COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC UTILITIES

RESPONSE OF COLUMBIA GAS OF MASSACHUSETTS TO THE
FIRST SET OF INFORMATION REQUESTS FROM THE D.P.U.
PIPELINE ENGINEERING AND SAFETY DIVISION

D.P.U. 19-PL-07 – Merrimack Valley Incident (9/13/18)

Date: September 18, 2019

Responsible: Lee Reynolds, Manager Gas Standards

IR-PL-1-3: Please provide copies of the most current Measurement and Regulation's ("M&R") procedures and requirements for approval of projects being conducted and the last six revisions of these procedures and requirements.

Response: The procedures for stakeholder review of design capital projects are stated in GS 2810.050 ("Stakeholder Reviews of Design and Capital Projects"), and the tie-in procedures are stated in GS 1680.010 ("Tie-ins and Tapping Pressurized Pipelines").

GS 2810.050 was issued as a new standard on July 1, 2019 and thus has no revision history. GS 2810.050 refers to the Constructability/Safety Review form.

The applicable procedures and Constructability/Safety Review forms are attached to this data request. Table IR-PL-1-3 provides a chronological listing.

Table IR-PL-1-3

IR-PL-1-3(a)	**IR-PL-1-3(b)**	**IR-PL-1-3(c)[1]**
GS 2810.050	**GS 1680.010**	**Constructability/Safety Review Form**
07-01-2019 Current Version	02-28-2019 (notes added 04-19-2019) Current Version	07-09-2019 Current Version
	02-28-2019	06-21-2019
	06-01-2018	04-15-2018
	01-01-2016	11-21-2017
	01-01-2014	08-18-2017
	04-22-2013	03-03-2017
	01-01-2013	11-15-2015 (First Issued)

[1] During the process to convert the files to pdf's, some of the "Last Updated" dates on the forms defaulted to 9/18/19.

NiSource
Distribution Operations

Gas Standard

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Companies Affected:	☒ NIPSCO	☒ CVA	☒ CMD
		☒ CKY	☒ COH
		☒ CMA	☒ CPA

REFERENCE None

1. GENERAL

The purpose of this Gas Standard is to describe the process for stakeholder reviews of design capital projects. This process requires engagement of stakeholders to identify and address potential issues which may impede construction. This includes review for pipeline, process, public and worker safety; efficient and accurate design; proper system configuration and sequencing of activities; appropriate control of energy; continuity of service; ease of installation; and the inclusion and alignment of critical steps. The reviews described below are valuable for enhancements to the project under review, as well as continuous improvement for future projects.

The NiSource Capital Program functions effectively with accurate design, planning, estimating, forecasting and project execution. Variances in design capital project cost and duration may affect the accomplishment of program goals and stakeholder commitments. Designs without the input of critical stakeholders can increase the risk of errors or missteps during project execution.

This Gas Standard includes the following reviews and briefings.

a. Conceptual Design Review.
b. Peer Design Review.
c. Constructability / Safety Review.
d. Pre-Construction Review.
e. Tie-in Plan Advance Briefing.
f. Tie-in Plan Execution Briefing.

The remainder of this Gas Standard will describe each of the above reviews, the organizations and stakeholders responsible for conducting and participating in each review, and the intended outcome of each.

For the purpose of this standard, the term

a. “project completion organization” is intended to include the Company Department(s) responsible for the completion of the job/work orders involved with

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the project, and

b. "design capital projects or job/work orders" is intended to include the installation, replacement or retirement of pipeline facilities only. This would include capital work on mains, services, metering and regulation, but would not include specific capital job/work orders for items such as land acquisition, structures or communication equipment.

2. CONCEPTUAL DESIGN REVIEW

The Conceptual Design Review is a review of a project's intended design with stakeholders. It is conducted to identify design risks, mitigation strategies and to ensure the most favorable project design alternatives are considered.

The responsibilities outlined in this section are related to the Design Engineering and Field Engineering departments.

2.1 Conceptual Design Review Project Criteria

Conceptual Design Reviews should be completed for design capital projects involving the installation or replacement of high-consequence facilities. A Conceptual Design Review may be performed for projects not meeting this description at the discretion of Engineering.

Examples of high-consequence facilities include, but are not limited to the following.

a. Point of delivery stations.

b. Regulator stations and/or meter stations installed or replaced by the Major Projects department.

c. Pipelines subject to transmission line design requirements per GS 2100.010 "Design – General."

2.2 Accountability and Stakeholder Participation

Conceptual Design Reviews are to be scheduled and facilitated by the engineering group in charge of the project design, typically Design Engineering unless initiated by Field Engineering or another entity. The Conceptual Design Review will also include personnel from project stakeholder groups as project parameters suggest.

Participating stakeholder groups may include, but are not limited to the following.

a. Field Engineering (if review is initiated by Design Engineering).

b. Field Operations.

c. Corrosion.

d. M&R/GM&T.

e. Major Projects.
f. Gas Systems Planning.
g. Compliance.
h. Survey & Land.
i. Environmental.
j. Instrumentation and Controls.
k. Gas Control.

Additional groups may be engaged at the discretion of the engineer and/or Company Management to address project-specific challenges.

2.3 Timing

The Conceptual Design Review, when applicable, should be conducted once the initial design is at a minimum 50% complete and in advance of significant preliminary project expenditures (e.g., right-of-way acquisition, contract bidding).

2.4 Evaluation Criteria and Stakeholder Concurrence

When conducted, the Conceptual Design Review shall evaluate the following, at a minimum.

a. The adequacy of the design to perform its intended function and/or meet customer need(s).
b. The overall design for pipeline and environmental safety.
c. The appropriateness of specified materials and site plans.

Opportunities for design improvements identified in the Conceptual Design Review should be reviewed by the responsible engineer and incorporated as appropriate.

Following the review, the facilitating engineer shall request concurrence from the project stakeholders to move forward with either the design as proposed, the design with modifications, or an alternate design. The facilitating engineer will specify a deadline for project stakeholders to provide their responses. A favorable response to the project design is achieved through either a response stating agreement or a lack of response from each individual stakeholder. Conversely, a response of rejection is represented by a response stating disagreement and rationale for that stance.

The facilitating engineer shall document acceptance or rejection of the proposed design along with any conditions for approval as applicable.

When stakeholder concurrence is achieved, Conceptual Design Review will be considered complete and the project may proceed to the next phase of design.

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If concurrence of stakeholders is not achieved, and the proposed project requires significant revision, the Conceptual Design Review shall be repeated until concurrence is reached. If the Conceptual Design Review reaches an impasse, then the facilitating engineer shall document the concerns and points of view discussed and escalate the project to the Manager, Director and/or Vice President level for resolution.

2.5 Record Keeping

When conducted, minutes of the Conceptual Design Review shall be kept by the facilitating engineer. Minutes should include the following.

a. Date of review.
b. Attendees.
c. Proposed project details.
d. Significant discussion topics.
e. Proposed modifications to design.
f. Concurrence or rejection of stakeholders.

Meeting minutes shall be filed with the project documentation.

3. PEER DESIGN REVIEW

The Peer Design Review is a technical review of a project design. This is conducted so that each design capital project, requiring a Peer Design Review, is evaluated and any errors or risks in the design are identified with corrective actions or mitigation strategies recommended.

The responsibilities outlined in this section are related to the Design Engineering and Field Engineering departments.

3.1 Peer Design Review Job/Work Order Criteria

Criteria for projects warranting a Peer Design Review are split into the following groups.

3.1.1 Associate Engineers 1 and 2

A Peer Design Review is required for all design capital job/work orders.

3.1.2 Engineers/Engineer Technician and Senior Engineers/Engineer Technician Operating Outside of Columbia Gas of Massachusetts (CMA)

Scenarios describing when a Peer Design Review is required for these positions include the following.

a. A design capital job/work order that is deemed “complex”, or

b. A “non-complex” pipeline design capital job/work order with an estimate of $50,000 or more.

“Complex” projects typically include.

a. Plans for installation or replacement of transmission class pipelines or distribution mains with an MAOP equal to or greater than 200 PSIG.

b. Plans for the installation or replacement of distribution mains with more than two tie-ins.

c. Plans for the installation of pipelines requiring a temporary bypass.

d. Projects which involve a change in system pressure.

e. Plans for installation of distribution services requiring an interruption of gas flow to the adjacent transmission lines and/or distribution mains.

f. Plans for non–standard new points of delivery and district regulator stations.

g. Plans for regulator station work that requires an interruption of gas flow on the inlet or outlet adjacent transmission lines and/or distribution mains.

3.1.3 Columbia Gas of Massachusetts (CMA)

A Peer Design Review is required for all design capital job/work orders.

3.2 Accountability and Stakeholder Participation

Except as noted, the engineer in charge of the project design shall initiate the Peer Design Review and identify, by complexity, an appropriate peer to conduct the review. The engineer in charge of job/work order design is not allowed to perform a Peer Design Review for his or her own design.

“Complex” projects shall be reviewed by the professional engineer (P.E.) exercising responsible charge of the project with the following exception.

Exception: If the project engineer is the same as the P.E. exercising responsible charge, the project shall undergo a Peer Design Review with one of the following: Engineer, Senior Engineer, Principal Engineer or Engineering Leader.

“Non-complex”, or “routine” projects, when applicable, shall be reviewed by one of the following.

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a. Engineering Leader.
b. Principal Engineer.
c. Senior Engineer.
d. Engineer.
e. Associate Engineer 2, Engineer Technician or Senior Engineer Technician at the discretion of the Engineering Leader.

Note: In CMA, all Peer Design Reviews for design capital projects shall be conducted by a P.E. exercising responsible charge on the project.

3.3 Timing

The Peer Design Review shall be conducted once the initial design is completed by the engineer in charge of project design, but prior to the job/work order(s) entering an "approved" status in the system of record (e.g., WMS, Maximo).

If after the Peer Design Review a subsequent project stakeholder review or construction activity results in significant alterations to or a redesign of the project, a second Peer Design Review should be conducted after the design is updated to reflect those changes.

3.4 Evaluation Criteria and Stakeholder Concurrence

The Peer Design Review shall evaluate technical design of the project. Examples of project criteria to review include the following.

a. Appropriateness of specified materials for the operating pressure of the system.
b. Completeness of specified materials for the project scope.
c. CAD Drawing for route selection and adherence to CAD Standards.
d. Tie-in location designs.
e. General accuracy review for labeling.

Upon completion of the Peer Design Review, the reviewer shall provide feedback and recommended design enhancements to the project engineer as deemed necessary. The engineer in charge of project design shall review all recommended design enhancements and incorporate applicable updates.

3.5 Record Keeping

3.5.1 Columbia Gas Companies

The engineer in charge of the project design shall submit a workflow request to

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the reviewer through WMSDocs.

Upon completion of the Peer Design Review, the reviewer shall complete the WMSDocs workflow. Recommendations for design enhancements shall be provided to the engineer in charge of project design.

3.5.2 NIPSCO

The engineer in charge of the project design shall email the reviewer requesting a Peer Design Review.

Upon completion of the Peer Design Review, the reviewer shall indicate completion by signing the CAD Drawing(s) for the project. Recommendations for design enhancements shall be provided to the engineer in charge of project design.

3.6 Emergency Projects

For emergency projects where a design capital project is necessary to mitigate an imminent safety risk, the Peer Design Review is not required to be completed prior to the project as described herein. In such an emergency scenario, a Peer Design Review should be completed after construction is complete to review the design for appropriate materials and operability considerations. If actual construction deviated from project design (e.g., used different materials, changed route, etc.), then this review should include representation from the project completion organization (e.g., Construction, Operations). If this review identifies a need for corrective actions, such actions shall be taken.

4. CONSTRUCTABILITY / SAFETY REVIEW

The Constructability / Safety Review is a review of a planned project with the goals of identifying foreseeable risks during the construction phase and developing mitigation strategies. The Constructability / Safety Review can include the Tie-in Advance Briefing as required by GS 1680.010 “Tie-Ins and Tapping Pressurized Pipelines.”

Constructability / Safety Reviews are conducted to gain concurrence between the organizations designing/planning and completing the project work so that the project can be constructed as designed, thus minimizing changes to the design during the construction phase.

4.1 Job/Work Orders Requiring a Constructability / Safety Review

A Constructability / Safety Review is required for “complex” design capital job/work orders **and** all job/work orders estimated to be ≥ $50,000.

Scenarios describing when to complete a Constructability / Safety Review include the following.

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a. A design capital job/work order that is deemed "complex."

b. A "non-complex" design capital job/work order with an estimate of $50,000 or above.

4.2 Accountability and Stakeholder Participation

Constructability / Safety Reviews are to be scheduled and facilitated by the Field Engineer that designed the job/work order or the Project Manager responsible for the project.

All Constructability / Safety Reviews will at a minimum include representation from the organizations planning/designing and completing the project work. The Constructability / Safety Review will also include personnel from project stakeholder groups as project parameters suggest.

Examples of minimum attendance by project type include the following.

a. Blanket construction projects: Field Engineering and Construction (Construction can be internal or the NiSource contractor management organizations).

b. Blanket projects executed by Operations: Field Engineering and Operations.

c. Projects executed by Major Projects: Major Projects and appropriate stakeholders as project characteristics dictate.

It is possible for a Constructability / Safety Review to be conducted with a project completion organization that is not ultimately the organization completing the work (e.g., the Constructability / Safety Review is completed with Construction but Field Operations performs the project completion). In these scenarios, the organization completing the project work will review the Constructability / Safety Review during the pre-construction review (see Section 5). If requested by the organization completing the project work, the Field Engineer / Project Manager shall participate in the pre-construction review.

Additional stakeholders shall be identified as either participants in the Constructability / Safety Review or as stakeholders to be consulted in project planning. Participants are required to acknowledge review of the project design and their participation in the Constructability / Safety Review. An example of the Constructability / Safety Review form, which provides a guide to identify stakeholder involvement, is provided in Exhibit A.

If practicable, stakeholders identified as participants shall meet together to perform the Constructability / Safety Review. Otherwise, the Constructability / Safety Review may be completed through one-on-one sessions with participants as long as understanding

of project design and constructability is accomplished and comments and acknowledgements are documented and filed with the project documentation.

Stakeholders identified to be consulted are to be informed of the project and provide input when appropriate. In many cases this can be completed through existing means, such as forms or workflows designed to engage stakeholders during project planning. The facilitator of the Constructability / Safety Review will ensure each group listed is engaged during the design phase for the specific project characteristics identified on the Constructability / Safety Review form.

4.3 Timing

The Constructability / Safety Review should be conducted once the design has been completed and the job/work order is ready for approval but prior to the job/work order entering an “approved” status in the system of record (e.g., WMS, Maximo).

Exceptions to this should be limited and include Major Project scenarios when contracts and project approvals are obtained several months in advance of construction. In these cases, the Constructability / Safety Review may occur after the project obtains budgetary approval.

4.4 Evaluation Criteria and Stakeholder Concurrence

The Constructability / Safety Review shall evaluate project risks and mitigation strategies through the following evaluation criteria, at a minimum.

a. Appropriateness of all materials specified for the project.
b. Proposed project route including permitting and/or right-of-way implications.
c. Feasibility of selected construction methods.
d. Contractor units estimated, when applicable.
e. Tie-in plan location designs and pressure monitoring/control considerations.
f. Special considerations such as work hours restrictions, special backfill and/or restoration requirements, and advance notification requirements.

Completion of the Tie-in Plan Advance Briefing (see Section 6 below) as described in GS 1680.010 “Tie-Ins and Tapping Pressurized Pipelines” is recommended to take place at this time.

Any unacceptable residual risk shall be mitigated through the consideration of adjustments to the proposed design or alternative designs. All such adjustments must be made in accordance with the project’s intended purpose and objectives.

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4.5 Record Keeping

The Constructability / Safety Review shall be documented on the Constructability / Safety Review form and filed with the associated job/work order documentation.

The Constructability / Safety Review form is available on both the Gas Engineering page and the Engineering Services (NIPSCO) page of MySource. See attached Exhibit A as an example of the form for reference only.

4.6 Emergency Projects

For emergency projects where a design capital project is necessary to mitigate an imminent safety risk, the Constructability / Safety Review does not necessarily need to be completed and filed with the associated job/work order documentation. In such an emergency scenario, constructability shall be assessed and reviewed at the Tie-In Plan Advance Briefing (see Section 6 below) and Tie-In Plan Execution Briefing (see Section 7 below) as described in GS 1680.010 “Tie-Ins and Tapping Pressurized Pipelines.” These stakeholder review steps may be combined for emergency projects.

5. PRE-CONSTRUCTION REVIEW

The Pre-Construction Review is an assessment of project scope with the personnel responsible for project completion. The goal is to familiarize the project completion personnel with project considerations (i.e., commit dates, permits, easements, environmental considerations, etc.) prior to the start of construction.

The Pre-Construction Review is conducted to ensure that on-site personnel are briefed on project details and are aware of any pre-identified risks or challenges identified in previous briefings.

5.1 Job/Work Orders Requiring a Pre-Construction Review

A Pre-Construction Review is required for all design capital projects.

5.2 Accountability and Stakeholder Participation

The Pre-Construction Review shall be scheduled and facilitated by the project completion organization; typically Construction or Operations.

The Pre-Construction Review will at a minimum include representation from the NiSource organization responsible for completing the project (Construction Coordinator or Operations Crew Lead) and the contractor foreman when the project is executed by a 2nd party contractor.

The Pre-Construction Review will also include personnel from project stakeholder groups as project parameters suggest.

Additional stakeholders may include, but are not limited to, the following.

a. Engineer responsible for designing and planning the project.

b. Environmental / Natural Resources Permitting representation for projects with environmental risks as outlined in the project Environmental Compliance Plan (ECP).

c. Sewer Camera Contractor for projects involving the use of trenchless technology per the applicable GS 1100.050 “Damage Prevention – Using Trenchless Technology.”

NOTE: The Sewer Locate Process, as defined in GS 1100.050 “Damage Prevention – Using Trenchless Technology,” details pre-job review activities for projects involving the use of trenchless technology. Where possible, the Pre-Construction Review and the Sewer Locate Process should be combined.

d. M&R/GM&T representation for sensitive projects impacting or in close proximity to station facilities.

e. Survey & Land representation for projects impacting facilities within private and/or railroad rights-of-way.

5.3 Timing

The Pre-Construction Review shall be completed once the project is scheduled and as near as possible to the work commencing.

If not already completed, the Tie-in Plan Advance Briefing (see Section 6 below) as required in GS 1680.010 “Tie-Ins and Tapping Pressurized Pipelines” should be completed at this time.

5.4 Evaluation criteria and stakeholder concurrence

The Pre-Construction Review shall evaluate the following, at a minimum.

a. Site safety (including presence of utility marks, traffic control, Personal Protective Equipment (PPE) requirements, excavation safety, etc.).

b. Presence of required permits and/or easement documentation and notification requirements.

c. Environmental considerations and notification requirements as outlined in the Environmental Compliance Plan (ECP).

d. Tools and equipment required.

e. Personnel required.

f. System configuration assumptions (e.g., is the system condition the same as the as-designed configuration).

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5.5 Record Keeping

5.5.1 Columbia Gas Companies

Completion of the Pre-Construction Review shall be documented in the "Pre-Construction Checklist." This checklist is available on the Gas Engineering page of MySource and in WMSDocs.

It is the responsibility of the project completion organization to complete this Checklist while the project is in "Pending" and "In Progress" status.

5.5.2 NIPSCO

In NIPSCO, no design capital project work is authorized to begin until Field Engineering provides the physical work order documentation to the project completion organization. This documentation hand-off is achieved at the Pre-Construction Review, which is the formal transition from the design phase to the construction phase.

5.5.3 Trenchless Technology Projects (Columbia and NIPSCO)

Applicable components of the Pre-Construction Review shall also be documented in the required NiSource Sewer Locate Process document available on both the Gas Engineering page and the Engineering Services (NIPSCO) page of MySource.

6. TIE-IN PLAN ADVANCE BRIEFING

The Tie-in Plan Advance Briefing as described in GS 1680.010 "Tie-Ins and Tapping Pressurized Pipelines," shall be conducted for all design capital projects. Where practical, it should be conducted in conjunction with the Constructability / Safety Review or Pre-Construction Review.

7. TIE-IN PLAN EXECUTION BRIEFING

The Tie-in Plan Execution Briefing(s) shall be conducted for all tie-ins on a design capital job/work order as described in GS 1680.010 "Tie-Ins and Tapping Pressurized Pipelines."

EXHIBIT A
(1 OF 5)

Example "Constructability / Safety Review" Form

For Capital Designed Job Orders
For use by Columbia Engineering Team

Constructability / Safety Review

Design to Build - Build as Designed

Project ID: 13-20210 / Job Order Number: 19-0214706-00

Fill out questionnaire to populate required stakeholders and stakeholders to consult at the bottom of this form

1. Is the project being executed by a blanket Construction and/or Operations crew? (NOTE: Only answer "No" if Major Projects is managing the project)
   ☒ Yes ☐ No
2. Does the project involve installation or replacement of a point of delivery (POD) or a new interconnect with an unconventional gas supply, i.e. landfills, livestock farms? ☐ Yes ☐ No
3. Does the project involve the full installation or replacement of a district station other than a POD? ☐ Yes ☐ No
4. Does the project involve replacement of individual property unit(s) at a station (ie, regulator swap out, valve replacement, etc)? ☐ Yes ☐ No
5. Does the project involve installing or replacing electronic monitoring facilities (SCADA)?
   ☐ Yes ☐ No
6. Does the project design or location impact the ability to operate, inspect or maintain the asset(s) post-construction, i.e. special order materials of large size or that are uncommon, significant installation depth, etc? ☐ Yes ☐ No
7. Does the project involve corrosion impacts including steel casing on steel carrier pipe installation, AC mitigation, or impacts to cathodic protection systems such as rectifiers? ☐ Yes ☐ No
8. Does the project involve work on a transmission line? ☐ Yes ☐ No
9. Does the project involve installation or repair/replacement of pig launchers? ☐ Yes ☐ No
10. Does the project require odorant monitoring or line pickling? ☐ Yes ☐ No
11. Does the project involve hydrostatic testing? ☐ Yes ☐ No
12. Is the project likely to attract significant public or regulatory attention? ☐ Yes ☐ No
13. Does the project have a planned duration of greater than 75 business days? ☐ Yes ☐ No
14. Does the project involve work in a privately owned or third-party easement, or within a railroad right-of-way?
    ☐ Yes ☐ No

Enter

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EXHIBIT A
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For Capital Designed Job Orders
For use by Columbia Engineering Team

Constructability / Safety Review

Design to Build - Build as Designed

Project ID: 13-20210 / Job Order Number: 19-0214706-00

- **Project Scope**
  - Notes:
- **Route and Drawings**
  - Special Considerations
  - Primary Construction Method(s)
  - Notes:
  - Permits
  - ROW and Staking Requirement
- **Tie-in Locations, Designs, and Sequencing**
  - Notes:
- **Route and Drawings**
  - Special Fittings
  - All Estimated Materials
  - Dewatering
  - Notes:
  - Long Lead-time Items
  - Other
- **Units for Estimate**
  - Labor
  - Fill
  - Restoration/Paving
  - Survey Requirements
  - Service Replacements/Tie-overs
  - Notes:
  - Tie-ins
  - Traffic Control
  - Shoring
  - Test Holes
  - Meter Moveouts
- **Duration**
  - Working Hours
  - Who is on Jobsite
  - Notes:
  - Number of Crews
  - Special Conditions

Last updated: 05/22/2019

EXHIBIT A
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For Capital Designed Job Orders
For use by Columbia Engineering Team

Constructability / Safety Review

Design to Build - Build as Designed

Project ID: 13-20210 / Job Order Number: 19-0214706-00

- **Land Services Requirements (permits, private ROW, etc.)**
  - Notes:
- **Safety**
  - Excavation Safety
  - Tie-in Locations
  - Contact Corporate Security prior to start
  - Traffic Control
  - Operability/Damage Prevention
  - Notes:
- **Pressure Monitoring Control Considerations**
  - Known concerns to monitor
  - High and Low Pressure safety limits
    - ie: if pressure rises/falls beyond these points, contact M&R
  - M&R Station abandonments
  - Pressure check locations
  - Non-Primary relief valves needed
  - Notes:
- **Field Visit Needed? (☐ Yes / ☐ No)**
- **Comments / Adjustments**
  -
  -
  -
  -
  -
  -

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EXHIBIT A
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For Capital Designed Job Orders
For use by Columbia Engineering Team

Constructability / Safety Review

Design to Build - Build as Designed

Project ID: 13-20210 / Job Order Number: 19-0214706-00

Has been completed and agreed upon by the following:

Signed, Field engineer/Project manager	(Printed Name)	Date
Signed, Construction/Operations	(Printed Name)	Date
Signed, Please enter department name in gray box above	(Printed Name)	Date
Signed, Please enter department name in gray box above	(Printed Name)	Date
Signed, Please enter department name in gray box above	(Printed Name)	Date

See: Consult section on next page

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Distribution Operations

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For Capital Designed Job Orders
For use by Columbia Engineering Team

Constructability / Safety Review

Design to Build - Build as Designed

Project ID: 13-20210 / Job Order Number: 19-0214706-00

For Capital Designed Job Orders
For use by Columbia Engineering Team

This document is to be completed with notes, signed, then filed into the applicable WMSDocs Project Workspace

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Companies Affected:

☒ NIPSCO	☒ CVA	☒ CMD
	☒ CKY	☒ COH
	☒ CMA	☒ CPA

04/19/2019

See Sections 4, 5, and 6 for notes that clarify the intent of GS 1680.010 until a formal revision can be published.

REFERENCE 49 CFR Part 192.627, 192.631

1. GENERAL

Tapping and tie-in operations range from routine to complex and are sometimes referred to as “management of change operations.” The term “Tie-in Plan” refers to a written document that includes requirements and steps for tie-ins and tapping of pressurized pipeline facilities and can incorporate other related elements such as bypassing, abandonments, purging, special odorization requirements and testing. Thorough knowledge and attention to detail during planning and construction activities is required.

Prior to tapping a pressurized pipeline, the person in charge of the tie-in (e.g., crew leader, Construction Coordinator/Inspector) shall positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the Tie-in Plan, material, and existing records are compatible with what is found in the tie-in excavation. Discrepancies shall be investigated and resolved, prior to tapping, and a contingency plan (e.g., identify, locate, access, and operate applicable shut-off valve(s)) shall be developed.

All tapping of pressurized pipelines shall be performed by personnel qualified in installation and use of the proper fittings, equipment, and procedures.

1.1 Material

Tapping fittings shall have a pressure rating equal to or greater than the Maximum Allowable Operating Pressure (MAOP) of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipeline at the time of the tapping operation. Refer to manufacturers’ documentation for the design pressure of specific fittings and tapping equipment. Use the tool recommended by the manufacturer to complete the tapping operation.

1.2 Pressure Testing

Pressure testing of tie-in fittings and/or joints shall be done in accordance with the applicable GS 1500.010 “Pressure Testing.”

Fittings used for tapping and plugging, including but not limited to, fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not

subjected to the main test pressure, shall be tested prior to tapping operations.

Performing a leak test on an untapped tapping or stopping fitting can dent or collapse the pipeline on which it is installed. The collapse can occur when there is a significant differential between the system pressure and the intended test pressure for the fitting. Refer to the applicable GS 1500.010 “Pressure Testing” for leak test procedures for steel tapping and stopping fittings.

1.3 Evaluation for Unknown Mechanical Couplings

Tie-ins involving pipeline separation on metallic pipelines operating over 10 psig that might contain unknown mechanical couplings shall be designed to resist thrust forces associated with stopping gas flow.

1.4 Safety and Related Standards

All applicable HSE and other safety standards shall be followed including the following.

a. HSE 4100.010 “Hazardous Atmosphere Considerations.”
b. GS 1690.010 “Purging.”
c. GS 1740.010 “Abandonment of Facilities.”
d. GS 1770.010 “Prevention of Accidental Ignition.”

2. DEFINITIONS

For the purpose of this gas standard, the following definitions are applicable.

“Person in Charge” is the person responsible for verifying each step is complete, documenting completion on the Tie-in Plan and authorizing movement to the next step.

“Reinforced,**”** as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

For other definitions, refer to GS 1012.010 “Definitions.”

3. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

3.1 Plastic

Two basic types of tie-ins are performed on plastic pipe.

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining.”

NOTE: Only hand tighten a cap on a plastic tapping tee. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze-off tool to stop the flow of gas. Refer to GS 1680.040 "Squeeze-Off Procedures for Plastic Pipe," as well as Gas Standard Series 1300 "Pipe & Fitting Joining."

Joints should be fused except where the confines of the excavation, weather conditions, or safety considerations* dictate the use of mechanical fittings.

*NOTE: For plastic propane piping systems or former plastic propane piping systems that have been converted to natural gas, mechanical fittings shall be used for tie-in joints. See Exhibit C for related mapping symbols.

3.2 Steel or Wrought Iron

3.2.1 Tie-In Method

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

Couplings shall not be used to tie-in pipe joints on distribution pipelines with an MAOP equal to or greater than 200 psig or transmission class pipelines, unless approved by the Manager of Engineering in accordance with GS 2100.010 "Design – General."

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, Engineering must be contacted for additional guidance.

3.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following.

a. The fitting connected to the pipeline.

b. The equipment being used.

It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

3.2.3 Bag and Diaphragm Type Pipeline Stoppers

The use of inflatable bags or diaphragm type stoppers is limited to low pressure

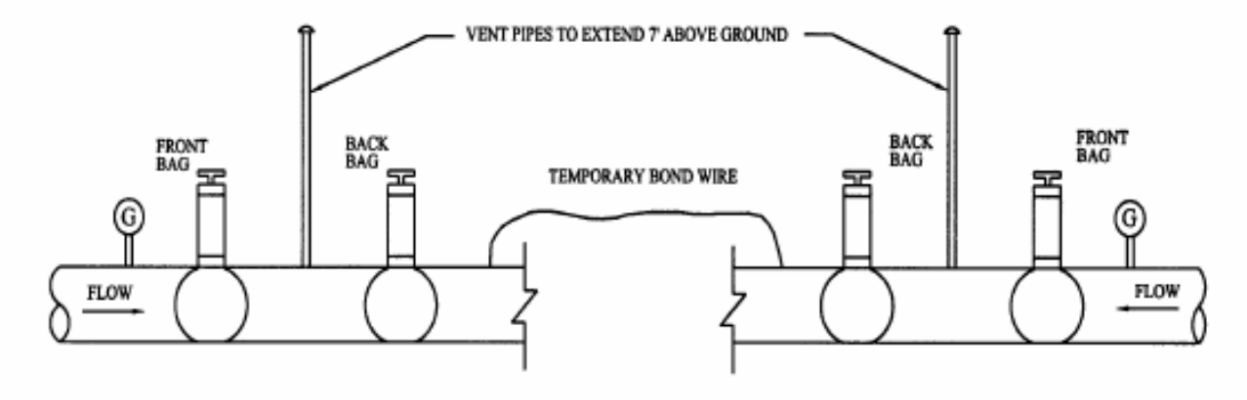
for tie-ins of steel and wrought iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



3.3 Cast Iron

When the term "cast iron" is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe's dimensions, the diameter or the circumference of the pipe must be measured.

3.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent unreinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

3.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

3.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except for the following.

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads.

b. A 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1" or 1 1/4"	2"	3"	4"
2"	Reinforced	Reinforced	X	X
3"	Reinforced	Reinforced	Reinforced	X
4"	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6"	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8"	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10"	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12"	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14"	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16"	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18"	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20"	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24"	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1-1/4 inch taps may be

installed on 4 inch cast iron or ductile iron without reinforcement.

4. WRITTEN TIE-IN PLAN

A Tie-in Plan shall be prepared for tie-in operations on the following types of work.

1. Designed capital mainline installations, replacement and/or abandonment work.
2. Designed capital installations, replacements and/or abandonments of measurement, regulation, or measurement and regulation (M&R) stations.
3. Emergency work, either capital or operations and maintenance (O&M), involving the replacement of mains, temporary bypass of a mainline or a mainline to be temporarily taken out of service. The Tie-in Plan for emergency work may be expedited and consolidate multiple elements such as the Advance and Execution Briefings (see Section 5.1 below). However, safety cannot be compromised.
4. Maintenance operations that require a temporary bypass of a mainline or require a mainline to be temporarily taken out of service.

Clarification for Section 4, bullet 3, an expedited Tie-in Plan may consist of issuing a shut-down plan first, then following up with a start-up plan.

NOTE: A Tie-in Plan is not required for operating a regulator station utilizing its permanent setting bypass.

4.1 Plan Requirements

The Tie-in Plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The Tie-in Plan includes two parts, the “Tie-in Plan: Design” and the “Tie-in Plan: Execution Steps,” as identified in the tie-in template. The Design is to be completed as part of the job order approval. The Execution Steps portion has to be prepared prior to the Advance Briefing (see Section 5.1.1 below).

The Tie-in Plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s) as described in Section 5.

A Tie-in Plan template example is shown in Exhibits A and B. Standard templates and drawings are provided through the Engineering SharePoint site and WMSDocs.

The Tie-in Plan shall address the following items, as applicable. Additional items may be addressed as deemed appropriate.

1. Necessity of, size, length and temperature limitations for a bypass.
2. Safety precautions to prevent abnormal operating conditions, such as the following.
    a. Identification and protection of control lines and tap locations.

b. Knowledge of maximum allowable operating pressure (MAOP) and expected range of system pressures during tie-in operations.

3. Scope or extent of system to be tied in and/or bypassed.
4. Identification of station(s) (district regulator, point-of-delivery (POD), town border - permanent or temporary), as follows.
   a. Delivering gas directly to the system in the area of the tie-in.
   b. Downstream of the work being performed that would be impacted and require monitoring during the tie-in process.
   c. Where a significant change in flow (increase or decrease) could result from the work.

   All stations identified shall be analyzed to determine the need for monitoring during excavation or the tie-in process.

   For low pressure regulator stations identified, refer to ON 19-02 “Low Pressure Regulator System Work Requirements” for the requirements to monitor low pressure regulator stations (based on completed LP Enhanced Safety Actions) during tie-in operations.

   All stations downstream of the work being performed shall be equipped with proper equipment (e.g., strainers) to protect the pressure regulation from pipeline debris such as construction shavings.

   All stations identified shall also have an accurate isometric sketch which is available in GIS, at the station and included in the project drawings.
5. Positive verification of the expected system status and configuration by comparing planned tie-in activities to what is uncovered in the tie-in excavation.
6. The need for reinforcement for branch connections (refer to GS 2420.010 “Reinforcement Requirements for Branch Connections”).
7. Verification of pressure and content.
8. Method and location of pressure control and monitoring for tie-in location(s).

Clarification for Section 4.1, bullet 4.

The intent of the first sentence in bullet 4 and the following sub-bullets a., b., and c. is to determine which stations are impacted by the Tie-in Plan.

“Impacted” stations is to be determined by the Engineer preparing the Tie-in Plan using sound engineering judgement through the use of engineering tools (e.g., Synergi), when necessary.

The remaining paragraphs in bullet 4 are the actions to take for those impacted stations.

Clarification for Section 4.1, bullet 10.

As an alternative to identifying valve(s), isolation points, such as bag or squeeze-off locations, may be identified; however, these locations must be excavated and squeeze-off or bagging equipment, as applicable must be accessible nearby.

9. Determining the sequence of closing and opening valves or any other flow controlling device.
10. Identifying applicable valve(s), which should be located and checked for accessibility and operability before the tie-in operation begins. If during tie-in and tapping operations, an emergency occurs (e.g., stopple failure, coupling pull out), the valve(s) could be more quickly accessed for pipeline shutdown, if necessary.
11. Planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction).
12. Planning for additional pressure monitoring at regulator stations where excavation is planned to occur within the footprint of a POD or district plant regulator station or within 25 feet of a station building or fence unless all regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines are verified to be located completely above ground (refer to applicable GS 1100.040 “Damage Prevention when Using Conventional Excavation Technologies”).
13. For tie-ins on a metallic pipeline operating above 10 psig, excluding the following exceptions, evaluate the pipeline to determine the existence of mechanical couplings from the edge of the excavation for a distance equal to or greater than the safe embedment distance (refer to GS 2220.020 “Pipeline Flexibility, Supports, Anchors and Safe Embedment Distance”) along the pipeline that will remain in-service.

    EXCEPTIONS: The following exceptions do not require an evaluation for unknown mechanical couplings. If an evaluation for unknown mechanical couplings is not included within the Tie-in Plan due to one or more of the following exceptions, the exception(s) shall be documented in the Tie-in Plan.

    a. Tie-ins that are made with spherical tees or shortstopp tees, where the pipeline is fully replaced and in-service prior to separation, and changes in direction are backfilled or blocked to prevent movement.
    b. Direct tie-ins with full-sized steel bypass (see example in Exhibit D).
    c. Following a thorough investigation of Company records, the Engineering Leader, in consultation with Construction and local Field Operations, provides confirmation that no mechanical couplings exist on the pipeline.

    Refer to Section 5.2.d. for methods of evaluation for unknown mechanical couplings.
14. Check for leak-through of line stopping devices.
15. Leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to

applicable GS 1500.010 "Pressure Testing" for additional guidance).

16. Purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses (refer to GS 1690.010 “Purging”).
17. Communication between critical points during the operation (e.g., monitoring pressures).
18. Notification of customers who will have service temporarily interrupted (if applicable).
19. Notification of local Field Operations Leaders/Supervisors, Measurement and Regulation Technicians, Construction Front Line Leaders/Supervisors, as appropriate, if sections of pipeline will be temporarily taken out of service.
20. Notification of Gas Control. Engineering shall review each planned tie-in to determine if it could impact Gas Control operations (e.g., SCADA monitored points, ERX) resulting in a high or low alarm as well as to determine if Gas Control could assist in management of the tie-in process. If it is determined that Gas Control can assist in management of a tie-in process, Gas Control is to be notified, and the Engineer shall indicate on the Tie-in Plan that notification of Gas Control is required and list the points monitored by Gas Control that could be impacted.
21. Odorant level testing if determined necessary by Engineering.

4.2 Plan Accountability

Engineering shall prepare or provide final review of the Tie-in Plan. Request input from Construction or Operations personnel for Tie-in Plans, as needed.

When Tie-in Plans involve the installation of concrete anchor(s) on a metallic pipeline (resulting from the evaluation for unknown mechanical couplings), the Tie-in Plan, prepared by Engineering, shall also be approved by all of the following, except as noted.

a. Engineering Leader.
b. Construction (or Project Management) Leader.
c. Corrosion Leader.

NOTE: If consensus cannot be reached between Engineering, Construction (or Project Management), and Corrosion leadership for Tie-in Plans involving the installation of concrete anchor(s) on a metallic pipeline, the Engineering Manager shall determine the appropriate method to use to prevent potential pullout of unknown mechanical couplings and approve the Tie-in Plan.

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5. PRE-CONSTRUCTION

5.1 Tie-in Plan Briefings

5.1.1 Advance Briefing

The Tie-in Plan advance briefing is to provide project leadership with a clear understanding of the planned tie-in(s). The Tie-in Plan advance briefing will typically be completed during the Pre-Construction Review or Constructability Review (refer to GS 2810.050 “Stakeholder Review of Capital Projects”) and shall include all of the following personnel, as applicable.

a. The Engineer responsible for the Tie-in Plan. The Engineer’s responsibility includes coordination of the advance briefing. This can be accomplished through a group meeting, one on one sessions or otherwise communicated as appropriate as long as understanding of the Tie-in Plan is accomplished and confirmation is documented.

b. M&R Leader (or designee).

c. Local OCM or designee as operator of the overall system.

d. Construction or Field Operations Leader (or designee) responsible for the project.

e. Engineering Leader.

f. Person in Charge of tie-in execution (e.g., crew leader, Construction Coordinator/Inspector).

g. Manager Transmission Integrity (or designee), if the Tie-in Plan involves a Company-owned transmission line.

Clarification for 5.1.1 e.

An Engineering Leader may assign a designee.

5.1.2 Execution Briefing

The Tie-in Plan execution briefing shall be conducted for each individual tie-in within a job order on the same day of the tie-in and shall include the following personnel. If the tie-in takes multiple days to complete, the Execution Briefing is to be repeated each day. It is also to be repeated when there is a change in personnel involved with the tie-in.

1. Person in Charge. The Person in Charge of the tie-in execution (e.g., crew leader, Construction Coordinator / Inspector). Their responsibility includes conducting the Tie-in Plan execution briefing to assure understanding of the plan and to make assignments for the required tasks of the tie-in execution (e.g., monitoring pressure at various locations during tie-in operations, regulator station monitoring or adjustments, tapping, stopping, bypassing).

2. Personnel performing tasks. Personnel performing the tasks involved with the tie-in execution.

3. Engineer. Engineer responsible for the Tie-in Plan as needed and requested.

The Execution Briefing shall cover the following.

a. Review of the Tie-in Plan.

b. Designation of personnel responsible for various aspects of the operation (e.g., make assignments for monitoring pressure at various locations during tie-in operations).

c. Review of the expected system status and configuration based on Company records and the Tie-in Plan to make sure Company facility records and the Tie-in Plan are consistent with what is visually observed in the tie-in excavation. Any discrepancies in Company facility records and the Tie-in Plan shall be addressed by reconciling Company facility records to the actual conditions found (i.e., submit map revision in accordance with GS 2610.040 “Map Revisions”) and by the Engineer evaluating and adjusting the Tie-in Plan (also see “i” below).

d. Review system MAOPs and acceptable pressures expected to be encountered at system monitoring locations.

e. Verification that on-site communications equipment is functioning properly.

f. Verification that tapping equipment is rated equal to or greater than the operating pressure.

g. Requirements of work zone and personal protective equipment (PPE) safety.

h. Reminder of Stop Work Authority. Every employee has the responsibility and authority to Stop Work immediately if a situation arises due to an unsafe action, condition, behavior or non-action that may potentially lead to an incident. Work suspended due to a Stop Work action shall not resume until all safety concerns are addressed.

i. If modifications to the Tie-in Plan are required after review at the job site, the changes shall be approved by all of the following.

   1. Engineer.
   2. M&R Leader (or designee).
   3. Construction or Field Operations Leader (or designee) responsible for the project.

Any changes or adjustments to the Tie-in Plan shall be documented, including revision approvals, and another execution briefing shall be held if the changes were made after the original execution briefing.

5.2 Other Pre-Construction Activities

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. If indicated by the Tie-in Plan, notify Gas Control of the work to be performed. This notification shall include the following.

   1. A point of contact for the crew performing the tie-in activity.
   2. A list of the points monitored by Gas Control that could be impacted by the work.
   3. Proposed start and end times of the tie-in activity.

c. For impacted LP stations (as identified on the Tie-in Plan), the location of the control lines and control line taps shall be verified and added to or updated on the LP station isometric drawing as necessary.

d. If the tie-in excavation is planned to occur within the footprint of a POD or district plant regulator station or within 25 feet of a station building or fence, available isometric drawings and/or as-built station drawings shall be reviewed for locations of buried regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines. Known buried regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines shall be located prior to excavation.

e. Expose pipe at tie-in location(s). Positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner. Discrepancies shall be investigated and resolved, prior to tapping, and a contingency plan shall be developed to identify applicable shut-off valve(s), which shall be located and checked for accessibility and operation before tapping activities begin. If modifications to the Tie-in Plan are required, the changes shall be approved, documented, and communicated in accordance with Section 5.1.2.i. above.

   NOTE**:** If pressure verification indicates a pressure that is above the MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 "Definitions," promptly notify local System Operations leadership and Gas Control.

f. Inspect pipe condition to determine suitability for tapping.

1. Inspect pipeline for external corrosion. Refer to GS 1410.010 “Metallic Pipeline Exposures” for additional guidance.
2. Verify wall thickness (if appropriate).
3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current Company welding procedures for additional guidance.
4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

g. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

1. Check the Tie-in Plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.
2. Install concrete support under the tie-in location to avoid additional stress on the existing pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rock shield, or an equivalent protective isolating material.
3. Install support (e.g., sandbags, side booms) on isolated sections of mechanically joined pipeline to avoid additional stress.
4. For tie-ins on a metallic pipeline operating above 10 psig, evaluate the pipeline to determine the existence of mechanical couplings for a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service, if practicable.

NOTE: If the evaluation along the safe embedment distance cannot be completed or is inconclusive, consult with Engineering.

Methods of evaluation for unknown mechanical couplings include the following options.

i. Use an approved camera system for live insertion through an in-service pipeline. The use of a camera to inspect for mechanical couplings is preferred since it minimizes disturbance to the pipeline. If the pipeline operating pressure is higher than the maximum working pressure of the camera system, consider reducing the pipeline operating pressure to allow for the use of a camera to inspect for mechanical couplings. If reducing the pipeline operating pressure is not practicable, refer to options

identified in bullets “ii” and “iii” below.

The inspection distance shall be equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service.

ii. Adjust the stopple (i.e., pressure control) equipment away from the tie-in/separation location to allow the use of an approved camera system through a pipeline that has been shut down and purged of gas.

Adjust the placement of the stopple fitting and equipment at a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation. Insert a camera system through the pipeline that has been shut down and purged in accordance with GS 1690.010 "Purging." The use of an air mover in accordance with GS 1770.020 “Use of Air Movers at Tie-Ins” may be required if complete shutdown cannot be maintained while performing the camera inspection.

iii. Strip the topsoil from the top of the pipeline from the edge of the tie-in excavation along the pipeline that will remain in-service for a distance equal to or greater than the safe embedment distance. If removing the topsoil from the top of the pipeline is the only valid option, consider using vacuum excavation at an angle to minimize topsoil removal. Only uncover one joint at a time. Consider adding an anchor prior to stripping topsoil.

iv. If the use of a camera or stripping the topsoil from the top of the pipeline is not practicable, anchoring and/or blocking (or equivalent restraint) shall be planned for installation prior to tie-in operations. Refer to GS 1320.010 “Mechanical Coupling Connections.”

5. Take further actions based on results of evaluation for unknown mechanical couplings.

If no indication of couplings are found, the project may resume without further investigation.

If mechanical coupling(s) are found or if the evaluation is inconclusive, take actions to prevent potential pullout of unknown mechanical couplings. One or more of the following actions may be appropriate.

i. Relocate the proposed tie-in upstream of found coupling(s) to remove the coupling(s) (preferred action).

NOTE: Evaluation of the pipeline from the edge of the

new tie-in excavation for a distance equal to or greater than the safe embedment distance is required if not previously evaluated.

ii. Harness (preferred) or strap known or found coupling(s). Only uncover one joint at a time, provide restraint (e.g., harness), then backfill.

iii. Anchor.

iv. Block to prevent pipeline movement at exposed changes in direction or dead ends.

v. Take the pipeline out of service.

vi. Reduce the operating pressure during construction and/or tie-in operations to reduce the safe embedment distance or to eliminate coupling(s) found from within the safe embedment distance.

vii. Submit a map revision according to GS 2610.040 “Map Revision” to record the location of the found coupling(s). See Section 8.2 below.

Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance.

6. DURING CONSTRUCTION

Qualified Company personnel shall be on site and in charge of the tie-in execution.

Assignments, as outlined in Section 5.1.2, shall be executed as planned and discussed in the Tie-in Plan execution briefing.

6.1 Pressure Monitoring

Whenever the Company or its contractor performs live gas main-to-main connections (i.e., tie-in connections, branch connections, bypasses), properly calibrated pressure gauges shall be installed in appropriate locations and utilized prior to and during tie-in operations, regardless of the system operating pressure, in order to reduce the possibility of over-pressurization of gas mains.

Regulating stations identified in the Tie-in Plan shall be monitored throughout the tie-in process by qualified personnel that can take corrective action at the station in the event an Abnormal Operating Condition (AOC) occurs, until the tie-in gauges are removed to ensure proper operation. Engineering will provide expected pressure ranges. Actual pressure information will be recorded as identified in the Tie-in Plan: Execution Steps.

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of

the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration shall be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. If a tie-in involves shutting down a section of pipeline immediately downstream of a regulator station supply, leak-through of the bypass valve or regulator orifice may occur which could result in a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure may occur on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken, and a new Tie-in Plan is prepared.

Tie-in gauges shall be left in place and monitored following completion of the tie-in for a minimum of 30 minutes to ensure the piping system is operating as expected.

6.2 Bypassing and Stopping Techniques

Engineering shall provide assistance for appropriate bypass sizing.

Clarification for 6.2.

It is still acceptable to plan to temporarily interrupt service to customers to perform a tie-in (e.g., take a pipeline temporarily out of service to pressure test).

Whenever the flow of gas is stopped, the isolated section of main shall be checked for leak-through before cutting into or parting the line. When positive shut-off of gas by a valve or line stopper is not accomplished, "live-gas" precautions shall be strictly followed to avoid exposure to combustible gas-air mixtures. Refer to GS 1770.010 “Prevention of Accidental Ignition” for additional guidance. An air mover or purger may be used to prevent the introduction of gas into the work area at open ends. Refer to GS 1770.020 “Use of Air Movers at Tie-Ins” and GS 1690.010 “Purging” for additional guidance.

Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to applicable GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by Engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is necessary to maintain gas service to downstream customers, unless an alternate gas supply is arranged (e.g. portable gas supply, alternate fuel).

6.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include the following.

a. Following manufacturer's recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve.

b. A combustible atmosphere in the work area cannot be avoided.

c. Other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion.

d. The tie-in is on cast iron pipe.

e. An installation is temporary (e.g., regulators for bypassing or uprating).

f. It is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

6.4 Additional Tie-In Considerations

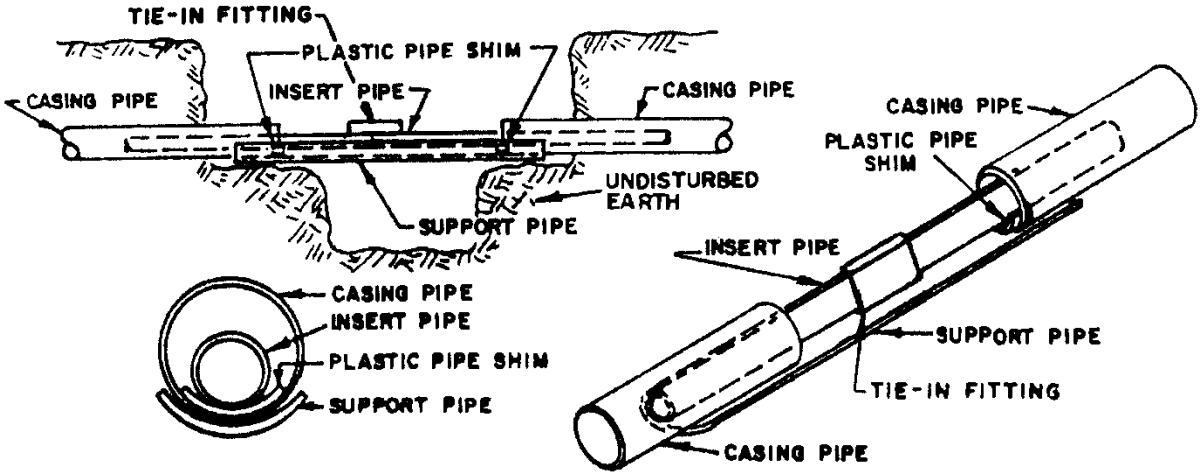
The following general tie-in considerations shall be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 "Reinforcement Requirements for Branch Connections" for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in shall be installed according to GS 3010.090 "Cover."

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture, screenings). Heavy or wet clays and frozen earth are not suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

7. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze-off jacks or removing bags and installing leak repair

clamps, or installing and/or removing any other appropriate materials, tools, or equipment.

e. Tie-in gauges shall be left in place and monitored following completion of the tie-in for a minimum of 30 minutes to ensure the piping system is operating as expected.

f. Engineering shall determine whether post construction odorant level testing is necessary, which should be part of the Tie-in Plan. If odorant level testing is required, refer to the applicable GS 1670.020 “Odor Level Monitoring” and GS 1670.040 “Pipeline Conditioning New Pipelines.”

8. RECORDS

8.1 Written Tie-In Plans

Approved and executed Tie-in Plans, including completed documentation of each checklist and step, shall be filed with the work order completion report and retained for at least the life of the pipeline plus 10 years.

8.2 Map Revisions

When unmapped mechanical coupling(s) are found and left in-service on a metallic pipeline, a map revision shall be submitted in accordance with GS 2610.040 “Map Revision” to record the location of the coupling(s). If a mechanical coupling is exposed, document the existing restraint found or the type of restraint installed (e.g., weld straps, harness) at the mechanical coupling(s).

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Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
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EXHIBIT A
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Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
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<<Project Name>>

Tie-In Plan: DESIGN

(To be completed prior to project approval)

System Number(s) involved		Tie-in Site Identifiers	
MAOP(s)		Expected Pressure Range(s)	
Feed into tie-in site	Choose an item	Bypass(es) Needed	Choose an item
M&R Needed during Tie-in?	Choose an item		

Tie-In Plan: Cover Sheet

No tie-in is to be made without a Written Tie-in Plan

1. The purpose of this plan is to address the requirements of tapping (GS 1680.010), pressure testing (GS 1500.010), purging (GS 1690.010), and abandonment (GS 1740.010) when performing tie-in planning and execution.
2. All persons performing any tie-in/bypass/abandonment operation ("tie-in") shall review the entire Tie-in Plan.
3. When any clarification or alteration is required, contact Engineering as far in advance of the tie-in as possible.
4. Engineering must re-review the Tie-in Plan prior to the start of the process when the temperature is at or below XX°F during any portion of the tie-in.
5. All persons performing tie-in operations shall have valid Operator Qualifications (OQ) for the actions they will perform. OQ shall be valid through the entire tie-in process and documented in the Company's system of record for the Project.
6. The person overseeing and controlling execution of the tie-in process is referred to as the "Person in Charge". The Person in Charge is responsible for verifying each step is complete, documenting completion on the Tie-in Plan and authorizing movement to the next step.
7. Throughout all Tie-in planning, preparation and execution, all persons shall follow proper procedures, Gas Standards, and safety precautions. These include but are not limited to the following Contingnecy Plan, Tie-in Plan, and checklists attached below:
   - Tie-in Planning – Engineering
   - Tie-in Preparation – Construction / Field Operations
   - Tie-in Execution Briefing – Construction / Field Operations

Contingency (Emergency Shut-down) Plan for this tie-in:

The project Contingency plan shall be used in the event of an emergency or hazardous situation during execution of the Tie-in plan. This is a supplement to the Emergency Manual and Gas Standard series GS 1150.

Contact the Field Operations Leader {Name of Field Operations Leader} at phone number {Field Operations Leader's Phone number} immediately in the event of an emergency.

A decision to shut down mains shall be based on protection of life and property, followed by maintaining gas service to customers.

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Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
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Emergency Isolation Valve(s) and Alternate Points of isolation have been identified, documented on the Project's Emergency Isolation Valve Form, and included with this document.

Checklist: Tie-in Planning – Engineering

☑	N/A	Tie-in Planning – Engineering (Check the appropriate box for each item)
☐	☐	a. Identify regulator station(s) requiring locating buried "control lines" ("control lines" also refer to regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines) prior to tie-in (GS 1100.040).
☐	☐	b. Identify regulator station(s) potentially requiring monitoring during tie-in. i. Regulator stations within 25 feet of tie-in excavation work, unless all control lines are confirmed to be completely above ground (ON 15-05). ii. Trace all lines planned for abandonment to confirm appropriate action taken for any existing control lines or service lines. iii. Upstream and/or downstream stations impacted by tie-in (GS 1680.010). iv. Perform station flow analysis based on planned system modification to assure proper capacity with focus on post-project under or oversizing. v. Regulator stations or commercial/industrial customers upstream that may be impacted by purging operations (GS 1690.010). vi. Station isometric drawings current and included in the project drawings. vii. List of stations identified:

Station ID	Station Impacted (Y/N)	Control Lines Impacted (Y/N)	Monitoring Required (Y/N)	Comments

Sign-offs: _____ Engineer _____ System Operations

☐	☐	c. Determine if tie-in(s) affect systems monitored by Gas Control, and add notification of Gas Control to the applicable tie-in scenario(s) (GS 1680.010, GS 1740.010).
☐		d. Identify MAOP of pipeline and expected range of pressures during tie-in operations for communication to field personnel and Gas Control.
☐	☐	e. Determine necessity of, size, length and temperature limitations for a bypass (GS 1680.010).
☐	☐	f. Determine the need for reinforcement for branch connections (GS 2420.010).
☐	☐	g. Determine if pressure changes are expected from moving customers from one system to another.
☐	☐	h. Determine if scope of job requires odorant checks and pipeline conditioning (GS 1670.040).
☐	☐	i. Identify downstream M&R and customer stations supplied by the project's pipeline section. Ensure proper equipment is installed to prevent pipeline debris from entering regulator equipment (e.g.: strainers). Plan for equipment installations and monitoring at downstream stations as needed.
☐		j. Create Emergency Shutdown plan. Identify valve(s) to be operated in case of emergency (GS 1680.010).
☐		k. Project drawings updated to show tie-in locations and designs, including required materials (permanent and temporary bypass) on the bill of materials.

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Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
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Project's Emergency Isolation Valves & Alternate Points

Ops Center: _____

<<SYSTEM NUMBER>> (<< HP / MP / IP / LP >>) SEGMENT ISOLATION VALVES

Total Quantity of Isolation Valves: _____ Additional Valves: _____

Verify & record that each valve is Operational within 30 days of tie-in, and verify Accessibility immediately before tie-in.

Ref #	Cross St / House # Or Alternate Point Description	Size	Type (ST/PL)	Year Installed	Facility ID / AKA	Critical? (Y/N)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Closing these valves will isolate the following area(s): <<List Streets and Critical Customers>>

DISCLAIMER: THE ISOLATION OF THIS AREA DOES NOT GUARANTEE CONTINUOUS FLOW DOWNSTREAM OF THE ISOLATED AREA

<<Copy and complete this page for each system that has work done on it by this project. This paragraph should be deleted>>

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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Pipe Internal Surface Area Calculation for Odorant Monitoring

Engineer to put a screenshot or other legible output copy of the project's "Pipe Surface Area Calculator" on this page for odorant check requirements (this text should be deleted)

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Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Tie-In Plan: Execution Steps

(To be completed prior to the Tie-in Advance Briefing with modifications or additions as needed during construction)

Advance Briefing: This briefing shall be conducted by Engineering.

Tie-in and Contingency Plan Reviewed by:

Title (or designee)	Name	Signature (or describe alternate confirmation)	Date
Engineer			
M&R Leader			
Construction or Field Leader			
Engineering Leader			

Checklist: Tie-in Preparation – Construction / Field Operations

☑	N/A	Tie-in Planning – Construction / Field Operations (Check the appropriate box for each item)
☐		a. Review job order package for completeness, accuracy and any system restrictions that must be considered prior to construction that could alter Tie-In Plans and Procedures.
☐		b. Set up Work Area Protection (GS 4100.020, GS 1770.010). • Traffic plan • Confined space entry • Excavation safety (shoring and ladders) • Noise and particulate protection for hard surface removal • Fire extinguishers • Conformance with HSE 4100.010 Hazardous Atmosphere Consideration • Adequate number of road plates available
☐	☐	c. Locate control lines at regulator stations identified by Engineering. Verify that the Isometric Sketch at each engineering-identified station contains control line measurements; notify engineering if sketch is incomplete, incorrect, or older than one calendar year. Work with Engineering to update station documentation (and Infrastructure Records) accordingly.
☐		d. Locate valve(s) identified for Emergency Shutdown, and verify that valve(s) are accessible and operable prior to Tie-in.
☐	☐	e. Notify customers who will have service temporarily interrupted to review job expectations (if applicable).
☐		f. Visually expose and verify systems and configurations match the Tie-in plan. Investigate and address inconsistencies. Ensure adequate plans are established to plate or protect road openings for off-hours.
☐		g. Verify required equipment and materials are available.
☐		h. Verify pressure and contents of pipeline(s) (GS 1680.010).
☐		i. Inspect pipe condition to determine suitability for tapping (GS 1680.010).
☐	☐	j. Obtain safe embedment distance from Engineering and evaluate metallic pipelines for the existence of mechanical couplings and take steps to prevent coupling pullout (GS 1680.010).
☐		k. Pressure test all pipelines and bypasses that will contain gas prior to introduction of gas (GS 1500.010).

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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☒	N/A	Tie-in Planning – Construction / Field Operations (Check the appropriate box for each item)
☐		l. Identify potential Abnormal Operating Conditions (AOCs) that could occur during tie-in and purging operations, including over- or under-pressurization. Discuss acceptable responses to identified AOCs with personnel assigned to monitor pressures.
☐		m. Conduct Tie-in Execution briefing whenever a new tie-in sequence is started (GS 1680.010). Discuss communication expectation at critical points during the Tie-in (e.g., monitoring pressures prior, during and after Tie-in).

Checklist: Pre-Construction Review – Construction / Field Operations

☒	Pre-Construction Review – Construction/Field Operations (Check the box once each item is completed)
☐	a. Review Tie-in Plan and Contingency Plan.
☐	b. Review the Operator Qualification(s). All persons performing Tie-in operations shall have valid Operator Qualifications (OQ) for the actions they will perform. OQ shall be valid through the entire Tie-in process and documented in the Company's system of record for the Project (e.g., WMSdocs, Maximo).
☐	c. Notify Gas Control that work is to start in conformance with Tie-In Procedures (if indicated as necessary). GS 1170.010 Gas Control Room Management Standard.
☐	d. Designate individuals responsible for various aspects of the operation (e.g., make assignments for monitoring pressure at various locations during tie-in operation.
☐	e. Discuss potential Abnormal Operating Conditions (AOCs) that could occur during tie-in and purging operations, including over- or under-pressurization. Discuss acceptable responses to identified AOCs with personnel assigned to monitor pressures. Reminder to communicate and resolve any AOCs prior to continuing further Tie-in operations.
☐	f. Reminder of Stop Work Authority.
☐	g. Verify that tapping equipment is rated equal to or greater than the operating pressure.
☐	h. Review expected system status and configuration, based on Company records and the Tie-in Plan • Verify tie-in designs are compatible with what is found in the tie-in excavation. • Confirm depths, sizes, materials, and pressures. Address inconsistencies before continuing. • Update Tie-In plans with field verified information. Thoroughly review tie-in plan details with all personnel involved to ensure understanding of the procedure steps and individual roles and responsibilities.
☐	i. Review system MAOPs and acceptable pressure ranges expected to be encountered at system monitoring locations.
☐	j. Verify that on-site communications equipment is functioning properly.
☐	k. Review requirements of work zone and personal protective equipment (PPE) safety.
☐	l. Perform tie-in in accordance with Tie-In Plan and applicable procedures. • Reminder that modifications to the Tie-in plan shall be approved by an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee. • Changes shall be documented, and list those parties involved in determining them. • Any changes or adjustments to the tie-in plan shall be communicated with the Engineer and the personnel performing the tasks and documented that the discussion of changes took place.

Crew Foreman

(Signature) (Printed Name) (Date)

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MiSource
Distribution Operations

Gas Standard

Effective Date: 02/28/2019	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 06/01/2018		Page 28 of 42

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Inspector or Supervisor

(Signature) (Printed Name) (Date)

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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Main Installation Standard Operating Procedure

IN PROGRESS status for Use by Columubia Gas Construction/Operations Team

The following checklist is to be used by the Construction Team when working a main installation that is in the In Progress Status. The following tasks must be completed before moving the JO into the Completed Status.

This list is not intended to replace or circumvent all applicable Gas Standards or the instructions in the JO.

While this list is applicable to most main installations, the SOP is intended to address the unique operating characteristics, system configuration and potential improper operations that could occur on this specific project. Moreover, this SOP will ensure consistent performance of the tasks necessary to safely install main in compliance with federal, state regulations and company standards.

Tasks to be completed by the Construction Team for main installations before moving JO to Complete Status

Purpose: Provide direction on main installations to:

1. Identify prerequisite tasks required prior to performing field construction.
2. Identify and address system configuration and system impacts in order to mitigate potential improper system operations.
3. Identify and perform critical steps required to install new gas facilities.
4. Document completed project.

Procedure Roles and Responsibilities:

RESPONSIBILITY	PERSONNEL
Oversee Implementation of Procedure	Crew Leader/Construction Coordinator
Confirm Personnel Qualifications	Construction FLL/Construction Coordinator
Notifications (police, municipalities, Gas Control, etc)	Construction FLL
Coordination (police, municipalities, Gas Control, etc)	Construction FLL
Monitor System Pressures	Designated Crew Member
Operate Critical Valve(s)	Designated Crew Member
Monitor Excavation Safety	Crew Leader/Construction Coordinator
Document Project Completion	Crew Leader/Construction Coordinator
As-builts	Crew Leader/Construction Coordinator
Backfill and Restoration	Crew Leader/Construction Coordinator
Site Safety	Crew Leader
Locate and Mark	Dig Safe Technician

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Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Project-Specific Tie-in / Purge / Abandonment Steps

#1 – Plastic Branch Saddle Side Tap
#2 – Plastic Double Squeeze Scenario 1
#3 – Plastic Double Squeeze Scenario 2
#4 – Plastic Full Flow Tee By Double Squeeze W/Two Bypasses
#5 – Plastic High Volume Tapping Tee (HVTT)
#6 – Plastic Single Squeeze Abandonment
#7 – Plastic Single Squeeze One-Way Feed ("Squeeze-and-Go")
#8 – Plastic Triple Squeeze
#9 – Steel Abandonment Using a Pressure Control Fitting
#10 – Steel Double Bag Stopping - Low Pressure Only
#11 – Steel Single Pressure Control Fitting
#12 – Steel Two Pressure Control Fittings

1. Person in charge and contractor / crew leader reviewed the Tie-in Plan and determined the number of crew members needed to perform the tie-in is: _____

Title	Name (printed)	Signature (verification the step is complete)	Date

2. Execution Briefing conducted by the Person in Charge on the day of the tie-in.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

Crew Member Attendees	Crew Member Attendees

3. Notify Gas Control (Columbia 1-800-921-2165, NIPSCO 1-219-853-5612) of the work to be performed. This notification shall include:
   a. point of contact for the crew preforming the tie-in activity

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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b. list of the points monitored by Gas Control that could be impacted by the work
c. proposed start and end times of the tie-in activity, and
d. the MAOP of pipeline and expected range of pressures during Tie-in operations.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

4. Installed gauge, verified and monitored main line pressure at all points as indicated on site specific sketch.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					

5. Mainline piping and pressure control fittings installed per site specific sketch. Provided support for weight of fitting and tapping equipment as necessary.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

6. Pressure Test per **GS 1500.010**, and per Job Order design completed.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

7. Qualified M&R Personnel monitored Regulator Station(s). Gauges were actively watched and personnel were ready to take immediate action (i.e., having a wrench on the applicable outlet valve(s) prior to the start of the tie-in). Monitoring to continue until the tie-in gauges were removed after the tie-ins are complete.

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

8. First pressure control fitting drilled out at point _____.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

9. Purged at point _____, as indicated on site specific sketch and filled with gas. Air is purged out of new main and 95% gas is achieved with CGI unit.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

10. Second pressure control fitting drilled out at point _____.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

11. If applicable, change over or add regulator control / sensing lines and services to new main. Do not continue until all regulator control / sensing lines and services are changed over.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

Abandonment:

12. Notified appropriate Company personnel that pipeline will be taken out of service.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

13. Set stopping devices in pressure control fittings at points _____ and _____ to stop flow into pipe to be abandoned.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

14. Properly depressurized gas from main to be abandoned via vent at point _____. Depressurize to zero (0) PSIG, continuing to monitor gauges.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

15. Verified adequate shutdown (point _____) and system stabilization. (waited a minimum of 15 minutes).

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

16. Utilized an air mover at point _____ to create suction on pipe to be abandoned.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

17. Properly purged gas from piping to be abandoned at point _____ until a sustained reading of less than 2% gas is achieved with CGI unit by opening or separating main at opposite ends of piping to be abandoned at points _____ and _____.

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

18. Properly cut and separated mains at points _____ and _____. If used, mechanical end caps are strapped or blocked as required (GS 1320.010).

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

19. All pipe ends are properly sealed for abandonment.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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20. Removed stopping devices at points _____ and _____ and removed vents.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

21. Performed completion process for pressure control fittings at points _____ and _____.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

22. Gauges left in place and monitored following the completion of the tie-in for a minimum of 30 minutes.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

Written Tie-in Template 02-26-19.docm Page 17 of 18

EXHIBIT A
(18 of 18)

Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date

23. Remove all gauges at monitoring points.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

24. Soap tested all required fitting, test point, monitoring, and purge locations.
25. Test for PCBs, inspect for internal corrosion, and secure materials when required.
26. If applicable, monitor, address, and document Odorant levels.
27. Gas Control (Columbia 1-800-921-2165, NIPSCO 1-219-853-5612) is notified the work is completed.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

28. Tie-in process complete.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

#13 – M&R Monitor Replacement & Bypass Removal
#14 – Perform Uprate (0001: XX-XXXXXXX-XX)

Written Tie-in Template 02-26-19.docm Page **18** of **18**

EXHIBIT B

Example Tie-in Sketch Template

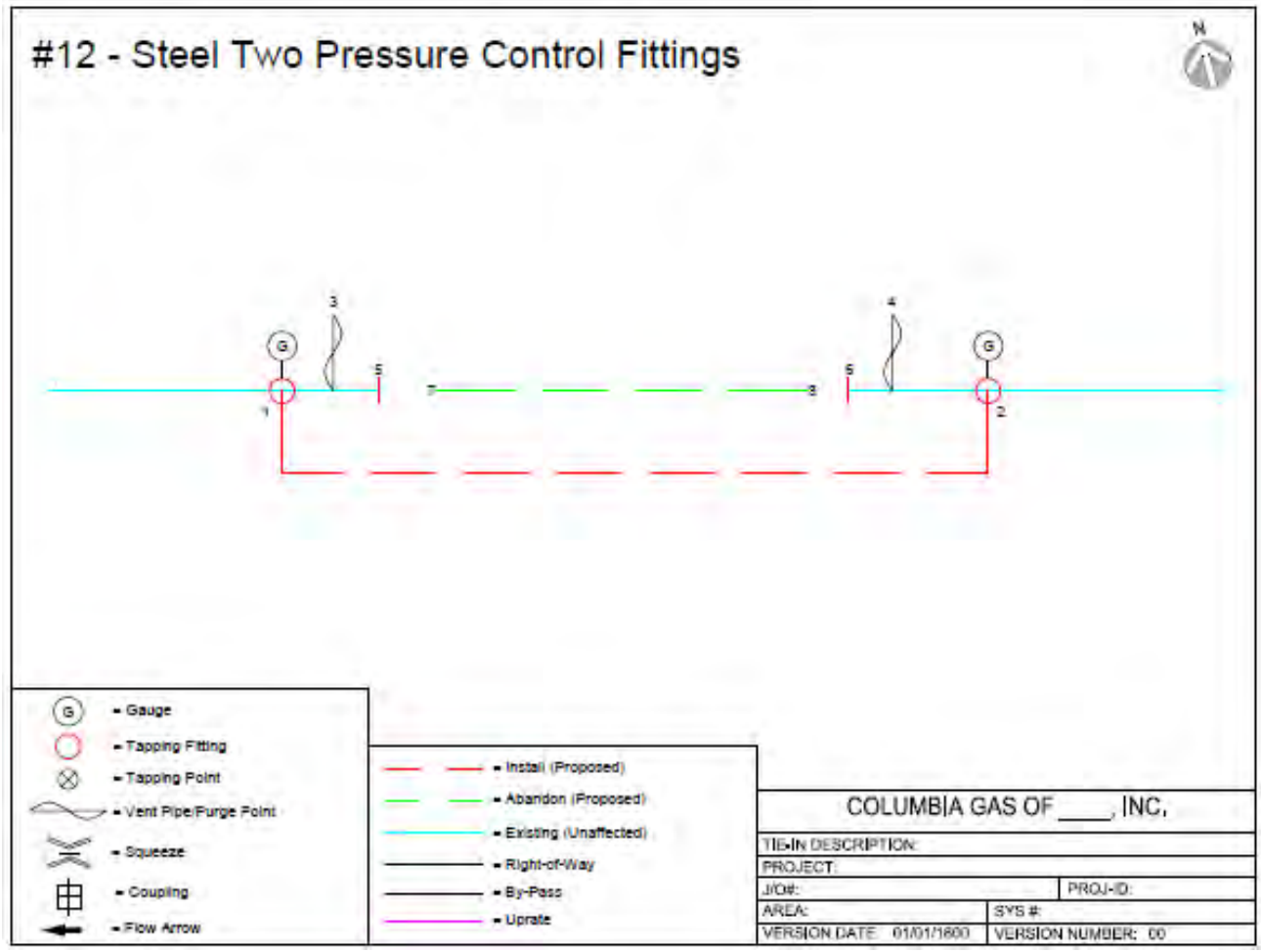
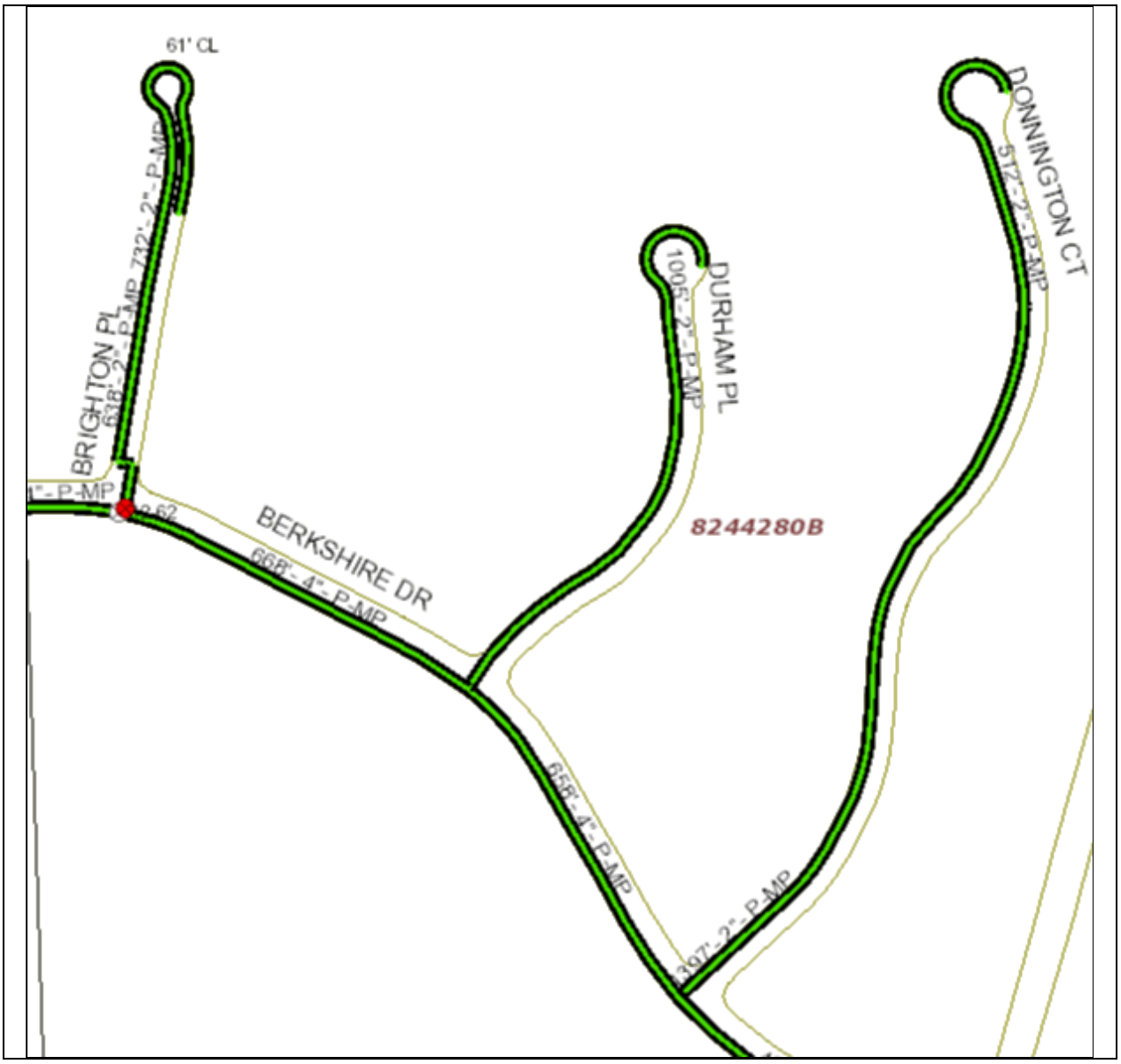


EXHIBIT C
(1 of 2)

GIS Mapping Symbol for Propane Piping Systems



Propane Piping System: Normal Pressure Color Code Outlined in Solid Black

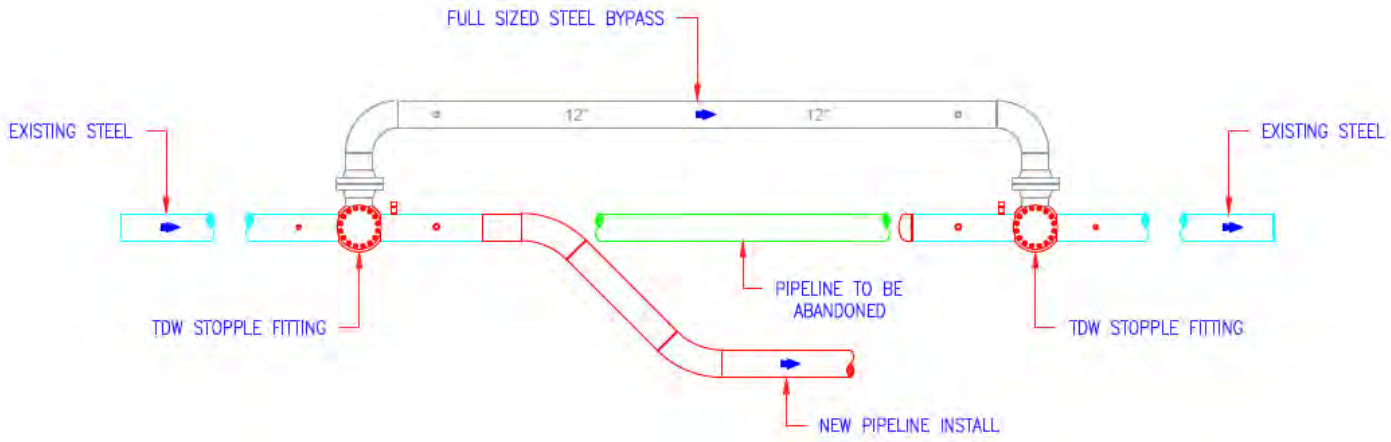
EXHIBIT C
(2 of 2)

GIS Mapping Symbol for Propane Piping Systems Converted to Natural Gas

Propane Piping System Converted to Natural Gas: Normal Pressure Color Code Outlined with Black Dashes

EXHIBIT D

Example of a Direct Tie-In with a Full-Sized Steel Bypass



NiSource
Distribution Operations

Gas Standard

Effective Date: 02/28/2019	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 06/01/2018		Page 1 of 42

Companies Affected:	☒ NIPSCO	☒ CVA	☒ CMD
		☒ CKY	☒ COH
		☒ CMA	☒ CPA

REFERENCE 49 CFR Part 192.627, 192.631

1. GENERAL

Tapping and tie-in operations range from routine to complex and are sometimes referred to as “management of change operations.” The term “Tie-in Plan” refers to a written document that includes requirements and steps for tie-ins and tapping of pressurized pipeline facilities and can incorporate other related elements such as bypassing, abandonments, purging, special odorization requirements and testing. Thorough knowledge and attention to detail during planning and construction activities is required.

Prior to tapping a pressurized pipeline, the person in charge of the tie-in (e.g., crew leader, Construction Coordinator/Inspector) shall positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the Tie-in Plan, material, and existing records are compatible with what is found in the tie-in excavation. Discrepancies shall be investigated and resolved, prior to tapping, and a contingency plan (e.g., identify, locate, access, and operate applicable shut-off valve(s)) shall be developed.

All tapping of pressurized pipelines shall be performed by personnel qualified in installation and use of the proper fittings, equipment, and procedures.

1.1 Material

Tapping fittings shall have a pressure rating equal to or greater than the Maximum Allowable Operating Pressure (MAOP) of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipeline at the time of the tapping operation. Refer to manufacturers’ documentation for the design pressure of specific fittings and tapping equipment. Use the tool recommended by the manufacturer to complete the tapping operation.

1.2 Pressure Testing

Pressure testing of tie-in fittings and/or joints shall be done in accordance with the applicable GS 1500.010 “Pressure Testing.”

Fittings used for tapping and plugging, including but not limited to, fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not

subjected to the main test pressure, shall be tested prior to tapping operations.

Performing a leak test on an untapped tapping or stopping fitting can dent or collapse the pipeline on which it is installed. The collapse can occur when there is a significant differential between the system pressure and the intended test pressure for the fitting. Refer to the applicable GS 1500.010 “Pressure Testing” for leak test procedures for steel tapping and stopping fittings.

1.3 Evaluation for Unknown Mechanical Couplings

Tie-ins involving pipeline separation on metallic pipelines operating over 10 psig that might contain unknown mechanical couplings shall be designed to resist thrust forces associated with stopping gas flow.

1.4 Safety and Related Standards

All applicable HSE and other safety standards shall be followed including the following.

a. HSE 4100.010 “Hazardous Atmosphere Considerations.”
b. GS 1690.010 “Purging.”
c. GS 1740.010 “Abandonment of Facilities.”
d. GS 1770.010 “Prevention of Accidental Ignition.”

2. DEFINITIONS

For the purpose of this gas standard, the following definitions are applicable.

“Person in Charge” is the person responsible for verifying each step is complete, documenting completion on the Tie-in Plan and authorizing movement to the next step.

“Reinforced,**”** as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

For other definitions, refer to GS 1012.010 “Definitions.”

3. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

3.1 Plastic

Two basic types of tie-ins are performed on plastic pipe.

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining.”

NOTE: Only hand tighten a cap on a plastic tapping tee. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze-off tool to stop the flow of gas. Refer to GS 1680.040 "Squeeze-Off Procedures for Plastic Pipe," as well as Gas Standard Series 1300 "Pipe & Fitting Joining."

Joints should be fused except where the confines of the excavation, weather conditions, or safety considerations* dictate the use of mechanical fittings.

*NOTE: For plastic propane piping systems or former plastic propane piping systems that have been converted to natural gas, mechanical fittings shall be used for tie-in joints. See Exhibit C for related mapping symbols.

3.2 Steel or Wrought Iron

3.2.1 Tie-In Method

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

Couplings shall not be used to tie-in pipe joints on distribution pipelines with an MAOP equal to or greater than 200 psig or transmission class pipelines, unless approved by the Manager of Engineering in accordance with GS 2100.010 "Design – General."

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, Engineering must be contacted for additional guidance.

3.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following.

a. The fitting connected to the pipeline.

b. The equipment being used.

It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

3.2.3 Bag and Diaphragm Type Pipeline Stoppers

The use of inflatable bags or diaphragm type stoppers is limited to low pressure

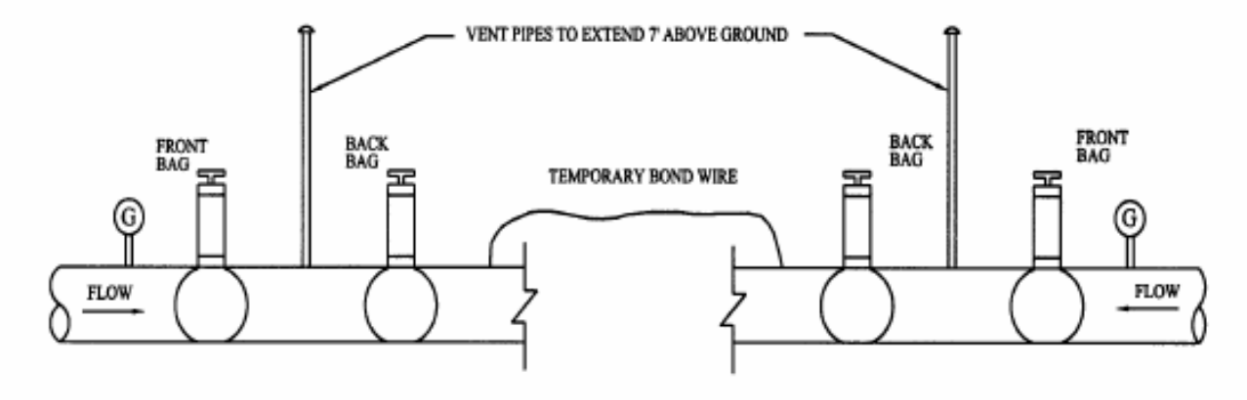
for tie-ins of steel and wrought iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



3.3 Cast Iron

When the term "cast iron" is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe's dimensions, the diameter or the circumference of the pipe must be measured.

3.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent unreinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

3.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

3.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except for the following.

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads.

b. A 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

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Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1” or 1 1/4”	2”	3”	4”
2”	Reinforced	Reinforced	X	X
3”	Reinforced	Reinforced	Reinforced	X
4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1-1/4 inch taps may be

installed on 4 inch cast iron or ductile iron without reinforcement.

4. WRITTEN TIE-IN PLAN

A Tie-in Plan shall be prepared for tie-in operations on the following types of work.

1. Designed capital mainline installations, replacement and/or abandonment work.
2. Designed capital installations, replacements and/or abandonments of measurement, regulation, or measurement and regulation (M&R) stations.
3. Emergency work, either capital or operations and maintenance (O&M), involving the replacement of mains, temporary bypass of a mainline or a mainline to be temporarily taken out of service. The Tie-in Plan for emergency work may be expedited and consolidate multiple elements such as the Advance and Execution Briefings (see Section 5.1 below). However, safety cannot be compromised.
4. Maintenance operations that require a temporary bypass of a mainline or require a mainline to be temporarily taken out of service.

NOTE: A Tie-in Plan is not required for operating a regulator station utilizing its permanent setting bypass.

4.1 Plan Requirements

The Tie-in Plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The Tie-in Plan includes two parts, the “Tie-in Plan: Design” and the “Tie-in Plan: Execution Steps,” as identified in the tie-in template. The Design is to be completed as part of the job order approval. The Execution Steps portion has to be prepared prior to the Advance Briefing (see Section 5.1.1 below).

The Tie-in Plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s) as described in Section 5.

A Tie-in Plan template example is shown in Exhibits A and B. Standard templates and drawings are provided through the Engineering SharePoint site and WMSDocs.

The Tie-in Plan shall address the following items, as applicable. Additional items may be addressed as deemed appropriate.

1. Necessity of, size, length and temperature limitations for a bypass.
2. Safety precautions to prevent abnormal operating conditions, such as the following.
    a. Identification and protection of control lines and tap locations.
    b. Knowledge of maximum allowable operating pressure (MAOP) and expected range of system pressures during tie-in operations.

3. Scope or extent of system to be tied in and/or bypassed.
4. Identification of station(s) (district regulator, point-of-delivery (POD), town border - permanent or temporary), as follows.
    a. Delivering gas directly to the system in the area of the tie-in.
    b. Downstream of the work being performed that would be impacted and require monitoring during the tie-in process.
    c. Where a significant change in flow (increase or decrease) could result from the work.

    All stations identified shall be analyzed to determine the need for monitoring during excavation or the tie-in process.

    For low pressure regulator stations identified, refer to ON 19-02 “Low Pressure Regulator System Work Requirements” for the requirements to monitor low pressure regulator stations (based on completed LP Enhanced Safety Actions) during tie-in operations.

    All stations downstream of the work being performed shall be equipped with proper equipment (e.g., strainers) to protect the pressure regulation from pipeline debris such as construction shavings.

    All stations identified shall also have an accurate isometric sketch which is available in GIS, at the station and included in the project drawings.
5. Positive verification of the expected system status and configuration by comparing planned tie-in activities to what is uncovered in the tie-in excavation.
6. The need for reinforcement for branch connections (refer to GS 2420.010 “Reinforcement Requirements for Branch Connections”).
7. Verification of pressure and content.
8. Method and location of pressure control and monitoring for tie-in location(s).
9. Determining the sequence of closing and opening valves or any other flow controlling device.
10. Identifying applicable valve(s), which should be located and checked for accessibility and operability before the tie-in operation begins. If during tie-in and tapping operations, an emergency occurs (e.g., stopple failure, coupling pull out), the valve(s) could be more quickly accessed for pipeline shutdown, if necessary.
11. Planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction).
12. Planning for additional pressure monitoring at regulator stations where excavation is planned to occur within the footprint of a POD or district plant

regulator station or within 25 feet of a station building or fence unless all regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines are verified to be located completely above ground (refer to applicable GS 1100.040 “Damage Prevention when Using Conventional Excavation Technologies”).

13. For tie-ins on a metallic pipeline operating above 10 psig, excluding the following exceptions, evaluate the pipeline to determine the existence of mechanical couplings from the edge of the excavation for a distance equal to or greater than the safe embedment distance (refer to GS 2220.020 “Pipeline Flexibility, Supports, Anchors and Safe Embedment Distance”) along the pipeline that will remain in-service.

    EXCEPTIONS: The following exceptions do not require an evaluation for unknown mechanical couplings. If an evaluation for unknown mechanical couplings is not included within the Tie-in Plan due to one or more of the following exceptions, the exception(s) shall be documented in the Tie-in Plan.

    a. Tie-ins that are made with spherical tees or shortstopp tees, where the pipeline is fully replaced and in-service prior to separation, and changes in direction are backfilled or blocked to prevent movement.

    b. Direct tie-ins with full-sized steel bypass (see example in Exhibit D).

    c. Following a thorough investigation of Company records, the Engineering Leader, in consultation with Construction and local Field Operations, provides confirmation that no mechanical couplings exist on the pipeline.

    Refer to Section 5.2.d. for methods of evaluation for unknown mechanical couplings.

14. Check for leak-through of line stopping devices.

15. Leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to applicable GS 1500.010 "Pressure Testing" for additional guidance).

16. Purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses (refer to GS 1690.010 “Purging”).

17. Communication between critical points during the operation (e.g., monitoring pressures).

18. Notification of customers who will have service temporarily interrupted (if applicable).

19. Notification of local Field Operations Leaders/Supervisors, Measurement and Regulation Technicians, Construction Front Line Leaders/Supervisors, as appropriate, if sections of pipeline will be temporarily taken out of service.

20. Notification of Gas Control. Engineering shall review each planned tie-in to determine if it could impact Gas Control operations (e.g., SCADA monitored points, ERX) resulting in a high or low alarm as well as to determine if Gas Control could assist in management of the tie-in process. If it is determined that Gas Control can assist in management of a tie-in process, Gas Control is to be notified, and the Engineer shall indicate on the Tie-in Plan that notification of Gas Control is required and list the points monitored by Gas Control that could be impacted.
21. Odorant level testing if determined necessary by Engineering.

4.2 Plan Accountability

Engineering shall prepare or provide final review of the Tie-in Plan. Request input from Construction or Operations personnel for Tie-in Plans, as needed.

When Tie-in Plans involve the installation of concrete anchor(s) on a metallic pipeline (resulting from the evaluation for unknown mechanical couplings), the Tie-in Plan, prepared by Engineering, shall also be approved by all of the following, except as noted.

a. Engineering Leader.
b. Construction (or Project Management) Leader.
c. Corrosion Leader.

NOTE: If consensus cannot be reached between Engineering, Construction (or Project Management), and Corrosion leadership for Tie-in Plans involving the installation of concrete anchor(s) on a metallic pipeline, the Engineering Manager shall determine the appropriate method to use to prevent potential pullout of unknown mechanical couplings and approve the Tie-in Plan.

5. PRE-CONSTRUCTION

5.1 Tie-in Plan Briefings

5.1.1 Advance Briefing

The Tie-in Plan advance briefing is to provide project leadership with a clear understanding of the planned tie-in(s). The Tie-in Plan advance briefing will typically be completed during the Pre-Construction Review or Constructability Review (refer to GS 2810.050 “Stakeholder Review of Capital Projects”) and shall include all of the following personnel, as applicable.

a. The Engineer responsible for the Tie-in Plan. The Engineer’s responsibility includes coordination of the advance briefing. This can be accomplished through a group meeting, one on one

sessions or otherwise communicated as appropriate as long as understanding of the Tie-in Plan is accomplished and confirmation is documented.

b. M&R Leader (or designee).

c. Local OCM or designee as operator of the overall system.

d. Construction or Field Operations Leader (or designee) responsible for the project.

e. Engineering Leader.

f. Person in Charge of tie-in execution (e.g., crew leader, Construction Coordinator/Inspector).

g. Manager Transmission Integrity (or designee), if the Tie-in Plan involves a Company-owned transmission line.

5.1.2 Execution Briefing

The Tie-in Plan execution briefing shall be conducted for each individual tie-in within a job order on the same day of the tie-in and shall include the following personnel. If the tie-in takes multiple days to complete, the Execution Briefing is to be repeated each day. It is also to be repeated when there is a change in personnel involved with the tie-in.

1. Person in Charge. The Person in Charge of the tie-in execution (e.g., crew leader, Construction Coordinator / Inspector). Their responsibility includes conducting the Tie-in Plan execution briefing to assure understanding of the plan and to make assignments for the required tasks of the tie-in execution (e.g., monitoring pressure at various locations during tie-in operations, regulator station monitoring or adjustments, tapping, stopping, bypassing).

2. Personnel performing tasks. Personnel performing the tasks involved with the tie-in execution.

3. Engineer. Engineer responsible for the Tie-in Plan as needed and requested.

The Execution Briefing shall cover the following.

a. Review of the Tie-in Plan.

b. Designation of personnel responsible for various aspects of the operation (e.g., make assignments for monitoring pressure at various locations during tie-in operations).

c. Review of the expected system status and configuration based on Company records and the Tie-in Plan to make sure Company facility

records and the Tie-in Plan are consistent with what is visually observed in the tie-in excavation. Any discrepancies in Company facility records and the Tie-in Plan shall be addressed by reconciling Company facility records to the actual conditions found (i.e., submit map revision in accordance with GS 2610.040 "Map Revisions") and by the Engineer evaluating and adjusting the Tie-in Plan (also see "i" below).

d. Review system MAOPs and acceptable pressures expected to be encountered at system monitoring locations.

e. Verification that on-site communications equipment is functioning properly.

f. Verification that tapping equipment is rated equal to or greater than the operating pressure.

g. Requirements of work zone and personal protective equipment (PPE) safety.

h. Reminder of Stop Work Authority. Every employee has the responsibility and authority to Stop Work immediately if a situation arises due to an unsafe action, condition, behavior or non-action that may potentially lead to an incident. Work suspended due to a Stop Work action shall not resume until all safety concerns are addressed.

i. If modifications to the Tie-in Plan are required after review at the job site, the changes shall be approved by all of the following.

    1. Engineer.
    2. M&R Leader (or designee).
    3. Construction or Field Operations Leader (or designee) responsible for the project.

Any changes or adjustments to the Tie-in Plan shall be documented, including revision approvals, and another execution briefing shall be held if the changes were made after the original execution briefing.

5.2 Other Pre-Construction Activities

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. If indicated by the Tie-in Plan, notify Gas Control of the work to be performed. This notification shall include the following.

    1. A point of contact for the crew performing the tie-in activity.
    2. A list of the points monitored by Gas Control that could be

impacted by the work.

3. Proposed start and end times of the tie-in activity.

c. For impacted LP stations (as identified on the Tie-in Plan), the location of the control lines and control line taps shall be verified and added to or updated on the LP station isometric drawing as necessary.

d. If the tie-in excavation is planned to occur within the footprint of a POD or district plant regulator station or within 25 feet of a station building or fence, available isometric drawings and/or as-built station drawings shall be reviewed for locations of buried regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines. Known buried regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines shall be located prior to excavation.

e. Expose pipe at tie-in location(s). Positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner. Discrepancies shall be investigated and resolved, prior to tapping, and a contingency plan shall be developed to identify applicable shut-off valve(s), which shall be located and checked for accessibility and operation before tapping activities begin. If modifications to the Tie-in Plan are required, the changes shall be approved, documented, and communicated in accordance with Section 5.1.2.i. above.

NOTE**:** If pressure verification indicates a pressure that is above the MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 "Definitions," promptly notify local System Operations leadership and Gas Control.

f. Inspect pipe condition to determine suitability for tapping.

1. Inspect pipeline for external corrosion. Refer to GS 1410.010 "Metallic Pipeline Exposures" for additional guidance.
2. Verify wall thickness (if appropriate).
3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current Company welding procedures for additional guidance.
4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

g. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent

coupling pullout.

1. Check the Tie-in Plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.
2. Install concrete support under the tie-in location to avoid additional stress on the existing pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rock shield, or an equivalent protective isolating material.
3. Install support (e.g., sandbags, side booms) on isolated sections of mechanically joined pipeline to avoid additional stress.
4. For tie-ins on a metallic pipeline operating above 10 psig, evaluate the pipeline to determine the existence of mechanical couplings for a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service, if practicable.

   NOTE: If the evaluation along the safe embedment distance cannot be completed or is inconclusive, consult with Engineering.

   Methods of evaluation for unknown mechanical couplings include the following options.

   i. Use an approved camera system for live insertion through an in-service pipeline. The use of a camera to inspect for mechanical couplings is preferred since it minimizes disturbance to the pipeline. If the pipeline operating pressure is higher than the maximum working pressure of the camera system, consider reducing the pipeline operating pressure to allow for the use of a camera to inspect for mechanical couplings. If reducing the pipeline operating pressure is not practicable, refer to options identified in bullets “ii” and “iii” below.

      The inspection distance shall be equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service.

   ii. Adjust the stopple (i.e., pressure control) equipment away from the tie-in/separation location to allow the use of an approved camera system through a pipeline that has been shut down and purged of gas.

      Adjust the placement of the stopple fitting and equipment at a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation. Insert a camera system through the pipeline that has been shut

down and purged in accordance with GS 1690.010 "Purging." The use of an air mover in accordance with GS 1770.020 “Use of Air Movers at Tie-Ins” may be required if complete shutdown cannot be maintained while performing the camera inspection.

iii. Strip the topsoil from the top of the pipeline from the edge of the tie-in excavation along the pipeline that will remain in-service for a distance equal to or greater than the safe embedment distance. If removing the topsoil from the top of the pipeline is the only valid option, consider using vacuum excavation at an angle to minimize topsoil removal. Only uncover one joint at a time. Consider adding an anchor prior to stripping topsoil.

iv. If the use of a camera or stripping the topsoil from the top of the pipeline is not practicable, anchoring and/or blocking (or equivalent restraint) shall be planned for installation prior to tie-in operations. Refer to GS 1320.010 “Mechanical Coupling Connections.”

5. Take further actions based on results of evaluation for unknown mechanical couplings.

   If no indication of couplings are found, the project may resume without further investigation.

   If mechanical coupling(s) are found or if the evaluation is inconclusive, take actions to prevent potential pullout of unknown mechanical couplings. One or more of the following actions may be appropriate.

   i. Relocate the proposed tie-in upstream of found coupling(s) to remove the coupling(s) (preferred action).

      NOTE: Evaluation of the pipeline from the edge of the new tie-in excavation for a distance equal to or greater than the safe embedment distance is required if not previously evaluated.

   ii. Harness (preferred) or strap known or found coupling(s). Only uncover one joint at a time, provide restraint (e.g., harness), then backfill.

   iii. Anchor.

   iv. Block to prevent pipeline movement at exposed changes in direction or dead ends.

   v. Take the pipeline out of service.

   vi. Reduce the operating pressure during construction and/or tie-in operations to reduce the safe embedment distance or

to eliminate coupling(s) found from within the safe embedment distance.

vii. Submit a map revision according to GS 2610.040 “Map Revision” to record the location of the found coupling(s). See Section 8.2 below.

Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance.

6. DURING CONSTRUCTION

Qualified Company personnel shall be on site and in charge of the tie-in execution.

Assignments, as outlined in Section 5.1.2, shall be executed as planned and discussed in the Tie-in Plan execution briefing.

6.1 Pressure Monitoring

Whenever the Company or its contractor performs live gas main-to-main connections (i.e., tie-in connections, branch connections, bypasses), properly calibrated pressure gauges shall be installed in appropriate locations and utilized prior to and during tie-in operations, regardless of the system operating pressure, in order to reduce the possibility of over-pressurization of gas mains.

Regulating stations identified in the Tie-in Plan shall be monitored throughout the tie-in process by qualified personnel that can take corrective action at the station in the event an Abnormal Operating Condition (AOC) occurs, until the tie-in gauges are removed to ensure proper operation. Engineering will provide expected pressure ranges. Actual pressure information will be recorded as identified in the Tie-in Plan: Execution Steps.

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration shall be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. If a tie-in involves shutting down a section of pipeline immediately downstream of a

regulator station supply, leak-through of the bypass valve or regulator orifice may occur which could result in a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure may occur on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken, and a new Tie-in Plan is prepared.

Tie-in gauges shall be left in place and monitored following completion of the tie-in for a minimum of 30 minutes to ensure the piping system is operating as expected.

6.2 Bypassing and Stopping Techniques

Engineering shall provide assistance for appropriate bypass sizing.

Whenever the flow of gas is stopped, the isolated section of main shall be checked for leak-through before cutting into or parting the line. When positive shut-off of gas by a valve or line stopper is not accomplished, "live-gas" precautions shall be strictly followed to avoid exposure to combustible gas-air mixtures. Refer to GS 1770.010 “Prevention of Accidental Ignition” for additional guidance. An air mover or purger may be used to prevent the introduction of gas into the work area at open ends. Refer to GS 1770.020 “Use of Air Movers at Tie-Ins” and GS 1690.010 “Purging” for additional guidance.

Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to applicable GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by Engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is necessary to maintain gas service to downstream customers, unless an alternate gas supply is arranged (e.g. portable gas supply, alternate fuel).

6.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include the following.

a. Following manufacturer’s recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve.

b. A combustible atmosphere in the work area cannot be avoided.

c. Other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion.

d. The tie-in is on cast iron pipe.

e. An installation is temporary (e.g., regulators for bypassing or uprating).

f. It is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

6.4 Additional Tie-In Considerations

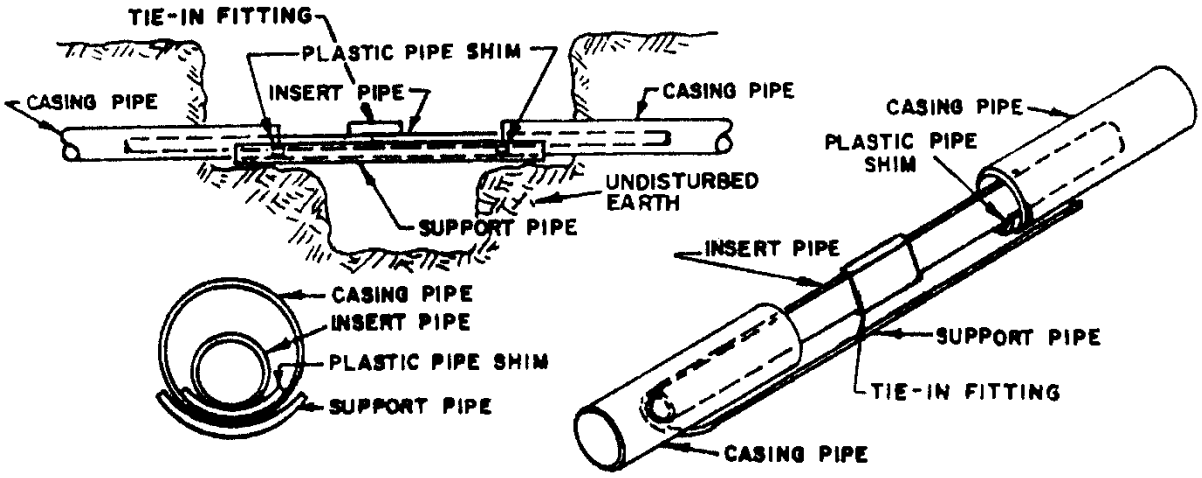
The following general tie-in considerations shall be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 “Reinforcement Requirements for Branch Connections” for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in shall be installed according to GS 3010.090 “Cover.”

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture,

screenings). Heavy or wet clays and frozen earth are not suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

7. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze-off jacks or removing bags and installing leak repair clamps, or installing and/or removing any other appropriate materials, tools, or equipment.

e. Tie-in gauges shall be left in place and monitored following completion of the tie-in for a minimum of 30 minutes to ensure the piping system is operating as expected.

f. Engineering shall determine whether post construction odorant level testing is necessary, which should be part of the Tie-in Plan. If odorant level testing is required, refer to the applicable GS 1670.020 "Odor Level Monitoring" and GS 1670.040 "Pipeline Conditioning New Pipelines."

8. RECORDS

8.1 Written Tie-In Plans

Approved and executed Tie-in Plans, including completed documentation of each checklist and step, shall be filed with the work order completion report and retained for at least the life of the pipeline plus 10 years.

8.2 Map Revisions

When unmapped mechanical coupling(s) are found and left in-service on a metallic pipeline, a map revision shall be submitted in accordance with GS 2610.040 “Map Revision” to record the location of the coupling(s). If a mechanical coupling is exposed, document the existing restraint found or the type of restraint installed (e.g., weld straps, harness) at the mechanical coupling(s).

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Example Tie-in Plan Template

MiSource

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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<<Project Name>>

Tie-In Plan: DESIGN

(To be completed prior to project approval)

System Number(s) involved		Tie-in Site Identifiers	
MAOP(s)		Expected Pressure Range(s)	
Feed into tie-in site	Choose an item	Bypass(es) Needed	Choose an item
M&R Needed during Tie-in?	Choose an item		

Tie-In Plan: Cover Sheet

No tie-in is to be made without a Written Tie-in Plan

1. The purpose of this plan is to address the requirements of tapping (GS 1680.010), pressure testing (GS 1500.010), purging (GS 1690.010), and abandonment (GS 1740.010) when performing tie-in planning and execution.
2. All persons performing any tie-in/bypass/abandonment operation ("tie-in") shall review the entire Tie-in Plan.
3. When any clarification or alteration is required, contact Engineering as far in advance of the tie-in as possible.
4. Engineering must re-review the Tie-in Plan prior to the start of the process when the temperature is at or below XX°F during any portion of the tie-in.
5. All persons performing tie-in operations shall have valid Operator Qualifications (OQ) for the actions they will perform. OQ shall be valid through the entire tie-in process and documented in the Company's system of record for the Project.
6. The person overseeing and controlling execution of the tie-in process is referred to as the "Person in Charge". The Person in Charge is responsible for verifying each step is complete, documenting completion on the Tie-in Plan and authorizing movement to the next step.
7. Throughout all Tie-in planning, preparation and execution, all persons shall follow proper procedures, Gas Standards, and safety precautions. These include but are not limited to the following Contingnecy Plan, Tie-in Plan, and checklists attached below:
   - Tie-in Planning – Engineering
   - Tie-in Preparation – Construction / Field Operations
   - Tie-in Execution Briefing – Construction / Field Operations

Contingency (Emergency Shut-down) Plan for this tie-in:

The project Contingency plan shall be used in the event of an emergency or hazardous situation during execution of the Tie-in plan. This is a supplement to the Emergency Manual and Gas Standard series GS 1150.

Contact the Field Operations Leader {Name of Field Operations Leader} at phone number {Field Operations Leader's Phone number} immediately in the event of an emergency.

A decision to shut down mains shall be based on protection of life and property, followed by maintaining gas service to customers.

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Example Tie-in Plan Template

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Emergency Isolation Valve(s) and Alternate Points of isolation have been identified, documented on the Project's Emergency Isolation Valve Form, and included with this document.

Checklist: Tie-in Planning – Engineering

☑	N/A	Tie-in Planning – Engineering (Check the appropriate box for each item)
☐	☐	a. Identify regulator station(s) requiring locating buried "control lines" ("control lines" also refer to regulator control, electrical/communication, remote monitoring (e.g., ERX), and/or odorant lines) prior to tie-in (GS 1100.040).
☐	☐	b. Identify regulator station(s) potentially requiring monitoring during tie-in. i. Regulator stations within 25 feet of tie-in excavation work, unless all control lines are confirmed to be completely above ground (ON 15-05). ii. Trace all lines planned for abandonment to confirm appropriate action taken for any existing control lines or service lines. iii. Upstream and/or downstream stations impacted by tie-in (GS 1680.010). iv. Perform station flow analysis based on planned system modification to assure proper capacity with focus on post-project under or oversizing. v. Regulator stations or commercial/industrial customers upstream that may be impacted by purging operations (GS 1690.010). vi. Station isometric drawings current and included in the project drawings. vii. List of stations identified:

Station ID	Station Impacted (Y/N)	Control Lines Impacted (Y/N)	Monitoring Required (Y/N)	Comments

Sign-offs: _____ Engineer _____ System Operations

☐	☐	c. Determine if tie-in(s) affect systems monitored by Gas Control, and add notification of Gas Control to the applicable tie-in scenario(s) (GS 1680.010, GS 1740.010).
☐		d. Identify MAOP of pipeline and expected range of pressures during tie-in operations for communication to field personnel and Gas Control.
☐	☐	e. Determine necessity of, size, length and temperature limitations for a bypass (GS 1680.010).
☐	☐	f. Determine the need for reinforcement for branch connections (GS 2420.010).
☐	☐	g. Determine if pressure changes are expected from moving customers from one system to another.
☐	☐	h. Determine if scope of job requires odorant checks and pipeline conditioning (GS 1670.040).
☐	☐	i. Identify downstream M&R and customer stations supplied by the project's pipeline section. Ensure proper equipment is installed to prevent pipeline debris from entering regulator equipment (e.g.: strainers). Plan for equipment installations and monitoring at downstream stations as needed.
☐		j. Create Emergency Shutdown plan. Identify valve(s) to be operated in case of emergency (GS 1680.010).
☐		k. Project drawings updated to show tie-in locations and designs, including required materials (permanent and temporary bypass) on the bill of materials.

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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Project's Emergency Isolation Valves & Alternate Points

Ops Center: _____

<<SYSTEM NUMBER>> (<< HP / MP / IP / LP >>) SEGMENT ISOLATION VALVES

Total Quantity of Isolation Valves: _____ Additional Valves: _____

Verify & record that each valve is Operational within 30 days of tie-in, and verify Accessibility immediately before tie-in.

Ref #	Cross St / House # Or Alternate Point Description	Size	Type (ST/PL)	Year Installed	Facility ID / AKA	Critical? (Y/N)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Closing these valves will isolate the following area(s): <<List Streets and Critical Customers>>

DISCLAIMER: THE ISOLATION OF THIS AREA DOES NOT GUARANTEE CONTINUOUS FLOW DOWNSTREAM OF THE ISOLATED AREA

<<Copy and complete this page for each system that has work done on it by this project. This paragraph should be deleted>>

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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Pipe Internal Surface Area Calculation for Odorant Monitoring

Engineer to put a screenshot or other legible output copy of the project's "Pipe Surface Area Calculator" on this page for odorant check requirements (this text should be deleted)

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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Tie-In Plan: Execution Steps

(To be completed prior to the Tie-in Advance Briefing with modifications or additions as needed during construction)

Advance Briefing: This briefing shall be conducted by Engineering.

Tie-in and Contingency Plan Reviewed by:

Title (or designee)	Name	Signature (or describe alternate confirmation)	Date
Engineer			
M&R Leader			
Construction or Field Leader			
Engineering Leader			

Checklist: Tie-in Preparation – Construction / Field Operations

☑	N/A	Tie-in Planning – Construction / Field Operations (Check the appropriate box for each item)
☐		a. Review job order package for completeness, accuracy and any system restrictions that must be considered prior to construction that could alter Tie-In Plans and Procedures.
☐		b. Set up Work Area Protection (GS 4100.020, GS 1770.010). • Traffic plan • Confined space entry • Excavation safety (shoring and ladders) • Noise and particulate protection for hard surface removal • Fire extinguishers • Conformance with HSE 4100.010 Hazardous Atmosphere Consideration • Adequate number of road plates available
☐	☐	c. Locate control lines at regulator stations identified by Engineering. Verify that the Isometric Sketch at each engineering-identified station contains control line measurements; notify engineering if sketch is incomplete, incorrect, or older than one calendar year. Work with Engineering to update station documentation (and Infrastructure Records) accordingly.
☐		d. Locate valve(s) identified for Emergency Shutdown, and verify that valve(s) are accessible and operable prior to Tie-in.
☐	☐	e. Notify customers who will have service temporarily interrupted to review job expectations (if applicable).
☐		f. Visually expose and verify systems and configurations match the Tie-in plan. Investigate and address inconsistencies. Ensure adequate plans are established to plate or protect road openings for off-hours.
☐		g. Verify required equipment and materials are available.
☐		h. Verify pressure and contents of pipeline(s) (GS 1680.010).
☐		i. Inspect pipe condition to determine suitability for tapping (GS 1680.010).
☐	☐	j. Obtain safe embedment distance from Engineering and evaluate metallic pipelines for the existence of mechanical couplings and take steps to prevent coupling pullout (GS 1680.010).
☐		k. Pressure test all pipelines and bypasses that will contain gas prior to introduction of gas (GS 1500.010).

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☑	N/A	Tie-in Planning – Construction / Field Operations (Check the appropriate box for each item)
☐		l. Identify potential Abnormal Operating Conditions (AOCs) that could occur during tie-in and purging operations, including over- or under-pressurization. Discuss acceptable responses to identified AOCs with personnel assigned to monitor pressures.
☐		m. Conduct Tie-in Execution briefing whenever a new tie-in sequence is started (GS 1680.010). Discuss communication expectation at critical points during the Tie-in (e.g., monitoring pressures prior, during and after Tie-in).

Checklist: Pre-Construction Review – Construction / Field Operations

☑	Pre-Construction Review – Construction/Field Operations (Check the box once each item is completed)
☐	a. Review Tie-in Plan and Contingency Plan.
☐	b. Review the Operator Qualification(s). All persons performing Tie-in operations shall have valid Operator Qualifications (OQ) for the actions they will perform. OQ shall be valid through the entire Tie-in process and documented in the Company's system of record for the Project (e.g., WMSdocs, Maximo).
☐	c. Notify Gas Control that work is to start in conformance with Tie-In Procedures (if indicated as necessary). GS 1170.010 Gas Control Room Management Standard.
☐	d. Designate individuals responsible for various aspects of the operation (e.g., make assignments for monitoring pressure at various locations during tie-in operation.
☐	e. Discuss potential Abnormal Operating Conditions (AOCs) that could occur during tie-in and purging operations, including over- or under-pressurization. Discuss acceptable responses to identified AOCs with personnel assigned to monitor pressures. Reminder to communicate and resolve any AOCs prior to continuing further Tie-in operations.
☐	f. Reminder of Stop Work Authority.
☐	g. Verify that tapping equipment is rated equal to or greater than the operating pressure.
☐	h. Review expected system status and configuration, based on Company records and the Tie-in Plan • Verify tie-in designs are compatible with what is found in the tie-in excavation. • Confirm depths, sizes, materials, and pressures. Address inconsistencies before continuing. • Update Tie-In plans with field verified information. Thoroughly review tie-in plan details with all personnel involved to ensure understanding of the procedure steps and individual roles and responsibilities.
☐	i. Review system MAOPs and acceptable pressure ranges expected to be encountered at system monitoring locations.
☐	j. Verify that on-site communications equipment is functioning properly.
☐	k. Review requirements of work zone and personal protective equipment (PPE) safety.
☐	l. Perform tie-in in accordance with Tie-In Plan and applicable procedures. • Reminder that modifications to the Tie-in plan shall be approved by an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee. • Changes shall be documented, and list those parties involved in determining them. • Any changes or adjustments to the tie-in plan shall be communicated with the Engineer and the personnel performing the tasks and documented that the discussion of changes took place.

Crew Foreman

(Signature) (Printed Name) (Date)

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Inspector or Supervisor

(Signature) (Printed Name) (Date)

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Main Installation Standard Operating Procedure

IN PROGRESS status for Use by Columubia Gas Construction/Operations Team

The following checklist is to be used by the Construction Team when working a main installation that is in the In Progress Status. The following tasks must be completed before moving the JO into the Completed Status.

This list is not intended to replace or circumvent all applicable Gas Standards or the instructions in the JO.

While this list is applicable to most main installations, the SOP is intended to address the unique operating characteristics, system configuration and potential improper operations that could occur on this specific project. Moreover, this SOP will ensure consistent performance of the tasks necessary to safely install main in compliance with federal, state regulations and company standards.

Tasks to be completed by the Construction Team for main installations before moving JO to Complete Status

Purpose: Provide direction on main installations to:

1. Identify prerequisite tasks required prior to performing field construction.
2. Identify and address system configuration and system impacts in order to mitigate potential improper system operations.
3. Identify and perform critical steps required to install new gas facilities.
4. Document completed project.

Procedure Roles and Responsibilities:

RESPONSIBILITY	PERSONNEL
Oversee Implementation of Procedure	Crew Leader/Construction Coordinator
Confirm Personnel Qualifications	Construction FLL/Construction Coordinator
Notifications (police, municipalities, Gas Control, etc)	Construction FLL
Coordination (police, municipalities, Gas Control, etc)	Construction FLL
Monitor System Pressures	Designated Crew Member
Operate Critical Valve(s)	Designated Crew Member
Monitor Excavation Safety	Crew Leader/Construction Coordinator
Document Project Completion	Crew Leader/Construction Coordinator
As-builts	Crew Leader/Construction Coordinator
Backfill and Restoration	Crew Leader/Construction Coordinator
Site Safety	Crew Leader
Locate and Mark	Dig Safe Technician

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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Project-Specific Tie-in / Purge / Abandonment Steps

#1 – Plastic Branch Saddle Side Tap
#2 – Plastic Double Squeeze Scenario 1
#3 – Plastic Double Squeeze Scenario 2
#4 – Plastic Full Flow Tee By Double Squeeze W/Two Bypasses
#5 – Plastic High Volume Tapping Tee (HVTT)
#6 – Plastic Single Squeeze Abandonment
#7 – Plastic Single Squeeze One-Way Feed ("Squeeze-and-Go")
#8 – Plastic Triple Squeeze
#9 – Steel Abandonment Using a Pressure Control Fitting
#10 – Steel Double Bag Stopping - Low Pressure Only
#11 – Steel Single Pressure Control Fitting
#12 – Steel Two Pressure Control Fittings

1. Person in charge and contractor / crew leader reviewed the Tie-in Plan and determined the number of crew members needed to perform the tie-in is: _____

Title	Name (printed)	Signature (verification the step is complete)	Date

2. Execution Briefing conducted by the Person in Charge on the day of the tie-in.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date
Crew Member Attendees		Crew Member Attendees	

3. Notify Gas Control (Columbia 1-800-921-2165, NIPSCO 1-219-853-5612) of the work to be performed. This notification shall include:
   a. point of contact for the crew preforming the tie-in activity

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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b. list of the points monitored by Gas Control that could be impacted by the work
c. proposed start and end times of the tie-in activity, and
d. the MAOP of pipeline and expected range of pressures during Tie-in operations.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

4. Installed gauge, verified and monitored main line pressure at all points as indicated on site specific sketch.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					

5. Mainline piping and pressure control fittings installed per site specific sketch. Provided support for weight of fitting and tapping equipment as necessary.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

6. Pressure Test per **GS 1500.010**, and per Job Order design completed.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

7. Qualified M&R Personnel monitored Regulator Station(s). Gauges were actively watched and personnel were ready to take immediate action (i.e., having a wrench on the applicable outlet valve(s) prior to the start of the tie-in). Monitoring to continue until the tie-in gauges were removed after the tie-ins are complete.

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Example Tie-in Plan Template

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Project ID:	Engineer:	Date
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Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

8. First pressure control fitting drilled out at point _____.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

9. Purged at point _____, as indicated on site specific sketch and filled with gas. Air is purged out of new main and 95% gas is achieved with CGI unit.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					

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Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

10. Second pressure control fitting drilled out at point _____.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

11. If applicable, change over or add regulator control / sensing lines and services to new main. Do not continue until all regulator control / sensing lines and services are changed over.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

Abandonment:

12. Notified appropriate Company personnel that pipeline will be taken out of service.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

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EXHIBIT A
(14 of 18)

Example Tie-in Plan Template

NiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

13. Set stopping devices in pressure control fittings at points _____ and _____ to stop flow into pipe to be abandoned.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

14. Properly depressurized gas from main to be abandoned via vent at point _____. Depressurize to zero (0) PSIG, continuing to monitor gauges.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

15. Verified adequate shutdown (point _____) and system stabilization. (waited a minimum of 15 minutes).

EXHIBIT A
(15 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

16. Utilized an air mover at point _____ to create suction on pipe to be abandoned.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

17. Properly purged gas from piping to be abandoned at point _____ until a sustained reading of less than 2% gas is achieved with CGI unit by opening or separating main at opposite ends of piping to be abandoned at points _____ and _____.

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EXHIBIT A
(16 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

18. Properly cut and separated mains at points _____ and _____. If used, mechanical end caps are strapped or blocked as required (GS 1320.010).

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

19. All pipe ends are properly sealed for abandonment.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

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EXHIBIT A
(17 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

20. Removed stopping devices at points _____ and _____ and removed vents.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

21. Performed completion process for pressure control fittings at points _____ and _____.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

22. Gauges left in place and monitored following the completion of the tie-in for a minimum of 30 minutes.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	Expected Press. Range	Actual Pressure	Temperature	Time	Date
A					
B					
C					
D					
Station Premise / Name	Expected Press. Range	Actual Pressure	Temperature	Time	Date

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EXHIBIT A
(18 of 18)

Example Tie-in Plan Template

MiSource

Project ID:	Engineer:	Date
Project Name:	J.O. #:	Version

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date

23. Remove all gauges at monitoring points.

Person In Charge Title	Name (printed)		Signature (verification the step is complete)		Date
Gauge	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**
A					
B					
C					
D					
Station Premise / Name	**Expected Press. Range**	**Actual Pressure**	**Temperature**	**Time**	**Date**

24. Soap tested all required fitting, test point, monitoring, and purge locations.
25. Test for PCBs, inspect for internal corrosion, and secure materials when required.
26. If applicable, monitor, address, and document Odorant levels.
27. Gas Control (Columbia 1-800-921-2165, NIPSCO 1-219-853-5612) is notified the work is completed.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

28. Tie-in process complete.

Person In Charge Title	Name (printed)	Signature (verification the step is complete)	Date

#13 – M&R Monitor Replacement & Bypass Removal
#14 – Perform Uprate (0001: XX-XXXXXXX-XX)

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EXHIBIT B

Example Tie-in Sketch Template

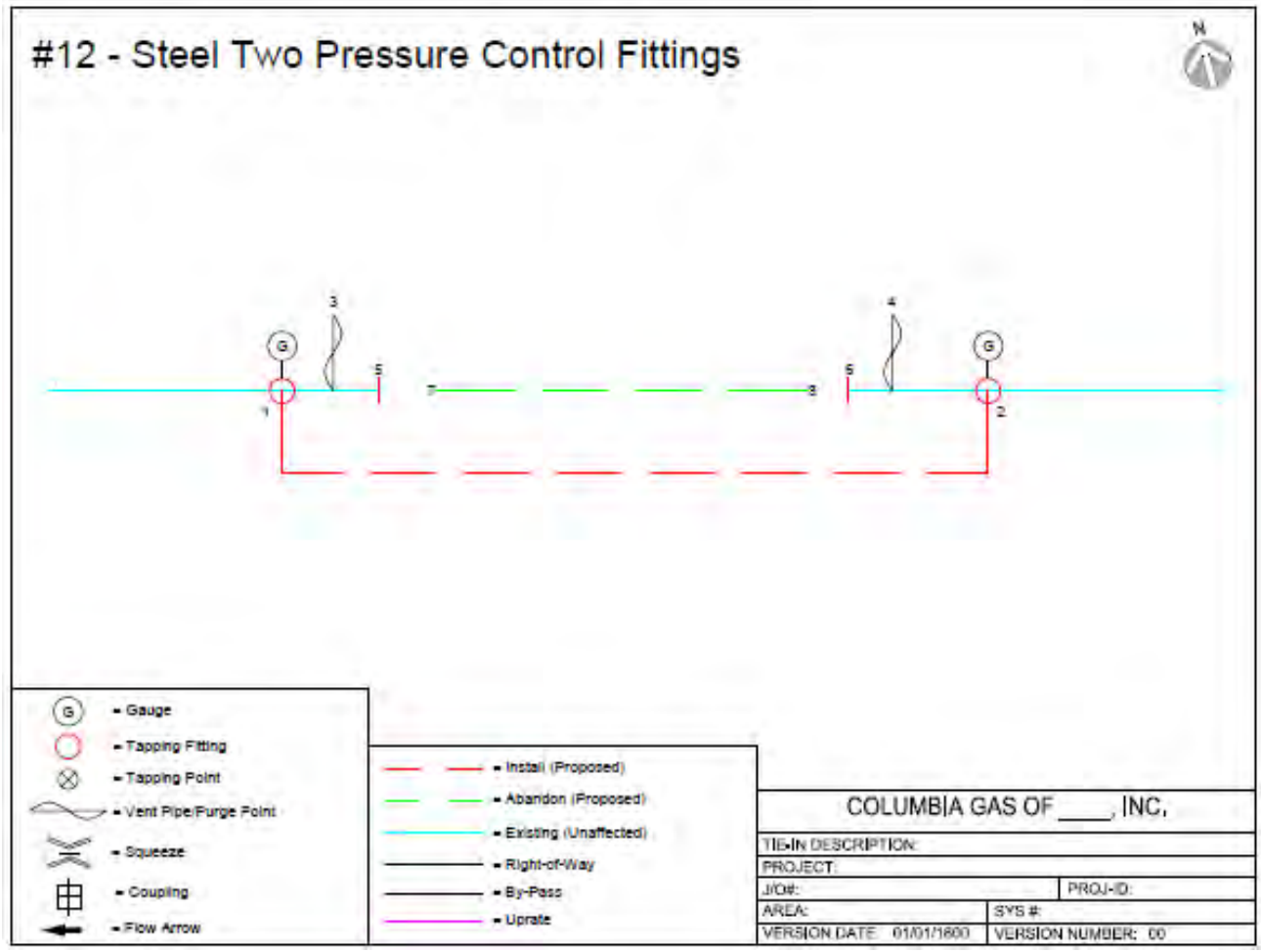
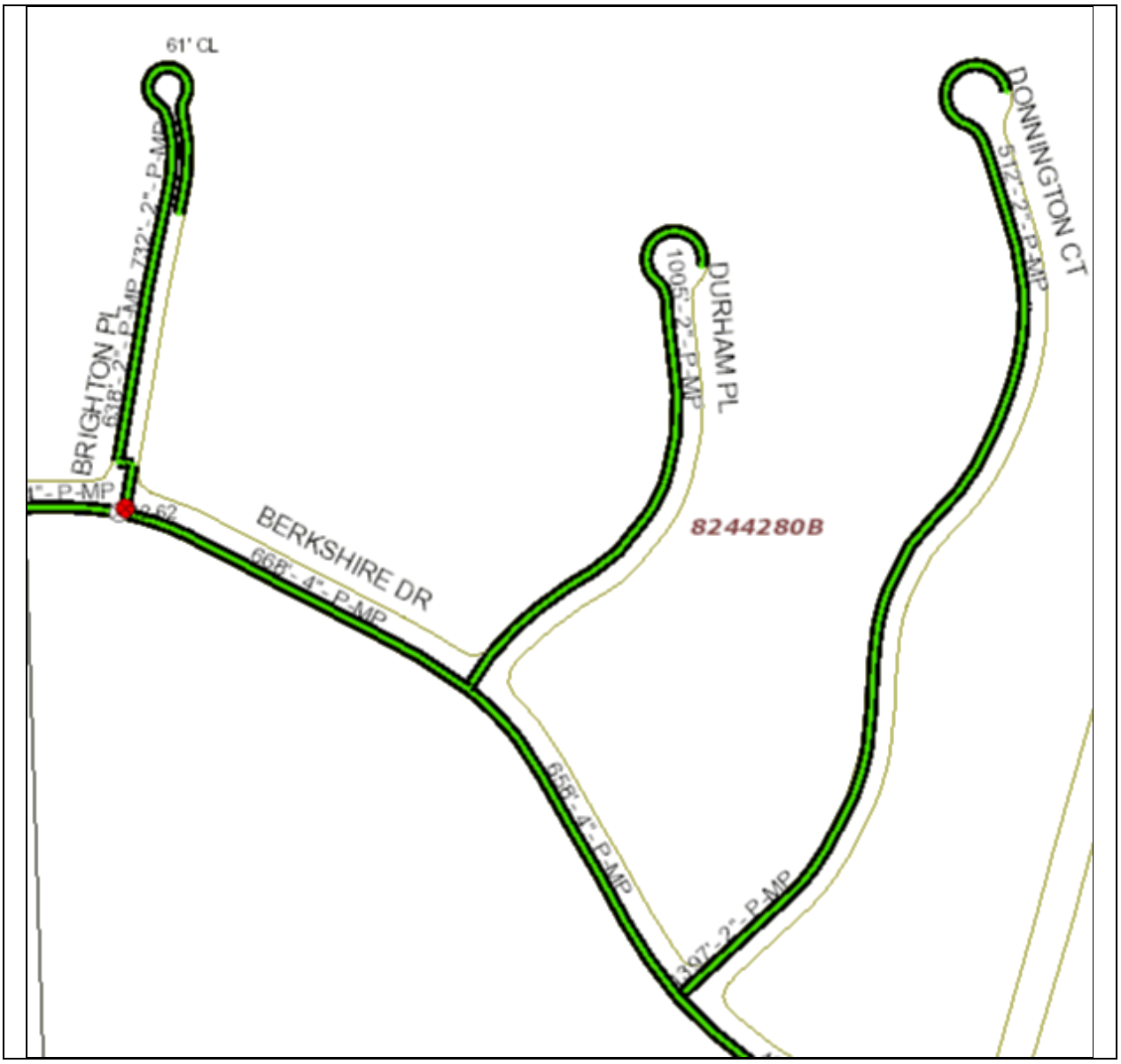


EXHIBIT C
(1 of 2)

GIS Mapping Symbol for Propane Piping Systems



Propane Piping System: Normal Pressure Color Code Outlined in Solid Black

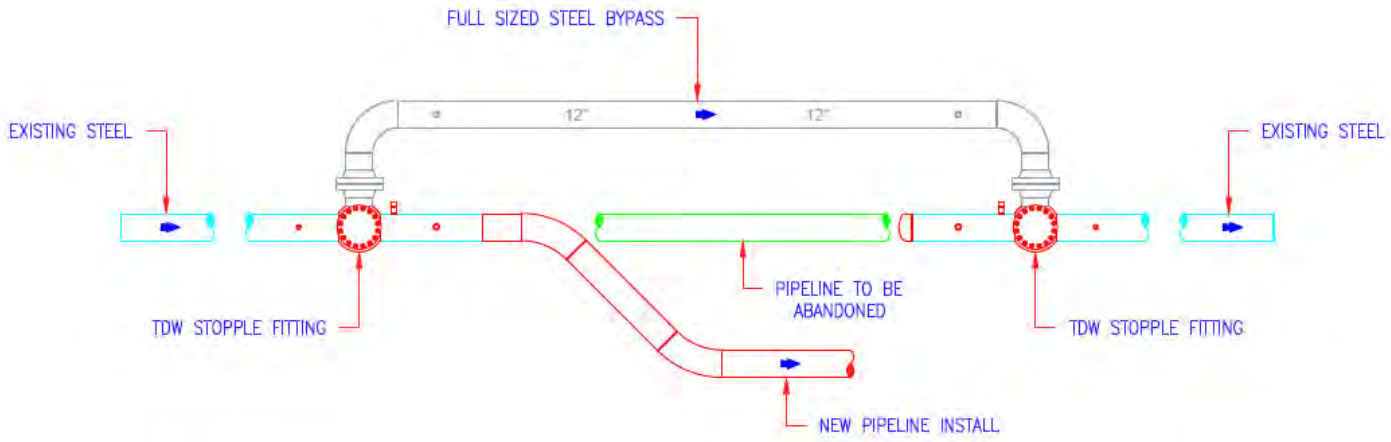
EXHIBIT C
(2 of 2)

GIS Mapping Symbol for Propane Piping Systems Converted to Natural Gas

Propane Piping System Converted to Natural Gas: Normal Pressure Color Code Outlined with Black Dashes

EXHIBIT D

Example of a Direct Tie-In with a Full-Sized Steel Bypass



NiSource
Distribution Operations

Gas Standard

Effective Date: 06/01/2018	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 01/01/2016		Page 1 of 18

Companies Affected:	☒ NIPSCO	☒ CVA	☒ CMD
		☒ CKY	☒ COH
		☒ CMA	☒ CPA

REFERENCE 49 CFR Part 192.627, 192.631

1. GENERAL

Tapping and tie-in operations are often complex. Thorough knowledge and attention to detail during planning and construction activities is required.

Prior to tapping a pressurized pipeline, the person in charge of the tie-in (e.g., crew leader, Construction Coordinator/Inspector) shall positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the tie-in plan, material, and existing records are compatible with what is found in the tie-in excavation. Discrepancies shall be investigated and resolved, if practicable, prior to tapping, and a contingency plan (e.g., identify, locate, access, and operate applicable shut-off valve(s)) shall be developed.

All tapping of pressurized pipelines shall be performed by personnel qualified in installation and use of the proper fittings, equipment, and procedures.

1.1 Material

Tapping fittings shall have a pressure rating equal to or greater than the Maximum Allowable Operating Pressure (MAOP) of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipeline at the time of the tapping operation. Refer to manufacturers' documentation for the design pressure of specific fittings and tapping equipment. Use the tool recommended by the manufacturer to complete the tapping operation.

1.2 Pressure Testing

Pressure testing of tie-in fittings and/or joints shall be done in accordance with the applicable GS 1500.010 "Pressure Testing."

Fittings used for tapping and plugging, such as fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not subjected to the main test pressure, shall be tested prior to tapping operations.

Performing a leak test on an untapped tapping or stopping fitting can dent or collapse the pipeline on which it is installed. The collapse can occur when there is a significant

differential between the system pressure and the intended test pressure for the fitting. A full encirclement type fitting is more apt to cause a problem than a tee type fitting.

1.3 Evaluation for Unknown Mechanical Couplings

Tie-ins involving pipeline separation on metallic pipelines operating over 10 psig that might contain unknown mechanical couplings shall be designed to resist thrust forces associated with stopping gas flow.

1.4 Safety and Related Standards

All applicable HSE and other safety standards shall be followed including the following.

a. HSE 4100.010 “Hazardous Atmosphere Considerations.”
b. GS 1770.010 “Prevention of Accidental Ignition.”

2. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

2.1 Plastic

Two basic types of tie-ins are performed on plastic pipe.

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining.”

   NOTE: It is very important to only hand tighten a plastic tapping tee’s cap. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze-off tool to stop the flow of gas. Refer to GS 1680.040 “Squeeze-Off Procedures for Plastic Pipe,” as well as Gas Standard Series 1300 “Pipe & Fitting Joining.”

Joints should be fused except where the confines of the excavation, weather conditions, or safety considerations* dictate the use of mechanical fittings.

*NOTE: For plastic propane piping systems or former plastic propane piping systems that have been converted to natural gas, mechanical fittings shall be used for tie-in joints. See Exhibit A for related mapping symbols.

2.2 Steel or Wrought Iron

2.2.1 Tie-In Method

The preferred method of tie-in to steel pipe is to stop the flow of gas using

inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

Couplings shall not be used to tie-in pipe joints on transmission class pipelines or distribution pipelines with a MAOP equal to or greater than 200 psig, unless approved by the Manager of Engineering in accordance with GS 2100.010 "Design – General."

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, Engineering must be contacted for additional guidance.

2.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following.

a. The fitting connected to the pipeline.

b. The equipment being used.

It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

2.2.3 Bag and Diaphragm Type Pipeline Stoppers

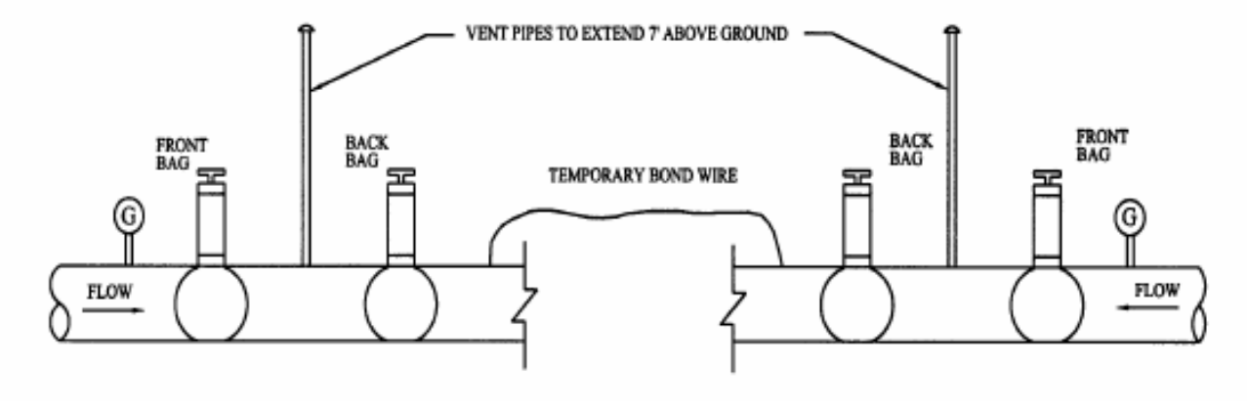
The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of steel and wrought iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



2.3 Cast Iron

When the term “cast iron” is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe’s dimensions, the diameter or the circumference of the pipe must be measured.

2.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent unreinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

2.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines with the following exception.

EXCEPTION: Inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line

Leader/Supervisor, or a qualified designee, but the use shall not exceed the manufacturers' pressure limitations.

Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

2.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except for the following.

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads.

b. A 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

"Reinforced," as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1” or 1 1/4”	2”	3”	4”
2”	Reinforced	Reinforced	X	X
3”	Reinforced	Reinforced	Reinforced	X
4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1-1/4 inch taps may be installed on 4 inch cast iron or ductile iron without reinforcement.

3. WRITTEN TIE-IN PLAN

3.1 Plan Requirements

A written plan shall be prepared for tie-in and bypassing operations on all designed capital mainline installation and replacement work.

The written tie-in plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The written plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s).

It is permissible to develop standard written plans for tie-ins that are not complex. However, they must be specifically adapted to meet the staffing needs and requirements of each individual tie-in.

Items to be considered for development of written tie-in plans are included in, but not limited to, the list below.

1. Necessity of, size, length and temperature limitations for a bypass.
2. Safety precautions (e.g., traffic control).
3. Scope or extent of system to be tied in and/or bypassed.
4. Positive verification of the expected system status and configuration by comparing planned tie-in activities to what is uncovered in the tie-in excavation.
5. The need for reinforcement for branch connections (refer to GS 2420.010 “Reinforcement Requirements for Branch Connections”).
6. Verification of pressure and content.
7. Pressure control and monitoring.
8. Determining the sequence of closing and opening valves or any other flow controlling device.
9. Identifying applicable valve(s), which should be located and checked for accessibility and operation before the tie-in operation begins. If during tie-in and tapping operations, an emergency occurs (e.g., stopple failure, coupling pull out), the valve(s) could be more quickly accessed for pipeline shutdown, if necessary.
10. Planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction).
11. Planning for additional pressure monitoring at regulator stations where the tie-in significantly affects the normal flow through the station.
12. Providing support at tie-in locations.
13. For tie-ins on a metallic pipeline, excluding the following exceptions, evaluate the pipeline to determine the existence of mechanical couplings from the edge of the excavation for a distance equal to or greater than the safe embedment distance (refer to GS 2220.020 “Pipeline Flexibility, Supports, Anchors and Safe Embedment Distance”) along the pipeline that will remain in-service.

EXCEPTIONS:

The following exceptions do not require an evaluation for unknown mechanical couplings. If an evaluation for unknown mechanical couplings is not included within the tie-in plan due to one or more of the following exceptions, the exception(s) shall be documented in the tie-in plan.

i. Tie-ins that are made with spherical tees or shortstopp tees, where the pipeline is fully replaced and in-service prior to separation, and changes in direction are backfilled or blocked to prevent movement.

ii. Direct tie-ins with full-sized steel bypass (see example in Exhibit B).

iii. Following a thorough investigation of Company records, the Engineering Leader, in consultation with Construction and local Field Operations, provides confirmation that no mechanical couplings exist on the pipeline.

Refer to Section 4, bullet d, for methods of evaluation for unknown mechanical couplings.

14. Check for leak-through of line stopping devices.
15. Leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to applicable GS 1500.010 "Pressure Testing" for additional guidance).
16. Purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses (refer to GS 1690.010 “Purging”).
17. Communication between critical points during the operation (e.g., monitoring pressures).
18. Notification of customers who will have service temporarily interrupted (if applicable).
19. Notification of local Field Operations Leaders/Supervisors, Measurement and Regulation Technicians, Construction Front Line Leaders/Supervisors, as appropriate, if sections of pipeline will be temporarily taken out of service.
20. Notification of Gas Control when Engineering determines an impact to Gas Control operations (e.g., SCADA monitored points) during the tie-in (e.g., operation of valves, shut-down of a section of pipeline).
21. Odorant level testing if determined necessary by Engineering.

3.2 Plan Accountability

Field Engineering shall prepare or provide final review of the written tie-in plan for designed capital work. It may be appropriate to request input from Construction

personnel for non-typical tie-in plans.

Tie-in plans involving the installation of concrete anchor(s) on a metallic pipeline shall be approved by Engineering, Construction (or Project Management), and Corrosion Leadership. If consensus cannot be reached, the Engineering Manager shall determine the appropriate method to use to prevent potential pullout of unknown mechanical couplings and approve the tie-in plan.

For emergency mainline installation and replacement design capital projects, a written tie-in plan is not required. Field Engineering should be consulted for assistance if the size, length, and configuration of the tie-in(s) are determined to be extensive.

The details for all tie-ins shall be discussed with the construction crew by either the crew leader or Construction Coordinator/Inspector prior to execution to be well understood.

4. PRE-CONSTRUCTION

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. Crew person in charge of project (e.g., crew leader, Construction Coordinator/Inspector) reviews tie-in plan with personnel performing the tasks on the same day prior to starting tie-in activities. The crew person in charge of project shall designate individuals responsible for various aspects of the operation (e.g., make assignments for monitoring pressure at various locations during tie-in operations). If modifications to the plan are required after review at the job site, the changes shall be approved by an Engineer, a Field Operations Leader/Supervisor, a Construction Front Line Leader/Supervisor, or a qualified designee by documenting the changes and those parties involved in determining them. Any changes or adjustments to the tie-in plan shall be communicated with the personnel performing the tasks and documented that the discussion took place.

c. Expose pipe at tie-in location(s). Positively verify the expected system status and configuration by reviewing maps and other records (e.g., work order, service line records) to ensure that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner. Discrepancies shall be investigated and resolved, if practicable, prior to tapping, and a contingency plan shall be developed to identify applicable shut-off valve(s), which shall be located and checked for accessibility and operation before tapping activities begin.

NOTE**:** If pressure verification indicates a pressure that is above the

MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 “Definitions,” promptly notify local System Operations leadership.

d. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

1. Check the tie-in plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.
2. Install concrete support under the tie-in location to avoid additional stress on the existing pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rockshield, or an equivalent protective isolating material.
3. Install support (e.g., sandbags, sidebooms) on isolated sections of mechanically joined pipeline to avoid additional stress.
4. For tie-ins on a metallic pipeline, evaluate the pipeline to determine the existence of mechanical couplings for a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service, if practicable.

NOTE: If the evaluation along the safe embedment distance cannot be completed or is inconclusive, consult with Engineering.

Evaluations for unknown mechanical couplings include the following.

i. Use an approved camera system for live insertion through an in-service pipeline. The use of a camera to inspect for mechanical couplings is preferred since it minimizes disturbance to the pipeline. Consider reducing operating pressure to allow for the use of a camera to inspect for mechanical couplings.

The inspection distance shall be equal to or greater than the safe embedment distance from the edge of the tie-in excavation along the pipeline that will remain in-service.

ii. Adjust the stopple (i.e., pressure control) equipment away from the tie-in/separation location to allow the use of an approved camera system through a pipeline that has been shut down and purged of gas.

Adjust the placement of the stopple fitting and equipment at a distance equal to or greater than the safe embedment distance from the edge of the tie-in excavation. Insert a camera system through the pipeline that has been shut down and purged in accordance with GS 1690.010 "Purging." The use of an air mover in accordance with GS 1770.020 “Use of Air Movers at Tie-Ins” may be required if complete shutdown cannot be maintained while performing the camera

inspection.

iii. Strip the topsoil from the top of the pipeline from the edge of the tie-in excavation along the pipeline that will remain in-service for a distance equal to or greater than the safe embedment distance. If removing the topsoil from the top of the pipeline is the only valid option, consider using vacuum excavation at an angle to minimize topsoil removal. Only uncover one joint at a time. Consider adding an anchor prior to stripping topsoil.

If the use of a camera or stripping the topsoil from the top of the pipeline is not practicable, anchoring and/or blocking (or equivalent restraint) shall be planned for installation prior to tie-in operations. Refer to GS 1320.010 “Mechanical Coupling Connections.”

5. Take further actions based on results of evaluation for unknown mechanical couplings.

If no indication of couplings are found, the project may resume without further investigation.

If mechanical coupling(s) are found or if the evaluation is inconclusive, plan to take actions to prevent potential pullout of unknown mechanical couplings. One or more of the following actions may be appropriate.

i. Relocate the proposed tie-in upstream of found coupling(s) to remove the coupling(s) (preferred action).

NOTE: Evaluation of the pipeline from the edge of the new tie-in excavation for a distance equal to or greater than the safe embedment distance is required if not previously evaluated.

ii. Harness (preferred) or strap known or found coupling(s). Only uncover one joint at a time, provide restraint (e.g., harness), then backfill.

iii. Anchor.

iv. Block to prevent pipeline movement at exposed changes in direction or dead ends.

v. Take the pipeline out of service.

vi. Reduce the operating pressure during construction and/or tie-in operations to reduce the safe embedment distance or to eliminate coupling(s) found from within the safe embedment distance.

vii. Submit a map revision according to GS 2610.040 “Map Revision” to record the location of the found coupling(s). See Section 7 below.

Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance.

e. Inspect pipe condition to determine suitability for tapping.

1. Inspect pipeline for external corrosion. Refer to GS 1410.010 “Metallic Pipeline Exposures” for additional guidance.
2. Verify wall thickness (if appropriate).
3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current Company welding procedures for additional guidance.
4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

f. Verify that tapping equipment is rated equal to or greater than the operating pressure.

g. Verify communications equipment is functioning properly.

5. DURING CONSTRUCTION

5.1 Pressure Monitoring

Whenever the Company or its contractor performs live gas main-to-main connections (i.e., tie-in connections, branch connections, bypasses), pressure gauges shall be installed, appropriately placed and utilized prior to and during tie-in operations, regardless of the system operating pressure, in order to reduce the possibility of over-pressurization of gas mains.

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration should be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. For example, if a tie-in involves shutting down a section of pipeline immediately downstream of a regulator station supply, bypass valve or regulator orifice, leak-through may occur which may cause a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure generally occurs

on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken.

5.2 Bypassing and Stopping Techniques

Engineering can provide assistance for appropriate bypass sizing.

Whenever the flow of gas is stopped, the isolated section of main shall be checked for leak-through before cutting into or parting the line. When positive shut-off of gas by a valve or line stopper is not accomplished, "live-gas" precautions to avoid exposure to combustible gas-air mixtures shall be strictly followed. Refer to GS 1770.010 “Prevention of Accidental Ignition” for additional guidance. An air mover or purger may be used to prevent the introduction of gas into the work area at open ends. Refer to GS 1770.020 “Use of Air Movers at Tie-Ins” and GS 1690.010 “Purging” for additional guidance.

Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to applicable GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by Engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is typically necessary to maintain gas service to downstream customers.

5.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include the following.

a. Following manufacturer’s recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve.
b. A combustible atmosphere in the work area cannot be avoided.
c. Other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion.
d. The tie-in is on cast iron pipe.
e. An installation is temporary (e.g., regulators for bypassing or uprating).
f. It is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

5.4 Additional Tie-In Considerations

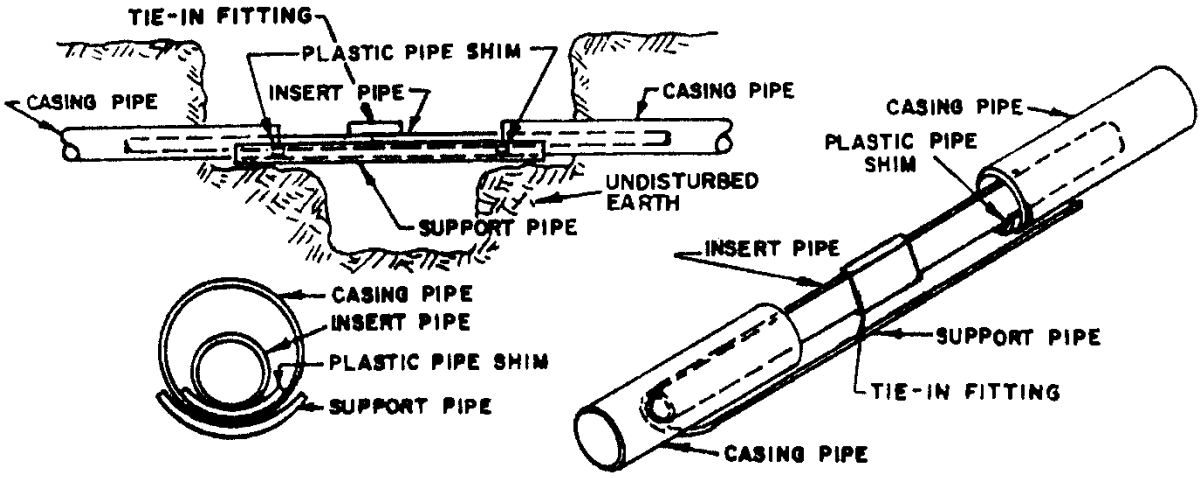
The following general tie-in considerations should be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 “Reinforcement Requirements for Branch Connections” for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in should be installed according to GS 3010.090 “Cover.”

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture (bankrun), screenings). Heavy or wet clays and frozen earth are not suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp

or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

6. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Monitor pressure gauges to ensure the piping system is operating as expected.

e. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze-off jacks or removing bags and installing leak repair clamps, etc.

f. Engineering is responsible for determining whether post construction odorant level testing is necessary, which should be part of the tie-in plan. If odorant level testing is required, refer to the applicable GS 1670.020 "Odor Level Monitoring" and GS 1670.040 "Pipeline Conditioning New Pipelines."

7. RECORDS

7.1 Written Tie-In Plans

Approved written tie-in plans shall be filed with the work order completion report.

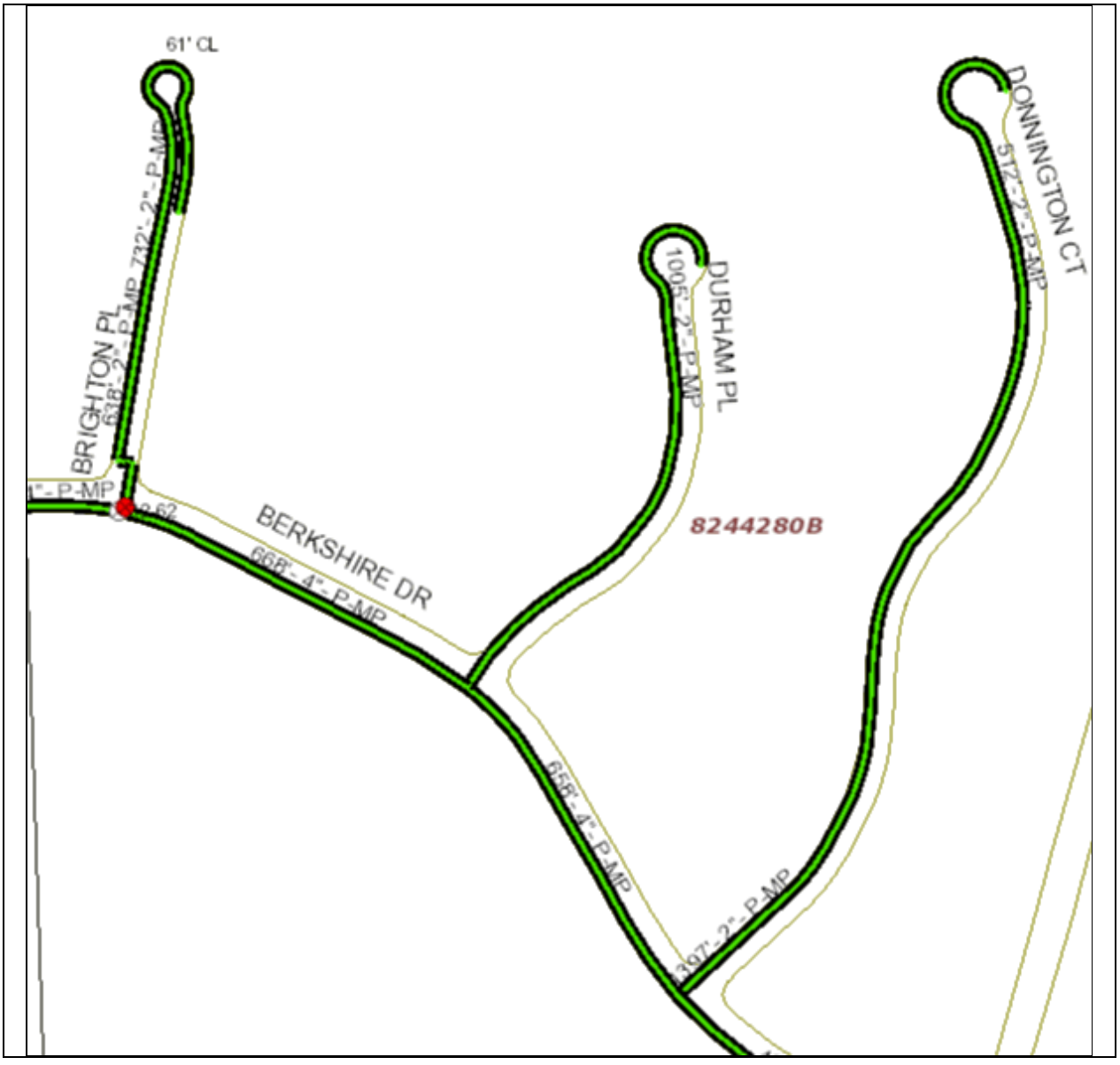
7.2 Map Revisions

When unmapped mechanical coupling(s) are found and left in-service on a metallic pipeline, a map revision shall be submitted in accordance with GS 2610.040 "Map Revision" to record the location of the coupling(s). If a mechanical coupling is exposed, document the existing restraint found or the type of restraint installed (e.g., weld straps, harness) at the mechanical coupling(s).

EXHIBIT A

(1 of 2)

GIS Mapping Symbol for Propane Piping Systems



Propane Piping System: Normal Pressure Color Code Outlined in Solid Black

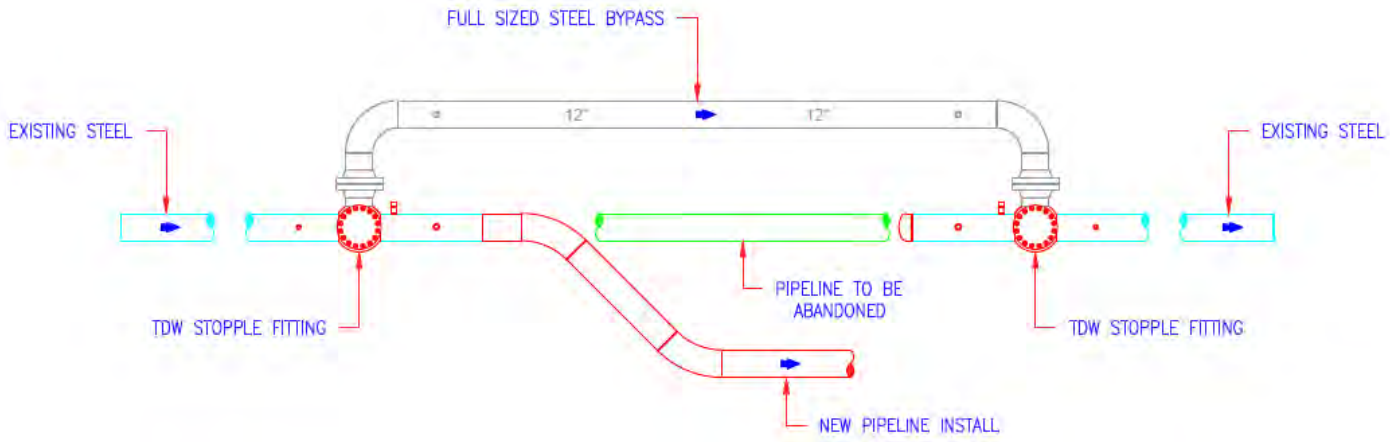
EXHIBIT A
(2 of 2)

GIS Mapping Symbol for Propane Piping Systems Converted to Natural Gas

Propane Piping System Converted to Natural Gas: Normal Pressure Color Code Outlined with Black Dashes

EXHIBIT B

Example of a Direct Tie-In with a Full-Sized Steel Bypass



NiSource
Distribution Operations

Gas Standard

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Companies Affected:			
☑ NIPSCO	☑ CGV	☑ CMD
	☑ CKY	☑ COH
	☑ CMA	☑ CPA

REFERENCE 49 CFR Part 192.627

1. GENERAL

Tapping and Tie-in operations are often complex. Thorough knowledge and attention to detail during planning and construction activities is required.

All tapping of pressurized pipelines shall be performed by a crew qualified in installation and use of the proper fittings, equipment, and procedures.

1.1 Material

Tapping fittings shall have a pressure rating equal to or greater than that of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipe at the time of the tapping operation. Refer to manufacturers' documentation for the design pressure of specific fittings and tapping equipment. Use the tool recommended by the manufacturer to complete the tapping operation.

1.2 Pressure Testing

Pressure testing of tie-in fittings and/or joint shall be done in accordance with applicable GS 1500.010 "Pressure Testing."

Fittings used for tapping and plugging, such as fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not subjected to the main test pressure, shall be tested prior to tapping operations.

Performing a leak test on an untapped tapping or stopping fitting can dent or collapse the pipeline it is installed on. The collapse can occur when there is a significant differential between the system pressure and the intended test pressure for the fitting. A full encirclement type fitting is more apt to cause a problem than a tee type fitting.

1.3 Safety and Related Standards

All applicable HSE safety standards shall be followed including the following.

a. HSE 4100.010 "Hazardous Atmosphere Considerations."

b. GS 1770.010 “Prevention of Accidental Ignition.”

2. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

2.1 Plastic

Two basic types of tie-ins are performed on plastic pipe:

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining.”

NOTE: It is very important to only hand tighten a plastic tapping tee’s cap. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze off tool to stop the flow of gas. Refer to GS 1680.040 “Squeeze-Off Procedures for Plastic Pipe,” as well as Gas Standards Series 1300 “Pipe & Fitting Joining.”

Joints should be fused except where the confines of the excavation or safety considerations dictate the use of mechanical fittings.

2.2 Steel or Wrought Iron

2.2.1 Welded Tie-in

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, engineering must be contacted for additional guidance.

2.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following:

a. The fitting connected to the pipeline, or

b. The equipment being used.

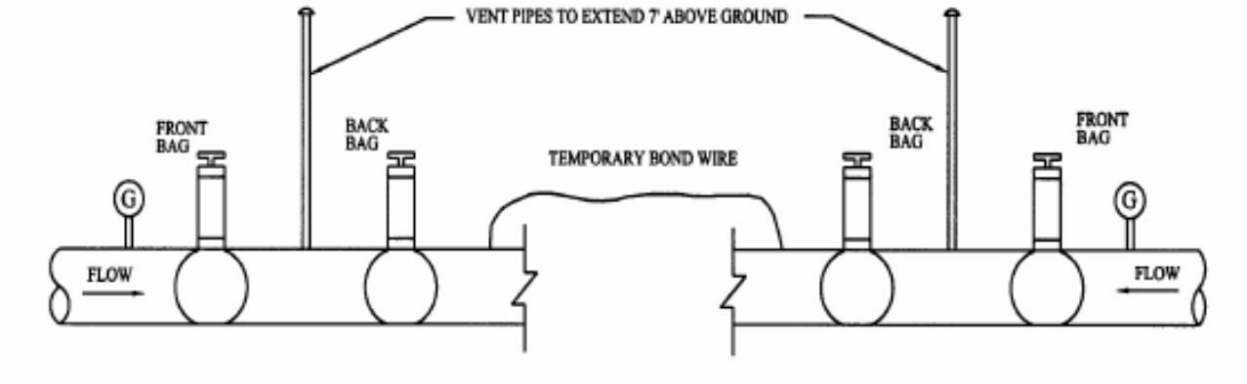
It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

2.2.3 Bag and Diaphragm Type Pipeline Stoppers

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of steel and wrought iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



2.3 Cast Iron

When the term "cast iron" is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe's dimensions, the diameter or the circumference of the pipe must be measured.

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2.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent un-reinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

2.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

2.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except that:

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads, and

b. a 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

"Reinforced," as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or

ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1” or 1 1/4”	2”	3”	4”
2”	Reinforced	Reinforced	X	X
3”	Reinforced	Reinforced	Reinforced	X
4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1-1/4 inch taps may be installed on 4 inch cast iron or ductile iron without reinforcement.

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3. WRITTEN TIE-IN PLAN

3.1 Plan Requirements

A written plan shall be prepared for tie-in and bypassing operations on all designed capital mainline installation and replacement work.

The written tie-in plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The written plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s).

It is permissible to develop standard written plans for tie-ins that are not complex. However, they must be specifically adapted to meet the staffing needs and requirements of each individual tie-in.

Items to be considered but not limited to for development of written plans are:

1. Necessity of, size, length and temperature limitations for a bypass,
2. safety precautions (e.g., traffic control),
3. scope or extent of system to be tied in and/or bypassed,
4. the need for reinforcement for branch connections refer to GS 2420.010 “Reinforcement Requirements for Branch Connections,”
5. verification of pressure and content,
6. pressure control and monitoring,
7. determining the sequence of closing and opening valves or any other flow controlling device,
8. planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction),
9. planning for additional pressure monitoring at regulator stations where the tie-in significantly affects the normal flow through the station,
10. the possibility that mechanical couplings exist in the pipeline (providing support at tie-in locations; strapping, anchoring, or blocking of changes in direction or soil movement; taking the pipeline out of service or reducing the operating pressure during construction and/or tie-in operations),
11. check for leak-through of line stopping devices,
12. leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to applicable GS 1500.010 "Pressure Testing" for additional guidance),
13. purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses, (refer to GS 1690.010

"Purging"),

14. communication between critical points during the operation,
15. notification of customers who will have service temporarily interrupted (if applicable),
16. notification of local Field Operations Leaders/Supervisors, Gas Control, measurement and regulation technicians, construction leaders, as appropriate, if sections of pipeline will be temporarily taken out of service, and
17. odorant level testing if determined necessary by engineering.

3.2 Plan Accountability

Field Engineering shall prepare or provide final review of the written tie-in plan for designed capital work. It may be appropriate to request input from construction personnel for non-typical tie-in plans.

For emergency mainline installation and replacement design capital projects, a written tie-in plan is not required. Field Engineering should be consulted for assistance if the size, length, and configuration of the tie-in(s) are determined to be extensive.

The details for all tie-ins shall be discussed with the construction crew by either the field leader/supervisor or construction coordinator prior to execution to be well understood.

4. PRE-CONSTRUCTION

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. Crew person in charge of project (e.g., crew leader, construction coordinator/inspector) reviews tie-in plan with personnel performing the tasks. Designate personnel responsible for various aspects of the operation. If modifications to the plan are required after review at the job site, the changes shall be approved by an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee by documenting the changes and those parties involved in determining them. Any changes or adjustments to the tie-in plan shall be communicated with the personnel performing the tasks and documented that the discussion took place.

c. Expose pipe at tie-in location(s). Verify that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner.

NOTE: If pressure verification indicates a pressure that is above the MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 “Definitions,” promptly notify local System Operations leadership.

d. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

   1. Check the tie-in plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.
   2. Install concrete support under the tie-in location to avoid additional stress on the existing coupled pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rockshield, or an equivalent protective isolating material.
   3. Install support (e.g., sandbags, sidebooms) on isolated sections of mechanically joined pipeline to avoid additional stress.
   4. Expose at least one joint back (in each direction if necessary) from the anticipated tie-in to determine whether the coupling provides positive restraint. If unable to determine, then adequate restraint must be provided. Only uncover one joint at a time and if necessary provide restraint then backfill. In the event that at least one pipe joint cannot be exposed (e.g., road crossing), the mainline shall be anchored or additional pipeline replacement should be considered. Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance on strapping and anchoring.

e. Inspect pipe condition to determine suitability for tapping.

   1. Inspect pipeline for external corrosion. Refer to GS 1410.010 “Metallic Pipeline Exposures” for additional guidance.
   2. Verify wall thickness (if appropriate).
   3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current company welding procedures for additional guidance.
   4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

f. Verify that tapping equipment is rated equal to or greater than the operating pressure.

g. Verify communications equipment is functioning properly.

5. DURING CONSTRUCTION

5.1 Pressure Monitoring

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration should be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. For example, if a tie-in involves shutting down a section of pipeline immediately downstream of a regulator station supply, bypass valve or regulator orifice, leak-through may occur which may cause a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure generally occurs on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken.

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Engineering can provide assistance for appropriate bypass sizing.

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Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to applicable GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is typically necessary to maintain gas service to downstream customers.

5.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include:

a. Following manufacturer's recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve,

b. a combustible atmosphere in the work area cannot be avoided,

c. other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion,

d. the tie-in is on cast iron pipe,

e. an installation is temporary (e.g., regulators for bypassing or uprating), or

f. it is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

5.4 Additional Tie-In Considerations

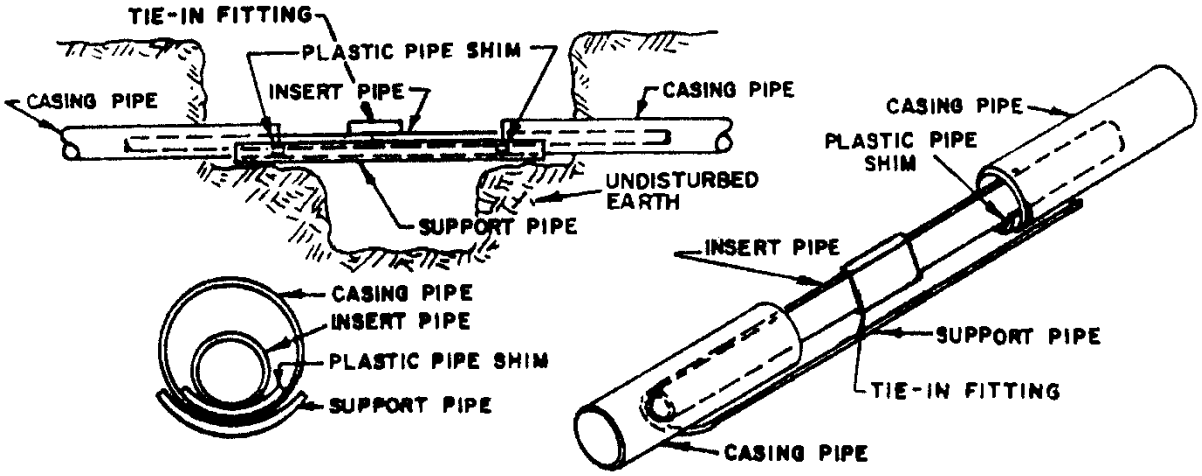
The following general tie-in considerations should be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 "Reinforcement Requirements for Branch Connections" for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in should be installed according to gas standard GS 3010.090 "Cover."

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



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g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

6. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Monitor pressure gauges to ensure the piping system is operating as expected.

e. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze off jacks or removing bags and installing leak repair clamps, etc.

f. Engineering will be responsible for determining whether post construction odorant level testing is necessary and be part of the tie-in plan. If odorant level testing is required, refer to the Company's existing procedure(s).

7. RECORDS

Approved written tie-in plans shall be filed with the work order completion report.

MiSource
Distribution Operations

Gas Standard

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Companies Affected:		
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1. GENERAL

Tapping and Tie-in operations are often complex. Thorough knowledge and attention to detail during planning and construction activities is required. Fittings used for tapping and plugging, such as fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not subjected to the main test pressure, shall be tested prior to tapping operations. The test pressure shall be at least equal to the main test pressure. Refer to GS 1500.010 “Pressure Testing” for additional guidance.

All tapping of pressurized pipelines shall be performed by a crew qualified in installation and use of the proper fittings, equipment, and procedures. All applicable safety standards shall be followed.

Tapping fittings shall have a pressure rating equal to or greater than that of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipe at the time of the tapping operation. Refer to manufacturers’ documentation for the design pressure of specific fittings and tapping equipment. Use the tool recommended by the manufacturer to complete the tapping operation.

All applicable Company welding and safety procedures shall be followed in addition to the procedures in GS 1770.010 “Prevention of Accidental Ignition” and HSE 4100.010 “Hazardous Atmosphere Considerations.”

2. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

2.1 Plastic

Two basic types of tie-ins are performed on plastic pipe:

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining” or GS 1306.010 “Saddle Fusion Joining.”

NOTE: It is very important to only hand tighten a plastic tapping tee’s cap. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze off tool to stop the flow of gas. Refer to GS 1680.040 "Squeeze-Off Procedures for Plastic Pipe," as well as Gas Standards Series 1300 "Pipe & Fitting Joining."

Joints should be fused except where the confines of the excavation or safety considerations dictate the use of mechanical fittings.

2.2 Steel or Wrought Iron

2.2.1 Welded Tie-in

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, engineering must be contacted for additional guidance.

2.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following:

a. The fitting connected to the pipeline, or

b. The equipment being used.

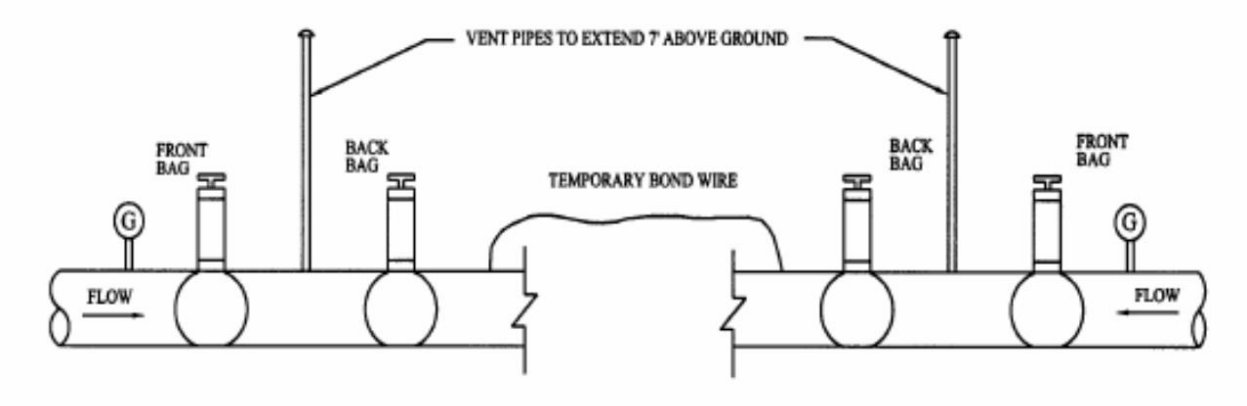
It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

2.2.3 Bag and Diaphragm Type Pipeline Stoppers

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of steel and wrought iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



2.3 Cast Iron

When the term "cast iron" is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe's dimensions, the diameter or the circumference of the pipe must be measured.

2.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent un-reinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

2.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the

following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

2.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except that:

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads, and

b. a 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

"Reinforced," as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1” or 1 1/4”	2”	3”	4”
2”	Reinforced	Reinforced	X	X
3”	Reinforced	Reinforced	Reinforced	X
4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
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18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1 1/4 inch taps may be installed on 4 inch cast iron or ductile iron without reinforcement.

3. WRITTEN TIE-IN PLAN

3.1 Plan Requirements

A written plan shall be prepared for tie-in and bypassing operations on all designed capital mainline installation and replacement work.

The written tie-in plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The written plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s).

It is permissible to develop standard written plans for tie-ins that are not complex. However, they must be specifically adapted to meet the staffing needs and requirements of each individual tie-in.

Items to be considered but not limited to for development of written plans are:

1. Necessity of, size, length and temperature limitations for a bypass,
2. safety precautions (e.g., traffic control),
3. scope or extent of system to be tied in and/or bypassed,
4. the need for reinforcement for branch connections refer to GS 2420.010 “Reinforcement Requirements for Branch Connections,”
5. verification of pressure and content,
6. pressure control and monitoring,
7. determining the sequence of closing and opening valves or any other flow controlling device,
8. planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction),
9. planning for additional pressure monitoring at regulator stations where the tie-in significantly affects the normal flow through the station,
10. the possibility that mechanical couplings exist in the pipeline (providing support at tie-in locations; strapping, anchoring, or blocking of changes in direction or soil movement; taking the pipeline out of service or reducing the operating pressure during construction and/or tie-in operations),
11. check for leak-through of line stopping devices,
12. leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to GS 1500.010 "Pressure Testing" for additional guidance),
13. purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses, (refer to GS 1690.010 “Purging-

New Construction and Abandonment"),

14. communication between critical points during the operation,
15. notification of customers who will have service temporarily interrupted (if applicable),
16. notification of local Field Operations Leaders/Supervisors, Gas Control, measurement and regulation technicians, construction leaders, as appropriate, if sections of pipeline will be temporarily taken out of service, and
17. odorant level testing if determined necessary by engineering.

3.2 Plan Accountability

Field Engineering shall prepare or provide final review of the written tie-in plan for designed capital work. It may be appropriate to request input from construction personnel for non-typical tie-in plans.

For emergency mainline installation and replacement design capital projects, a written tie-in plan is not required. Field Engineering should be consulted for assistance if the size, length, and configuration of the tie-in(s) are determined to be extensive.

The details for all tie-ins shall be discussed with the construction crew by either the field leader/supervisor or construction coordinator prior to execution to be well understood.

4. PRE-CONSTRUCTION

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. Crew person in charge of project (e.g., crew leader, construction coordinator/inspector) reviews tie-in plan with personnel performing the tasks. Designate personnel responsible for various aspects of the operation. If modifications to the plan are required after review at the job site, the changes shall be approved by an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee by documenting the changes and those parties involved in determining them.

c. Expose pipe at tie-in location(s). Verify that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner.

NOTE: If pressure verification indicates a pressure that is above the

MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 “Definitions,” promptly notify local System Operations leadership.

d. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

   1. Check the tie-in plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.
   2. Install concrete support under the tie-in location to avoid additional stress on the existing coupled pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rockshield, or an equivalent protective isolating material.
   3. Install support (e.g., sandbags, sidebooms) on isolated sections of mechanically joined pipeline to avoid additional stress.
   4. Expose at least one joint back (in each direction if necessary) from the anticipated tie-in to determine whether the coupling provides positive restraint. If unable to determine, then adequate restraint must be provided. Only uncover one joint at a time and if necessary provide restraint then backfill. In the event that at least one pipe joint cannot be exposed (e.g., road crossing), the mainline shall be anchored or additional pipeline replacement should be considered. Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance on strapping and anchoring.

e. Inspect pipe condition to determine suitability for tapping.

   1. Inspect pipeline for external corrosion. Refer to GS 1410.010 “Metallic Pipeline Exposures” for additional guidance.
   2. Verify wall thickness (if appropriate).
   3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current company welding procedures for additional guidance.
   4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

f. Verify that tapping equipment is rated equal to or greater than the operating pressure.

g. Verify communications equipment is functioning properly.

5. DURING CONSTRUCTION

5.1 Pressure Monitoring

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of

the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration should be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. For example, if a tie-in involves shutting down a section of pipeline immediately downstream of a regulator station supply, bypass valve or regulator orifice, leak-through may occur which may cause a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure generally occurs on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken.

5.2 Bypassing and Stopping Techniques

Engineering can provide assistance for appropriate bypass sizing.

Whenever the flow of gas is stopped, the isolated section of main shall be checked for leak-through before cutting into or parting the line. When positive shut-off of gas by a valve or line stopper is not accomplished, "live-gas" precautions to avoid exposure to combustible gas-air mixtures shall be strictly followed. Refer to GS 1770.010 “Prevention of Accidental Ignition” for additional guidance. An air mover or purger may be used to prevent the introduction of gas into the work area at open ends. Refer to GS 1690.010 “Purging New Construction and Abandonment” for additional guidance.

Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is typically necessary to maintain gas service to downstream customers.

5.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include:

a. Following manufacturer's recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve,

b. a combustible atmosphere in the work area cannot be avoided,

c. other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion,

d. the tie-in is on cast iron pipe,

e. an installation is temporary (e.g., regulators for bypassing or uprating), or

f. it is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

5.4 Additional Tie-In Considerations

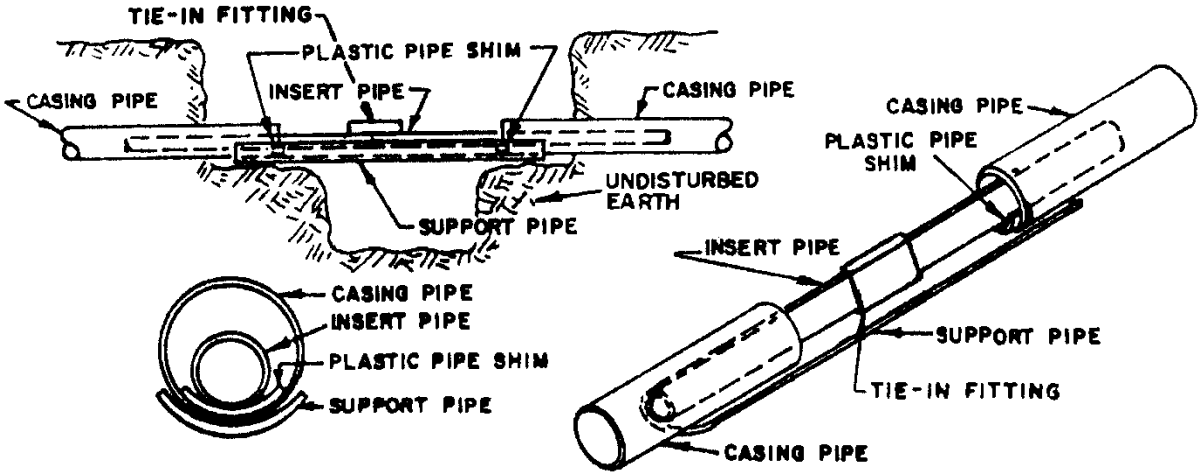
The following general tie-in considerations should be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 "Reinforcement Requirements for Branch Connections" for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in should be installed according to gas standard GS 3010.090 "Cover."

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture (bankrun), screenings). Heavy or wet clays and frozen earth are not suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

6. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Monitor pressure gauges to ensure the piping system is operating as expected.

e. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze off jacks or removing bags and installing leak repair clamps, etc.

f. Engineering will be responsible for determining whether post construction odorant level testing is necessary and be part of the tie-in plan. If odorant level testing is required, refer to the Company's existing procedure(s).

7. RECORDS

Approved written tie-in plans shall be filed with the work order completion report.

MiSource
Distribution Operations

Gas Standard

Effective Date: 04/22/2013	Tie-Ins and Tapping Pressurized Pipelines	Standard Number: GS 1680.010
Supersedes: 01/01/2013		Page 1 of 11

Companies Affected:			
	☑ NIPSCO	☑ CGV	☑ CMD
		☑ CKY	☑ COH
		☑ CMA	☑ CPA

1. GENERAL

Tapping and Tie-in operations are often complex. Thorough knowledge and attention to detail during planning and construction activities is required. Fittings used for tapping and plugging, such as fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not subjected to the main test pressure, shall be tested prior to tapping operations. The test pressure shall be at least equal to the main test pressure. Refer to GS 1500.010 “Pressure Testing” for additional guidance.

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Tapping fittings shall have a pressure rating equal to or greater than that of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipe at the time of the tapping operation. Refer to manufacturers’ documentation for the design pressure of specific fittings and tapping equipment.

All applicable Company welding and safety procedures shall be followed in addition to the procedures in GS 1770.010 “Prevention of Accidental Ignition” and HSE 4100.010 “Hazardous Atmosphere Considerations.”

2. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

2.1 Plastic

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NOTE: It is very important to only hand tighten a plastic tapping tee’s cap. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze off tool to stop the flow of gas. Refer to GS 1680.040 “Squeeze-Off Procedures for Plastic Pipe,” as well as the Plastic Fusion and Mechanical Joining Manual.

Joints should be fused except where the confines of the excavation or safety considerations dictate the use of mechanical fittings.

2.2 Steel or Wrought Iron

2.2.1 Welded Tie-in

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, engineering must be contacted for additional guidance.

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Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

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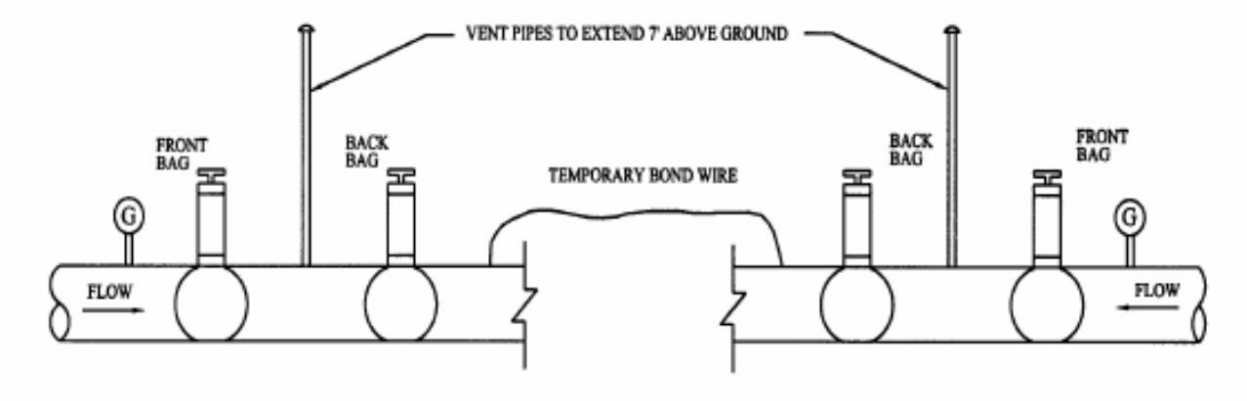

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10. the possibility that mechanical couplings exist in the pipeline (providing support at tie-in locations; strapping, anchoring, or blocking of changes in direction or soil movement; taking the pipeline out of service or reducing the operating pressure during construction and/or tie-in operations),
11. check for leak-through of line stopping devices,
12. leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to GS 1500.010 "Pressure Testing" for additional guidance),
13. purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses, (refer to GS 1690.010 “Purging-New Construction and Abandonment”),
14. communication between critical points during the operation,
15. notification of customers who will have service temporarily interrupted (if applicable),
16. notification of local Field Operations Leaders/Supervisors, Gas Control, measurement and regulation technicians, construction leaders, as appropriate, if sections of pipeline will be temporarily taken out of service, and
17. odorant level testing if determined necessary by engineering.

3.2 Plan Accountability

Field Engineering shall prepare or provide final review of the written tie-in plan for designed capital work. It may be appropriate to request input from construction personnel for non-typical tie-in plans.

For emergency mainline installation and replacement design capital projects, a written tie-in plan is not required. Field Engineering should be consulted for assistance if the size, length, and configuration of the tie-in(s) are determined to be extensive.

The details for all tie-ins shall be discussed with the construction crew by either the field leader/supervisor or construction coordinator prior to execution to be well understood.

4. PRE-CONSTRUCTION

The following steps shall be completed in the field prior to tie-in/tapping operations.

a. Set up work area protection (e.g., traffic control, fire extinguisher).

b. Crew person in charge of project (e.g., crew leader, construction coordinator/inspector) reviews tie-in plan with personnel performing the tasks. Designate personnel responsible for various aspects of the operation. If modifications to the plan are required after review at the job site, the changes shall be approved by an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee by documenting the changes and those parties involved in determining them.

c. Expose pipe at tie-in location(s). Verify that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner.

   NOTE: If pressure verification indicates a pressure that is above the MAOP or outside of the **normal operating pressure** ranges as defined in GS 1012.010 "Definitions," promptly notify local System Operations leadership.

d. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

   1. Check the tie-in plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.

   2. Install concrete support under the tie-in location to avoid additional stress on the existing coupled pipeline. Provide protection for the pipeline from

damage by the concrete by installing extra coating and tape wrap, rockshield, or an equivalent protective isolating material.

3. Install support (e.g., sandbags, sidebooms) on isolated sections of mechanically joined pipeline to avoid additional stress.
4. Expose at least one joint back (in each direction if necessary) from the anticipated tie-in to determine whether the coupling provides positive restraint. If unable to determine, then adequate restraint must be provided. Only uncover one joint at a time and if necessary provide restraint then backfill. In the event that at least one pipe joint cannot be exposed (e.g., road crossing), the mainline shall be anchored or additional pipeline replacement should be considered. Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance on strapping and anchoring.

e. Inspect pipe condition to determine suitability for tapping.
   1. Inspect pipeline for external corrosion. Refer to GS 1430.010 “Metallic Pipeline Exposures” for additional guidance.
   2. Verify wall thickness (if appropriate).
   3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current company welding procedures for additional guidance.
   4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

f. Verify that tapping equipment is rated equal to or greater than the operating pressure.

g. Verify communications equipment is functioning properly.

5. DURING CONSTRUCTION

5.1 Pressure Monitoring

The most crucial part of the tie-in/bypass operation is the initial stopping or rerouting of the gas supply. To ensure that pressure is maintained, monitoring shall be conducted during the installation and operation of the stopping and/or bypassing equipment.

In the case of looped systems, gauges shall be monitored to ensure that a sufficient volume of gas is flowing through the looped system and that the flow of gas is not watered off or blocked off.

Special consideration should be given to monitoring pressures at industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction) to avoid operating issues or an unplanned service interruption.

In addition, special consideration should be given to monitoring pressures at regulator stations where the tie-in significantly affects the normal flow through the station. For example, if a tie-in involves shutting down a section of pipeline immediately downstream of a regulator station supply, bypass valve or regulator orifice, leak-through may occur which may cause a buildup of downstream pressure and a possible overpressure situation.

When the existing mains are stopped/plugged, a variance of pressure generally occurs on either side of the separation. If an unexpected sharp pressure drop is observed, it may be necessary to restore the flow of gas by either increasing the pressure at the regulator (if possible) or by removing the stopping/plugging device. At no time shall a stopping device be removed if there is any indication that an outage has occurred, until corrective action has been taken.

5.2 Bypassing and Stopping Techniques

Engineering can provide assistance for appropriate bypass sizing.

Whenever the flow of gas is stopped, the isolated section of main shall be checked for leak-through before cutting into or parting the line. When positive shut-off of gas by a valve or line stopper is not accomplished, "live-gas" precautions to avoid exposure to combustible gas-air mixtures shall be strictly followed. Refer to GS 1770.010 “Prevention of Accidental Ignition” for additional guidance. An air mover or purger may be used to prevent the introduction of gas into the work area at open ends. Refer to GS 1690.010 “Purging New Construction and Abandonment” for additional guidance.

Before a bypass is placed in operation, the bypass piping shall be leak tested. Refer to GS 1500.010 “Pressure Testing” for additional guidance.

Regulation contained in temporary bypasses, shall be designed by engineering.

When designing an in-line tie-in along a one-way feed, the installation of a bypass is typically necessary to maintain gas service to downstream customers.

5.3 Joining Considerations

The preferred method for tie-in joints shall be welded or fused. Some exceptions include:

a. Following manufacturer’s recommendations if a weld could result in weld heat or splatter deteriorating a bag, stopper, or valve,

b. a combustible atmosphere in the work area cannot be avoided,

c. other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion,

d. the tie-in is on cast iron pipe,

e. an installation is temporary (e.g., regulators for bypassing or uprating), or

f. it is not possible to make an acceptable plastic fusion due to propane permeation of plastic pipe.

5.4 Additional Tie-In Considerations

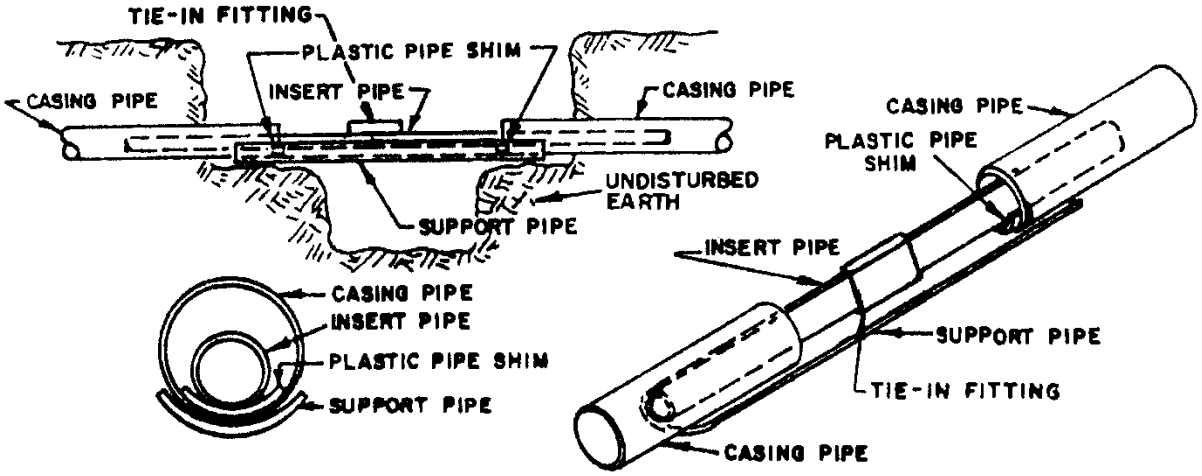
The following general tie-in considerations should be used as applicable.

a. Certain branch connections may require reinforcement, depending on size and pressure. Refer to GS 2420.010 “Reinforcement Requirements for Branch Connections” for additional guidance.

b. The height of all tie-in fittings must be considered prior to installation to ensure adequate cover. Final cover from top-of-ground to top-of-fittings involved with the tie-in should be installed according to gas standard GS 3010.090 “Cover.”

c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

d. In case piped situations, when there is any possibility of excessive ground settlement, the carrier pipe shall be supported by installing a split piece of rigid pipe under the tie-in connection, spanning the areas of possible settlement as illustrated below.



e. All tie-in fittings and tapping equipment shall be adequately supported. Larger diameter pipe may require special support (e.g., concrete pad).

f. Use backfill material that will compact well, (e.g., sand, gravel mixture (bankrun), screenings). Heavy or wet clays and frozen earth are not

suitable for bedding pipe at tie-ins.

g. Weld fittings and steel pipe shall be used to make elevation changes that ensure that plastic to steel transition connections are made on firm ground. Transition fittings shall not be welded directly to a three-way tee (shortstopp or spherical tee). Additional information regarding plastic to steel transition connections is found in GS 1680.020 "Plastic to Steel Transition Connections."

h. Stick plastic pipe may be fused to coiled plastic pipe at tie-in points to facilitate the tie-ins.

6. POST-CONSTRUCTION

The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Monitor pressure gauges to ensure the piping system is operating as expected.

e. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze off jacks or removing bags and installing leak repair clamps, etc.

f. Engineering will be responsible for determining whether post construction odorant level testing is necessary and be part of the tie-in plan. If odorant level testing is required, refer to the Company's existing procedure(s).

7. RECORDS

Approved written tie-in plans shall be filed with the work order completion report.

NiSource
Distribution Operations

Gas Standard

Effective Date: 01/01/2013	**Tie-Ins and Tapping Pressurized Pipelines**	Standard Number: **GS 1680.010**
Supersedes: 07/08/2011		Page 1 of 11

Companies Affected:		
☑ NIPSCO	☑ CGV ☑ CKY ☑ CMA	☑ CMD ☑ COH ☑ CPA

1. GENERAL

Tapping and Tie-in operations are often complex. Thorough knowledge and attention to detail during planning and construction activities is required. Fittings used for tapping and plugging, such as fittings by T.D. Williamson and Mueller, as well as related bypass fittings and joints which are not subjected to the main test pressure, shall be tested prior to tapping operations. The test pressure shall be at least equal to the main test pressure. Refer to GS 1500.010 “Pressure Testing” for additional guidance.

All tapping of pressurized pipelines shall be performed by a crew qualified in installation and use of the proper fittings, equipment, and procedures. All applicable safety standards shall be followed.

Tapping fittings shall have a pressure rating equal to or greater than that of the pipeline. Tapping equipment shall have a pressure rating equal to or greater than the operating pressure of the pipe at the time of the tapping operation. Refer to manufacturers’ documentation for the design pressure of specific fittings and tapping equipment.

All applicable Company welding and safety procedures shall be followed in addition to the procedures in GS 1770.010 “Prevention of Accidental Ignition” and HSE 4100.010 “Hazardous Atmosphere Considerations.”

2. TIE-IN CONSIDERATIONS BY MATERIAL TYPE

2.1 Plastic

Two basic types of tie-ins are performed on plastic pipe:

a. Installation of a side wall fitting (e.g., tapping tee, branching saddle, tap fitting) onto the plastic pipe. Refer to GS 1304.010 “Electrofusion Joining” or GS 1306.010 “Saddle Fusion Joining.”

NOTE: It is very important to only hand tighten a plastic tapping tee’s cap. The use of wrenches or other tools can permanently damage the fitting.

b. Installation of plastic pipe and/or an in-line plastic tee utilizing a squeeze off tool to stop the flow of gas. Refer to GS 1680.040 “Squeeze-Off Procedures for Plastic Pipe,” as well as the Plastic Fusion and Mechanical Joining Manual.

Joints should be fused except where the confines of the excavation or safety considerations dictate the use of mechanical fittings.

2.2 Steel or Wrought Iron

2.2.1 Welded Tie-in

The preferred method of tie-in to steel pipe is to stop the flow of gas using inline valves or approved line stoppers and welding directly to the end(s) of an existing pipeline or to an approved tie-in fitting.

NOTE: If wrought iron pipe is exposed at the location of the tie-in and it has not been previously identified in the work order or on maps, engineering must be contacted for additional guidance.

2.2.2 Tapping and Stopping

The maximum pressure for which tapping or stopping equipment may be used is limited by the lowest pressure rating of any one of the following:

a. The fitting connected to the pipeline, or

b. The equipment being used.

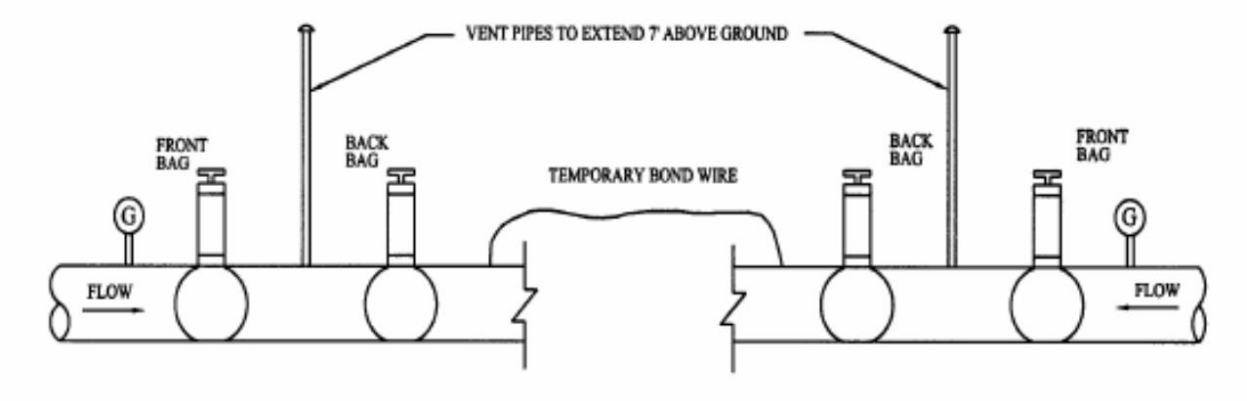
It is acceptable to temporarily lower the pipeline system operating pressure during tapping and stopping operations to a pressure lower than the maximum allowable operating pressure of the tapping and/or stopping device, providing the device does not become a permanent part of the tie-in fitting.

2.2.3 Bag and Diaphragm Type Pipeline Stoppers

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of steel and wrought iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers' pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use.

Stopping equipment shall be used in accordance with the manufacturer's instructions and pressure limitations. Refer to Figure 1 for guidance when installing low pressure stoppers.

Figure 1



2.3 Cast Iron

When the term “cast iron” is used in this gas standard, it also refers to ductile iron and gray iron.

Cast iron pipe shall not be joined by threading, brazing, or welding. When steel or plastic pipe is to be joined to cast iron pipe, the joint shall be made with an insulated coupling (with the insulating side on the same side as the cast iron).

The outside diameter of the cast iron pipe shall be determined to ensure that the proper size coupling is available. To establish the pipe’s dimensions, the diameter or the circumference of the pipe must be measured.

2.3.1 Joint Restraint

When joining plastic pipe to cast-iron, if a restraining fitting is not used, the joint shall be designed in a manner that will provide adequate restraint against pull-out forces and avoid transmitting forces to adjacent un-reinforced joints. This may be accomplished by the use of pipe restraints (e.g., anchor clamps, electrofusion restraints) when insertion of the plastic pipe through a casing is involved or by installing offsets in the plastic pipe adjacent to the tie-in point.

2.3.2 Stopping Gas Flow

The use of inflatable bags or diaphragm type stoppers is limited to low pressure for tie-ins of cast iron pipelines. Exception: inflatable bags or diaphragm type stoppers may be used on higher pressures with approval by at least one of the following: an engineer, a field operations leader/supervisor, a construction leader/supervisor, or a qualified designee, but not exceed the manufacturers’ pressure limitations. Because gas may be introduced into the immediate work area when they are used, inflatable bags or diaphragm type stoppers are the

least preferred line stopping method and should only be used when the availability of manpower, equipment or piping materials involved dictate their use. Refer to Figure 1 for guidance when installing low pressure stoppers.

NOTE: Consider using existing valves or installation of approved tie-in fittings onto cast iron pipe at alternate locations. Installation of a bypass or the shut-down of customers may have to be considered.

2.3.3 Tapping

Where a threaded tap is made in cast iron or ductile iron pipe, the diameter of the tapped hole may not be more than 25 percent of the nominal diameter of the pipe unless the pipe is reinforced, except that:

a. Existing taps may be used for replacement service, if they are free of cracks and have good threads, and

b. a 1-1/4 inch tap may be made in a 4 inch cast iron or ductile iron pipe, without reinforcement.

However, in areas where climate, soil, and service conditions may create unusual external stresses on cast iron pipe, unreinforced taps may be used only on 6 inch or larger pipe.

"Reinforced," as used in this standard, means using a band-type fitting with a full encirclement gasket (e.g., Servi Seal).

Table 1 shows the acceptable methods for tapping a cast iron pipe.

Where a saddle is used, a tap hole is drilled (not threaded) into the cast iron or ductile iron pipe, and a tapping tee is threaded into the saddle.

To resist longitudinal cracks between taps, taps into cast iron or ductile iron pipe should be separated longitudinally by at least the circumference of the pipe being tapped.

Table 1 – Taps Made in Cast Iron or Ductile Iron Pipe

Main Size	Tap Size			
	1" or 1 1/4"	2"	3"	4"
2"	Reinforced	Reinforced	X	X
3"	Reinforced	Reinforced	Reinforced	X

4”	Reinforced (See Note below.)	Reinforced	Reinforced	Reinforced
6”	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced	Reinforced
8”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
10”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced	Reinforced
12”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
14”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Reinforced
16”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
18”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
20”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced
24”	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced	Direct Threading, Saddle, or Reinforced

NOTE: In locations where climate, soil, and service conditions would not create unusual external stresses on cast iron pipe, threaded 1 inch or 1 1/4 inch taps may be installed on 4 inch cast iron or ductile iron without reinforcement.

3. WRITTEN TIE-IN PLAN

3.1 Plan Requirements

A written plan shall be prepared for tie-in and bypassing operations on all designed capital mainline installation and replacement work.

The written tie-in plan shall prescribe that an adequate labor force, appropriate material and required tools are available; proper steps are followed; and personal, public and customer safety is ensured. The written plan shall be reviewed with the personnel responsible for performing the tasks prior to the tie-in(s).

It is permissible to develop standard written plans for tie-ins that are not complex. However, they must be specifically adapted to meet the staffing needs and

requirements of each individual tie-in.

Items to be considered but not limited to for development of written plans are:

1. Necessity of, size, length and temperature limitations for a bypass,
2. safety precautions (e.g., traffic control),
3. scope or extent of system to be tied in and/or bypassed,
4. the need for reinforcement for branch connections refer to GS 2420.010 “Reinforcement Requirements for Branch Connections,”
5. verification of pressure and content,
6. pressure control and monitoring,
7. determining the sequence of closing and opening valves or any other flow controlling device,
8. planning for additional pressure monitoring for industrial or commercial customers affected by the tie-in (e.g., flow restriction due to bypass or change in flow direction),
9. planning for additional pressure monitoring at regulator stations where the tie-in significantly affects the normal flow through the station,
10. the possibility that mechanical couplings exist in the pipeline (providing support at tie-in locations; strapping, anchoring, or blocking of changes in direction or soil movement; taking the pipeline out of service or reducing the operating pressure during construction and/or tie-in operations),
11. check for leak-through of line stopping devices,
12. leak tests for tap fittings, tie-in piping, and temporary bypasses (refer to GS 1500.010 "Pressure Testing" for additional guidance),
13. purge points and vent locations for both abandoned lines and lines being placed in service and temporary bypasses, (refer to GS 1690.010 “Purging-New Construction and Abandonment”),
14. communication between critical points during the operation,
15. notification of customers who will have service temporarily interrupted (if applicable),
16. notification of local Field Operations Leaders/Supervisors, Gas Control, measurement and regulation technicians, construction leaders, as appropriate, if sections of pipeline will be temporarily taken out of service, and
17. odorant level testing if determined necessary by engineering.

3.2 Plan Accountability

Field Engineering shall prepare or provide final review of the written tie-in plan for designed capital work. It may be appropriate to request input from construction personnel for non-typical tie-in plans.

For emergency mainline installation and replacement design capital projects, a written tie-in plan is not required. Field Engineering should be consulted for assistance if the size, length, and configuration of the tie-in(s) are determined to be extensive.

The details for all tie-ins shall be discussed with the construction crew by either the field leader/supervisor or construction coordinator prior to execution to be well understood.

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The following steps shall be completed in the field prior to tie-in/tapping operations.

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c. Expose pipe at tie-in location(s). Verify that the exposed pipe is the one to be tapped by confirming the diameter, pressure, content, material, coating, joint connections, manufacturer's markings, color, pipe temperature, etc. A recommended best practice is to expose tie-ins early on in the project, so that differences between the plan and what actually exists in the field can be addressed in a timely manner.

d. If there is a possibility that non-restraint type mechanical couplings exist in the pipeline, the following steps should be considered to help prevent coupling pullout.

    1. Check the tie-in plan and/or contact Engineering to consider taking the pipeline out of service or reducing the operating pressure before attempting to uncover the pipeline.

    2. Install concrete support under the tie-in location to avoid additional stress on the existing coupled pipeline. Provide protection for the pipeline from damage by the concrete by installing extra coating and tape wrap, rockshield, or an equivalent protective isolating material.

    3. Install support (e.g., sandbags, sidebooms) on isolated sections of mechanically joined pipeline to avoid additional stress.

4. Expose at least one joint back (in each direction if necessary) from the anticipated tie-in to determine whether the coupling provides positive restraint. If unable to determine, then adequate restraint must be provided. Only uncover one joint at a time and if necessary provide restraint then backfill. In the event that at least one pipe joint cannot be exposed (e.g., road crossing), the mainline shall be anchored or additional pipeline replacement should be considered. Refer to GS 1320.010 “Mechanical Coupling Connections” for additional guidance on strapping and anchoring.

e. Inspect pipe condition to determine suitability for tapping.

1. Inspect pipeline for external corrosion. Refer to GS 1430.010 “Metallic Pipeline Exposures” for additional guidance.
2. Verify wall thickness (if appropriate).
3. Verify proper tap/seam/joint relationships. The tap should not intersect a longitudinal pipe seam or a circumferential weld of the pipeline. Refer to current company welding procedures for additional guidance.
4. Check for evidence that would indicate the existence of a casing (e.g., variance in diameter or material, presence of vents).

f. Verify that tapping equipment is rated equal to or greater than the operating pressure.

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Regulation contained in temporary bypasses, shall be designed by engineering.

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c. other structures, unusual depth, or restrictions on excavation size may prevent adequate space for welding or fusion,

d. the tie-in is on cast iron pipe,

e. an installation is temporary (e.g., regulators for bypassing or uprating), or

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c. Minimize the effects of contraction/expansion of plastic pipe on tie-ins. Whenever possible, the final tie-in should be performed after the majority of the pipeline is backfilled and allowed to remain overnight to let the pipe cool down to near normal ground temperatures.

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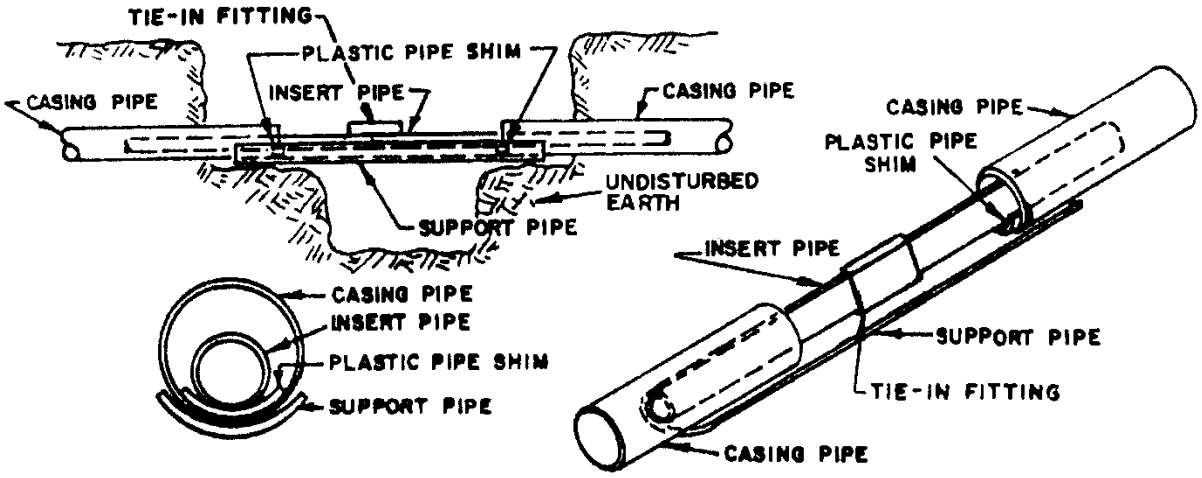

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The following steps shall be followed after tie-in/tapping operations are completed.

a. Inspect for internal corrosion if a piece of the pipe is removed for the tie-in. Refer to GS 1440.010 "Internal Corrosion" for additional guidance. Report findings according to GS 1410.010 "Metallic Pipe Exposures."

b. Apply corrosion control materials according to GS 1420.010 "Corrosion Control Design-General" and/or Form GS 1420.010-1 "Transmittal of Corrosion Control Requirements."

c. Restore gas service to affected customers.

d. Monitor pressure gauges to ensure the piping system is operating as expected.

e. Complete each tie-in by removing tapping equipment and installing completion plug, removing squeeze off jacks or removing bags and installing leak repair clamps, etc.

f. Engineering will be responsible for determining whether post construction odorant level testing is necessary and be part of the tie-in plan. If odorant level testing is required, refer to the Company's existing procedure(s).

7. RECORDS

Approved written tie-in plans shall be filed with the work order completion report.

For Capital Design Job Orders
For use by NiSource

Constructability / Safety Review

DESIGN TO BUILD – BUILD AS DESIGNED

PROJECT ID: / JOB ORDER NUMBER:

Fill out questionnaire to populate required stakeholders and stakeholders to consult at the bottom of this form

1. Is the project being executed by a blanket Construction and/or Operations crew?
   (NOTE: Only answer "No" if Major Projects is managing the project)
   ☒ Yes ☐ No
2. Does the project involve installation or replacement of a point of delivery (POD) or a new interconnect with an unconventional gas supply, i.e. landfills, livestock farms?
   ☐ Yes ☐ No
3. Does the project involve the full installation or replacement of a district station other than a POD?
   ☐ Yes ☐ No
4. Does the project involve replacement of individual property unit(s) at a station (i.e., regulator swap out, valve replacement, etc.)?
   ☐ Yes ☐ No
5. Does the project involve installing or replacing electronic monitoring facilities (SCADA)?
   ☐ Yes ☐ No
6. Does the project design or location impact the ability to operate, inspect or maintain the asset(s) post-construction, i.e. special order materials of large size or that are uncommon, significant installation depth, etc.?
   ☐ Yes ☐ No
7. Does the project involve corrosion impacts including steel casing on steel carrier pipe installation, AC mitigation, or impacts to cathodic protection systems such as rectifiers?
   ☐ Yes ☐ No
8. Does the project involve work on a transmission line?
   ☐ Yes ☐ No
9. Does the project involve installation or repair/replacement of pig launchers?
   ☐ Yes ☐ No
10. Does the project require odorant monitoring or line pickling?
    ☐ Yes ☐ No
11. Does the project involve hydrostatic testing?
    ☐ Yes ☐ No
12. Is the project likely to attract significant public or regulatory attention?
    ☐ Yes ☐ No
13. Does the project have a planned duration of greater than 75 business days?
    ☐ Yes ☐ No
14. Does the project involve work in a privately owned or third-party easement, or within a railroad right-of-way?
    ☐ Yes ☐ No

Enter

Constructability / Safety Review

DESIGN TO BUILD – BUILD AS DESIGNED

PROJECT ID: / JOB ORDER NUMBER:

PROJECT SCOPE

Notes:

ROUTE AND DRAWINGS

- Special Considerations
- Primary Construction Method(s)
- Permits
- ROW and Staking Requirement

Notes:

TIE-IN LOCATIONS, DESIGNS, AND SEQUENCING

Notes:

ROUTE AND DRAWINGS

- Special Fittings
- All Estimated Materials
- Dewatering
- Long Lead-time Items
- Other

Notes:

UNITS FOR ESTIMATE

- Labor
- Fill
- Restoration/Paving
- Survey Requirements
- Service Replacements/Tie-overs
- Tie-ins
- Traffic Control
- Shoring
- Test Holes
- Meter Moveouts

Notes:

DURATION

- Working Hours
- Who is on Jobsite
- Number of Crews
- Special Conditions

Notes:

LAND SERVICES REQUIREMENTS (PERMITS, PRIVATE ROW, ETC.)

Notes:

Constructability / Safety Review

DESIGN TO BUILD – BUILD AS DESIGNED

PROJECT ID: / JOB ORDER NUMBER:

SAFETY

- Excavation Safety
- Tie-in Locations
- Traffic Control
- Operability/Damage Prevention
- Contact Corporate Security prior to start

Notes:

PRESSURE MONITORING CONTROL CONSIDERATIONS

- Known concerns to monitor
- High and Low Pressure safety limits
  - i.e.: if pressure rises/falls beyond these points, contact M&R
- M&R Station abandonments
- Pressure check locations
- Non-Primary relief valves needed

Notes:

FIELD VISIT NEEDED?

(☐ Yes / ☐ No)

COMMENTS / ADJUSTMENTS

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Constructability / Safety Review

DESIGN TO BUILD – BUILD AS DESIGNED

PROJECT ID: / JOB ORDER NUMBER:

Signed, Field Engineer/Project Manager	(Printed Name)	Date
Signed, Construction/Operations	(Printed Name)	Date
Signed, Please enter department name in gray box above	(Printed Name)	Date
Signed, Please enter department name in gray box above	(Printed Name)	Date
Signed, Please enter department name in gray box above	(Printed Name)	Date

See: Consult section on next page

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For Capital Design Job Orders
For use by NiSource

Constructability / Safety Review

DESIGN TO BUILD – BUILD AS DESIGNED

PROJECT ID: / JOB ORDER NUMBER:

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Enter

Constructability / Safety Review

DESIGN TO BUILD – BUILD AS DESIGNED

PROJECT ID: / JOB ORDER NUMBER:

PROJECT SCOPE

Notes:

ROUTE AND DRAWINGS

- Special Considerations
- Primary Construction Method(s)
- Permits
- ROW and Staking Requirement

Notes:

TIE-IN LOCATIONS, DESIGNS, AND SEQUENCING

Notes:

ROUTE AND DRAWINGS

- Special Fittings
- All Estimated Materials
- Dewatering
- Long Lead-time Items
- Other

Notes:

UNITS FOR ESTIMATE

- Labor
- Fill
- Restoration/Paving
- Survey Requirements
- Service Replacements/Tie-overs
- Tie-ins
- Traffic Control
- Shoring
- Test Holes
- Meter Moveouts

Notes:

DURATION

- Working Hours
- Who is on Jobsite
- Number of Crews
- Special Conditions

Notes:

LAND SERVICES REQUIREMENTS (PERMITS, PRIVATE ROW, ETC.)

Notes:

Constructability / Safety Review

DESIGN TO BUILD – BUILD AS DESIGNED

PROJECT ID: / JOB ORDER NUMBER:

SAFETY

- Excavation Safety
- Tie-in Locations
- Traffic Control
- Operability/Damage Prevention
- Contact Corporate Security prior to start

Notes:

PRESSURE MONITORING CONTROL CONSIDERATIONS

- Known concerns to monitor
- High and Low Pressure safety limits
  - i.e.: if pressure rises/falls beyond these points, contact M&R
- M&R Station abandonments
- Pressure check locations
- Non-Primary relief valves needed

Notes:

FIELD VISIT NEEDED?

(☐ Yes / ☐ No)

COMMENTS / ADJUSTMENTS

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Constructability / Safety Review

DESIGN TO BUILD – BUILD AS DESIGNED

PROJECT ID: / JOB ORDER NUMBER:

Signed, Field Engineer/Project Manager	(Printed Name)	Date
Signed, Construction/Operations	(Printed Name)	Date
Signed, Please enter department name in gray box above	(Printed Name)	Date
Signed, Please enter department name in gray box above	(Printed Name)	Date
Signed, Please enter department name in gray box above	(Printed Name)	Date

See: Consult section on next page

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For Capital Designed Job Orders
For use by Columbia Engineering Team

Constructability / Safety Review

Design to Build - Build as Designed

Project ID: / Job Order Number:

€ Project Scope

- Notes:

€ Route and Drawings

- Special Considerations
- Primary Construction Method(s)
- Notes:
- Permits
- ROW and Staking Requirement

€ Tie-in Locaitons, Designs, and Sequencing

- Notes:

€ Route and Drawings

- Special Fittings
- All Estimated Materials
- Notes:
- Long Lead-time Items
- Other

€ Units for Estimate

- Labor
- Fill
- Restoration/Paving
- Survey Requirements
- Service Replacements/Tie-overs
- Notes:
- Tie-ins
- Traffic Control
- Shoring
- Test Holes
- Meter Moveouts

€ Duration

- Working Hours
- Who is on Jobsite
- Notes:
- Number of Crews
- Special Conditions

For Capital Designed Job Orders
For use by Columbia Engineering Team

Constructability / Safety Review

Design to Build - Build as Designed

Project ID: / Job Order Number:

€ Land Services Requirements (permits, private ROW, etc.)

- Notes:

€ Safety

- Excavation Safety
- Tie-in Locations
- Contact Corporate Security prior to start
- Notes:
- Traffic Control
- Operability/Damage Prevention

€ Pressure Monitoring Control Considerations

- Known concerns to monitor
- High and Low Pressure safety limits
  - ie: if pressure rises/falls beyond these points, contact M&R
- M&R Station abandonments
- Pressure check locations
- Non-Primary relief valves needed
- Notes:

€ Field Visit Needed? (☐ Yes / ☐ No)

€ Comments / Adjustments

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For Capital Designed Job Orders
For use by Columbia Engineering Team

Constructability / Safety Review for

Project ID:

Job Order Number:

Has been completed and agreed upon by the following:

Signed, Field Engineering	(Printed Name)	Date
Signed, Construction Services	(Printed Name)	Date
Signed, Contractor's Foreman (Contractor's Foreman only needs to sign when applicable)	(Printed Name)	Date
Signed, M&R (M&R Services only needs to sign when applicable)	(Printed Name)	Date
Signed, Land Services (Land Services only needs to sign when applicable)	(Printed Name)	Date

This document is to be completed with notes, signed, then filed into the applicable WMSDocs Project Workspace

CAPITAL DESIGN JOB ORDER CHECKLIST
For use by Columbia Engineering Team

Constructability / Safety Review

Design to Build - Build as Designed

Job Order Number:

€ Project Scope

-

€ Route and Drawings

- Special Considerations
- Primary Construction Method(s)
- Permits
- ROW and Staking Requirements

€ Tie-in Locations, Designs, and Sequencing

-

€ Material

- Special Fittings
- All Estimated Materials
- Long Lead-time Items
- Other

€ Units for Estimate

- Labor
- Fill
- Restoration/Paving
- Survey Requirements
- Service Replacements/Tie-overs
- Tie-ins
- Traffic Control
- Shoring
- Test Holes
- Meter Move-outs

€ Duration

- Working Hours
- Who is on Jobsite
- Number of Crews
- Special Conditions

€ Land Services Requirements (permits, private ROW, etc.)

-

CAPITAL DESIGN JOB ORDER CHECKLIST
For use by Columbia Engineering Team

Constructability / Safety Review

Job Order Number:

€ Safety

- Excavation Safety
- Tie-in Locations
- Traffic Control
- Operability/Damage Prevention

€ Field Visit Needed? (☐ Yes / ☐ No)

€ Comments/Adjustments

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For Engineering: _____ **Date:** _____

For Construction: _____ **Date:** _____

For M&R: _____ **Date:** _____

(M&R only needs to sign when applicable)

For Land Services: _____ **Date:** _____

(Land Services only needs to sign when applicable)

* : To be filed in WMSDocs Workspace(s)

CAPITAL DESIGN JOB ORDER CHECKLIST
For use by Columbia Engineering Team

Constructability / Safety Review

Design to Build - Build as Designed

Job Order Number:

€ Project Scope

-

€ Route and Drawings

- Special Considerations
- Primary Construction Method(s)
- Permits
- ROW and Staking Requirements

€ Tie-in Locations, Designs, and Sequencing

-

€ Material

- Special Fittings
- All Estimated Materials
- Long Lead-time Items
- Other

€ Units for Estimate

- Labor
- Fill
- Restoration/Paving
- Survey Requirements
- Service Replacements/Tie-overs
- Tie-ins
- Traffic Control
- Shoring
- Test Holes
- Meter Move-outs

€ Duration

- Working Hours
- Who is on Jobsite
- Number of Crews
- Special Conditions

€ Land Services Requirements (permits, private ROW, etc.)

-

CAPITAL DESIGN JOB ORDER CHECKLIST
For use by Columbia Engineering Team

Constructability / Safety Review

Job Order Number:

€ Safety

- Excavation Safety
- Tie-in Locations
-
- Traffic Control
- Operability/Damage Prevention

€ Field Visit Needed? (☐ Yes / ☐ No)

€ Comments/Adjustments

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-

For Engineering:		**Date:**	
For Construction:		**Date:**	
For M&R:		**Date:**	
	(M&R only needs to sign when applicable)		
For Land Services:		**Date:**	
	(Land Services only needs to sign when applicable)		

* : To be filed in WMSDocs Workspace(s)

CAPITAL DESIGN JOB ORDER CHECKLIST
For use by Columbia Engineering Team

Constructability / Safety Review

Design to Build - Build as Designed

Job Order Number:

€ Project Scope

-

€ Route and Drawings

- Special Considerations
- Primary Construction Method(s)
- Permits
- ROW and Staking Requirements

-

€ Tie-in Locations, Designs, and Sequencing

-

€ Material

- Special Fittings
- All Estimated Materials
- Long Lead-time Items
- Other

-

€ Units for Estimate

- Labor
- Fill
- Restoration/Paving
- Survey Requirements
- Service Replacements/Tie-overs
- Tie-ins
- Traffic Control
- Shoring
- Test Holes
- Meter Move-outs

-

€ Duration

- Working Hours
- Who is on Jobsite
- Number of Crews
- Special Conditions

-

€ Land Services Requirements (permits, private ROW, etc.)

-

CAPITAL DESIGN JOB ORDER CHECKLIST
For use by Columbia Engineering Team

Constructability / Safety Review

Job Order Number:

€ Safety

- Excavation Safety
- Tie-in Locations
- Traffic Control
- Operability/Damage Prevention

€ Field Visit Needed? (☐ Yes / ☐ No)

€ Comments/Adjustments

For Engineering:		**Date:**	
For Construction:		**Date:**	
For M&R:		**Date:**	
	(M&R only needs to sign when applicable)		
For Land Services:		**Date:**	
	(Land Services only needs to sign when applicable)		

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CAPITAL DESIGN JOB ORDER CHECKLIST
For use by Columbia Engineering Team

Job Order Number:

Design to Build - Build as Designed

Constructability / Safety Review

€ Project Scope

-

€ Route and Drawings

- Special Considerations
- Primary Construction Method(s)
-
- Permits
- ROW and Staking Requirements

€ Tie-in Locations, Designs, and Sequencing

-

€ Material

- Special Fittings
- All Estimated Materials
-
- Long Lead-time Items
- Other

€ Units for Estimate

- Labor
- Fill
- Restoration/Paving
- Survey Requirements
- Service Replacements/Tie-overs
-
- Tie-ins
- Traffic Control
- Shoring
- Test Holes
- Meter Move-outs

€ Duration

- Working Hours
- Who is on Jobsite
-
- Number of Crews
- Special Conditions

€ Land Services Requirements (permits, private ROW, etc.)

-

€ Safety

- Excavation Safety
- Tie-in Locations
-
- Traffic Control
- Operability/Damage Prevention

€ Field Visit Needed? (☐ Yes / ☐ No)

CAPITAL DESIGN JOB ORDER CHECKLIST
For use by Columbia Engineering Team

Constructability / Safety Review

Job Order Number:

€ Comments/Adjustments

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-

For Engineering: _____ **Date:** _____

For Construction: _____ **Date:** _____

For M&R: _____ **Date:** _____

(M&R only needs to sign when applicable)

For Land Services: _____ **Date:** _____

(Land Services only needs to sign when applicable)

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