

## Exhibit J – Pipeline Construction

Offshore pipelay and construction vessels are typically supported by tugboats, material barges, crewboats, supply vessels and sometimes helicopters for transportation of staff and supplies to and from the vessel. The main vessel and these associated vessels constitute a “spread.”

Typical barges are held on station and advance along the proposed pipeline route with an array of eight to twelve anchors. A posted barge or “spud” barge may be used instead of an anchoring system in shallow water. Spud barges have heavy, steel pilings that can be raised during barge relocation and then lowered to hold the barge in place once it is in position. Spud-moored barges may be used to install pipelines or conduct dredging.

Note that drawings referenced in herein are presented beginning on page 9 of this Exhibit J.

### 1. *Pipelay*

Pipelay will be accomplished with a conventional pipelay barge. (See DWG. No. 03162-DWPA-001.) The pipeline forms an S-curve with an “overbend” beginning on the stern of the barge, and a sagbend that ends where the pipeline rests on the seafloor. In the shallow water encountered within Alabama State Waters, in some places as little as four feet deep, a separate laybarge, designed and constructed for work in extremely shallow water, may be required.

Prior to transport offshore, the joints of pipe to be installed offshore will be coated with fusion bonded epoxy (FBE) to protect the steel from external corrosion. Sacrificial anodes, used for cathodic protection, will be installed on the pipeline as determined by engineering calculations. Each joint of pipe will be concrete weight coated to provide negative buoyancy. After application of corrosion and weight coating to the pipe joints, they will be loaded and secured onto material barges, which will then be towed to the work location for offloading onto the laybarge.

Typically, a laybarge will have several welding stations, a non-destructive examination (NDE) station, and a field joint coating station. All welding and coating will comply with Department of Transportation requirements set forth in 49 CFR 192, “Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards” and with the latest edition of American Petroleum Institute (API) Standard 1104.

Laybarges may utilize tension machines and stingers to hold the pipeline in a calculated configuration to prevent overstressing of the steel as it “leaves” the barge. (See DWG. No. 03162-DWPA-001.) As the barge moves forward and a new pipe segment is added to the front of the production area, a similar length of welded pipeline is lowered off the stern with the assistance of a stinger. The

stinger is a mechanical device with rollers that protrudes off the stern of the barge providing extra support for the welded pipeline as it is lowered into the water. The stinger reduces stress from excessive bending of the pipeline.

The ends of the pipe joints will be cleaned as they are lifted onto the laybarge. The joints will be placed in the line-up station, where a line-up clamp will be utilized to align the ends of the pipe joints prior to the first welding passes. Once the initial welding passes have been completed in the line-up station, the laybarge is moved forward, incrementally moving the barge beneath the pipe string. This yields the impression that the new field joint is “moved” to the next station in the pipeline assembly line, where the assembly line process continues. The process will continue through four or five stations spaced approximately 40 feet apart until the entire welding process has been completed.

The next station through which the field joint will pass is the non-destructive examination (NDE) station. Qualified personnel examine the completed weld to verify the quality of the weld.

After completion of the NDE, the next station the field joint will enter is the coating station. The field joints between the pipe sections will be cleaned and coated using a system compatible with that applied onshore. The coating of all field joints will be visually and electronically inspected to detect coating defects, which will be repaired prior to the pipe entering the water. Additionally, “infill” (polyurethane foam) may be applied to the pipeline at the field joint to make the outside diameter of that area flush with concrete weight coating. The field joint infill provides a constant outside diameter for passage over support rollers.

## **2. Pipeline Lowering**

The term “pipeline lowering” refers to the processes used to ensure that the pipeline has been installed below the natural bottom of the seabed. Typical pipeline lowering methods include pre-lay dredging (See DWG. No. 03162-DWPA-005), post-lay jetting / plowing (See DWG. No. 03162-DWPA-002, -003, and -004), post-lay diver hand jetting, and mechanical pumping.

### **2.1 Description of Soils in Area**

See the DWP Environmental Report, Topic Report 6 and the Hazard Survey Report (Exhibit H) for a description of soils.

### **2.2 Pipeline Lowering in Portersville Bay**

Dredging will be required for some distance from the western edge of Portersville Bay (generally defined to occur at a line north from Coffee Island) to the offshore Horizontal Directional Drill (HDD) exit point in order to provide an adequate transition for the pipeline. This transition will be such that the pipeline will achieve the radius of curvature as determined by engineering calculations.

The location of the HDD exit point in Portersville Bay near Coden, Alabama was selected to minimize the impact of the construction operations on nearby oyster reefs and boat traffic in the Coden boat channel. (See DWG. No. 03162-DWPA-010 and -011.)

The dredging for the Coden HDD exit hole will be accomplished by a dredge that will place the dredged material into a means of positive containment of the spoil (hopper barges or sheet pile pens) located near the exit hole. Once the HDD has been completed, the excavated material will be returned to the excavated location and all equipment and installation aids utilized to contain the spoil will be removed.

### **2.3 Pipeline Lowering other than Portersville Bay**

In all cases within Alabama State Waters, the pipeline will be lowered such that the top of pipe is a minimum of four feet (4') below pre-disturbed natural bottom. The pipeline will be lowered a minimum of three feet (3') below pre-disturbed natural bottom in Federal Waters. The pipeline will be lowered such that the top-of-pipe is a minimum ten feet (10') below natural bottom at the Intracoastal Waterway (ICWW) crossing and at the Coastwise Shipping Fairway. (See DWG. No. 03162-DWPA-008 and -009.)

In areas other than Portersville Bay, jetting will be the predominant method utilized to lower the pipeline. State of Alabama regulatory bodies have historically placed two restrictions on marine pipeline construction within Portersville Bay: construction does not occur within 2,500' of State-recognized oyster beds during the oyster spat producing season and the permittee will take actions to prevent impacts to oyster reefs, whether charted or uncharted. Traditionally, these restrictions have meant that marine construction within Portersville Bay, defined as the area within Mississippi Sound east of a line extending north from Coffee Island (Isle aux Herbes), may occur from October 1 through April 30, and that dredged spoil must be positively contained, either within a sheet-pile structure or within hopper barges. Marine pipelines constructed in areas associated more predominately with shrimp habitat (areas other than Portersville Bay) are more practically lowered by jetting methods. Although jetting may initially produce greater turbidity within the water column immediately adjacent to the lowering operation, the ability of shrimp to move away from the area means the shorter duration of the operation decreases the overall impact.

In all areas where the pipeline is to be lowered by shallow water "wishbone" jetting techniques, raking may be used to check for and remove stumps prior to the pipelay operation. A number of pipelines previously installed in Mississippi Sound encountered large, old tree stumps, some possibly petrified, which required removal prior to installation of the pipeline. The term "raking" describes the process where a bucket or clamshell dredge is worked down the pipeline right-of-way checking for stumps. The dredge bucket lifts a load of soil from the bay

bottom, checks the load for evidence of stumps then returns the load to the spot from which it was removed if no stumps are present. Any stumps located in this manner will be removed from the worksite for off-site disposal. There will be no side casting of spoil during the raking process therefore no spoil mounds will be created.

### **2.4 Pipeline Lowering by Dredging**

Pre-lay dredging methods, with bucket, dragline or backhoe dredges, will open a trench into which the pipeline will be laid. The spoil from the pipeline trench will be sidecast to either or both sides of the proposed pipeline route. The excavated area will be monitored and maintained until the pipeline has been successfully installed. The trench depth will be such that the top of the proposed pipeline will be at least four feet below pre-disturbed natural bottom. Dredge spoil will be returned to the trench from which it came, thereby eliminating the need for separate spoil disposal areas. (See DWG. No. 03162-DWPA-006.)

### **2.5 Pipeline Lowering by Jetting**

When the term jetting is used, it may refer to one of two types of vessels used to lower the pipeline below the seafloor - a “wishbone” type jet barge for shallower water or a barge with a towed or self-propelled jet sled for deeper water. (See DWG. No. 03162-DWPA-003.)

Multiple passes with the bury barge / jet sled are often required to attain sufficient depth below the seafloor.

The jetting method is used after the pipeline is lying on the sea bottom. Jetting requires water to be pumped at high pressure through pipe nozzles, which partially encompass the pipeline, to displace the soil around the pipeline. A high volume of air may be used in conjunction with the high-pressure water. The air is compressed into “air lifts” which are located adjacent to the water jet nozzles. The rising column of air bubbles creates a vacuum at the base of the airlift that assists the water jets by lifting the soil away from the pipe. In both cases, the displacement of the soil around the pipeline will allow the pipeline to settle to the bottom of the trench. (See DWG. No. 03162-DWPA-003.)

For some shallow water barges, referred to herein as “wishbone” barges, the jetting nozzles and air lifts are mounted on a pivoting arm that is suspended over the side or through an open slot on the barge. Suspended from this vessel is a wishbone-shaped apparatus that uses high-pressure water jets to loosen and remove soil from beneath the pre-laid pipeline. A wishbone jet barge has extremely shallow draft of roughly two to three feet. If the water depth is 5’ or greater, a pushboat may be tied to the stern of the wishbone jet barge for propulsion. In some cases where the water depth is shallower, the wishbone jet barge may be winched back and forth along the pipeline by cables attached to remotely moored vessels.

In deeper water, an anchor-moored barge may be used as the pipeline-lowering barge. A separate sled or plow is placed over the pipeline and towed by the barge with its anchor winches to loosen and remove soil from beneath the pipeline.

Since pipeline lowering with jetting methods may not produce significant spoil mounds, natural tidal and current movement around the pipeline route will be utilized for backfill of the trench.

### **3. *Horizontal Directional Drilling***

The shoreline crossing, where the nearshore portion of the pipeline transitions to the onshore portion, will be installed with the Horizontal Directional Drill (HDD) technique. The drilling point of entry will be located onshore and the drilling exit point will be located offshore. The planned length of this transition drill is 4,000 - 5,000. A site-specific geotechnical investigation will be conducted at the crossing location in order to define the geological characteristics and engineering properties of the subsurface material.

The segment of the pipeline to be installed in the drilled crossing is attached to the rotating drill string with a swivel mechanism. Once the pipe is attached to the drill string, it is pulled from the exit point to the drilling rig (pull back) thus completing the installation.

Throughout the drilling operations, pilot hole drilling, pre-reaming and pull back, drilling fluids will be pumped into the drilled hole for stabilization and to carry cuttings away from the drill bit. A slurry of fresh water and naturally occurring bentonite clay is typically used as the drilling fluid. This slurry is considered non-toxic and non-detrimental to the marine environment. Slurry recovered at the onshore HDD entry hole will be disposed of at upland locations per applicable regulatory requirements.

The offshore exit point of the crossing will be dredged and/or excavated to accommodate a specific transition profile. A combination of the burial depth, transition length and HDD exit angle combine to determine the configuration of the dredged exit hole. The transition profile allows the pipeline to return to a horizontal position, and be readied for tie-in, at the design burial depth of four feet (4') below natural bottom. An additional length of pipe, referred to as the "pipeline tail", is added to the transition length and accounted for when determining the final tie-in position. The tail will allow the marine pipeline installation contractor to manipulate or maneuver the pipeline to perform the tie-in to the adjoining section of pipeline.

### **4. *Foreign pipeline and Utility Crossings***

At each foreign pipeline and utility crossing, the proposed pipeline will be installed such that positive separation and protection is maintained between the two systems. A minimum of eighteen inches separation will be accomplished with two layers of 9-inch thick articulated concrete mats. The pipeline will

transition to the surface from the trench, pass over the foreign utility on the concrete mats, then transition back into the trench. Concrete mats will be installed on top of the newly installed pipeline as required. (See DWG. No. 03162-DWPA-007.)

**5. Equipment, Frequency, and Transport**

The following table lists the equipment to be used for clearing, trenching, dredging, boring, and pipe installation.

**Table I-1: Equipment used for Clearing, Trenching, Dredging, Boring, and Pipe Installation**

Activity	Location	Equipment
Clearing	Onshore	◆ Earthmoving machinery
Trenching	Onshore	◆ Earthmoving machinery
Pipe Installation	Onshore	◆ Sideboom, welding machines, NDE and corrosion coating equipment.
Horizontal Directional Drills	Onshore/ Offshore	◆ HDD mounted on mobile mechanical sled.
Trenching	Offshore	◆ <b>Dredge:</b> Clamshell, bucket or back-hoe dredge vessel with support tug. ◆ <b>Jetting:</b> Shallow water “wishbone” barge with support tug. In deeper water, barge-towed jet sled or plow with support tugs.
Pipelay	Offshore	◆ Shallow water spud laybarge (<12’ water depth) with 2-3 pushboats, and 140’ material barges. Otherwise, the laybarge will be anchored with 2-3 anchor handling tugs and 180’ to 240’ material barges. ◆ Supply boats. ◆ Crew boats.

The following table presents the frequency of operation for the boat types to be used during construction.

**Table I-2: Frequency of Operation for Boat Types during Construction**

Location	Type of equipment	Round trips / day from Port of entry
Shallow Coastal Waters	Dredges	Stay offshore
	Pushboat	2 trips/day
	Supply boats	4 trips/day
Offshore	Lay barge and anchor tugs	Stay offshore
	Pipe barge / tug combinations	2 trips/day
	Jet barge and anchor tugs	Stay offshore
	Supply boats	1 trip/day

The following table lists the types of vessels to be used to transport work crews and supplies to the work sites.

**Table I-3: Vessels to be used to Transport Work Crews and Supplies to Work Sites**

Location	Type of Vessel	Vessel Length	Vessel Draft
Shallow coastal waters	Supply/crew boat	~60 ft	~4 ft
Offshore	Crew boat	~100 ft	~6 ft
Offshore	Supply boat	~180 - 220 ft	~12 - 14 ft
Shallow coastal waters	Pipe barge	~140 ft x 40 ft	~4 ft
Offshore	Pipe barge	~200 x 60 ft	~8 - 12 ft

Selection of vessels used to transport personnel, equipment, and supplies to and from the worksite will be based upon the water depth in which the vessels are operating. In extremely shallow waters, personnel and supplies will be delivered to working vessels via small crew boats, approximately 60’ long by approximately 4’ draft. In waters greater than 10’ - 12’ deep, a crew / supply boat could be approximately 100’ long with a draft of approximately 6’. For offshore installation south of the barrier islands, supply boats 180’ to 220’ long with 12’ draft will be used to transport supplies to the working vessels.

Similarly, the sizes of the barges transporting pipe and heavier equipment to the working vessel will be restricted by the water depth. Small barges, roughly 140’ x 40’, which can draw as little as 4’ water, will work in the shallow waters. Larger barges, roughly 180’ x 54’ x 8’ or 9’ draft will otherwise be used within State Waters. South of the barrier islands, a typical pipe transportation barge will be 250’ x 72’ and may draft roughly 12’. The following table identifies the location, type and quantity of equipment to be used throughout the construction phase.

**Table I-4: Location, Type and Quantity of Equipment to be used during Construction**

Location	Type of Equipment	Vessel Qty
Water Depth <12’	Bucket, backhoe or clamshell dredge w/ pushboat	2
	Spud laybarge with tugs or pushboats	1
	Crew / supply boats	2
	Wishbone jet barge w/ pushboats	2
Water Depths >12’	Laybarge and 2 anchor tugs	1
	Pipe barge and tug combinations	4
	Jet or plow barge and 2 anchor tugs	1
	Crew / Supply boats	2-3

**6. Turbidity during Construction**

A water quality plan will be developed to monitor turbidity that may be caused by installation activities. Reference stations for “control” readings will be set up at predetermined locations in the vicinity of the work site. Readings at each reference station shall be taken prior to the start of installation activities. The

reference readings will be taken at a time deemed practical to keep turbidity caused by installation activities within limits similar to those caused by naturally occurring phenomena. The control values will be compared against the water conditions close to the pipeline installation operations. If turbidity levels above the permissible level are measured, then corrective action will be undertaken up to and including temporary cessation of installation activities until such time as the readings return to acceptable limits.

**7. Preparation of Installation Vessels**

All vessels and equipment utilized for the installation of the pipeline in state waters will comply with “Zero Discharge” requirements prior to arrival at the job site. All contractors’ personnel will receive safety and environmental orientations and training prior to start of the work to insure they are fully aware of these requirements. Each vessel will be inspected for proper functioning of equipment and cleanliness prior to arrival on site.

Tug and crew boats will not be required to have a perimeter deck coaming due to stability concerns if excessive water were retained on deck. Overboard discharge of cooling water from a closed loop cooling water system is acceptable as long as the system is in good working order and no fluids are exchanged between the primary and secondary systems.

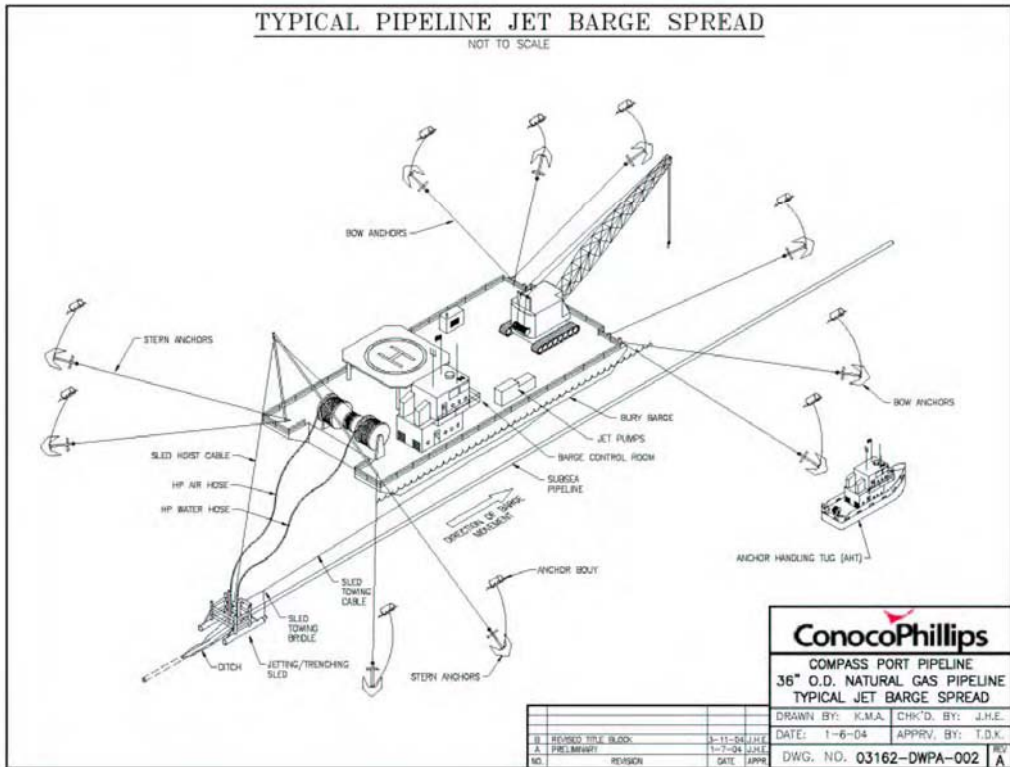
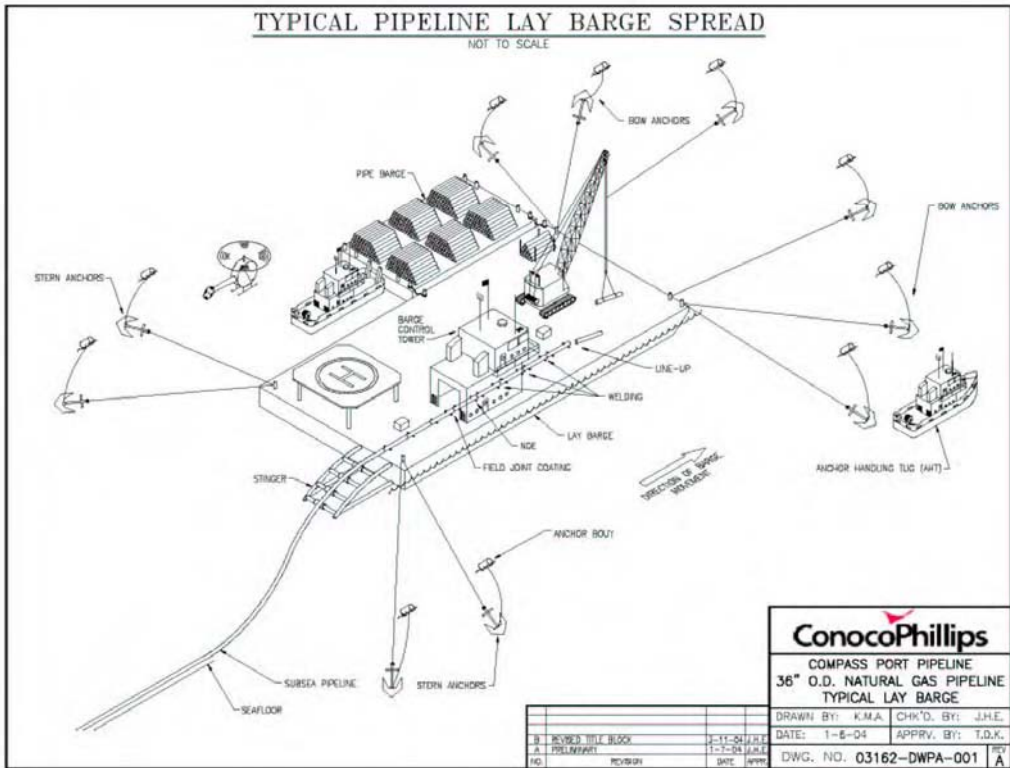
If the installation vessel is not equipped with appropriate treatment facilities, gray and black water will be collected in separate holding tanks until it can be disposed of onshore in an appropriate manner. Wastes other than sewage will be collected in plastic garbage bags and disposed of in an approved metal waste container for transport to shore and onward to an approved disposal site.

**List of Drawings:**

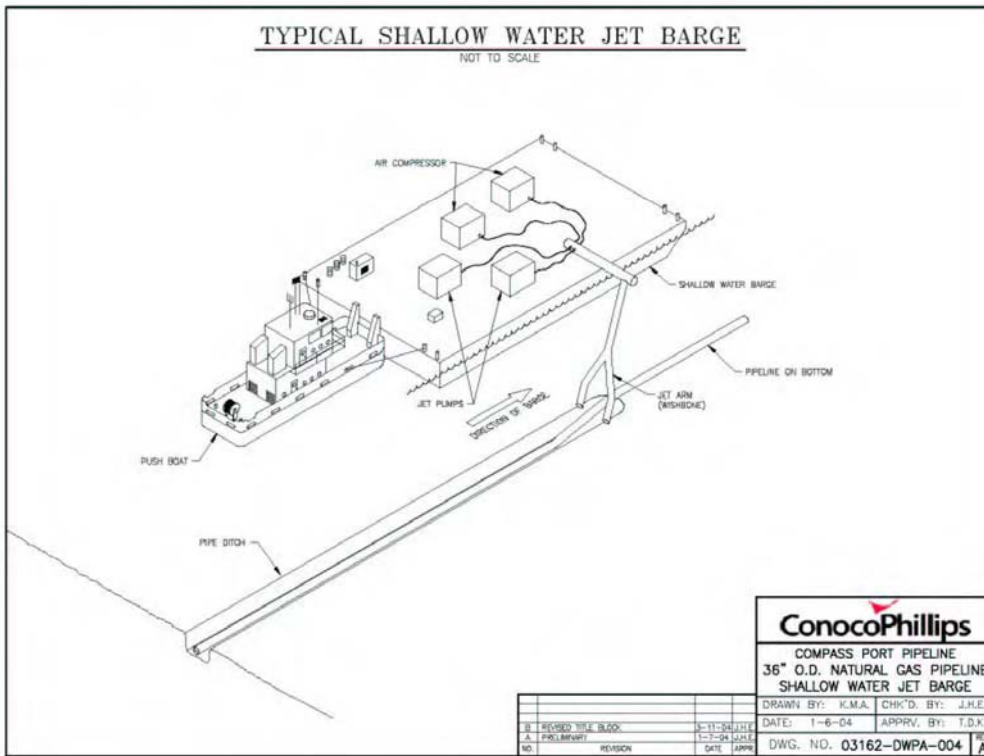
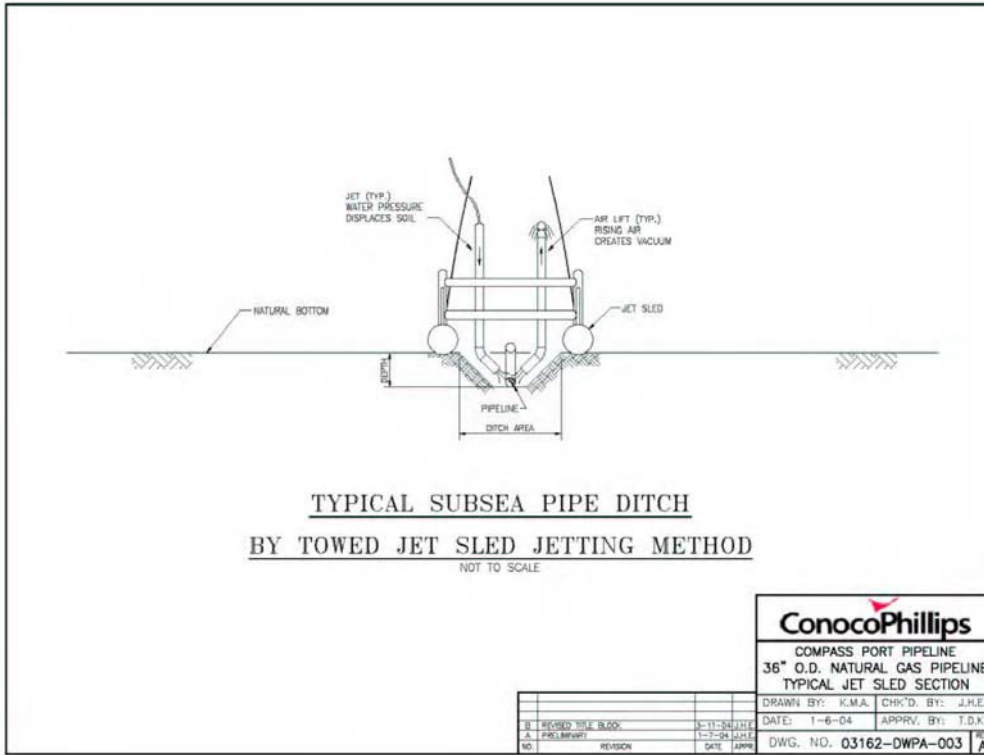
DWG. No.	Title
03162-DWPA-001	Typical Lay Barge
03162-DWPA-002	Typical Jet Barge Spread
03162-DWPA-003	Typical Jet Sled Section
03162-DWPA-004	Shallow Water Jet Barge
03162-DWPA-005	Typical Dredge Barge
03162-DWPA-006	Typical Dredged Trench
03162-DWPA-007	Typical Foreign Utility Crossing
03162-DWPA-008	Coastwise Fairway Crossing
03162-DWPA-009	Intracoastal Waterway Crossing
03162-DWPA-010	Typical HDD Shoreline Crossing
03162-DWPA-011	Coden HDD Exit Hole

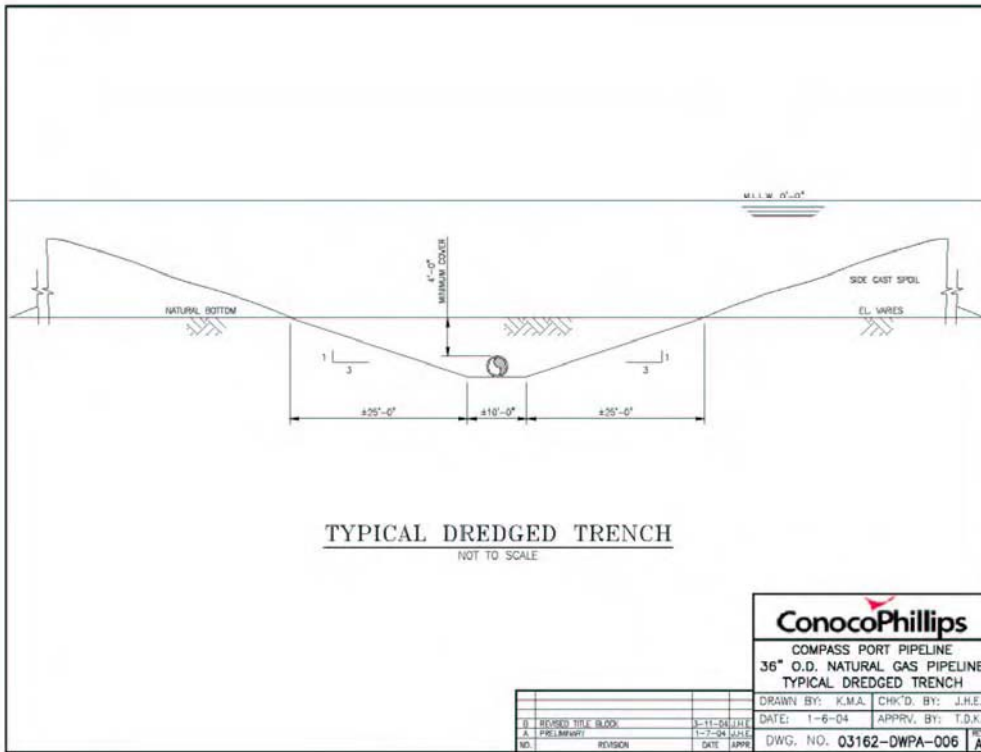
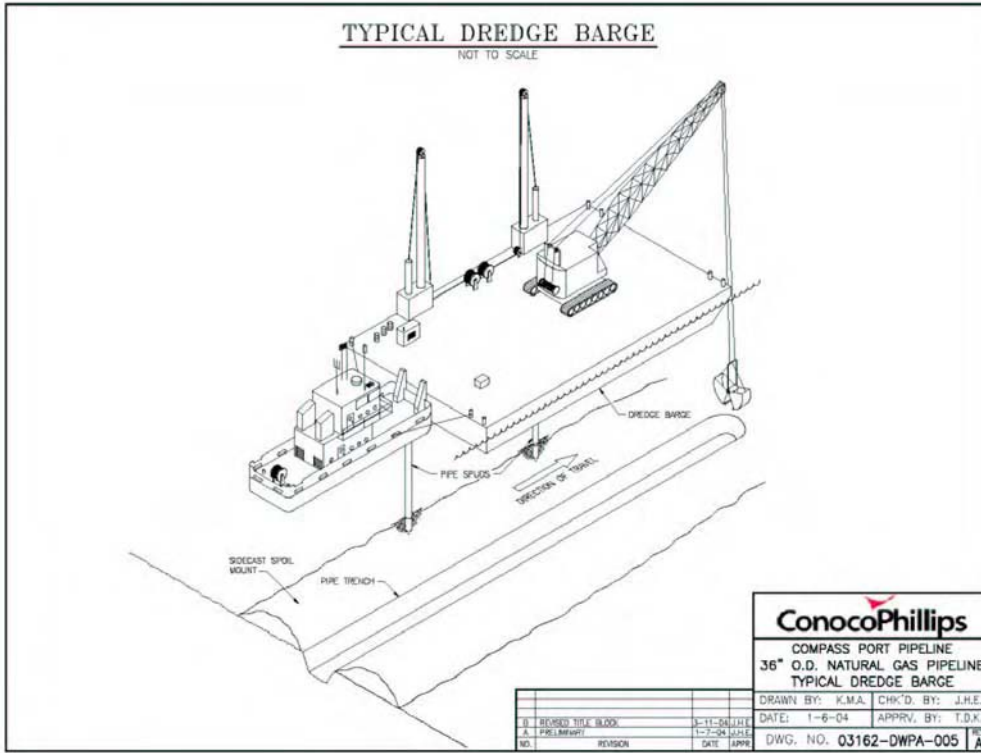


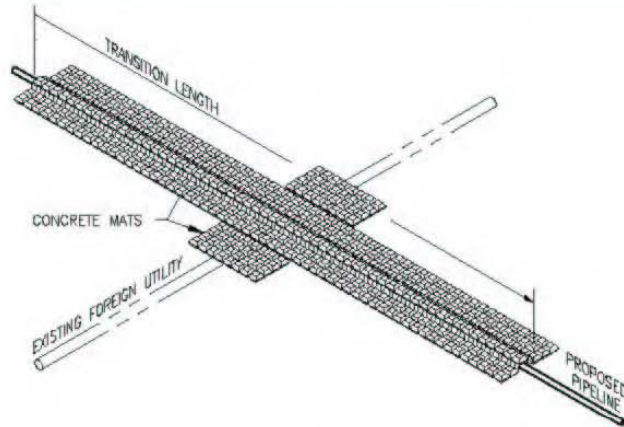
# Pipeline Construction Description



# Pipeline Construction Description

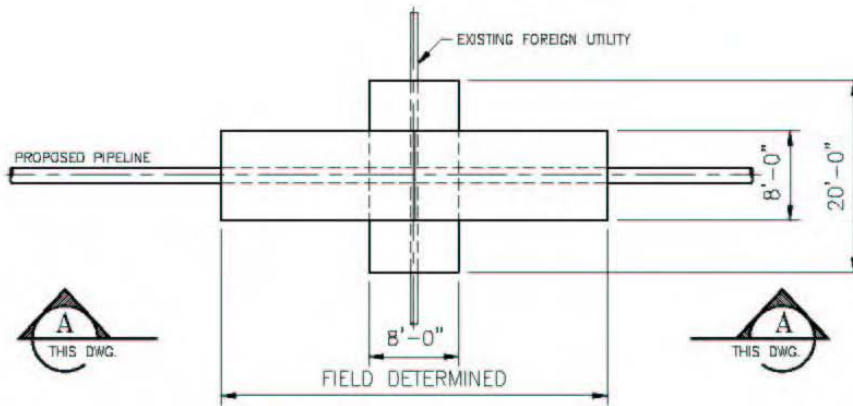




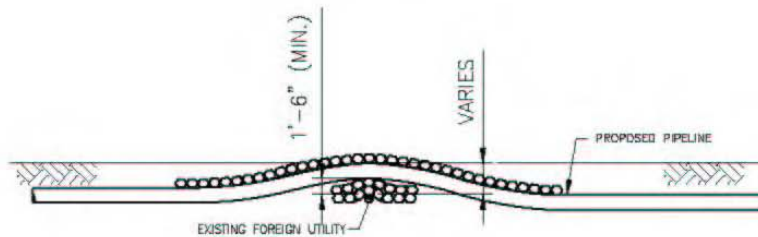


**TYPICAL FOREIGN UTILITY OR PIPELINE CROSSING**

SCALE: N.T.S.



**PLAN**  
SCALE: N.T.S.



**SECTION**

SCALE: N.T.S.



**ConocoPhillips**

COMPASS PORT PIPELINE  
36" O.D. NATURAL GAS PIPELINE  
TYPICAL FOREIGN UTILITY CROSSING

DRAWN BY: K.M.A. CHK'D. BY: J.H.E.

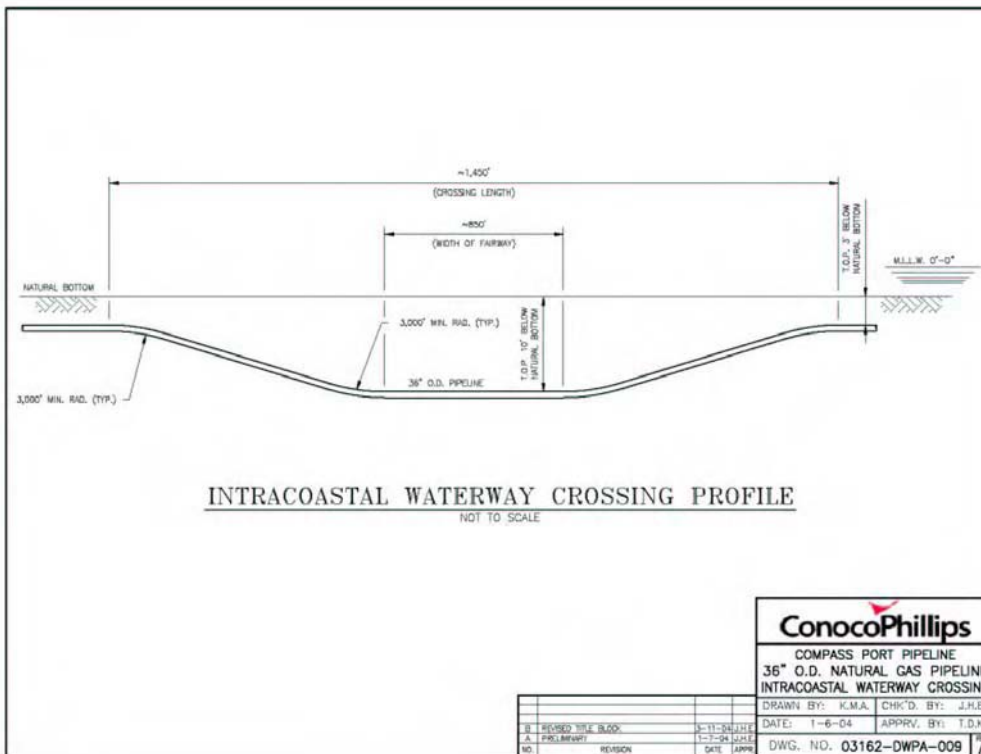
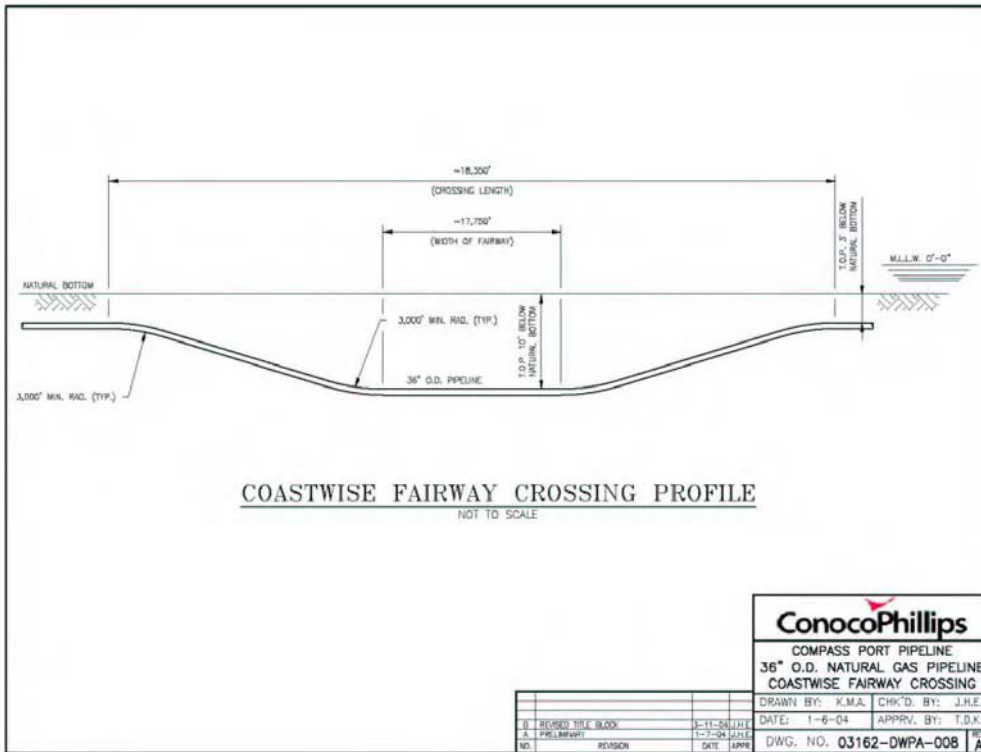
DATE: 1-6-04 APPRV. BY: T.D.K.

DWG. NO. 03162-DWPA-007

NO.	REVISION	DATE	APPR
B	REVISED TITLE BLOCK	3-11-04	J.H.E.
A	PRELIMINARY	1-7-04	J.H.E.

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# Pipeline Construction Description



# Pipeline Construction Description

