

ATTACHMENT 4.0

CONSTRUCTION METHODOLOGY



Permit Application SWG-2018-00789
Axis Midstream Holdings, LLC – Midway to Harbor Island Pipelines & Terminal
CONSTRUCTION METHODOLOGY

Axis Midstream Holdings, LLC (Axis) has proposed a crude oil storage and marine transport system that consists of three facilities interconnected by a series of pipelines. The project originates at the proposed Midway Tank Farm (Midway) extends southeasterly for approximately 19 miles to the Aransas Pass Staging Facility (Aransas Facility) connected by 2-36” crude oil pipelines and 1-2” conduit housing a fiber optics line. A 6” gas supply line will be co-located with the oil pipelines and fiber optic line for the last mile between Midway and Aransas Facilities. The project continues southeasterly from the Aransas Facility with a series of pipelines (1-2” fiber optics conduit, 1-6” gas supply pipeline, 16” intermix return pipeline and 2-42” crude pipelines) for approximately 5.5 miles to the proposed Harbor Island Loading Terminal (Harbor Island). The permit drawings will provide all more clearly.

Axis has made every effort to avoid adverse impacts to ecological, environmental, cultural and administratively sensitive features and for those features that cannot be avoided, the adverse impacts have been minimized to the maximum extent practical. Axis has and continues to work diligently with construction experts and regulatory agencies to develop construction best management practices to avoid and minimize potential adverse impacts that may occur as a result of the proposed project.

The following will detail the construction requirements and sequence for installation of the pipelines from Midway to the Aransas Facility:

1. Midway to Aransas Facility

The Midway to Aransas Facility route consists of the land lay portion of the project. The method of installation involves conventional trenching along with horizontal directional drilling (HDD) or the jack and bore method for roadway and waterway crossings. The proposed construction ROW for this segment of the project is 130’. The permanent ROW width is 60’ with the additional 70’ utilized as temporary workspace. Additional temporary construction workspace outside of the 130’ is proposed at various locations to accommodate foreign pipeline crossings, road crossings, waterway crossings, and points of inflexions (PI), etc., encountered along the route from Midway to the Aransas Facility. All of these features require additional workspace for temporary spoil stockpiling, construction equipment installation, etc., which is needed to safely achieve the required crossings depths.

The proposed alignment involves nineteen (19) road crossings, seven (7) waterbody crossings, and five (5) wetland crossings. HDD or the jack and bore method is proposed for all road crossings, which requires additional workspace, however, no road crossings workspaces are located within wetlands. Three (3) of the seven (7) waterbody crossings will be crossed using HDD or the jack and bore method avoiding ± 0.37 acres of impacts to waters of the U.S. The remaining four (4) waterbodies within the alignment are proposed to be trenched. Total impacts to the waterbodies being trenched is ± 0.57 acres. Five (5) jurisdictional wetlands were identified within this alignment. The potential for temporary impacts to jurisdictional



wetlands within the ROW is \pm 13.37 acres. Finally, segregation of top soil only will be performed on the tracts of lands where ROW agreements dictate such. For the location of all wetlands and waterbodies, please see the permit drawings Sheets 2 through 20. For details of the typical workspaces and pipeline construction methods please refer to Sheets 25 through 30.

2. Aransas Facility to the Harbor Island.

This portion of the project involves both water and land installation. The following will detail the construction requirements and sequence for installation of the pipelines from the Aransas Facility to the Harbor Island:

a. Horizontal Directional Drilling (HDD) at the Gulf Intracoastal Waterway (GIWW):

The first portion of the Harbor Island route will consist of utilizing the HDD method from a land-based drilling location within the proposed Aransas Facility extending southeasterly approximately 4,200 feet to an exit within an abandoned oil and gas well slip in Redfish Bay. The pipelines will be installed in three separate drilling operations at various depths. The shallowest drill, the center HDD, will be a bundle drill consisting of the 2" fiber optic conduit, 6" gas supply and 16" return remix line and will be drilled first. The two outermost and deepest drills will be the two (2) individual 42" crude pipelines which will be installed separately during the second and third drills. For a detail of the HDD profile and a cross-section of the HDD, see Sheet 21 of the permit drawings. The pilot hole will be drilled from the Aransas Facility site to the oil and gas well slip within the proposed 200' x 300' HDD workspace. The existing oil and gas slip will be utilized for the 250' x 300' HDD exit workspace. The oil and gas slip access canal will be utilized for marine vessel access, assembly of the pipelines and for floatation of the HDD back-string. Once the drilling operation is complete, the pipelines will be assembled, pre-hydrotested and pulled from the location canal back to the Aransas Facility. The use of the HDD method and existing oil and gas slip infrastructure provide the least damaging alternative to the sensitive sea grass beds that characterize Redfish Bay. To minimize the potential impacts and provide protection to the sea grass beds, the entire HDD exit workspace and access canal will be lined with turbidity curtains

For details on the Horizontal Directional Drilling (HDD) Operations, working procedures, monitoring of inadvertent returns of drilling fluids, training and reporting, response procedures, and the proposed cleanup techniques, a Best Drilling Practices Plan will be provided.

b. Installation within existing Oil and Gas Canal System:

To further avoid and minimize potential adverse impacts during the installation of the series of pipelines, Axis will utilize a series of abandoned oil and gas canals on the northwest side and southeast side of Redfish Bay. As detailed in the permit drawings, a trench will be excavated within the canal bottoms and the excavated material will be temporarily stockpiled adjacent to the trench. Excavation will be done with barge mounted dredging equipment. The individual lines will be fabricated on a pipe lay barge and



installed within the common trench. The trench will be backfilled utilizing the stockpiled material to provide the required protective cover.

Excavation and spoil placement within the existing canal systems will avoid impacts to submerged aquatic vegetation to the maximum extent practicable. The proposed workspace is 150' wide, with 76' being designated as the trench/workspace, and 60' designated as temporary spoil placement area. Additionally, turbidity curtains will be installed adjacent to the workspaces to reduce the potential for secondary impacts to adjacent seagrass habitats. Utilization of the existing access canals limit the impacts to the sea grass beds to 1.83 acres. The majority of the seagrass that may be potentially impacted are located on the fringe of the access canal, with the largest area (1.3 acres – Seagrass Bed #1; see Sheets 16 & 17) being located just south of the HDD exit within the access canal.

c. Installation across Redfish Bay:

Similar to the Canal Bottom installation methodology, a 75' wide trench will be excavated within the bay bottom and excavated material will be temporarily stockpiled on the bay bottom adjacent to the trench. Excavation will be done with barge mounted dredging equipment. The individual lines will be fabricated on a pipe lay barge and installed within the common trench. The trench will be backfilled utilizing the stockpiled material to provide the required protective cover. During bay construction the work areas and temporary spoil placement sites will be marked, and signage maintained to provide for safe marine traffic. Approximately 2.3 acres of seagrass (Seagrass Bed #6; see Sheet 18) will potentially be adversely impacted with the proposed alignment across Redfish Bay. Due to its location being at the mouth of the existing oil and gas access canal located on the south side of Redfish Bay, potential adverse impacts to the resource are unavoidable. The minimum workspace needed to install the pipelines across this area is being proposed to reduce impacts.

d. Seagrass Shallows and Tidal Flat Installation:

When departing the most southernly canal reach, the pipelines are proposed to be installed within shallow open water of Redfish Bay onto the southern reach of Harbor Island and then easterly on the island roughly parallel to the Corpus Christi Ship Channel for approximately 4,000 feet. This sandy area (tidal flat) is situated above mean high water and is generally devoid of vegetation. A trench will be excavated within the bay shallows and on the tidal flat utilizing a mechanical excavator on pontoons (marsh buggy). The excavated material will be temporarily stockpiled adjacent to the trench. In the bay shallows the individual lines will be fabricated on a pipe lay barge and pushed into the common trench to a tie-in point with the land-based segment. On the tidal flats, the lines will be assembled adjacent to the trench and placed within the trench by cranes. The trench will be backfilled utilizing the stockpiled material to provide the required protective cover.

Within the shallow bay area, turbidity curtains will be installed adjacent to the workspaces to reduce potential secondary adverse impacts to adjacent seagrass habitats. On the tidal flats' standard terrestrial



best management practices (e.g., silt curtains, haybales, etc.) will be utilized to reduce potential secondary adverse impacts from runoff. Approximately 3.68 acres of sea grass will be potentially impacted by the proposed alignment (Seagrass Bed #7; see Sheet 19) and is located just north of the point where the alignment turns easterly across the tidal flat area. Approximately 10.62 acres of tidal flats will potentially be temporarily impacted during the installation (See Sheets 19 & 20). Construction across the tidal flats will also result in potential adverse impacts to approximately 0.51 acres of black mangrove (See Sheets 19 & 20). Additionally, approximately 0.11 acres of estuarine wetlands will be potentially impacted. The estuarine wetland (Estuarine Wetland #2; see Sheets 19 & 20) is a fringe wetland located along the western most boundary of Discharge Material Placement Area (DMPA) No. 3.

e. Installation within the Dredge Material Placement Area (DMPA):

The pipeline approach to the Harbor Island Terminal within the DMPA will be installed by conventional land-based trench and backfill method. The trench will be excavated, and material placed adjacent to the trench within the workspace. The lines will be laid out adjacent to the trench, welded and placed into the common trench. All the lines will be hydrotested and then the trench backfilled utilizing the stockpiled material to provide the required protective cover. Standard terrestrial best management practices (e.g., silt curtains, haybales, etc.) will be utilized to reduce secondary impacts from runoff.

ATTACHMENT 5

PJD DATA TABLE

PERMIT APPLICATION SWG-2018-00789
AXIS MIDSTREAM HOLDINGS, LLC
 Midway to Harbor Island Pipelines & Terminal
 PJD Date Table

Date: 3/29/2019

Preliminary Jurisdictional Determination Affected Resource Data Table							
AR Water Name	Latitude	Longitude	UTM Northing	UTM Easting	Acres	Cowardin Class	Class of AR
18-00789 Waterbody #1	27° 54' 59.110" N	97° 22' 35.199" W	2164586	10134506	0.23	PUBFh	404
18-00789 Waterbody #2	27° 54' 58.678" N	97° 21' 23.648" W	2171005	10134549	0.1	N/A	404
18-00789 Waterbody #3	27° 55' 58.080" N	97° 20' 36.343" W	2175166	10140604	0.04	R5UBFx	404
18-00789 Waterbody #4	27° 56' 40.893" N	97° 19' 46.677" W	2179562	10144988	0.1	R2UBHx	404
18-00789 Wetland #1a	27° 53' 48.807" N	97° 12' 26.567" W	2219283	10128169	5.48	PEM1A	404
18-00789 Waterbody #5	27° 53' 48.403" N	97° 12' 20.396" W	2219837	10128137	0.3	R4SBCx	404
18-00789 Wetlands #1b	27° 53' 48.161" N	97° 12' 15.698" W	2220259	10128118	2.04	PEM1A	404
18-00789 Wetlands #2	27° 53' 30.447" N	97° 11' 28.187" W	2224548	10126392	0.05	PEM1A	404
18-00789 Wetlands #3	27° 53' 29.817" N	97° 11' 27.056" W	2224650	10126330	0.03	PEM1A	404
18-00789 Waterbody #6	27° 53' 29.535" N	97° 11' 25.414" W	2224798	10126304	0.03	R4SBCx	404
18-00789 Waterbody #7	27° 52' 57.022" N	97° 10' 30.745" W	2229752	10123094	0.14	PUBHx	404
18-00789 Wetlands #4	27° 52' 40.798" N	97° 9' 57.983" W	2232716	10121499	0.06	PEM1A	404
18-00789 Wetlands #5	27° 52' 46.459" N	97° 9' 46.646" W	2233725	10122086	5.71	PEM1J	404
18-00789 Wetlands #6	27° 52' 38.543" N	97° 9' 32.731" W	2234985	10121305	0.51	E2EM1P	10/404
18-00789 Wetlands #7	27° 52' 44.539" N	97° 9' 31.047" W	2235127	10121913	0.06	N/A	10/404
18-00789 Wetlands #8	27° 52' 45.637" N	97° 9' 31.914" W	2235048	10122023	0.06	N/A	10/404
18-00789 Wetlands #9	27° 52' 33.400" N	97° 9' 31.750" W	2235081	10120787	15.8	PEM1A	10/404
18-00789 Estuarine Wetlands #1	27° 52' 30.509" N	97° 9' 23.883" W	2235792	10120506	0.24	E2EM1P	10/404
18-00789 Sea Grass Bed #1	27° 52' 5.059" N	97° 8' 35.579" W	2240165	10118002	1.3	E1AB3L	10
18-00789 Sea Grass Bed #2	27° 52' 2.591" N	97° 8' 33.876" W	2240322	10117755	0.01	E1UBLx	10
18-00789 Sea Grass Bed #3	27° 51' 55.364" N	97° 8' 22.498" W	2241354	10117040	0.08	E1UBLx	10
18-00789 Sea Grass Bed #4	27° 51' 52.487" N	97° 8' 15.711" W	2241967	10116759	0.09	E1AB3L	10
18-00789 Sea Grass Bed #5	27° 51' 48.403" N	97° 8' 11.410" W	2242360	10116353	0.35	E1UBLx	10
18-00789 Sea Grass Bed #6	27° 51' 10.080" N	97° 7' 10.293" W	2247904	10112566	2.3	E1AB3L	10
18-00789 Oyster Shell Area #1	27° 51' 8.103" N	97° 7' 6.170" W	2248308	10112372	0.01	N/A	10
18-00789 Oyster Shell Area #2	27° 51' 7.932" N	97° 7' 5.831" W	2248277	10112356	0.001	N/A	10
18-00789 Sea Grass Bed #7	27° 50' 32.232" N	97° 6' 44.871" W	2250244	10108779	3.68	E1UBLx E1AB3L	10

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18-00789 Smooth Cord Grass #1	27° 50' 25.778" N	97° 6' 37.016" W	2250960	10108139	0.001	E2EM1P	10
18-00789 Tidal Flat #1	27° 50' 27.075" N	97° 6' 27.193" W	2251839	10108283	4.9	E2USP	10
18-00789 Smooth Cord Grass #2	27° 50' 27.713" N	97° 6' 20.015" W	2252483	10108358	0.01	E2EM1N	10
18-00789 Black Mangrove #1	27° 50' 27.035" N	97° 6' 19.327" W	2252545	10108290	0.03	E2EM1N	10
18-00789 Tidal Flats #2	27° 50' 27.304" N	97° 6' 16.860" W	2252767	10108321	0.1	E2USP	10
18-00789 Black Mangrove #2	27° 50' 27.340" N	97° 6' 15.837" W	2252858	10108326	0.34	E2EM1N	10
18-00789 Black Mangrove #3	27° 50' 28.661" N	97° 6' 7.142" W	2253637	10108471	0.04	E2EM1N	10
18-00789 Tidal Flats #3	27° 50' 29.105" N	97° 6' 0.928" W	2254194	10108525	4.9	E2USP	10
18-00789 Estuarine Wetland #2	27° 50' 29.194" N	97° 5' 56.646" W	2254578	10108540	0.11	E2EM1N	10
18-00789 Waterbody (dock area)	27° 50' 38.417" N	97° 4' 53.692" W	2260215	10109559	70	E1UBL	10
18-00789 Estuarine Wetland #3	27° 52' 19.590" N	97° 9' 44.901" W	2233922	10119375	0.1	N/A	10/404
18-00789 Waterbody #8	27° 52' 18.727" N	97° 9' 45.489" W	2233871	10119287	0.3	E2USN	10/404
18-00789 Estuarine Wetland #2	27° 52' 18.498" N	97° 9' 45.623" W	2233859	10119264	0.01	N/A	10/404