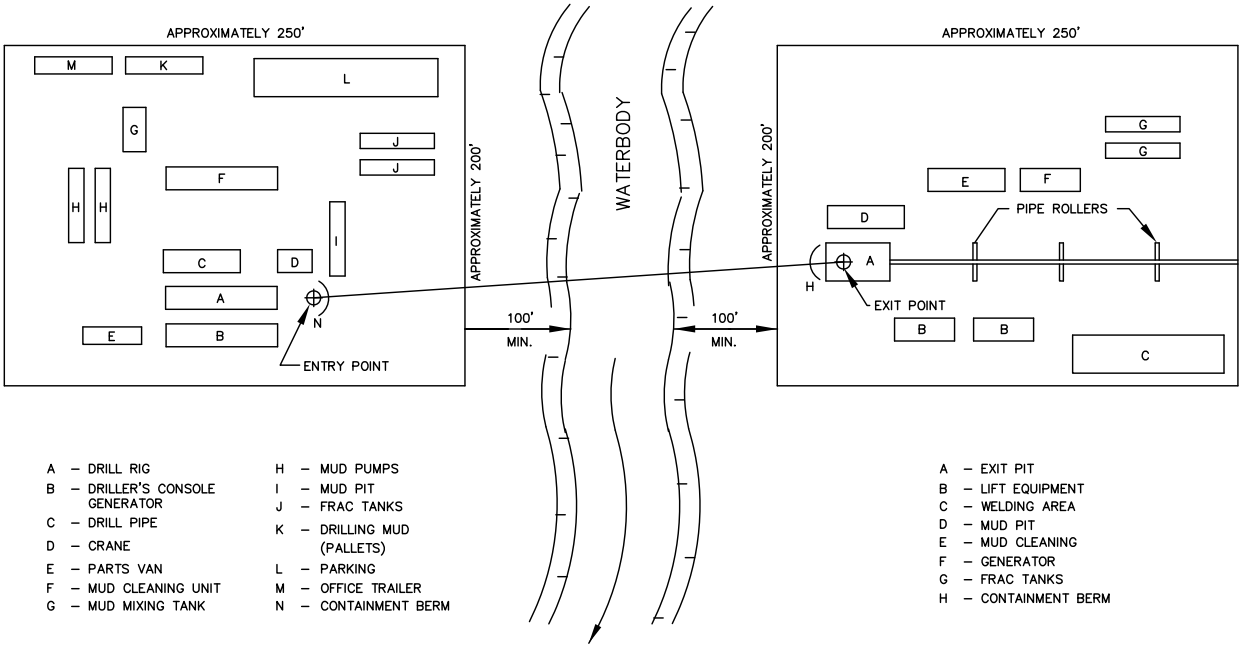
Mitigation measures would be implemented to minimize impacts to the aquatic environment during construction, as described in the Companies' Procedures. Construction would be scheduled so that the trench would be excavated immediately prior to pipelaying activities. The duration of construction across minor waterbodies would be limited to 24 hours for minor waterbodies (10 feet wide or less) and 48 hours for intermediate waterbodies (greater than 10 feet wide but less than or equal to 100 feet in width). In accordance with their Procedures, excavated spoil would be stockpiled in the construction right-of-way at least 10 feet from the stream bank or in approved additional work areas and would be surrounded by sediment control devices to prevent sediment from returning to the waterbody. The waterbody banks would be returned to as near preconstruction conditions as possible within 24 hours of completing all open-cut crossings.

Horizontal Directional Drill

HDD is a trenchless crossing method that may be used to avoid direct impacts to sensitive resources (such as waterbodies and wetlands) or infrastructure (such as roads and railways) by directionally drilling beneath them. HDD installation on the proposed Project would result in a pipeline that is installed beneath the ground surface by pulling the pipeline through a pre-drilled bore hole. HDD installation typically is carried out in three stages: (1) directional drilling of a small-diameter pilot hole; (2) enlarging the pilot hole to a sufficient diameter to accommodate the pipeline; and (3) pulling the prefabricated pipeline, or pull string, into the enlarged bore hole. Figure 2.3.2-1 illustrates a typical HDD installation process.

The pilot hole (that is approximately 12 inches in diameter, depending on drill head and soil characteristics) would be drilled along a predetermined HDD bore. The drill head for the pilot hole would have a down-hole, hydraulic motor-powered drill bit attached to the drill string (pipe connecting the drill rig to the drill head). The hydraulic motor would convert hydraulic energy from drilling fluid, or drilling mud, pumped from the surface to mechanical energy at the drill head, allowing for bit rotation without drill string rotation. Drill string would be added as the pilot hole progressed.

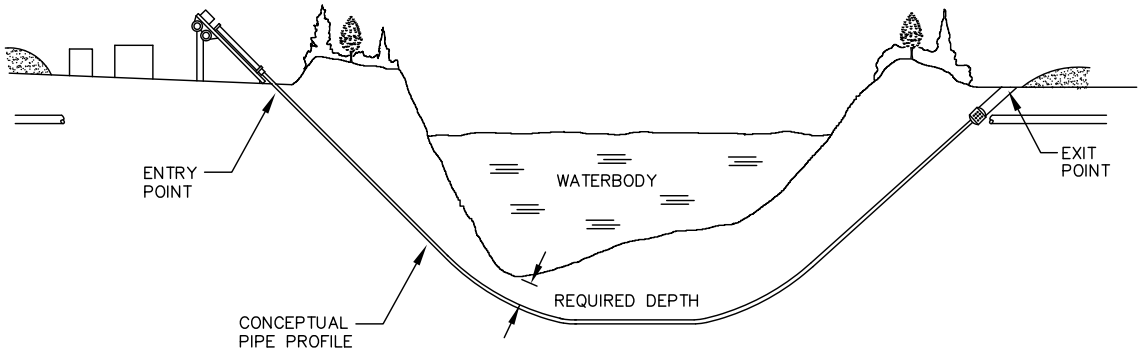
The Companies propose to use hand-laid electric-grid guide wires to assist guidance of the drill bit along the proposed route. A small pathway approximately 2 to 3 feet wide may be cut, using hand tools in heavily vegetated areas in order to position these guide wires, resulting in minimal ground disturbance. No large trees would be cut as part of this process. The path of the drill head would be controlled using an electromagnetic steering tool positioned on the tip of the drill bit and would follow the electromagnetic field created by the guide wires. Additionally, drill bit positioning sensors may help guide the path of the drill.



A – DRILL RIG
B – DRILLER'S CONSOLE GENERATOR
C – DRILL PIPE
D – CRANE
E – PARTS VAN
F – MUD CLEANING UNIT
G – MUD MIXING TANK
H – MUD PUMPS
I – MUD PIT
J – FRAC TANKS
K – DRILLING MUD (PALLETS)
L – PARKING
M – OFFICE TRAILER
N – CONTAINMENT BERM

A – EXIT PIT
B – LIFT EQUIPMENT
C – WELDING AREA
D – MUD PIT
E – MUD CLEANING
F – GENERATOR
G – FRAC TANKS
H – CONTAINMENT BERM

PLAN



PROFILE

NOT TO SCALE

GULF CROSSING PIPELINE PROJECT

Typical HDD Pipeline Installation

DATE: February 2008

FIGURE: 2.3.2-1

After completion of the pilot hole, the HDD bore would be progressively reamed to a diameter about 12 inches larger than the pipeline diameter. Drilling fluid would be pumped through the reaming tools to aid in cutting, support the bore hole, transport spoil back to the surface, and lubricate the trailing pipe. Upon completion of drilling and reaming, the drill string would extend from the entrance pit to the exit pit. Concurrent with reaming the bore, the pull string to be inserted in the HDD bore would be fabricated and laid out within the construction right-of-way or extra workspace areas extending from the HDD exit pit. The pull string would be connected to the drill string and pulled back through the bore. The pipeline would be neutrally buoyant in the drilling fluid, allowing it to be pulled through the HDD bore hole.

Drilling fluid circulated through the bore during the pilot hole drilling and reaming process would be collected at the surface and processed to remove spoils, allowing the fluid to be reused. Excess spoils and drilling fluid would be treated for disposal and disposed of at an approved location in accordance with regulatory requirements, agreements, and permit conditions. The proposed HDD drilling fluid would consist of water and bentonite. Bentonite is a mixture of non-toxic clays and rock particles consisting of about 85 percent montmorillonite clay; 10 percent quartz and feldspars; and 5 percent accessory materials, such as calcite and gypsum. Potentially toxic additives are added to drilling fluids used in some applications, but the Companies have not stated that they would use any synthetic or potentially toxic drilling fluid additives. A successful HDD would result in little or no impact to the waterbody being crossed.

HDD is not without risk, however, as inadvertent drilling fluid releases could result if the fluid escapes containment at pits that would be excavated at the HDD entrance and exit points or if a “frac-out” occurs. A frac-out occurs when drilling fluids escape the drill bore hole and are forced through the subsurface substrate to the ground surface. Frac-outs occur most often in highly permeable soils during the entrance and exit phases of the pilot hole drill, as this is when the greatest pressures are exerted on the bore walls in shallow soils. Drilling fluid pressures in the bore hole and drilling fluid pumping and return flow rates would be monitored to detect the potential occurrence of a frac-out. If survey and monitoring procedures indicate that a frac-out may have occurred, the Companies would implement the corrective measures identified in the HDD Contingency Plan. If a frac-out does occur, the Companies would immediately suspend drilling operations. These corrective measures would include determination and modification of the drilling technique to minimize or prevent further releases. Any surfaced drilling fluids would be contained, clean-up procedures would commence, and the appropriate agencies would be notified. A discussion of the potential impacts of HDD on waterbodies and wetlands is provided in Sections 3.3 and 3.4.

The Companies propose to use 34 separate HDD crossings to accomplish pipeline installation across 59 waterbodies, including 16 of the 22 major waterbody crossings (greater than 100 feet in width), two Louisiana Natural and Scenic Rivers, and three Nationwide Rivers Inventory- (NRI-) listed streams (the Blue River, Bayou D’Arbonne, and the Pearl River) (Table 2.3.2-1). Section 3.3 and Appendix D of identify and describe the waterbodies that would be crossed using HDD techniques. In addition to waterbodies, the Companies propose to cross five roadways, three railroad lines, and one Wildlife Management Area (WMA) via HDD methods. One HDD would be conducted specifically to cross the Francis Creek Break wetland complex. Multiple other wetlands would be crossed utilizing HDD methods in conjunction with the larger crossing effort of other features, such as adjacent roads and waterbodies. Section 3.4 and Appendix E identify and describe the wetlands that would be crossed using HDD techniques.

TABLE 2.3.2-1
Proposed Horizontal Directional Drill Locations for Waterbody and Road Crossings for the Proposed Gulf Crossing Project

Features Crossed	Begin MP[a]	End MP[a]	Length (feet)
Pipeline			
Choctaw Creek & Red River 1	3.9	4.4	2,680
Blue River	BB27.3	BB27.7	1,923
Red River 2	40.9	41.5	3,378
Bois D'Arc Creek	46.9	47.4	2,722
Sulphur River	93.8	94.2	2,209
White Oak Creek	106.8	107.2	2,384
Black Bayou 1	175.4	176.0	2,997
Interstate 49	183.0	183.4	2,218
Red River 3	188.3	188.7	1,950
Bayou Bodcau Reservoir (Bodcau State WMA)	209.8	210.3	2,355
Dorcheat Bayou	217.4	217.8	2,301
Black Bayou 2	219.4	219.9	2,678
Highway 167	259.4	259.8	2,036
Lake D'Arbonne Tributary	266.6	267.4	3,835
Francis Creek Break	BU282.5	BU282.9	2,021
Bayou D'Arbonne	AQ284.7	AQ285.2	2,195
Blasingame Tributary 1	289.7	290.1	2,225
Blasingame Tributary 2	290.3	290.7	2,124
Ouachita River	291.5	291.9	2,053
Bayou De Siard	298.0	298.6	3,056
Little Beouf Bayou	AT305.2	AT305.8	3,390
Coulee Ditch & Galion Bayou	309.2	309.6	1,946
Bayou Lafourche Tributary and Mott Rd	312.9	313.3	2,272
Little Lake	AU316.1	AU316.5	2,065
Bayou Lafourche	AU316.8	AU317.2	2,087
Beouf River	320.1	320.5	1,972
Cypress Creek	AV322.5	AV322.8	1,876
Big Colewa Creek	327.5	327.8	1,836
Macon Bayou	BX333.9	BX334.2	1,644
Joe's Bayou	AY338.6	AY339.1	2,502
Tensas Bayou 1	AY341.6	AY342.0	1,886
Tensas Bayou 2	344.3	344.7	1,775
Tensas Bayou 3 and Interstate 20	345.2	345.6	2,287
Lake Despair	346.8	347.1	1,776
Mothiglam Bayou	349.2	349.8	2,819
Mississippi Loop			
Interstate 55	L6.1	L6.4	1,585
Pearl River	L11.1	L11.6	2,520

Notes:

[a] Milepost Designations, not including the Mississippi Loop, with prefixes indicate locations associated with minor pipeline reroutes proposed since the issuance of the draft EIS.

Flume Crossing

This procedure would consist of temporarily directing the flow of water through one or more flume pipes placed over the area to be excavated. This procedure would allow trenching across the waterbody to be completed underneath the flume pipes without disruption of water flow. Stream flow would be diverted through the flumes by constructing two bulkheads, using sand bags or plastic dams, to direct the stream flow through the flume pipes. Following completion of pipeline installation, backfill of the trench, and restoration of stream banks, the bulkheads and flume pipes would be removed. This crossing method generally minimizes downstream turbidity by allowing excavation of the pipeline trench under relatively dry conditions. In addition to those waterbodies currently proposed for flume crossing, the Companies may elect to use the flume method at select waterbodies depending on the amount of flow and site-specific conditions at the time or as agreed to in discussions with state agencies.

Horizontal Bore Crossing

Horizontal bores are similar to HDDs in that they avoid direct surface impacts to sensitive resources by installing the pipeline beneath the feature. Horizontal bores are typically much shorter and are used to cross such features as roads or railroads. Some waterbodies directly adjacent to or associated with roads or railroads that would be crossed by horizontal bores may also be included in the length of the planned bore. Similarly, some elevated or channelized waterbodies (e.g., irrigation drains or ditches) could also be crossed using horizontal boring, if groundwater conditions permit. In these instances, bores beneath these waterbodies would be accomplished by excavating pits on both sides of the feature and boring a horizontal hole equivalent to the diameter of the pipe (or casing, if required) at the depth of the pipeline installation. The pipeline section and/or casing would then be pushed through the bore. If additional pipeline sections were required, they would be welded to the first section of the pipeline in the bore pit before being pushed through the bore. Only one waterbody, Sanders Creek (MP 55.4), would be crossed by horizontal bore.

Dam and Pump Crossing

The dam and pump method involves installing temporary dams upstream and downstream of the proposed waterbody crossing. The temporary dams typically would be constructed using sandbags and plastic sheeting. Following dam installation, appropriately sized pumps would be used to dewater and transport the stream flow around the construction work area and trench. Intake screens would be installed at the pump inlets to prevent entrainment of aquatic life, and energy dissipating devices would be installed at the pump discharge point to minimize erosion and stream bed scour. Trench excavation and pipeline installation then would commence through the dewatered portion of the waterbody channel. Following completion of pipeline installation, backfill of the trench, and restoration of stream banks, the temporary dams would be removed, and flow through the construction work area would be restored. This method is generally only appropriate for those waterbody crossings where pumps can adequately transfer streamflow volumes around the work area and there are no concerns about sensitive species passage. During construction, the Companies may elect to use the dam-and-pump method at select waterbodies depending on the amount of flow and site-specific conditions at the time or as agreed to in discussions with state agencies.

2.3.2.2 Wetland Crossings

Construction of the proposed Project pipeline across wetlands would be conducted in accordance with applicable permits and the Companies' Procedures (see Section 3.4). Overall, the wetland crossing methods and mitigation measures identified in the Companies' Procedures are designed to minimize the extent and duration of construction-related disturbance within wetlands. Construction methods in

wetlands would consist of the conventional lay method or the push-float method. The site-specific crossing procedures used to install the pipeline across wetlands would be determined based on conditions at the time of construction and would vary dependent on site-specific weather conditions, the level of soil stability and saturation encountered during construction.

During crossing of unsaturated wetlands (those wetlands without standing water or saturated soils), conventional lay method construction would be similar to the upland construction procedures described in Section 2.3.1, although mats may be used, passage through the wetland by equipment would be minimized, and the directions in the Companies' Procedures would be implemented. The pipeline segment to be installed through the wetland would be assembled adjacent to the excavated trench. In conditions where the trench is inundated or saturated to the extent that soils can not support heavy equipment, especially in large wetlands, a prefabricated floating pipeline segment may be pushed or pulled into position from outside the wetland, using the push-float method. The floats then would be removed and the pipeline segment would sink into the trench. Regardless of the installation technique used, implementation of their Procedures would reduce the potential for pipeline construction to affect wetland hydrology and soil structure.

The construction right-of-way width through wetland areas would be reduced to 75 feet. Within the right-of-way, woody vegetation would be removed or cut off at ground level and would be removed from the wetlands, leaving the root systems intact. Pulling of tree stumps and grading activities would be limited to that area directly over the trenchline, unless it was determined that safety-related construction constraints required grading or removal of tree stumps from under the working side of the construction right-of-way. Temporary erosion control devices would be installed as necessary immediately after initial disturbance of wetlands or adjacent upland areas to prevent sediment flow into wetlands, and would be maintained until revegetation is complete. Trench plugs would be installed as necessary to maintain wetland hydrology.

The construction equipment operating in wetland areas would be limited to that needed to clear the construction right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction right-of-way. If standing water or saturated soil conditions were present, or if construction equipment caused ruts or mixing of the topsoil and subsoil, construction equipment operating in wetland areas would be further limited to the use of low-ground-pressure equipment or normal equipment operating from timber riprap or prefabricated equipment mats.

Topsoil would be stripped from the area directly over the trench line to a maximum depth of 12 inches in unsaturated soils and would be stockpiled separately from the subsoil where practicable. The segregated topsoil would be restored to its original location immediately following installation of the pipe and backfill of the trench. Materials such as timber mats placed in wetlands during construction would be removed during final cleanup, and the preconstruction contours of the wetland would be restored. Any required permanent erosion control measures then would be installed, and disturbed areas within the wetland would be temporarily stabilized with appropriate vegetation to protect the wetland soils from erosion.

The wetlands that would be affected by construction of the proposed Project are described in Section 3.4. That section also provides further discussion of the wetland restoration and mitigation procedures that would be implemented by the Companies.

2.3.2.3 Road, Highway, and Railroad Crossings

The proposed pipeline would cross numerous paved and unpaved roads, highways, and railroads along the proposed Project route. Construction across these features would be accomplished in

accordance with their Plan and the requirements of all applicable crossing permits and approvals. During roadway construction, the Companies would incorporate any safety precautions required by state and local transportation agencies.

All railroads and approximately 325 major highways and paved roads would be crossed using HDD or subsurface boring techniques. The HDD crossing method is described in detail in Section 2.3.2.1 and would be used at Interstate 49, Highway 167, Mott Road, Interstate 20, and Interstate 55. There would likely be little disruption of traffic on roads and railways that are bored. Section 3.8 provides additional information on the proposed major road crossing locations.

Pipeline crossings of lightly traveled and unimproved rural dirt roads typically would be crossed via open-cut installation. Such crossings would require the temporary closure of these roads and implementation of detours, where feasible. In the absence of a reasonable detour, construction across the roadway would be staged to allow at least one lane of traffic to remain open except for the limited periods required for installing the pipeline. Efforts would be made to schedule lane closures outside of peak traffic periods. Attempts also would be made to avoid peak-traffic periods on all road construction. All construction operations at these crossings, including repair and surface restoration, normally would be completed within one day.

2.3.2.4 Agricultural Areas

Agricultural areas along the proposed Project route include pasture areas used for livestock grazing, hayfields, fallow fields, and rotated croplands such as cotton and corn. In these areas, the Companies would implement special procedures to minimize impacts on current agricultural uses, in accordance with the Companies' Plan. Topsoil would be removed to its actual depth, up to a maximum of 12 inches, and would be stockpiled separately from the subsoil excavated from the pipeline trench. Typically, topsoil would be stripped from directly over the pipeline ditch and the adjacent subsoil spoil storage area (Figure 2.3.1-2), but landowners would be provided with the option of topsoil segregation across the full construction work area. During construction, the natural flow patterns of all fields would be maintained by providing breaks in topsoil and subsoil stockpiles.

During cleanup and restoration, all disturbed areas would be finish-graded and restored as closely as possible to preconstruction contours. Topsoil previously segregated from the trench material in all agricultural and residential areas would be spread uniformly across the construction right-of-way, and any stones or excess rock would be removed from at least the top 12 inches of soil. The topsoil and subsoil in all agricultural areas also would be tested for compaction at regular intervals, using penetrometers or other appropriate devices to conduct tests. Any severely compacted areas would be plowed with a paraplow or other deep tillage device. In areas where the topsoil was segregated, the subsoil also would be plowed before replacing the segregated topsoil.

The Companies' Plan requires that they work with property owners to identify locations of existing drainage structures and irrigation facilities that could be damaged during construction. Should any damage occur to these facilities, the Companies would repair these systems with the input of the property owners. The Companies also would work with landowners during easement negotiations to establish compensation agreements for crop damages and for loss of growing time, as applicable. Additional information on special procedures used in agricultural areas is presented in Sections 3.2 and 3.8.

2.3.2.5 Rugged Topography

The proposed Project would not involve construction in areas of excessively rugged topography, such as mountains or canyons. Those areas with side slopes and rolling terrain would be graded using cross right-of-way leveling construction techniques, whereby the uphill side of the construction right-of-way would be cut down, and the material removed would be used to fill the downhill side of the construction right-of-way. The ditch for the pipeline would be excavated from the new graded right-of-way. Typical side-slope construction is illustrated in Figure 2.3.2-2. After the pipeline has been installed and the trench has been backfilled, the excavated material would be placed back on the area cut and compacted to restore to original contours. Stabilization would be done in accordance with the Companies' Plan.

2.3.2.6 Residential Areas

The Companies propose to complete construction activities near residences as quickly as possible to minimize construction-related disturbances. Open access to residences would be maintained to the extent possible and coordination with landowners and would be conducted to minimize inconvenience regarding possible temporary loss of utility service or to address special landscaping issues. Safety fencing would also be used to prevent pedestrian access to the construction site. Additionally, the Companies would develop site-specific construction plans for residences located within 25 feet of the construction right-of-way as discussed in more detail in Section 3.8.3.

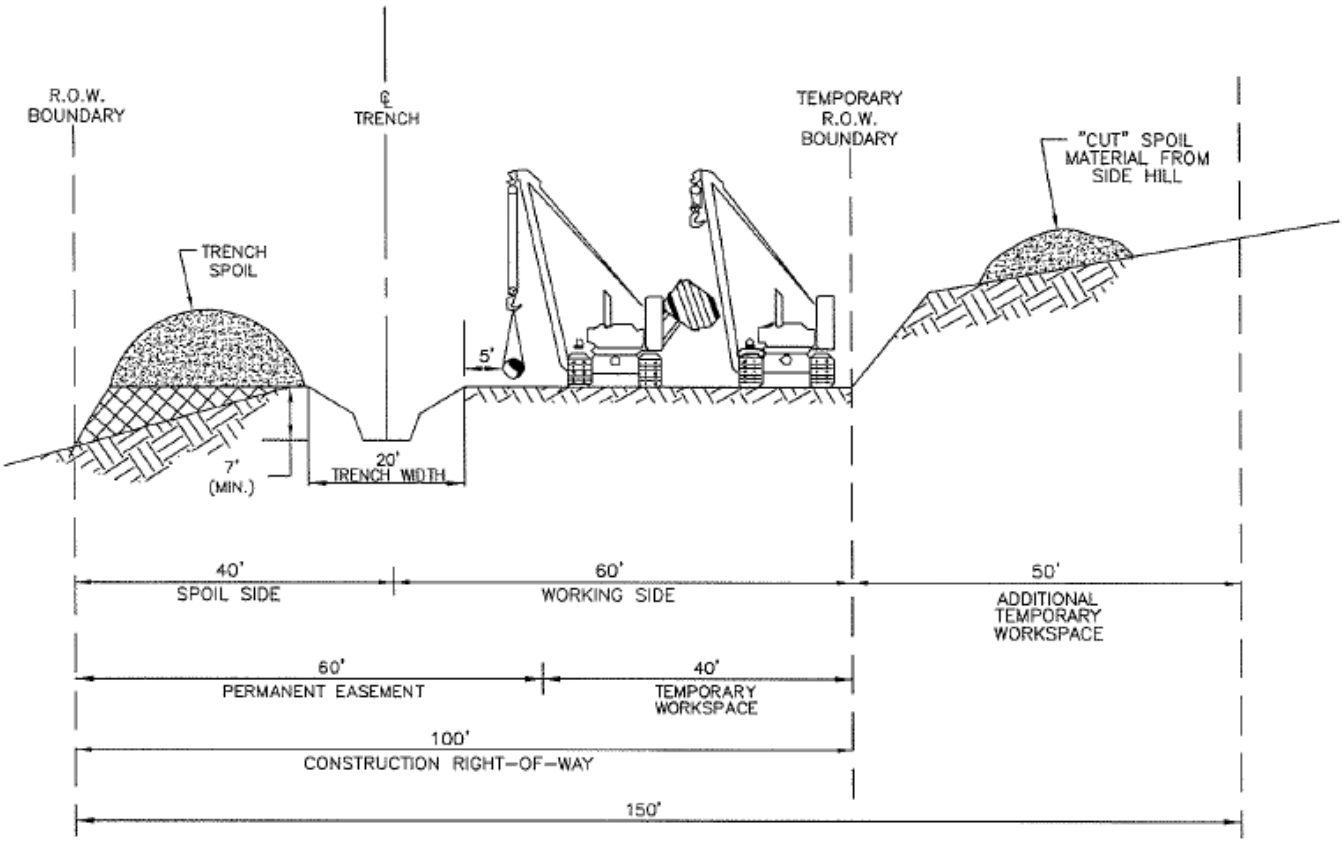
Section 3.11 provides additional information on noise abatement and emission control technology.

2.3.3 Aboveground Facilities Construction Procedures

The aboveground facilities would be constructed concurrent with pipeline installation, but construction would be conducted by special fabrication crews generally working separately from the pipeline construction spreads.

Construction of the compressor stations would involve clearing, grading, and compacting the sites to the surveyed elevations, where necessary, for placement of concrete foundations for buildings and to support skid-mounted equipment. Prefabricated segments of pipe, valves, fittings, and flanges would be shop- or site-welded and assembled at the compressor station site. The compressor units and other large equipment would be mounted on their respective foundations, and the compressor enclosures would be erected around them. Noise abatement equipment (including sound-attenuating enclosures around the turbines, exhaust stack silencers, and air inlet silencers) and emission control technology would be installed as needed to meet applicable federal, state, and local standards. Section 3.11 provides additional information on noise abatement and emission control technology. As necessary, electrical, domestic water and septic, and communications utilities would be installed.

Facility piping, both aboveground and below ground, would be installed and hydrostatically tested before being placed in service. Controls and safety devices, such as the emergency shutdown system, relief valves, gas and fire detection facilities, and other protection and safety devices, also would be checked and tested. Upon completion of construction, all disturbed areas associated with the



PROFILE

Not to Scale

GULF CROSSING PIPELINE PROJECT

Typical Side-Slope Construction Right-of-Way Cross Section

DATE: February 2008

FIGURE: 2.3.2-2

aboveground facilities would be finish-graded and seeded or covered with gravel, as appropriate. All roads and parking areas would be graveled. Additionally, the compressor station sites would be fenced for security and protection.

Construction of M/R stations, MLVs, side valves, and pig launcher/receiver facilities not collocated with the compressor stations generally would be similar to that described above for compressor station sites and would entail site clearing and grading, installation and erection of facilities, hydrostatic pressure testing, cleanup and stabilization, and installation of security fencing around the facilities.

2.4 CONSTRUCTION SCHEDULE

The Companies propose to commence construction of the Gulf Crossing Project in spring 2008, pending Commission approval. The facilities, including installation of the proposed pipeline, compressor stations, and associated ancillary facilities, then would be completed in approximately 6 months and would be in-service by fourth quarter 2008. The actual start date of construction, if the proposed Project is certificated, would depend on the Commission's environmental review process.

2.5 ENVIRONMENTAL TRAINING AND MONITORING

The Companies have indicated that they would conduct environmental training for all company and construction contractor personnel prior to and during construction activities. Such training would focus on implementation of the Companies' Plan and Procedures, but also would address Project-specific permit requirements, company policy and commitments, any protection procedures and restrictions associated with cultural resources or sensitive species/habitats, and any other pertinent job-related information.

During Project construction, environmental inspectors (EIs) would be responsible for monitoring and ensuring compliance with all environmental mitigation measures required by the FERC Certificate, if granted, and the Companies' Plan and Procedures (see Section 3.4). The EIs would have the authority to stop activities that violate the environmental conditions of these authorizations, state and federal environmental permit conditions, or landowner requirements and to order appropriate corrective actions if needed. The Companies would be represented by at least one EI per construction spread, consistent with their Plan. However, the Companies' Plan also indicates that the number and experience of EIs assigned to each construction spread should be appropriate for the length of the construction spread and the number and significance of resources affected. If the Project were authorized, the Companies would be required to develop and submit an Implementation Plan for our approval prior to construction. During our review of the Implementation Plan, we would consider the absolute number and qualifications of the EI personnel proposed by the Companies.

In addition to the personnel requirements specified above, we believe that a third-party independent Environmental Compliance Monitoring and Reporting Program (ECMR Program) for the proposed Project would provide a number of benefits, both to us and to the Companies. The overall objective of an ECMR Program would be twofold: to assess environmental compliance during construction in order to achieve a high level of environmental compliance throughout the Project and to assist the FERC staff in screening and processing variance requests during construction. The Companies have agreed to fund a third-party EI and support the ECMR Program, if requested by the FERC, and we are recommending the Companies hire and fund a third party compliance inspection contractor.

The third-party compliance monitors also would be responsible for preparing and submitting status reports that would be filed with the FERC on a continuous basis until all construction-related activities, including restoration and initial permanent seeding, are complete. Due to the compressed

construction schedule proposed by the Companies, we consider that the additional level of environmental compliance screening provided by the ECMR Program, as well as the assistance to the FERC staff in processing of the variance requests that may arise, warrants the use of third-party compliance monitors.

The Companies established an Internet website (www.gulfcrossing.com) to provide potentially affected landowners and stakeholders with a venue for providing comments or requesting additional information about the proposed Gulf Crossing Project. The FERC staff is interested in ensuring that landowner issues are resolved in an effective and timely manner. Therefore, we are including in Recommendation 12 in Section 5.2 that the Companies should develop and implement an environmental complaint resolution procedure. The procedure should provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the Project and restoration of the right-of-way. We want to ensure that the Companies commit to maintaining open communications with affected landowners during construction, should the Project be certificated.

2.6 OPERATION, MAINTENANCE, AND SAFETY CONTROLS

The proposed Project pipeline and aboveground facilities would be designed, constructed, operated, and maintained to meet or exceed all safety standards as set forth in the DOT's *Transportation of Natural and Other Gas By Pipeline: Minimum Federal Safety Standards* (49 CFR Part 192). These safety standards are discussed further in Section 3.12.

The pipeline would be constructed of welded carbon steel that meets or exceeds industry standards and would be covered with a protective coating to minimize rust and corrosion. To protect against damage from external forces, the proposed pipeline would be buried at a minimum depth of 3 feet below ground. All welds joining each section of pipe would be visually inspected and x-rayed to ensure the integrity of the welds. Prior to being placed in service, the pipeline would be hydrostatically pressure tested to verify its integrity and to ensure its ability to withstand the maximum designed operating pressure. A cathodic protection system would be installed to protect all underground and submerged pipeline facilities constructed of metallic materials from external, internal, and atmospheric corrosion.

During operations, the Companies would conduct regular patrols of the pipeline right-of-way in accordance with the requirements of 49 CFR Part 192. The patrol program would include periodic aerial, vehicle, or pedestrian patrols of the pipeline facilities. These patrols would be conducted to survey surface conditions on and adjacent to the pipeline right-of-way for evidence of leaks, unauthorized excavation activities, erosion and wash-out areas, areas of sparse vegetation, damage to permanent erosion control devices, exposed pipe, and other conditions that might affect the safety or operation of the pipeline. The cathodic protection system also would be inspected periodically to ensure that it is functioning properly. In addition, intelligent pigs would regularly be sent through the pipeline to check for corrosion and irregularities in the pipe. The Companies would keep detailed records of all inspections and supplement the corrosion protection system as necessary to meet the requirements of 49 CFR Part 192.

Routine operation and maintenance also would be performed at all aboveground facilities by qualified personnel. Safety equipment, such as pressure relief devices, fire detection and suppression systems, and gas detection systems would be maintained throughout the life of each facility. Mainline valves also would be inspected, serviced, and tested to ensure proper functioning.

The Companies would establish and maintain a liaison with the appropriate fire, police, and public officials. This program would identify the available resources and responsibilities of each

organization that may respond to a natural gas pipeline emergency and assist in developing coordination responsibilities.

Pipeline markers would be placed and maintained along the right-of-way at roadway crossings, railroad crossings, and other highly visible places to alert those contemplating working in the vicinity of the location of the buried pipeline. The markers would identify Gulf Crossing as the operator and display telephone numbers to call if any abnormal conditions are detected.

The Companies also would participate in the One-Call program. This program provides telephone numbers for excavation contractors to call prior to commencing any excavation activities. The One Call operator would notify the Companies of any planned excavation in the vicinity of the pipeline so that the Companies could flag the location of the pipeline and assign staff to monitor activities if required.

Vegetation management procedures during operation would be performed in accordance with the Companies proposed Plan and Procedures and would include regular mowing, cutting, and trimming along most of the proposed 60-foot-wide permanent pipeline right-of-way. In Section 2.2.1, we are recommending that the Companies should limit the width of their permanent right-of-way to 50 feet. Routine vegetative maintenance clearing would not be performed more frequently than every 3 years, and never between April 15 and August 1 to minimize disturbance to nesting migratory birds, unless requested or approved by appropriate state and local agencies. However, a corridor not exceeding 10 feet in width centered on the pipeline could be maintained annually in an herbaceous state, as required to facilitate periodic corrosion and leak detection surveys. Vegetation management is discussed further in Section 3.5.

2.7 FUTURE PLANS AND ABANDONMENT

The Companies do not have plans for future expansion of the proposed facilities. If additional demand for natural gas supplies requires future expansion, the Companies would seek the appropriate authorizations from the FERC. When and if an application is filed, the environmental impact of the new proposal would be examined at that time.

Abandonment of the pipeline facilities would be subject to approval of the FERC under Section 7(b) of the NGA and would comply with DOT regulations and specific agreements or stipulations made for the pipeline rights-of-way. An environmental review of any proposed abandonment would be conducted when the application is filed with the FERC.

2.8 NONJURISDICTIONAL FACILITIES

Under Section 7 of the NGA, the FERC is required to consider, as part of a decision to certificate jurisdictional facilities, all facilities including nonjurisdictional facilities that are directly related to the proposed Project where there is sufficient federal control and responsibility to warrant environmental analysis as part of this proceeding. The jurisdictional facilities for the proposed Project are described in detail in Section 2.1 and are addressed throughout this EIS. Nonjurisdictional facilities are those facilities that would be constructed upstream or downstream of the jurisdictional facilities for the purpose of delivering, receiving, or using the proposed gas volumes. Nonjurisdictional facilities typically include major power facilities, such as cogeneration plants, as well as less significant facilities, such as lateral pipeline connections.

Service connections to the local electric power grid would be constructed to provide electrical service to the new compressor stations. These facilities would be constructed and operated by electric service providers and have been identified as nonjurisdictional facilities.

We use a "four-factor test" to determine whether there is sufficient federal control and responsibility over a project as a whole to warrant environmental analysis of project-related nonjurisdictional facilities. These factors are:

- whether the regulated activity comprises "merely a link" in a corridor-type project (e.g., a transportation or utility transmission project);
- whether there are aspects of the nonjurisdictional facility in the immediate vicinity of the regulated activity that affect the location and configuration of the regulated activity;
- the extent to which the entire Project would be within the Commission's jurisdiction; and
- the extent of cumulative federal control and responsibility.

With regard to the first factor, the jurisdictional facilities, the proposed Project, is clearly a link in a natural gas project. The proposed Project would serve as a new pipeline transportation system between the producers and consumers of natural gas. As common carriers, the Companies serve only to transport natural gas for their customers and do not sell gas to consumers. Therefore, this factor supports examining the nonjurisdictional facilities.

With regard to the second factor, the proposed Project would receive electricity from nonjurisdictional facilities, but the design and route of the proposed Project has not been uniquely influenced by the location or configuration of the nonjurisdictional facilities. The locations of the nonjurisdictional facilities have not been established, thus these facilities have had no effect on the location of the Expansion Project facility configuration. Thus, the second factor does not support examining the nonjurisdictional facilities.

The third factor weighs the extent to which the entire Project would be within the FERC's jurisdiction. Electrical facilities are regulated by state and local permitting agencies. The FERC has no authority over the permitting, licensing, funding, construction, or operation of these nonjurisdictional facilities. Because the FERC has no authority over the nonjurisdictional facilities, this factor also weighs against extending the scope of the environmental review.

Finally, the last factor weighs the extent of cumulative federal control and responsibility over the nonjurisdictional facilities. Federal control is determined by the amount of federal financing, assistance, direction, regulation, or approval inherent in a project. The nonjurisdictional facilities are private construction projects under state and local jurisdiction. The federal government has no financial involvement, and no federal lands are involved. Based on the available information, federal agencies are expected to have either very limited or no involvement in the approval of the nonjurisdictional facilities. Therefore, cumulative federal control is minimal, and this factor does not warrant extending the FERC's environmental review.

We have applied the four factor test to the proposed Gulf Crossing Project and have determined that only one factor favors examining the identified nonjurisdictional facilities. Therefore, insufficient justification exists to warrant extension of the FERC's environmental review to include the proposed electrical power lines.

Waste Heat Electric Generation Facilities and Efficiency

At its open meeting on September 21, 2006, the Commission expressed interest in examining the potential for energy efficiency in connection with its consideration of major pipeline infrastructure projects. Accordingly, FERC staff queried Gulf Crossing on measures that Gulf Crossing may have

considered regarding energy efficiency at the proposed compressor stations as well as the possibility of installing waste heat cogeneration facilities at the large gas turbine-driven compressor stations.

There are millions of horsepower of installed gas turbine capacity in the continental United States in addition to the installed reciprocating engine capacity. Most, if not all, of these turbines and reciprocating engines operate on simple cycles and do not capture any exhaust for useful purposes. More than two-thirds of the fuel energy to drive a pipeline compressor is discharged to the atmosphere as exhaust heat. Using the exhaust gas to generate electricity can recapture from approximately 10 to 24 percent of the energy lost to the atmosphere and convert it to usable energy.

Currently the most effective technology to produce electricity from waste heat is the organic rankine cycle (ORC). The typical large electric generation combined-cycle plants typically use steam as the working fluid. A more recently available variation is the ORC which uses organic fluids as the heat transfer fluid and working fluid. Currently there are 6 projects in North America that use the ORC to generate electricity from waste heat from natural gas transportation compressor stations and at least 10 projects in the planning stage (INGAA 2008).

The Interstate Natural Gas Association of America (INGAA) has determined that for waste heat cogeneration to be viable, a minimum of 15,000 hp of gas turbines running at 60 percent load and for 5,250 hours per year must be installed at the Compressor Station. INGAA has, identified approximately 90-100 compressor stations in the US that are of sufficient size and load factor (INGAA 2008).

Installation of a waste heat electric generation would have the potential for environmental impacts if installed at the proposed Gulf Crossing compressor stations. For example, incorporating the technology into the Project would require a larger footprint for the compressor station and waste heat generation facilities. This increased footprint would result in increased impact on the previous land use, including soils, vegetation and wildlife habitat, archeological impacts, and stormwater drainage. Should water cooling be used, a large supply of water would be necessary, potentially causing impacts related to intake entrainment of aquatic species, effects of increased temperature of discharge, effect of treatment chemicals on the environment, as well as physical effects such as scour. In addition, we may see a slight increase in air emissions due to decreased efficiency of the compressor turbine, a potentially significant increase in air impacts due to decreased exhaust temperature, and an increase in noise impacts due to the air cooling fans and steam turbine.

As stated above, this technology could be utilized for electricity generation at medium to large gas-fired turbine compressor stations, and potentially for large reciprocating engine facilities at high load factors. Major factors determining the use would be primarily economic and site-specific environmental conditions. Each cogeneration facility would require electric lines to get the electricity to market. If these lines do not exist, they would need to be constructed. Depending on the length of these lines, this could be a significant cost. With a relatively small added footprint, manageable noise and air impacts, and little if any ground or surface water impacts (*e.g.*, if air cooling were used), environmental impacts appear insignificant, with proper siting and mitigation. However, local stakeholder input would be needed first.

The Companies state that they do not believe that waste heat cogeneration is feasible for installation during construction of the facilities, but that subsequent third party installation of waste heat electric generation is possible. We believe based upon data submitted by the Companies that waste heat cogeneration may only be feasible at the Sherman Stations and Harrisville Compressor Stations. Should waste heat cogeneration be installed at these stations, the Companies estimate that a net average of 2700 megawatt-hr could be generated at the Sherman Compressor Station and 2600 megawatt-hr generated at the Harrisville Compressor Station at 75 percent and 55 percent of load, respectively.

The Companies have instituted measures to increase efficiency of the pipeline. The Companies are installing pipe that is internally coated to improve the flow efficiency, thus lowering the energy, compression, and environmental disturbance required to move a greater volume of natural gas. In addition, the Companies are applying for a special permit from the US Department of Transportation to increase the maximum allowable operating pressure from 72 percent of the specified minimum yield strength of the pipe to 80 percent, allowing the system to transport more natural gas without additional environmental disturbance.