BOARDWALK SM

PIPELINES

Engineering & Construction

EC-DS-007

Design Standard: Meter Station

Revision: 1.20
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Tables

Appendices

1 INTRODUCTION

1.1 Overview

The intent of this interconnect specification is to provide a general guide for the engineering, design and construction of Company Meter Stations. The engineering, design and construction of these facilities shall be in accordance with this document, Company specifications and standards, as well as sound engineering practices.

1.2 Scope

The scope of this Specification applies to onshore meter stations utilizing all meter types of six (6”) inch and greater.

For the purpose of this document, meter station refers to facilities consisting of meters, regulation, and other associated equipment.

1.3 Codes and Standards

The codes and standards listed in the following tables are incorporated by reference. In the event of any conflict between Company specifications and these codes and standards, the more stringent shall apply.

Codes and standards in the table below and referenced in 49 CFR Part 192, shall be the edition referenced in 49 CFR Part 192. All others listed below shall be the latest edition.

Code/Standard	Title
49 CFR, Part 192	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
29 CFR Part 1910	Occupational Safety and Health Standards
29 CFR Part 1926	Safety and Health Regulations for Construction
API Spec 5L	Specification for Line Pipe
API Spec 6D	Specification for Pipeline Valves
API RP 500C	Classification of Locations for Electrical Installations at Pipeline Transportation Facilities
API Standard 1104	Welding of Pipelines and Related Facilities
API MPMS Chapter 14.1	Collecting and Handling of Natural Gas Samples for Custody Transfer

Code/Standard	Title
API MPMS Chapter 21.1	Electronic Gas Measurement
ASTM A106/A106M	Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A234/A234M	Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
ASTM A105/A105M	Standard Specification for Carbon Steel Forgings for Piping Applications
ASTM A694/A694M	Standard Specification for Carbon and Alloy Steel Forgings for Pipe Flanges, Fittings, Valves, and Parts for High-Pressure Transmission Service
ASTM A193/A193M	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
ASTM A194/A194M	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
ASTM E709	Standard Guide for Magnetic Particle Testing
ASME B31.8	Gas Transmission and Distribution Piping Systems
ASME Boiler & Pressure Vessel Code, Section VIII, Division 1	Rules for Construction of Pressure Vessels
ASME Boiler & Pressure Vessel Code, Section IX	Welding and Brazing Qualifications
ASME B16.5	Pipe Flanges and Flanged Fittings
ASME B16.9	Factory-Made Wrought Buttwelding Fittings
ASME B16.11	Forged Steel Fittings, Socket-Welding and Threaded
ASME B16.20	Metal Gaskets for Pipe Flanges

Code/Standard	Title
ASME B18.2.1	Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws
ASME B18.2.2	Nuts for General Applications
ASME B31.3	Process Piping
MSS SP-44	Steel Pipeline Flanges
MSS SP-75	Specification for High-Test, Wrought, Butt- Welding Fittings
MSS SP-97	Integrally Reinforced Forged Branch Outlet Fittings – Socket Welding, Threaded, and Buttwelding Ends
ACI 318	Building Code Requirements for Structural Concrete
ASCE 7	Minimum Design Loads for Buildings and Other Structures
NACE RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0286	Standard Recommended Practice - Electrical Isolation of Cathodically Protected Pipelines
UL	Underwriters Laboratories
UL 142	Steel Aboveground Tanks for Flammable and Combustible Liquids
NFPA	National Fire Protection Association
NFPA 70	National Electrical Code (NEC)
AGA Report 3	Orifice Metering of Natural Gas and Other Related Hydrocarbon Fluids
AGA Report 7	Measurement of Natural gas by Turbine Meter
AGA Report 9	Measurement of Gas by Multipath Ultrasonic Meters
AGA XL1001	Classification of Locations for Electrical Installations in Gas Utility Areas

2 GENERAL REQUIREMENTS

The gas measurement facilities shall be designed and constructed to comply with all Company requirements, including:

- The design of the measurement facilities shall consider the effects of the piping arrangement on the meter accuracy and limit the amount of gas losses due to leaks, instrument venting, and gas blow-down.
- Only those materials and fabricators that have been approved by Company shall be used as set forth in Company Approved Vendor List and Company Approved Fabricator List. This includes the use of approved suppliers, fabricators, and vendors, as well as exclusive domestic sourcing of materials. Any deviation from domestic sourced materials must be approved by Project Manager.
- Facilities shall be designed to allow safe access and movement through the station for operations and maintenance. Adequate room shall be provided for parking off roads while accessing the station gates.
- Adequate lighting for safe movement through the facilities at night shall be included.
- The interconnecting and measurement facilities shall be designed to prevent intentional and un-intentional trespassing, access to data equipment, and ready access to other adjustable equipment. Security shall include fences, door and gate locks, and secure covers over instruments.
- Equipment within the facility shall be arranged to eliminate tight spaces and provide stairs, platforms or other permanent means to provide adequate access to junction boxes and instrumentation and other serviceable components, without having to climb, crawl or use portable ladders in accordance with OSHA, State, and local requirements.
- The facility shall include appropriate site drainage and provisions for run-off, to avoid ponding or free standing water within the site.

3 MEASUREMENT

The type of gas meter shall be in accordance with the Company Measurement Design Standard. The preferred method of measuring natural gas flow shall be with multipath ultrasonic meters. The use of other types of meters shall only be considered after input from Measurement Services.

The method for bi-directional meter installations shall generally be to install piping within the station to keep the direction of flow through the meter(s) in one direction. Installation of bi-directional meter tubes shall require special design consideration and Measurement Services approval.

At least one spacer plate shall be installed in each meter run.

Meter facility measured capacity shall be designed for 120% of the maximum daily flow, unless otherwise specified and approved by Project Manager and Measurement Services.

Where multiple meters of any type are installed to divide the flow, the meters shall be of the same size; no single meter shall be sized for less than 120% of the maximum daily spilt flow, unless deviation is approved by Project Manager and Measurement Services. The exception to this requirement would be for meters specifically required for periodic low flow applications. Low flow applications shall require special design considerations and review by Measurement Services.

3.1 Ultrasonic Meters

Ultrasonic meter arrangement shall comply with AGA 9 and Company drawing BWP-201-08.

Operating range is 2 to 80 feet per second. The maximum daily flow rate shall not exceed 350 MMSCFD for any one meter.

Multiple meter runs shall be of the same size.

Ultrasonic meters shall not be larger than 16” nominal.

Ultrasonic meter 8” and larger shall include a verification meter, either integral to the primary meter body or a separate meter body incorporated in the downstream spool piece of the meter tube.

When verification meters are required, the verification meter shall have dedicated and separate temperature and pressure transmitters.

Multiple meter runs not installed on skids shall have a minimum clearance of 4 feet between meters for access and maintenance.

All ultrasonic meters shall be installed with a protective overhead canopy. The canopy shall cover the entirety of the meter tube(s) and shall extend a minimum of 5 feet from the sides of the meter or meter skid.

Company has pre-engineered ultrasonic meter skid designs that incorporate the latest Company requirements. Utilizing the designs as well as Company approved fabricators will help ensure compliance with Company requirements.

3.2 Other Types of Gas Meters

The use of other types of meters shall only be considered after input from Measurement Services.

Meters shall be installed on a skid complete with all required instrumentation and electrical. Where Company standard drawings are available, they shall be used.

Orifice meters

- Orifice meters shall be Senior type fittings.
- Differential range shall be 10” to 360” water column.
- Orifice Meter arrangements shall comply with AGA 3 and any applicable Company standard drawing.
- Design beta range shall be 0.2 to 0.60.

Positive Displacement Meters

- Positive Displacement (PD) Meters shall be rotary meters with 1000 pulse per revolution outputs.
- PD meters shall be installed with an excess differential activated, integral or external bypass system.
- PD Meters arrangements shall comply any applicable Company standard drawing.

Turbine Meters

- Turbine Meter arrangements shall comply with AGA 7 and any applicable Company standard drawing.
- Turbine Meter shall be dual rotor auto adjust type.

4 FLOW CONTROL VALVES

Flow Control Valves shall be installed to regulate the flow or pressure of gas.

Unless otherwise specified by Measurement Services, the Flow Control Valve shall be installed downstream of the meter(s).

Flow Control Valves shall be configured to receive a 4-20 mA control signal. Flow and/or pressure control function is determined by the connected flow computer (RTU).

When a second party override is required, the Flow Control Valve shall be provided with an electronic flow override select relay mounted in the Company junction box or EGM panel.

Where multiple Flow Control Valves are to be used to divide the flow, the Flow Control Valves shall be of the same size; no single valve shall be sized for less than 120% of the maximum average daily split volumes. The exception to this requirement would be for smaller valves specifically required for periodic low flow applications. Low flow applications shall require special design considerations and review by Measurement Services.

Flow Control Valves shall not be larger than nominal 12”. Gas flow velocities in the downstream piping of the Flow Control Valve shall not exceed 80 feet per second.

The noise level of the Flow Control Valve shall not exceed 90 dB at 3 feet from the valve as determined by manufacturer software. Site conditions may require more stringent noise abatement.

Flow Control Valves shall be designed to fail in their last position upon loss of supply pressure or loss of control signal.

Each Flow Control Valve shall have its own heated power gas supply system. These systems shall consist of 12VDC catalytic heaters, pressure regulation and inlet filters in accordance with Company Approved Vendor List.

5 OVERPRESSURE PROTECTION (OPP)

OPP shall be installed to protect equipment and piping from accidental overpressure. Company shall install OPP when Company has the lower system MAOP or if the connecting system MAOP is unknown.

In no case shall Company provide OPP for pipe and facilities owned and/or operated by other (non Company) entities.

The preferred method of OPP is by means of a pressure limiting valve (Monitor Valve) installed upstream of the Flow Control Valve. The use of other types of OPP, including Relief Valves, shall be specified and approved by Project Manger and Measurement Services.

The requirements of this section do not apply to the overpressure protection of instrumentation, fuel or power gas systems.

5.1 Pressure Limiting Valves (OPP Valve)

When an OPP Valve is installed it shall include a pressure override signal to the Flow Control Valve.

The OPP monitor valve shall be located upstream of the Flow Control Valve.

The OPP monitor valve shall be pneumatic and sense pressure locally, downstream of the Flow Control Valve and downstream isolation valve. The OPP setpoint shall not exceed the maximum allowed value as outlined in the O&M manual.

The OPP valve shall be the same nominal size as the Flow Control Valve.

The OPP valve shall fail in the closed position upon loss of supply pressure or shall have a standby power gas supply system

Company has pre-engineered skid mounted regulator designs that also include actuated shut-in valves. Utilizing these designs as well as Company approved fabricators set forth in Company Approved Fabricator List will help ensure compliance with Company requirements.

Each OPP Valve shall have its own heated power gas supply system. These systems shall consist of 12VDC catalytic heaters, pressure regulation and inlet filters in accordance with Company Approved Vendor List.

5.2 Pressure Relieving Valves (Relief Valves)

Relief Valve type and size shall be specified by Measurement Services.

Relief valves shall be constructed of corrosion resistant metal and/or coatings for all moving, seating, and control components, and otherwise constructed of materials such that corrosion will not impair the operation of the Relief Valve.

Relief Valves shall be designed not to stick in a position that will make the device inoperative

Relief Valves shall be installed in the vertical position with supports sufficient to stabilize the valve and exhaust stack during operation and constructed of steel or other non-combustible material.

Valves used to isolate the relief valve from the source of pressure for testing and maintenance shall be full-bore ball valves, lockable in the full open position.

Relief Valves shall be installed with a spool piece with tap and branch valve installed between the isolation valve and the relief valve for testing of the valve (unless equipped with test ports).

The relief valves control lines and or associated equipment physically independent from the pressure control device and/or adequately protected such that a single catastrophic incident could not affect the operation of both the relief valve and the pressure control device.

Relief valves that are located within a building shall be vented to the outside of the building with the vent stack extending to a minimum of 2’-0” above the ridge of the building roof.

Relief Valves shall have discharge stacks, vents, or outlet ports designed with rain caps and weep holes to prevent accumulation of water, ice, or snow. Relief vents shall be located so that gas can be discharged into the atmosphere without undue hazard.

Have an outlet that is a minimum of one (1) nominal pipe size larger than the relief valve inlet. Pipe and fittings on the relief valve outlet shall be of an adequate size to prevent impairment of relief capacity.

6 REDUNDANCY

Redundant Meters and Flow Control may be used if uninterruptible service is specified in the project specific Design Basis Memorandum. Redundant Meters or Flow Control shall be the same size as the largest single meter or Flow Control run.

7 BYPASS

A bypass line shall be installed around the meter or multiple meters. The bypass shall be capable of handling the capacity of any one meter taken out of service.

A bypass line shall be installed around the regulation equipment. The bypass shall be capable of handling the capacity of the regulator run taken out of service and the bypass valve shall be capable of maintaining the same differential pressure as the control valve with damage.

Generally, the bypass line can be sized one nominal pipe size smaller than the meter or regulation. Preferable, bypass lines shall contain a lockable API 6D double block-and-bleed ball valve. Two valves installed in series, with a manual pressure release valve in between, is also acceptable.

Meters and regulation that have redundancy do not require bypass.

8 ELECTRONIC GAS MEASUREMENT (RTU)

The meter station RTU shall be specified by Measurement Services.

Generally, the RTU shall be mounted on the primary meter skid. However, in locations subject to harsh winter conditions or other instances where Field Operations determines a building is required, Company Electronic Gas Measurement, communication and other related electronic and power equipment shall be housed in a dedicated building (RTU Building). The RTU building shall comply with the following:

- Only Company equipment shall be housed in the Company RTU building and only Company personnel shall have access to the Company RTU building, unless otherwise approved by the Project Manager.
- The RTU building shall be located in an electrically non-hazardous area. Access to the RTU should be through non-hazardous areas.
- The door way of the RTU building shall face towards the measurement equipment.

Where applicable, the standard pre-engineered RTU systems and building designs shall be used. Utilizing the designs set forth in the Standard RTU Building Drawings as well as Company approved fabricators will help ensure compliance with Company requirements.

9 GAS SAMPLING

Measurement Services shall determine if gas sampling is required and shall specify equipment type. The chromatograph equipment or building should be placed as close as practical to the sample point on the primary meter run.

Stand alone gas chromatograph shall be rack mounted adjacent to the meter skid.

If a moisture analyzer or other analyzing equipment is required, then a enclosure shall be utilized to house the equipment.

- The building should be placed perpendicular to the tap and no more than 15 feet from the sample point on the meter run.
- The Gas Chromatograph Building should be located so that a Specialist can easily back a vehicle close to the building to move calibration standard and helium bottles in and out of the building.
- The Gas Chromatograph Building should be positioned such that the doors are orientated in the same direction as the meter run.
- Company has a pre-engineered Gas Chromatograph Building design that incorporates the latest Company requirements. Utilizing the designs set forth in Standard Gas Chromatograph Building Drawings as well as Company approved fabricators set forth in Company Approved Fabricator List will help ensure compliance with Company requirements.

A sample probe is required on the primary meter run only.

For systems with operating pressure under 800 psig, a sample probe-regulator shall be used.

For wet or rich gas systems, and operating pressures 800 psig and greater, a supplemental heated and regulated sample system shall be used.

Sample lines shall be 1/8” nominal diameter stainless-steel tubing with self regulating electric heat tracing. The sample line heat trace circuit shall not have thermostatic control.

Gas chromatographs shall be required for measurement facilities utilizing 6” and larger ultrasonic meter stations and dual 6” orifice meters; receipts into Company pipelines operating at 80% SMYS and higher; as well as all other locations as determined by Measurement Services and Field Operations.

Composite sample systems shall be required for measurement facilities without Gas Chromatographs.

The use of common area gas chromatograph data (zoning) shall require approval by Measurement Services and Field Operations.

Moisture analyzers shall be required for all receipts into Company Special Permit or Alternative MAOP pipelines and all other systems determined by Measurement Service and Field Operations

The need for other gas analyzing equipment, such as O_2 and H_2S analyzers, shall be determined by the project specific requirements.

Company approved gas chromatograph and other analyzer equipment are listed in Company Approved Vendor list.

10 COMMUNICATIONS EQUIPMENT

The Project Manager shall consult the Company's Field Communication Leader (FCL) at the onset of the project scoping for project specific Communications requirements. The Company FCL shall make the final determination of the method and equipment that comprise the Communications solution for all projects.

The selection of the Communications solution will be made based on the following criteria:

- The range of projected flow volumes of new meter station.
- Whether real-time SCADA, Daily data collection, or both are required by the Company's Gas Control and Measurement departments.
- Whether Remote Control capability is required by the Company's Gas Control department.
- GPS coordinates of new meter station location.

Methods of Communications commonly utilized by the Company are as follows:

10.1 Company Data Radio

When the new meter station location falls within coverage of any existing Company owned and operated Data Radio networks, this will be the preferred method of Communications for all new meter station projects. This determination will be made by the Company's FCL based upon radio path criteria calculated by the FCL for each meter station.

10.2 VSAT (Satellite Communications)

When the new meter station location does not fall within coverage of any existing Company owned and operated Data Radio networks, as determined by the Company FCL, third party VSAT Communications will typically be utilized where the projected flow volumes of the new meter station are greater than 50 MMCFD and when an RTU Building and/or Gas Chromatograph Building exist.

10.3 Cellular Modem

Third party Cellular Modem Communications will typically be established in the following applications:

1) Paired with above VSAT for Communications redundancy, or
2) Stand-alone Communications where adequate cellular coverage exists and projected flow volumes of the new meter station are less than 50 MMCFD.

10.4 Satellite Modem

Third party Satellite Modem Communications will typically be utilized at new meter stations with smaller flow volumes when both the following apply:

1) Where the new meter station RTU is located on the meter skid
2) Where adequate cellular coverage does not exist, as determined by the Company FCL.

11 OTHER EQUIPMENT

All equipment shall be supplied by Company Approved Vendors and/or assembled by Company Approved Fabricators.

11.1 Filter Separator

Where required, filter-separators shall be capable of removing solid particles of 1 micron or larger and 99% of liquids through the design operating range.

Filter-separators shall be required for measurement facilities receiving gas into Company Special Permit or Alternative MAOP pipelines and all other locations as determined by Company.

Filter-separators shall be installed upstream of the meter.

Filter-separators shall be provided with the following instrumentation:

- Differential Pressure Transmitter across the filter element(s)
- External fixed level gages on each sump
- Electric High for alarm signal and High-High level switches for shut-in on each liquid sump
- Other project specifics instrumentation

Dump Valves

- Dump valves shall be pneumatically operated with level controller on each sump.
- Dump valves shall be fail-closed
- The supply lines to the dump valve shall be provided with electrically operated solenoid valves that prevent the valves from operating if a high level is detected at the condensate tank

Filter-separators shall be installed with inlet and outlet isolation valves and a bypass valve, thermal relief valve, as well as a 2” manual valve specifically for the purpose of venting and purging the vessel. A Filter-separator inlet valve 8” or greater shall have a 2” bypass valve for the purpose of pressurizing and purging the vessel.

Stairs and access platforms shall be installed to access all serviceable equipment and instrumentation in accordance with OSHA, State and local requirements.

11.2 Condensate Tanks

Condensate Tanks shall be installed at all facilities with filter-separators.

Aboveground oil and gasoline storage tanks must be protected in accordance with National Fire Protection Association Standard No. 30.

Condensate Tanks shall be double-wall construction and shall be elevated to allow inspection of the underneath of the tank.

Condensate Tanks shall be constructed in accordance with the following:

- Vertical Tanks: UL-142 and API 650
- Horizontal Tanks: UL-142.

Condensate Tanks shall be internally coated with 2 coats of epoxy.

Condensate Tanks shall have the following instrumentation:

- External fixed level gage
- Electric High Level switch
- Electric High-High level switch (filter-separator dump override)
- Leak detection indicator or level switch.
- Other project specifics instrumentation required

Condensate Tanks shall be provided with a 2” outlet pipe extending a minimum of 25 feet from the tank to the truck loading connection, and shall have isolation valves at each end. A truck grounding connection shall be installed at the truck loading connection.

Spill prevention leak trap shall be installed at truck loading connections.

11.3 Process Gas Heaters

Process gas heater shall be indirect fired water-bath heaters.

Process gas heater shall be installed before pressure regulation.

Process gas heater shall be sized by the manufacturer to minimize pressure drop and deliver gas at temperatures after regulation 40°F or meet the minimum temperature in the tariff requirements for a particular system as well as a minimum of 40°F above the Hydrocarbon Dew Point. The gas temperature directly at the outlet of the Heater shall not exceed 110°F.

Process Heaters shall be installed with inlet and outlet isolation valves as well as bypass valve and piping.

Fuel gas meters are to be installed downstream of delivery meters and upstream of receipt meters.

11.4 Odorizers

Odorization is not to be installed unless required to meet Federal, State or local requirements.

Odorant shall only enter the gas stream downstream of regulation and only in single direction meter facilities.

The selection of the odorization equipment shall be coordinated with Operations and Measurement Services.

12 CONNECTING PARTY/CUSTOMER EQUIPMENT AND CONNECTIONS

Operating responsibilities and ownership shall be stated in the Interconnect Agreement (ICA).

Equipment and piping operated by Company shall be contiguous unless approved by the Project Manager.

Company shall not be responsible for the design of equipment it does not operate. However, Company shall insure that any equipment or piping adjoining its facilities shall comply with applicable codes and standards.

Integration of shared electronic signals or installation of Connecting Party/Customer instrumentation on Company operated equipment shall be coordinated early in the project.

3rd Party electronic signals shall be opto-isolated.

13 PIPING

Piping systems shall be designed to meet the requirements of 49 CFR part 192 and ASME B 31.8.

In general, piping systems shall be designed for a maximum allowable operating pressure (MAOP) of 1,480 psig at 100°F with a 0.5 design factor applied. For other MAOP or temperature requirements, Company shall specify the pipe, fittings and valves.

A corrosion allowance is not required.

The gas flow through station piping shall not exceed 100 feet per second.

Intermittent gas flow through bypass blow-down or relief valves, and piping, may exceed 100 feet per second.

Inlet and outlet header piping shall be sized to limit the gas flow to 50 feet per second for 125% of the maximum average daily volume of the piping connected to the header, excluding redundant runs and bypass piping. Pipe headers shall be at least one nominal pipe size greater than the largest connected pipe.

Inlet and outlet header piping should be buried to allow ready access between the connected meters or regulator runs. Buried headers shall have low point drains.

Header shall be arranged to eliminate “dead areas” and to generally allow the same distance for each flow run for balanced flow.

Each section of pipe that can be isolated shall have a vent valve.

13.1 Internal Corrosion Design

Integrity Management Services and Field Operation shall be consulted early on in the project to insure that the meter station piping design provides for internal corrosion mitigation.

The design shall consider corrosion mitigation such as pigging, sweeping, drains, or the use of corrosion coupons.

The design review shall facilitate the completion of the Internal Corrosion Check List.

13.2 Above Ground Piping

Nominal 2” and larger pipe and fittings shall be butt welded or flanged.

Nominal 1-1/2” pipe and smaller shall be threaded or socket welded.

Clearance between bottom of pipe and final grade shall be not less than 24”.

Above ground piping shall be properly secured with Company approved pipe straps or u-bolts. Straps and supports shall have a minimum of 1/8” Teflon or other Company approved material between it and the pipe.

Above ground pipe shall have removable blocks or adjustable supports at all support points that allow a minimum of 3” space for coating inspection or repair.

13.3 Below Ground Piping

Minimum depth of coverage for buried pipe shall be 3 feet from top of grade to top of pipe. Pipe routed under roads or other areas subject to frequent vehicle traffic shall have a minimum depth of cover of 5 feet from the bottom of the road bed material or other cover. Other installations, such as wetlands, may require additional cover, markings or concrete. Buried utility and drain piping shall have a minimum of 18” of cover.

Underground pipe supports or concrete sleepers shall not be installed underneath pipe fittings and welds. Underground supports shall include a minimum of 1/8” thick felt or neoprene pad between the pipe and the support.

All buried pipe shall be welded.

Installation of flanges below ground should be avoided and requires Company approval.

Station pipe crossings underground shall have a minimum separation of 12” between pipes. Pipes routed in the same ditch shall have a minimum separation of 24” between pipes.

13.4 Low Point Drains

The location of low point drains shall take in to consideration the direction of gas flow and the likely accumulation of liquids.

Low point drains shall be a minimum of 2” and shall be connected to bottom of headers or pipe. Siphon drains are not permitted. Low point drains risers shall be properly supported.

Low point drains shall terminate above ground with a ¾” lockable ball valve. Low point drains shall not be piped together or piped to any collection tank.

13.5 Piping Material

All pressure containing pipe and fittings shall be new and have Mill Test Reports (MTRs). MTRs shall be provided to Company for approval before installation.

All materials shall be of domestic origin. In the event that domestic materials are not available, the MTR’s shall be submitted to the Project Manager for review and acceptance.

Pipe shall be seamless or ERW, certified ASTM A-106 or API 5L. Pipe larger than nominal pipe size of 4” shall be PSL 2.

Maximum allowable weldolet size is 2” nominal pipe size.

Flanges shall be raised face weld neck conforming to ANSI B16.5, ASTM A105 for Grade B or MSS-SP44, ASTM A694 for Grade F42 or higher.

Flange stud bolts shall conform to ASTM A193 grade B7, and shall be cadmium or Teflon coated. Flange stud lengths shall extend 2 - 3 full threads, past the nut on each end when properly torque.

Stud nuts shall be ASTM A194 grade 2H, and shall be cadmium or Teflon coated.

Gaskets shall be spiral wound conforming to ANSI B.16.20 suitable for ANSI B16.5 RF flanges with 304 SS centering ring and inner ring (12” and larger only), 304/316SS graphite filled windings. The gasket inside diameter shall be sized to match the flange inside diameter.

All butt-weld, Grade B fittings shall be specified to ANSI B16.9, ASTM A234 Grade WPB. All “Y” grade fittings shall be specified to MSS SP-75. Threaded and socket weld fittings shall be specified to ANSI B16.11.

The butting wall thickness shall be equal to, or no greater than 0.093” difference of, the matching pipe.

Pipe shall have Standard wall thickness or greater and a grade not less than shown in the table below.

Table 13-1: Minimum Wall Thickness & Corresponding Grade

NPS	Minimum Schedule or Wall	Minimum Grade
2” & smaller	X.S/Sch. 80	B
3” & 4”	Std./Sch. 40	B
6” & 8”	Std./Sch. 40	X42
10”	Std./Sch. 40 (0.365”)	X46
12”	Std. (0.375”)	X52
14”	Std./Sch. 30 (0.375”)	X56
16”	Sch. 40 (0.500”)	X52
18”	Sch. X.S. (0.500”)	X56
20”	Sch. X.S. (0.500”)	X60

13.6 Valves

Valves 2” and larger shall conform with API 6D and shall bear an API monogram. In addition, all valves installed above ground shall be “fire safe” conforming to API 6FA, API 6FD and/or API 607. All isolating valves in the primary flow path shall be full port. Ball valves 6” and larger shall have double block and bleed and a secondary sealant system feature.

Valves 1-½” and smaller installed above ground shall be ASTM A105 material and conform to ASME B 16.34 with a working pressure of 3,000 psi or higher. Valves with a two-piece body joined by threads are prohibited. All valves must be capable of accepting a suitable locking device.

Pipeline mainline block valves may be designated as Rupture-Mitigation Valves (RMVs). These designations may dictate the location placement due to response times, access to commercial power, and remote actuation requirements. Valve actuation shall take into consideration §§192.179(e), (f), 192.610, 192.634, 192.903, 192.935, and Appendix E to Part 192 – Guidance of Determining High Consequence Areas and on Carrying out Requirements in the Integrity Management Rule.

> **Note:** When an RMV is designated, the shut-off segment may contain a lateral and may require additional design considerations based on flow and size of the lateral. Refer to §192.634(b)(3).

14 PAINTING AND COATING

Coating application shall be in accordance with Company coating specifications as set forth in Appendix A and B.

General requirements are as follows:

- All above ground metal surfaces and bare pipe shall be abrasive blast clean in accordance with SSPC-SP-6; Commercial Blast with a 2-3 mil profile.
- Above ground coating system shall be Carboline products and shall consist of an Epoxy prime coat of 6-8 mils, and a Urethane finish coat of 2-4 mils. Finish coat shall be “Boardwalk” grey unless otherwise specified.
- Undamaged above ground FBE coated pipe shall be brush blasted, primed and top coated to specified coating thickness,
- Below ground pipe shall be FBE coated.

Below ground metal surfaces and bare pipe and seams shall be abrasive blast clean in accordance with NACE 2 /SSPC-SP-10; Near White Blast, with maximum surface profile as outlined in Table 7-1 or Table 7-2 of the Company below ground coating specification (Appendix B) with 20 – 25 mils of SP 2888, Protol 7200, or other Company approved coating.

Pipe extending from below ground shall be coated with belowground coating and wrapped with RD-6 impact resistant wrap to a minimum of 24” above grade and 18” below grade.

Structural supports and equipment skids shall be hot-dip galvanized.

OSHA safety colors shall be used where applicable.

15 CIVIL

15.1 Grading

Meter Facilities shall in general be level with a 1 degree of slope for sheet drainage across the site.

The Meter Facility shall be clear of all vegetation.

15.2 Roads

Roads shall be designed for all weather accessibility and endurance for all truck traffic and equipment necessary for operations and maintenance of the site. Drainage culverts shall be installed as required to maintain adequate drainage.

Roads or roadways within the meter site shall have adequate provisions for vehicle turn around.

15.3 Cover

Meter Facilities shall have a minimum of 4” of rock cover over the entire fenced area.

Geotechnical fabric shall be used.

15.4 Foundations

Foundations shall be adequately designed to support the intended load and soil conditions, including consideration of the load of the pipe during hydrostatic testing.

The minimum compressive strength of concrete shall be 3,000 psi at 28 days.

Equipment shall not be set on foundations before 7 days after installation and the compressive strength is at 2,400 psi or greater.

Top of concrete for building and other foundations shall not be less than 4” above finished grade and not less than 12” if snow accumulation can occur.

Elevation of pipe support piers shall provide not less than 24” between the bottom of the pipe and the final grade.

15.5 Structural

Buildings and equipment that are elevated more than 10” above finished grade shall require steps or stairs for access. All instrumentation, terminal boxes, access covers and other equipment requiring maintenance shall be readily accessible from grade or be provided with a permanent platform.

Platforms shall have sufficient work space to perform the work and facilitate tools and materials. Platforms shall be provided with permanent stairs and guard rails.

All steps, stairs, and platforms must meet all Federal, State and local codes

All structural steel shall be hot dipped galvanized.

All steel pipe supports shall have provisions to allow a minimum of 3” space for coating inspection or repair.

15.6 Fencing and Gates

All stations shall have a 6' high chain link wire fabric fence constructed with three (3) strands of 11-1/2 gauge barbed wire supported by 1' angled extensions facing outward.

All gates, corner posts, fence posts, gate support posts, top rails, hardware, braces and ties shall have galvanized finish.

Each facility shall have a minimum of one (1) drive gate, to be 16’ wide, and a minimum of one (1) personnel gate that is at least 3’ wide with locking hardware.

The fence shall be a minimum of 15 feet from any equipment or parallel piping.

16 ELECTRICAL AND INSTRUMENTATION

All electrical facilities shall be designed and installed in accordance with the National Electrical Code (NEC) and any applicable local codes and Company standards.

All electrical materials and equipment shall be labeled as approved by Underwriters Laboratories (UL) or Factory Mutual (FM).

16.1 Area Classification

Electrical area classification shall be determined in accordance with AGA XL 1001 and API RP 500.

All electrical facilities installed in classified areas shall meet the requirements of the National Electrical Code (NEC).

Installation of electrical equipment in Class 1, Div. 1 classified areas shall be avoided whenever possible.

Electrical hazardous classified areas shall not extend beyond the facility boundary fence.

16.2 Power Requirements

In general, measurement facilities require 3-wire, 240/120 Volt AC electrical service or otherwise adequately sized to meet a minimum of 125% of the facility's connected load.

The service entrance equipment shall be located in an accessible non-hazardous location within the meter site, near the fence.

The main electrical disconnect shall be located at the service entrance equipment.

The service entrance equipment shall be grounded at main disconnect to a buried ground rod. The service entrance ground shall be kept separate from the station ground grid.

16.3 Conduit and Wiring Systems

Company and Connecting Party signal and power wiring shall not be installed in the same conduit or cable.

With the exception of skid mounted and building systems, all station conduits shall be buried. Minimum cover over conduit shall be 18".

All conduit crossing a road or roadway shall be encased in red concrete.

Minimum size for buried conduit shall be 1" nominal trade size.

Conduit installed underground and installed vertically within 18" of final grade shall be PVC coated rigid galvanized conduit (RGS). All other above ground conduit shall be galvanized rigid conduit.

The use of C-L-X type armored cable is permitted if agreed to by Area Manager. C-L-X cable shall not be used in heavy traffic area or in conditions that could potentially damage the cable.

AC power and control circuits shall be run in separate conduits or cables.

Control circuits shall utilize tray-cable type multi-conductor cable rated for 300 volts. Instrument cables shall have individually shielded twisted pair or tri conductors.

Minimum conductor size for control circuits routed other than on packaged equipment shall be 18 AWG minimum.

AC power circuits may utilize either multi-conductor cable or individual conductors rated 600 VAC; minimum conductor size 12 AWG.

All cable or wire run in conduit shall have at least 20% spare conductors.

The use of flexible liquid tight metallic conduit (Sealtite) shall be permitted to provide flexible connection to electrical equipment in non-hazardous and Class 1 Div 2 areas. For similar connections in Class 1 Div 1 areas, explosion proof flexible couplings shall be used. Flexible conduit shall not exceed 18” in length.

Conduit seals shall be installed in accordance with the NEC. Conduit seals shall be poured with sealing compound in accordance with the manufacturer’s recommended procedures. Conduits seals shall be sealed prior to gas being introduced into the station.

The conduit or cable system shall be electrically isolated from piping and other equipment connected to the station cathodic protection system.

16.4 Grounding

All above ground metal structures and buildings shall be grounded to the station ground system as shown on the engineered electrical drawings.

Station Piping shall not be grounded.

Equipment and equipment skids shall be connected to the ground loop in two locations with a minimum of #2 AWG conductors.

Ground loops shall consist of 2/0 AWG insulated wire, either HMLPE or RHW insulation.

Ground rods shall be a minimum of ¾” by 10 ft solid copper, buried vertically. Ground rods may by laid horizontal or at 45 degrees if soil conditions do not permit straight vertical installation.

All gates shall be connected to the ground grid. Flexible grounding straps shall bond the moving section of the gate to the gate posts.

A minimum of two (2) grounding test wells shall be installed in accordance with engineered electrical drawings.

Conduit shall not be used as the primary grounding method or as an instrument ground path.

16.5 Area Lighting

Area lighting shall be provided to enable safe access around the facilities.

In populated areas, the lighting design may need to take into consideration nuisance potential on nearby homes.

Area lighting shall be provided with a disconnect switch to allow the operator to manually turn on the lights only when required.

Pole mounted lights shall be installed in non hazardous electrical areas.

Meter skids shall be furnished with lights.

16.6 Heat Tracing

Heat trace circuits shall be connected to ground fault interrupting (GFCI) circuit breakers.

Heat trace cables shall be self regulating as well as thermostatically controlled.

Electrically heat traced sample tubing shall be self regulating without thermostatic control.

16.7 Instrumentation

Pressure, temperature, and multi variable transmitters shall be “Smart” type transmitters from Company approved vendor.

Transmitters shall be mounted on racks or poles as near as practical to the associated meter or regulator run. Direct mount of transmitter on meter or other piping requires approval by the Project Manager and Measurement Services.

Pressure transmitters and gauges shall have manifold valves to allow isolation, bleed-off and calibration.

16.8 Instrument Tubing

Instrument tubing and tube fittings on gas service shall be ASTM A-268 Type 316 Stainless Steel from Company Approved Vendor List.

All underground tubing shall be PVC coated.

Tubing shall be rated at a minimum of 2000 psig.

Minimum tubing size shall be 3/8” with the following wall thickness minimum requirements:

- 3/8-inch through 1/2-inch tubing – 0.035 inch (seamless)
- 5/8-inch through 3/4-inch tubing – 0.049 inch

Tubing and tube fittings shall be installed in a neat and professional manner in accordance with the manufacturer’s requirements and standard industry installation practices.

The Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry Suggested Spacing for Supports is detailed in the table below:

Table 16-1: Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry Suggested Spacing for Supports

Tubing Diameter OD (inches)	Tubing Diameter OD (mm)	Distance between Clamps (feet)	Distance between Clamps (m)
3/16 to 3/8	4 to 10	3	0.9
½ to 7/8	15 to 22	5	1.5
1 to 1 ¼	25 to 30	7	2.1

Table 16-2: Maximum Horizontal Pipe Hanger and Support Spacing

Nominal Pipe or Tube Size (inches)	Nominal Pipe or Tube Size (mm)	Standard Wt. Steel Pipe			
		Water Service (ft).	Water Service (m)	Vapor Service (m)	Vapor Service (m)
¼	6	7	2.1	8	2.4
3/8	10	7	2.1	8	2.4
½	15	7	2.1	8	2.4
¾	20	7	2.1	9	2.7
1	25	7	2.1	9	2.7
1 ¼	32	7	2.1	9	2.7
1 ½	40	9	2.7	12	3.6
2	50	10	3.0	13	3.9

Process pipe connections for instrument tubing shall be 1/2-inch or larger with a minimum of 1/2-inch isolation ball valve. Instruments installed at or near the process pipe shall be installed so that the tubing connection at the instrument is above the process pipe and the connecting tubing slopes back to the pipe.

Tubing routed to remote devices shall have an 18” vertical rise at the process pipe connection.

Company and Connecting Party instrument valves and sense lines shall not be shared.

16.9 Cathodic Protection

Project Manager shall consult with Integrity Management and Corrosion Department early on in the project for the requirements of the cathodic protection system to include the location of each specific type, size and jacket color of cable, as well as the location of anodes and electrical isolation devices to be incorporated in the construction drawings.

Cathodic protection systems shall only be installed by qualified personnel and in accordance with manufacture’s requirements.

Cable and Wire:

- Where underground cable passes under roadways, it shall be in conduit and ends of conduit sealed with watertight connectors.
- All ends of cables not terminated shall be taped immediately with Okoweld tape and two layers of electrical tape.
- No other cables shall be laid in the same trench.
- Cable or wire shall extend a minimum of 18” into junction boxes.
- Corrosion Department shall specify all Tee splices, inline splices, and end lug materials in the design. Tee and inline splices shall be covered with Company specified splice kits.

Anodes:

- All anodes shall be centered in the trench or hole and backfilled National BF-3 or equal material.
- Depth and width of vertical and horizontal holes shall be specified by the Corrosion Department.
- Should rock be encountered, Corrosion Department shall determine the alternative position or depth of anodes. A minimum of 6” of loose soil shall be placed between the rock and the backfill material.

Rectifier Units:

- The indicating meter shall be approximately 57” above floor or grade, so they can easily be read by the operator.
- The cathodic protection rectifiers shall only be powered up and placed in service by Company personnel.

All above ground equipment, such as meter and regulator piping, connected to station piping shall be electrically isolated from the station or connecting piping with insulating flanges.

Insulating flanges shall be installed above ground only.

17 ENGINEERING REQUIREMENTS

17.1 Project Scoping

A project scope of work shall be developed for the purpose of cost estimating and drafting the Interconnect Agreement (ICA). This generally includes a site visit with Company and Interconnecting Party stake holders. The project scope of work shall include:

- Purpose of the Interconnect; receipt or delivery
- Proposed site location
- Flow rates and upstream and downstream operating conditions.
- Proposed equipment
- Operating responsibilities (Responsibility Matrix)

17.2 Project Workbook

A Project Workbook shall be set-up by Project Controls once the ICA has been executed and the budget has been approved. Project specific information entered into workbook will initiate approval review by Company Regulatory, Right of Way (ROW), and Environmental Departments.

17.3 Project Kick-off

A meeting with all Company stakeholders shall be held for the purpose of initiating the project and presenting the project details. A Project Execution Plan shall be developed for distribution and review prior to the kick-off meeting. The Project Execution Plan shall include as a minimum:

- Organizational Chart
- Communications Plan
- Schedule
- Document Control Process

17.4 Front End Engineering and Design (FEED)

A FEED package shall be produced for the basis of soliciting the detail engineering design. The FEED package shall consist of:

- Design Basis Memorandum (DBM)
- Area location map
- Process Flow Diagram (PFD)
- List of Major Equipment
- Proposed meter station general arrangement

If completed, a site survey may also be included in the FEED package.

17.5 Engineering

An engineering scope of work shall be drafted that includes the FEED package for the purpose of soliciting detail engineering services. The engineering scope of work shall include the following deliverables applicable to the project:

Engineering Activities:

- Site Civil Survey
- Site Geotechnical Investigation and Report. The survey shall be sufficient to determine the foundation design equipments and should include a minimum of two soil borings, or a number of bores as determined appropriate by the survey engineer.
- Foundation Calculations.
- Drainage Calculations – drainage calculations shall ensure that station design provides adequate drainage to prevent water from accumulating on the site, and the site drainage does not cause excessive erosion.
- Noise Survey (if applicable)
- Voltage Drop/ Wire Size calculations
- Arc-Flash / Grounding Study
- Pipe Stress Analysis – required if the piping arrangement or process condition could pose stress condition on the piping.

Drawings:

- Cover Sheet/Drawing Index
- Process
    1. P&ID Symbols and Legend
    2. Process Flow Diagram (PFD)
    3. P&ID's
    4. Line List
    5. Civil
    6. Civil General Notes
    7. Site Survey (Legal Plats) – Including elevations and all temporary work space.
    8. Grading and Road Plan(s), Section and Details
    9. Erosion and Sediment Control Plan, Section and Details
    10. Storm Water Plan, Section and Details (if deemed applicable)
    11. Foundation Location Plan(s)

12. Foundation Plans, Sections and Details
13. Structural Steel – Supports, Ladders and Platforms
14. Structural Steel Sections and Details
15. Building (Architectural) Plans and details
16. Fence Plan, Sections and Details

- Piping
  1. Piping General Notes
  2. Piping Key Plan/Model
  3. Piping Area Plans
  4. Piping Sections and Details
  5. Pipe Supports
  6. Pipe Bill of Materials
  7. Electrical and Instrumentation
  8. Electrical Instrumentation General Notes
  9. Electrical/Instrumentations Symbols and Legend
  10. Instrumentation Key Plan
  11. Conduit Routing Plan(s)
  12. Area Classification Plan
  13. Area Classification Details
  14. Grounding Plan
  15. Lighting Plan
  16. Electrical and Lighting Details
  17. Instrumentation Details
  18. Grounding Details
  19. Electrical Block Diagram
  20. Instrumentation Block Diagram
  21. Power Distribution Panels
  22. Panel/Junction Box Drawings
  23. Conduit and Cable Schedule
  24. Instrument Index
  25. Instrumentation and Electrical Bill of materials
- Vendor Drawings

Regularly scheduled design progress meetings shall be scheduled by the Project Manager, the frequency of which should be determined by the scope of the project. In-person design reviews are strongly encouraged.

17.6 Drawing Review

The engineering scope of work shall be executed with the following design reviews. The deliverables for each review shall be distributed to the appropriate project stakeholders a minimum of one week prior to the review meeting.

Preliminary Design Review, to include:

- PFD
- Piping and Instrument Drawings (P&ID's)
- Site plan and General Arrangement
- Electrical and Instrument One-line Diagrams
- Electrical Area Classification Plan Drawing

Pre-Issue for Bid (IFB) Review

- All substantially complete construction drawings.

The engineering company shall participate in the Construction Pre-bid Meeting for the purpose of explaining the design and capturing any relevant comments that will improve or clarify the construction drawings.

17.7 Issue for Bid (IFB) Drawings

The IFB drawings consist of all substantially complete construction drawings that will be used by the respective contractor to bid the work.

Any applicable comments from the Pre-Bid Meeting shall be included in the IFC drawings.

17.8 Issue for Construction (IFC) Drawings

The engineering company shall issue a complete Issued for Construction (IFC) drawing set at a minimum ten days prior to the construction start date.

All drawings shall be submitted to Company in PDF format, with all content and text legible when printed on 11" x 17" paper.

All documents and drawings issued to Company shall be issued in accordance with Company document control procedures.

18 PROCUREMENT

18.1 Manufactured Equipment

All manufactured equipment is subject to Company requirements and approval.

Company shall be invited to all applicable vendor pre-production meetings and other fabrication progress meetings.

The following shall be reviewed and approved by the Company:

- Equipment Purchase Specifications and Purchase Order
- Vendor Approval Drawings
- Bill of Materials
- Welding Procedures (complete with PQR's)
- Welder Qualifications
- Inspection and Test Plan (ITP)
- Quality Assurance Plan

Vendor will be required to complete the Fabrication Checklist.

Vendor shall include the following in a Project Book/Job Book delivered to company at the completion of the manufactured equipment:

- Bill of Materials
- MTRs
- Vendor Drawings
- Approved Welding Procedures
- Approved Welder Qualifications
- Calibration Test Records
- Certification of NDT Personnel
- X-Ray Film
- Weld Map Drawings
- Hydro Test Documents
- Torque Procedures and Torque Equipment Calibration Tests

A Company Inspector will be assigned to inspect the equipment at the witness points designated in the ITP. This will include initial mechanical inspection of fit-up, post fabrication, NDT and hydrostatic testing, factory acceptance testing (FAT) and pre-shipment.

Company Inspector shall complete the Inspection Checklist and give to the Project Manager.

FAT will be conducted on all manufactured equipment such as Regulator and Meter Skids to ensure properly installed and working skids before delivery to the field. The proper FAT checklist shall be completed during the test.

A fabrication schedule shall be provided. At least one week prior notice shall be given for all inspections.

NDT and Hydrostatic testing requirements shall be the same as described in Section 19.3 below.

18.2 Pipe, Fittings, Valves and other pressure containing materials

MTR's shall be submitted for approval for all pipe, fittings, valves and all other pressure containing materials prior to fabrication and installation.

18.3 Ultrasonic Meter Flow Calibration

At least two week notice shall be given to the Project Manager prior to meter calibration at a Company approved calibration facility to allow for inspection and witnessing by a Company representative.

18.4 Approved Vendors

All materials shall be purchased from Company approved vendors as set forth in Company Approved Vendor List.

18.5 Company Engineering and Material Approval Matrix

I – INFORMATION R - REVIEW A - APPROVAL		PROJECT MANAGER	MEASUREMENT SERVICES	AREA MANAGER	CONSTRUCTION	ENVIRONMENTAL	LAND/ROW
	MATERIALS						
1	METER, METER TUBE	R	A				
2	FLOW CONTROL VALVE	R	A				
3	MONITOR VALVE	R	A				
4	ACTUATED VALVES	A	R				
5	METER SKID	A	R				
6	REGULATOR SKID	A	R				
7	RTU/RTU BUILDING	R	A				
8	ANALYZERS/ GC BUILDING	R	A				
9	MISCL. INSTRUMENTATION	A	R				
10	FILTER SEPARATOR	A	R	R			
11	CONDENSATE TANK	A	R	R			
12	VALVE LIST	A					
13	TAP MATERIALS	A			R		
14	PIPE BOM	A			R		
	DRAWINGS						
15	PROCESS FLOW DIAGRAM	A	R	I			
16	P&IDS	A	R	I			
17	PLATS	A		R		I	I
18	GENERAL ARRANGEMENT	A	R	I	I		
19	GRADING AND FOUNDATIONS	A		I	R		
20	PIPING	A		I	R		
21	ELECTRICAL AND INSTRUMENTATION	A	R	I	I		

19 CONSTRUCTION

19.1 Construction Company Selection

A detailed construction scope of work shall be developed and a bid package developed for the purpose of soliciting construction bids. The bid package will include:

- Construction Scope of Work
- IFB Drawings
- Relevant specifications
- Area location map

Contractors selected to bid shall be required to participate in a pre-bid meeting for the purpose of reviewing the scope of work and IFB drawings, as well as obtaining any clarification and information not included in the bid package. Contractor bid shall include:

- Lump-sum cost for construction
- Cost for bond
- Consent of Surety
- Rate sheet for addition work activities
- Proposed project schedule
- Project Execution Plan
- Financial information
- Safety rating
- Current and future project load
- Resume of key personnel
- List of exceptions/deviations, if any
- List of proposed subcontractor(s)
- References of prior assignments

Upon review of the qualifying bids, the proposed contractor to be awarded will be notified by a Letter of Contingent Award. The letter will require the following:

- Submittal of a Project Specific Safety Plan
- Submittal of a Project Specific Emergency Response and Spill Prevention Control and Countermeasure Plan
- Contractors Performance and Payment Bond
- Participation in a pre-award meeting

- Execution of the Scope of Work Agreement

19.2 Meter Station Construction

Construction activities shall not begin until all applicable permits, including environmental and regulatory clearances, have been obtained.

Construction activities shall not begin until all applicable land agreements have been obtained or assigned.

Meter Station shall be constructed in accordance with Company approved engineered drawings marked Issued for Construction.

Prior to construction start; the contractor shall attend a pre-job meeting for the purpose of reviewing the Scope of Work, Project Specific Safety Plan, Project Specific Emergency Response and Spill Prevention Control and Countermeasure Plan as well as any other project specific requirements.

Contractor shall furnish detailed construction schedule at the beginning of construction and furnish updates on a weekly basis.

Prior to construction, the contractor shall provide the Project Manager with the following for its review and acceptance:

- List Identifying Operator Qualification Covered Tasks (Veriforce)
- Worker's Operator Qualification Documentation for Each Covered Task
- Welder Qualifications

Contractor shall provide Project Manager with the documentation prior to the introduction of natural gas to the Connecting facilities:

- Weld maps to include heat number, weld x-ray numbers, and welder identification.
- Hydrostatic Test Reports (deadweight records, temperature and pressure charts)
- Certification for Deadweight Tester, Temperature and Pressure Recorders; current within the previous six (6) months.

Contractor shall submit and obtain approval for all change orders prior to commencing related work.

Contractor shall provide the following documentation prior to demobilizing from the construction site:

- All Material Test Reports (MTR's) along with redline markups showing all revisions to IFC drawings during Construction. Heat numbers for all materials installed (individual as installed items) shall be shown on the redline markups.
- List of all surplus materials

19.3 Testing and Inspection

Onsite Company Inspection is required for the duration of the construction. Company shall contract any 3rd party inspections services required. Inspectors shall include.

- Chief Inspector
- Welding Inspector
- Electrical Inspector

Company shall contract all X-ray and other Non-Destructive Examination (NDE) contractors.

All welding and NDE will be in accordance with the current approved edition on API 1104. All welders shall be tested to Company accepted welding procedures.

NDT inspection:

- All butt welds shall be 100% X-rayed per API 1104.
- All fillet welds shall be 100% Magnetic Particle tested per ASTM E709.

NDT Reports:

- Welder Qualification Reports (from destructive testing), welder stencils and welding procedures.
- Daily Radiographic Inspection Reports

Hydrostatic Testing:

- All pipe installed in the field that will be subject to gas pressure shall be hydrostatically tested for eight continuous hours.
- Company shall provide hydrostatic test letter.
- Any valves include in the test shall be partially open during the test. Piping shall be dewatered using pigs or other means after testing is complete. Any trapped water in the valve cavity shall be drained.

19.4 Commissioning

A Commissioning and Test Plan shall be developed prior commissioning of the meter station. The Commissioning and Test Plan shall include all commissioning activities by the Connecting Party, if applicable.

Contractor shall provide adequate support during commissioning to include electrical, instrumentation and mechanical crafts.

A Commissioning Manual will be developed prior to commissioning of the meter/regulator station by the Commissioning Manager. This manual will include:

- Inspection Reports
- Fabrication Checklist
- Inspection Checklist
- Site Commissioning Checklist
- FAT Checklist

- Valve Identification Checklist for entry into MAXIMO
- Purge and Pack Plan
- I/O Checklist
- Transmitter Checklist
- Wiring Checklist
- Measurement Checklist
- SCADA Point to Point Documentation
- Operations Facility Commissioning Checklist
- All BWP Forms for transmitters, relief valves, regulators, overpressure protection, and control valve inspections
- All BWP Work Instructions that apply
- Data books on equipment installed.

The Commissioning Manual original shall be given to the Area Manager of the facilities. A copy of the Commissioning Manual shall be included in the Project File Box.

A commissioning team will be identified prior to commissioning to ensure all systems/equipment is thoroughly reviewed, tested, and documented prior to placing equipment in service. This team shall consist of:

- Project Manager
- Commissioning Manager or Commissioning Lead
- Area Manager
- Construction Project Manager
- Measurement Services
- Approved 3rd Party Commissioning Representative

A meter station shall not be turned on for in-service unless thoroughly checked out and Gas Control/SCADA point to point verification has been completed.

19.5 Project Close Out

A Project File Box shall be compiled to include all required project records as listed in EC-DC-AR-FM-0011_PFB_CHECKLIST_BWP. The Project File Box shall be compiled in accordance with Company procedure as stated in the Document Control Manual. The Project File Box shall contain at a minimum:

- Completion Report (PS5624)
- Facility Commissions Checklist (BWP-0008)
- PHMSA Compliance Record (BWP-0278)

- BWP Weld Inspection Film and NDT Report (BWP-149 20th NDE Inspection)
- Asbuilt Drawings
- Internal Corrosion Design Checklist
- Meter Station Commissioning Manual

20 VERSION HISTORY

Table 20-1: Document History Log

Version	Effective Date	Description
0.00	12/18/2012	Initial Publication
1.00	4/10/2019	Revised per CR 2019-04-02
1.10	10/04/2022	Revised language to incorporate Requirement of Valve Installation and Minimum Rupture Detection Standards per CR 2022-09-15c
1.20	05/17/2024	Added tables to clarify tubing support requirements to coincide with manufacturer recommendations per CR 2024-04-24

APPENDIX A

Interconnect Project Task List