



National Aeronautics and  
Space Administration

**John C. Stennis Space Center**  
Stennis Space Center, MS  
39529-6000

**SSTD-8070-0092-FLUIDS**

**Rev. B**

**OCTOBER 2023**

# **COMPLIANCE IS MANDATORY**

## **John C. Stennis Space Center Design, Installation and Maintenance of Sitewide Natural Gas Distribution System**

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<b>SUBJECT: Design, Installation, Maintenance of Sitewide Natural Gas Distribution System</b>	

## Document History Log

Change/ Revision	Change Date	Originator/ Phone	Description
Basic	07.19.2013	Ryan Seals/ ext. 1184	Initial release, supersedes SSC 99-023.
A	08.16.2018	William Rippy Ext. 3187  James Mitchell Ext. 2246	5-year review. Updated cover sheet to reflect approval by NASA PMD; and concurrence by OMD and SMA. Updated references and acronyms. Administrative and format changes throughout document. Added “with 100 PSI Case” to 5. Added 4.0. “General Operating Parameters” to “Design Requirements.” Changed “Operating Pressure” to “Design Pressure” and “Operating Temperature” to “Temperature Range.” Revised 6.1, adding second sentence for clarification purposes. Revised Figures 1 and 2 to Figures 1A, 1B, and 2.
B	10.29.2023	Benjamin Bellelo Ext. 3187  Quinn Hall Ext. 3754  Pat Mitchell Ext. 2246	5-year review. Updated cover sheet approvals as necessary. Updated references and acronyms. Added: 2.0-c, 2.0-d, 2.0-e, 2.0-f, 7.0-k, 7.0-l, 7.0-m, 7.0-n, and Figure 3. 6.2.1-2 and 6.2.1-3: Added “(not including the generator)”. 6.2.1-2: Added “, and ELCOR Gas Volume Correctors.” 6.2-d: Added “The regulator (American Meter Industrial Regular 1800/2000 Series or approved equal) must include automatic low-pressure cutoff and full internal pressure relief.” 7.0-a: PE2406 and PE3408 replaced with PE2708 and PE4710. Added “Non-metallic Warning/Identification tape shall be buried with all underground piping in accordance with SSTD-8070-0119-MISC and manufacturer recommendations. The Test end of the tracer wire shall be coiled and stored in the valve box.

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			<p>7.0-e: Added “which shall include end caps and spacers and be vented in compliance with 49CFR, Subpart G, 192.323.”</p> <p>7.0-h and Figures 1A and 1B-Note 2: Added “per SSTD-8070-0124-IDCODES”.</p> <p>Replaced Figures 1A, 1B, 2A, 2B, and 3.</p>
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## 1.0 PURPOSE

This John C. Stennis Space Center (SSC) standard (SSTD) is to provide a standard method for the design, installation, and maintenance of the natural gas distribution systems and system components at SSC.

## 2.0 APPLICABILITY

- a. For the purpose of this SSTD, a distribution system entails all of the valves, piping, meters, and other components up to the pipe building penetration or equipment hookup.
- b. The distribution of natural gas within buildings is not covered in this SSTD because of the wide variety of components and gas usage within buildings/systems at SSC. Distribution within buildings will be covered by building procedures.
- c. The provisions of this SSTD do not apply retroactively to existing systems that were in compliance with the provisions of the codes and standards in effect at the time of installation. However, all new natural gas systems or modifications to existing natural gas systems shall comply with this SSTD.
- d. The SSC Certified Natural Gas Operator shall be notified before any work is performed that has the potential to impact the SSC natural gas distribution system, such as updates, repairs, projects, and/or proposals, per CFR Title 49 Part 192 and MPSC Rule 57.1.
- e. See SSTD-8070-0075-PIPE Box Diagram for additional detail. (Note: "Point of delivery," as cited in SSTD-8070-0075-PIPE, and "use point" are one and the same.)
- e. In case of conflict between this SSTD and another applicable technical requirement or document, the most stringent technical requirement(s) shall take precedence.

## 3.0 REFERENCES AND APPLICABLE DOCUMENTS

All references are assumed to be the latest version unless otherwise indicated.

APWA Uniform Color Code

CFR Title 49 Part 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*

MPSC Rule 57.1, *Rules and Regulations Governing Public Utility Service: Reporting of Construction Work*

NFPA 54/ANSI Z223.1, *National Fuel Gas Code*

PER#6325-12-012, *Preliminary Engineering Report Site-Wide Cathodic Protection*

SPLN-1040-0006, *SSC Emergency Management Plan*

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SPLN-8621-0003, *SSC Mishap Preparedness and Contingency Plan*  
 SPR 1440.1, *SSC Records Management Program Requirements*  
 SSOP-8830-0057, *SSC Natural Gas System*  
 SSTD-8070-0005-CONFIG, *SSC Preparation, Review, Approval, and Release of SSC Standards*  
 SSTD-8070-0075-PIPE, *SSC Plumbing and Ordinary Service Copper Tubing*  
 SSTD-8070-0081-ELEC, *SSC Facility Electrical Standard*  
 SSTD-8070-0119-MISC, *Dig Permit Standard*  
 SSTD-8070-0124-IDCODES, *SSC Identification of Piping Systems and Above-Ground Markers*

#### 4.0 DESIGN REQUIREMENTS

Unless otherwise specified in this SSTD, all new natural gas systems or modifications to existing natural gas systems shall comply with NFPA 54/ANSI Z223.1.

<u>Service</u>	<u>Design Pressure</u>	<u>Temperature Range</u>
Natural Gas	100 psig	-20°F to +120°F

#### 5.0 RESPONSIBILITIES

- a. Users of this SSTD shall comply with its requirements, ensure use of the correct version of this SSTD and the documents it references, and inform the appropriate organization of needed changes in accordance with SSTD-8070-0005-CONFIG.
- b. Responsibilities for the use and control of this SSTD and for the review and approval of revisions or cancellation of this SSTD shall be as specified in SSTD-8070-0005-CONFIG and the applicable documents referenced therein.

#### 6.0 REQUIRED COMPONENTS OF THE GAS DISTRIBUTION SYSTEM

The natural gas distribution system at SSC includes piping for the main distribution system and branches from the main system that deliver gas to each use point.

##### 6.1 Main Distribution System

- a. The main distribution system supplies gas to all of the branches. The operating pressure of the natural gas system is  $40 \pm 5$  psig.
- b. The main distribution system shall contain a metering station, pressure reducing station, and an odorizing station.

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### 6.1.1 Metering

- a. The main distribution system meter is a rotary-type meter with temperature and pressure compensation capability.
- b. The main meter shall also include a digital, electronic flow corrector with an audit trail file within a permanent memory.
- c. The main meter shall be connected to the Energy Management Control System (EMCS) to allow for remote monitoring.

## 6.2 Branch Systems

- a. Each branch system shall have a manual shut-off valve to allow isolation of that branch.
- b. Each valve shall have an access box with the symbol “NG” cast in the top of the box.
- c. The box shall be mounted in a concrete casing with enough space to allow for valve operation with the top of the box far enough above grade to prevent the box from inadvertently being covered or filled with dirt, gravel, etc.
- d. Each branch shall also have a pressure regulator to regulate pressure to the use point. The regulator (American Meter Industrial Regular 1800/2000 Series or approved equal) must include automatic low-pressure cutoff and full internal pressure relief.
- e. Each branch shall contain two (2) pressure gauges to show pressure upstream and downstream of each regulator. (See Figures 1A/1B for the piping set up of a metering station.)

### 6.2.1 Branch Metering

1. Each use point or branch shall also be metered with a positive displacement diaphragm meter of the appropriate pressure range that meets the requirements of 49CFR, Subpart H, 192.359. American Meter AL-Series, with 100 PSI Case.
2. Each meter (not including the generator) shall have a digital electronic flow corrector with temperature and pressure compensation capability. Eagle Research XARTU/1, Mercury MiniMax, and ELCOR Gas Volume Correctors.

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3. Each meter (not including the generator) shall be connected to the EMCS system to allow for remote monitoring with power supplied from an alkaline battery pack or solar cells with a rechargeable battery backup system.
4. Each use point (including facilities, buildings and flare stacks) shall have a metering station with meter bypass piping.
5. Each station shall have a concrete foundation, at least two (2) barrier posts constructed of 4-inch diameter steel pipe filled with concrete, and the meter shall face away from the building or facility that the meter serves to allow easy access for reading or repairs. (See Figures 1A/1B for the general layout of a metering station.)

## 7.0 PIPING

- a. Branch and distribution piping shall be minimum Schedule 40 carbon steel coated with galvanic or anodic corrosion protection or PE2708 or PE4710 compliant PE pipe graded for natural gas use with SDR 11 or greater wall thickness and installed in accordance with NFPA 54 and 49 CFR Sub-part G, 192.321. Use of Polyethylene (PE) pipe is restricted to below-grade sections of pipe systems and system sections not exposed to natural or artificial light. Install tracer wire in accordance with 49CFR, Sub-part G, 192.321.paragraph (e). Non-metallic Warning/Identification tape shall be buried with all underground piping in accordance with SSTD-8070-0119-MISC and manufacturer recommendations. The Test end of the tracer wire shall be coiled and stored in the valve box.
- b. Above-ground pipe stub-outs made of PE shall be coated with bituminous surface coating or equivalent light or abrasion barrier and protected from damage by external forces in accordance with 49CFR, Sub-part G, 192.321.paragraph (g), including sub-paragraphs 1, 2and 3.
- c. Blow-down connections shall be installed at low points in the system to enable condensation removal from the system sections.
- d. The blow-down connections shall be drained on a regular maintenance schedule to reduce condensation build-up in the system.
- e. At each road, railroad, and ditch crossing, the natural gas line shall be extended through the appropriate carbon steel casing, which shall include end caps and spacers and be vented in compliance with 49CFR, Subpart G, 192.323.
- f. Valve installation in PE pipe shall be designed so as to protect the pipe against excessive torsional or shearing loads when the valve is being operated.



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- g. Plastic valves are not acceptable. Valve boxes shall be installed so as to avoid the transmission of external loads to the pipe.
- h. All piping shall contain above-ground markers per SSTD-8070-0124-IDCODES at no more than 100-yard intervals. In some instances, casing vent pipes may be utilized as markers.
- i. Markers shall also be placed at each major bend, take-off, and on each side of all railroad and road crossings.
- j. Each marker shall be painted in conformance with SSTD-8070-0124-IDCODES.
- k. Trenchless installations of PE pipe shall include the use of a weak link, as defined by 49CFR, Subpart G, 192.3, to ensure the pipeline will not be damaged by any excessive forces during the pulling process.
- l. Where isolation of existing systems is impractical, hot taps may be performed in accordance with 49CFR, Subpart D, 192.151 with prior approval from the Contracting Officer Representative (COR).
- m. Pressure testing shall be performed in accordance with 49CFR, Subpart J.
  - 1. Tests shall include an initial leak test for a minimum duration of 15 minutes at a pressure of no greater than five (5) psig and a pneumatic pressure test for a minimum duration of one (1) hour at a pressure defined by 49CFR, Subpart J.
  - 2. Test media for leak and pneumatic pressure tests shall be oil-free nitrogen unless stated otherwise.
- n. Above-ground portions of pipe shall be grounded per NFPA 54/ANSI Z223.1.

## **8.0 METERING STATION SAFETY**

- a. Each metering station shall be protected to prevent automobiles, lawn equipment, and any other maintenance equipment from colliding into the station.
- b. Each station shall be protected by barriers made of 4-inch Schedule 40 steel pipe filled with concrete (See Figure 2 for the proper construction and installation of the safety protection barriers.)
- c. Any other exposed natural gas piping or components shall be protected by these barriers to prevent accidents.

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## 9.0 RECORDS AND FORMS

- a. Records and forms required by the procedures of this standard shall be maintained in accordance with SPR 1440.1.
- b. All records and forms are assumed to be the latest edition unless otherwise indicated.
- c. Forms may be obtained from the SSC Electronic Forms repository or from the NASA SSC Forms Management Officer. Quality Records are identified in the SSC Master Records Index.

## 10.0 ACRONYMS AND ABBREVIATIONS

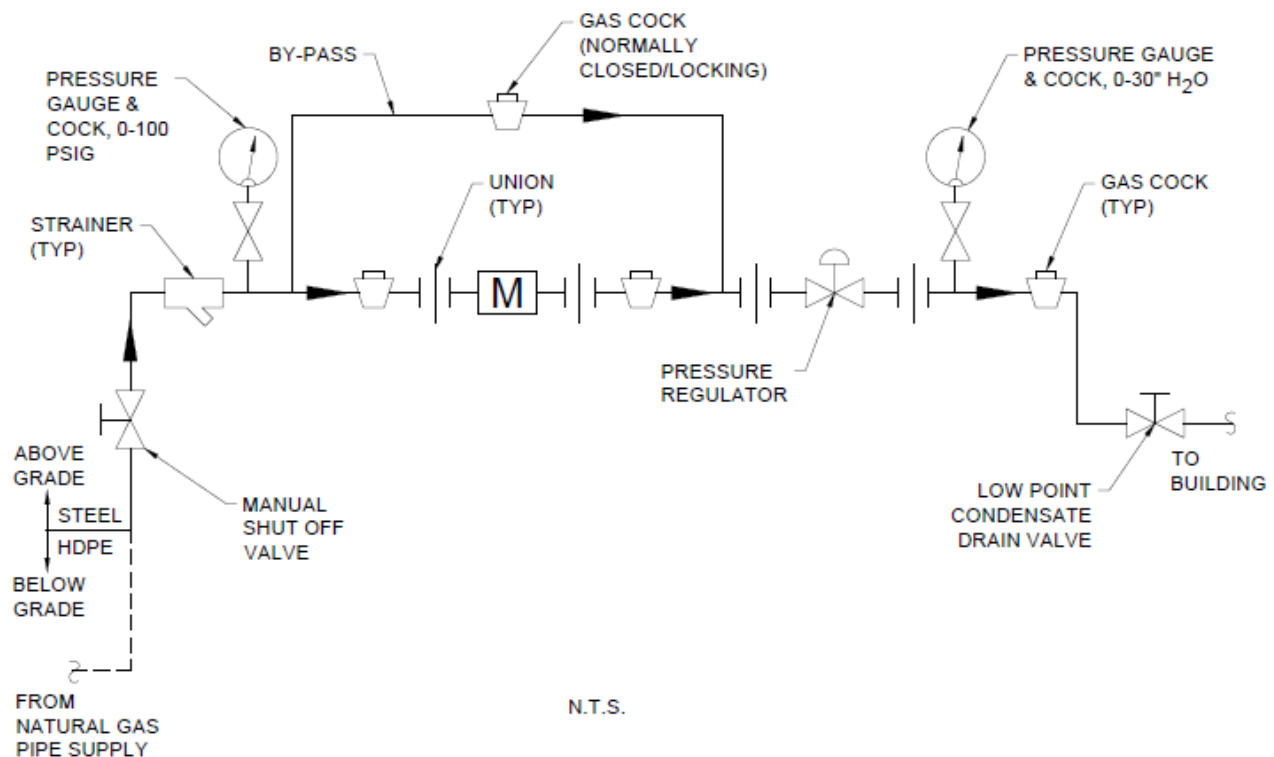
<b>APWA</b>	American Public Works Association
<b>CFR</b>	Code of Federal Regulations
<b>COR</b>	Contracting Officer Representative
°	Degrees
<b>EMCS</b>	Energy Management Control System
<b>F</b>	Fahrenheit
<b>MSPC</b>	Mississippi Public Service Commission
<b>NASA</b>	National Aeronautics and Space Administration
<b>NFPA</b>	National Fire Protection Agency
<b>NTS</b>	Not to Scale
<b>PE</b>	Polyethylene
<b>PER</b>	Preliminary Engineering Report
<b>psig</b>	pounds per square inch gauge
<b>SPLN</b>	Stennis Plan
<b>SPR</b>	Stennis Procedural Requirements
<b>SSC</b>	John C. Stennis Space Center
<b>SSOP</b>	Stennis Standard Operating Procedure
<b>SSTD</b>	John C. Stennis Space Center Standard

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**Figure 1A: Piping Diagram of Typical Meter Installation**

**NOTES:**

1. Paint all piping yellow.
2. Mark "Natural Gas" with arrows indicating flow direction per SSTD-8070-0124-IDCODES.

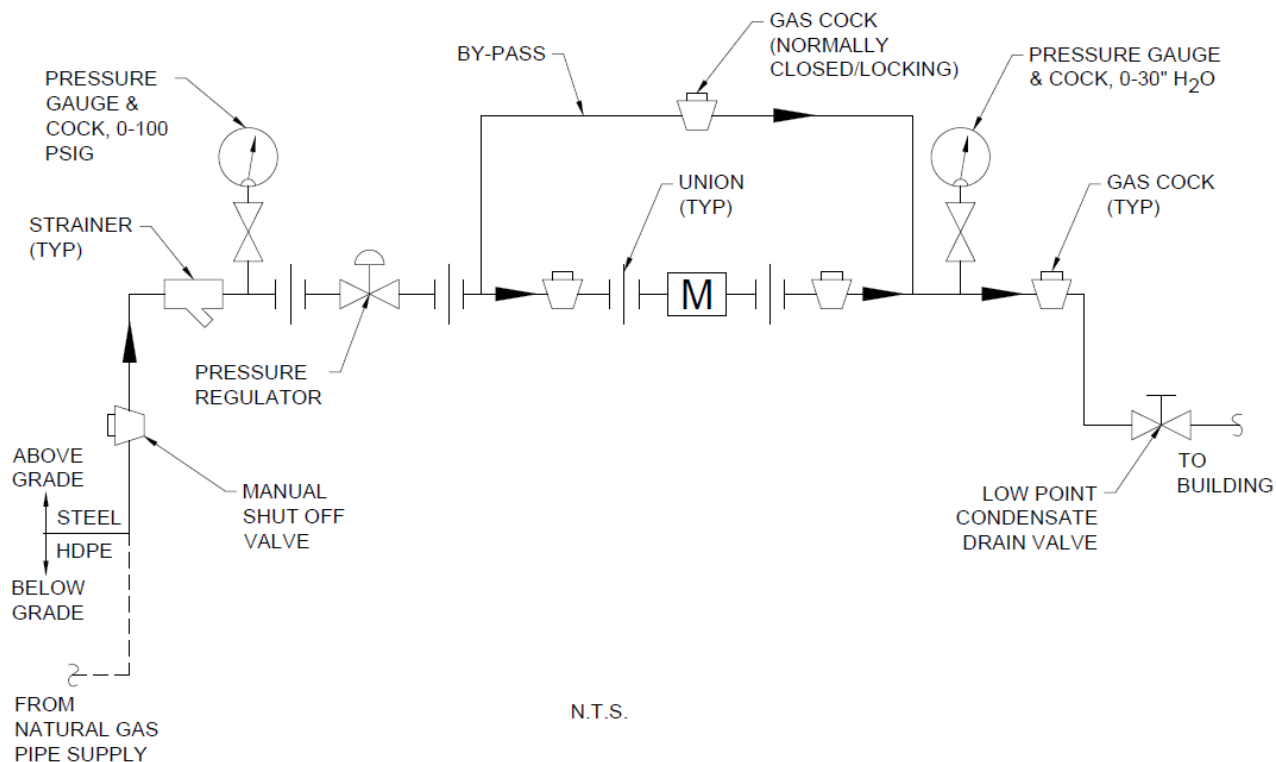


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**Figure 1B: Piping Diagram of Optional Meter Installation**

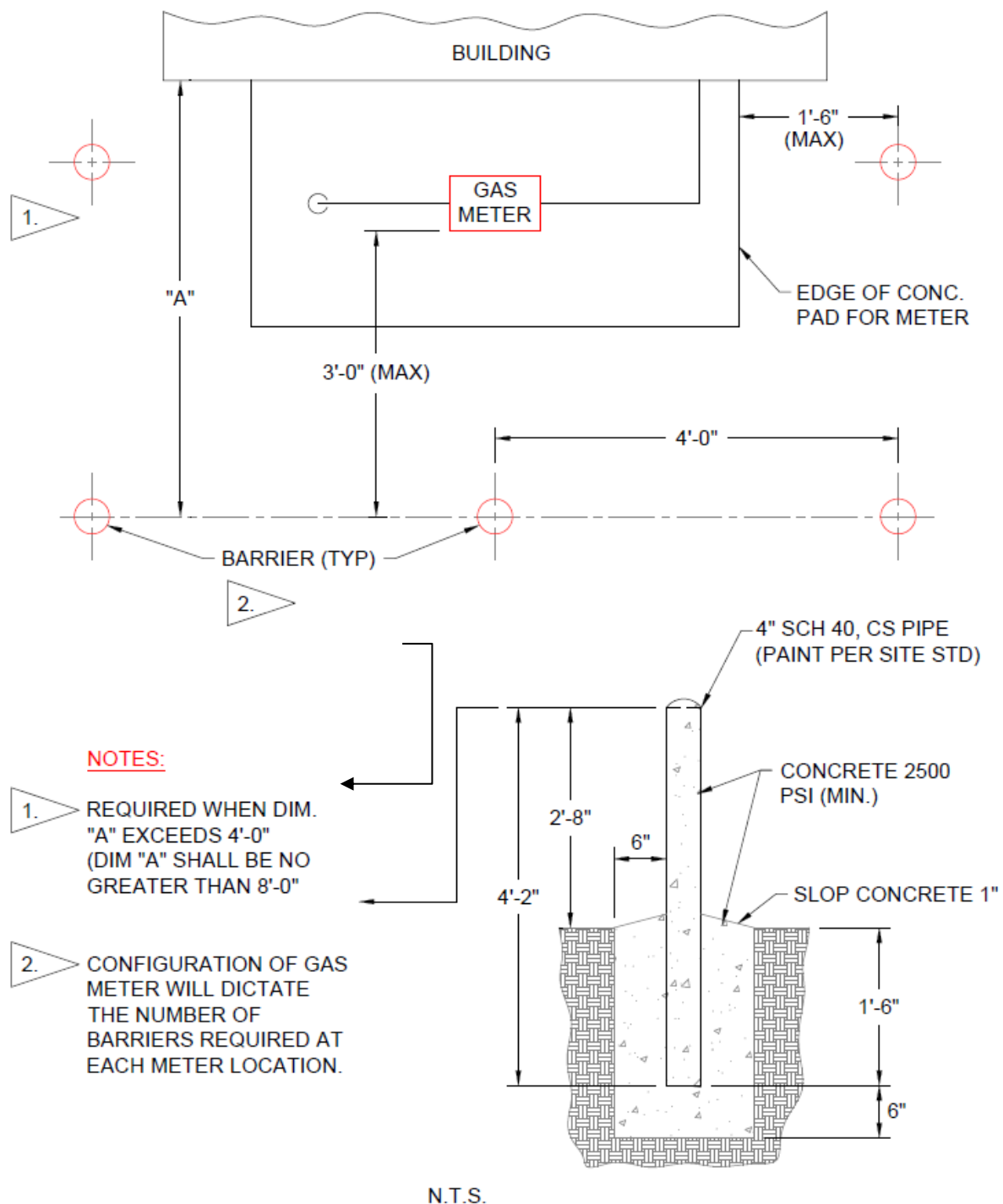
**NOTES:**

1. Paint all piping yellow.
2. Mark "Natural Gas" with arrows indicating flow direction per SSTD-8070-0124-IDCODES.



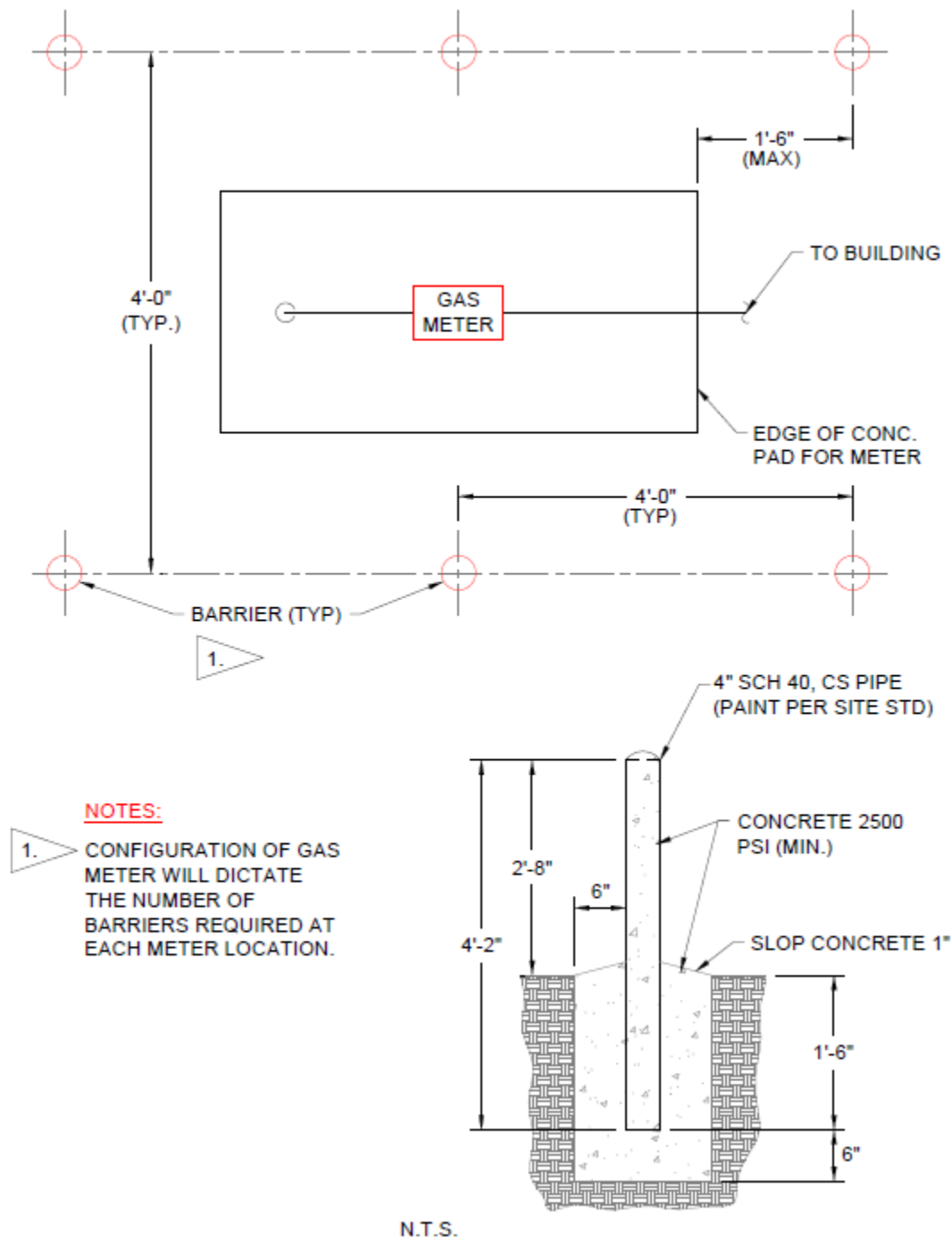
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**Figure 2A: Typical Meter Barrier Section – Option 1**



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**Figure 2B: Typical Meter Barrier Section – Option 2**



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**Figure 3: Typical Valve Tag Detail**

