



SECTION 15720

NATURAL GAS POLYETHYLENE MAIN INSTALLATION

TABLE OF CONTENTS

PART 1: GENERAL	4
1.1 SCOPE	4
1.2 DEFINITIONS	4
PART 2: SAFETY	4
2.1 GENERAL	4
PART 3: EXECUTION	4
3.1 GENERAL MAIN INSTALLATION	5
3.2 HANDLING OF MATERIALS	5
3.3 INSTALLATION METHODS	6
TABLE 1: Minimum Trench Width	6
TABLE 2: Maximum Allowable Tensile Loads	7
3.4 CLEARANCE FROM OTHER UTILITIES	7
DETAIL 1: Crossing a Heat Source	8
3.5 DEPTH	8
3.6 VALVES AND TEES	8
<u>3-VALVE TEE FIGURES (NEW PE MAIN TO NEW PE MAIN)</u>	
Figure 15720-A: 3-Valve Tee for 1-1/4" or 2" New PE Main	9
Figure 15720-B: 3-Valve Tee for 4"-12" New PE Main	10
Figure 15720-C: 3-Valve Tee for 2" to 4" New PE Main	11
Figure 15720-D: 3-Valve Tee for 2" to 4-12" New PE Main	12
Figure 15720-E: 3-Valve Tee for 4" to 6", 6" to 8", and 8" to 12" New PE Main	13
Figure 15720-F: 3 -Valve Tee for 4" to 8" and 6" to 12" New PE Main	14
Figure 15720-G: 3-Valve Tee for 4" to 12" New PE Main	15
<u>2-VALVE TEE FIGURES (NEW PE MAIN TO NEW PE MAIN)</u>	
Figure 15720-H: 2-Valve Tee for 1-1/4 inch or 2 inch New PE Main	16
Figure 15720-I: 2-Valve Tee for 4-12 inch New PE Main	17
Figure 15720-J: 2-Valve Tee for 2 inch to 4 inch New PE Main	18
Figure 15720-K: 2-Valve Tee for 2 inch to 4-12 inch New PE Main	19
Figure 15720-L: 2-Valve Tee for 4 inch to 6 inch, 6 inch to 8 inch, and 8 inch to 12 inch New PE Main	20
Figure 15720-M: 2 -Valve Tee for 4 inch to 8 inch and 6 inch to 12 inch New PE Main	21
Figure 15720-N: 2-Valve Tee for 4 inch to 12 inch New PE Main	22
<u>1-VALVE TEE FIGURES (NEW PE MAIN TO NEW PE MAIN)</u>	
Figure 15720-O: 1-Valve Tee for 1-1/4 inch or 2 inch New PE Main	23
Figure 15720-P: 1-Valve Tee for 4-12 inch New PE Main	24
Figure 15720-Q: 1-Valve Tee for 2 inch to 4 inch New PE Main	25
Figure 15720-R: 1-Valve Tee for 2 inch to 4-12 inch New PE Main	26
Figure 15720-S: 1- Valve Tee for 4 inch to 6 inch, 6 inch to 8 inch, and 8 inch to 12 inch New PE Main	27



Figure 15720-T: 1-Valve Tee for 4 inch to 8 inch and 6 inch to 12 inch New PE Main	28
Figure 15720-U: 1-Valve Tee for 4 inch to 12 inch New PE Main	29

3.7 VALVE BOXES.....30

Figure 15720-V1: Single Valve Installation Profile View	31
Figure 15720-V2: Single Valve Installation Cross Section View	32

3.8 BACKFILL33

TABLE 3: Maximum Particle Size For Backfill.....	33
--	----

3.9 PROJECT PLAN.....33

3.10 PIGGING34

3.11 PRESSURE TESTING.....34

TABLE 4: Pressure Testing Durations for Mains	35
---	----

3.12 TIE-INS35

STRAIGHT TIE-IN FIGURES (PE MAIN TO PE MAIN)

Figure 15720-W: Straight Tie-in for 1-1/4 inch to 1-1/4 inch or 2 inch to 2 inch PE Main	36
Figure 15720-X: Straight Tie-in for 1-1/4 inch to 2 inch PE Main.....	37
Figure 15720-Y: Straight Tie-in for 4 inch to 2 inch PE Main	37
Figure 15720-Z: Straight Tie-in for 4-12 inch to 4-12 inch PE Main.....	38
Figure 15720-AA: Straight Tie-in for 4 inch to 6 inch, 6 inch to 8 inch, and 8 inch to 12 inch PE Main..	39

STRAIGHT TIE-IN FIGURES (PE MAIN TO STEEL MAIN)

Figure 15720-BB: Straight Tie-in for 2 inch PE Main to 2 inch Steel Main	40
Figure 15720-CC: Straight Tie-in for 4-12 inch PE Main to 4-12 inch Steel Main.....	41

3-VALVE TEE FIGURES (NEW PE MAIN TO EXISTING PE MAIN)

Figure 15720-DD: 3-Valve Tee for New 1-1/4 inch or 2 inch PE Main to Existing 1-1/4 inch or 2 inch PE Main	42
Figure 15720-EE: 3-Valve Tee for New 4-12 inch PE Main to Existing 4-12 inch PE Main	43
Figure 15720-FF: 3-Valve Tee for New 2 inch PE Main to Existing 4 inch PE Main	44
Figure 15720-GG: 3-Valve Tee for New 2 inch PE Main to Existing 4-12 inch PE Main.....	45
Figure 15720-HH: 3-Valve Tee for New 4 inch PE Main to Existing 6 inch PE Main, New 6 inch PE Main to Existing 8 inch PE Main, and new 8 inch PE Main to Existing 12 inch PE Main.....	45
Figure 15720-II: 3 -Valve Tee for New 4 inch PE Main to Existing 8 inch PE Main and New 6 inch PE Main to Existing 12 inch PE Main	47
Figure 15720-JJ: 3-Valve Tee for New 4 inch PE Main to Existing 12 inch PE Main.....	48

2-VALVE TEE FIGURES (NEW PE MAIN TO EXISTING PE MAIN)

Figure 15720-KK: 2-Valve Tee for New 1-1/4 inch or 2 inch PE Main to Existing 1-1/4 inch or 2 inch PE Main	49
Figure 15720-LL: 2-Valve Tee for New 4-12 inch PE Main to Existing 4-12 inch PE Main	50
Figure 15720-MM: 2-Valve Tee for New 2 inch PE Main to Existing 4 inch PE Main.....	51
Figure 15720-NN: 2-Valve Tee for New 2 inch PE Main to Existing 4-12 inch PE Main.....	52
Figure 15720-OO: 2-Valve Tee for New 4 inch PE Main to Existing 6 inch PE Main, New 6 inch PE Main to Existing 8 inch PE Main, and New 8 inch PE Main to Existing 12 inch PE Main.....	52
Figure 15720-PP: 2-Valve Tee for New 4 inch PE Main to Existing 8 inch PE Main and New 6 inch PE Main to Existing 12 inch PE Main	54
Figure 15720-QQ: 2-Valve Tee for New 4 inch PE Main to Existing 12 inch PE Main.....	55



1-VALVE TEE FIGURES (NEW PE MAIN TO EXISTING PE MAIN)

Figure 15720-RR: 1-Valve Tee for New 1-1/4 inch or 2 inch PE Main to Existing 1-1/4 inch or 2 inch PE Main	56
Figure 15720-SS: 1-Valve Tee for New 4-12 inch PE Main to Existing 4-12 inch PE Main.....	57
Figure 15720-TT: 1-Valve Tee for New 2 inch PE Main to Existing 4 inch PE Main.....	58
Figure 15720-UU: 1-Valve Tee for New 2 inch PE Main to Existing 4-12 inch PE Main.....	59
Figure 15720-VV: Valve Tee for New 4 inch PE Main to Existing 6 inch PE Main, New 6 inch PE Main to Existing 8 inch PE Main, and new 8 inch PE Main to Existing 12 inch PE Main.....	60
Figure 15720-WW: 1-Valve Tee for New 4 inch PE Main to Existing 8 inch PE Main and New 6 inch PE Main to Existing 12 inch PE Main	61
Figure 15720-XX: 1-Valve Tee for New 4 inch PE Main to Existing 12 inch PE Main.....	62

3.13 TEMPORARY BYPASSES63

Figure 15720-YY: 1 inch PE Temporary Bypass	64
Figure 15720-ZZ: 2 inch PE Temporary Bypass	65

3.14 PURGING ACTIVITIES.....65

3.15 CONDEMNATION66

3.16 CLEAN UP AND RESTORATION67

3.17 RECORD KEEPING.....67

DOCUMENT INFORMATION AND REVIEW HISTORY..... ERROR! BOOKMARK NOT DEFINED.



PART 1: GENERAL

1.1 SCOPE

- 1.1.1 The work to be performed herein shall consist of the installation of new medium density polyethylene (MDPE or PE) mains operating at or below a maximum allowable operating pressure (MAOP) of 60 pounds per square inch gauge (psig), which includes, but is not limited to PE pipe and all appurtenances related to the construction of the main. All work shall be performed in accordance with this Section in conjunction with all additional project drawings and standards and specifications that may or may not be referred to in this Section.
- 1.1.2 KUB Standards and Specifications for Natural Gas Polyethylene Main Installation are intended to meet or exceed the Code of Federal Regulations title 49 Part 192 – Transportation of Natural and Other Gases by Pipeline: Minimum Federal Safety Standards (hereafter referred to as “MFSS”).

1.2 DEFINITIONS

- 1.2.1 **Business Days** - Any reference to business days excludes KUB holidays and weekends
- 1.2.2 **Butt Fusion** means the method of joining polyethylene pipe where two pipe ends are heated to a molten state and rapidly brought together under pressure to form a homogeneous bond.
- 1.2.3 **Depth** means the distance from the top of the distribution line to finished grade.
- 1.2.4 **Distribution Line** is a pipeline other than a gathering or transmission line.
- 1.2.5 **Electrofusion** means the method of joining PE pipe using special fittings that have built-in electric heating elements which are used to weld the joint together.
- 1.2.6 **GSE** means Gas Systems Engineering
- 1.2.7 **IPS** means Iron Pipe Size (for PE pipe nominal inside diameters).
- 1.2.8 **Main** means a distribution line that serves as a common source of supply for more than one service line.
- 1.2.9 **NGUS** means Natural Gas Utility Sheet: A document to be filled out by the person(s) responsible for: any work performed to a natural gas service line, work on a natural gas mains that is 50 feet or less in length, a temporary bypass, or a test station.
- 1.2.10 **Pipeline** means all parts of those physical facilities through which natural gas moves in transportation, including pipe, valves, and other appurtenances attached to PE pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies.
- 1.2.11 **RPR** means the Resident Project Representative designated by Gas Systems Engineering and assigned to the site.
- 1.2.12 **Sidewall Fusion** means the method of joining PE pipe using a fitting that fuses onto the side of the main pipe wall in a transverse orientation to the main pipe. The fitting and external surface of the main pipe are heated to the proper temperature and then pressed together to form the bond.
- 1.2.13 **Socket Fusion** means the method of joining PE pipe using a coupling with an inside diameter sized to the outside diameter of the pipe. A short length of outside surface of the pipe and the inside surface of the coupling are heated to a molten state. The pipe is then pressed into the opening of the coupling.

PART 2: SAFETY

2.1 GENERAL

- 2.1.1 Refer to General Conditions 00700, 6.13 for general safety considerations.
- 2.1.2 In addition to conditions noted in **SECTION 00700**, FR PPE is required during purging activities. All ignition sources shall be removed from the area during purging activities.

PART 3: EXECUTION



3.1 GENERAL MAIN INSTALLATION

- 3.1.1 Mains shall not be installed under buildings, permanent structures, or future/proposed structures.
- 3.1.2 Mains shall be installed below ground, in the most direct, shortest path feasible, and in accordance with the project drawings.
- 3.1.3 Materials not supplied through KUB Storerooms shall be submitted for approval for use to KUB GSE prior to construction of the pipeline.
- 3.1.4 All pipe fusion connections shall be allowed to cool as required by KUB's joining procedures for socket fusion, sidewall fusion, butt fusion, and electrofusion prior to lowering the pipe into the trench and/or excavation to eliminate stress on the fused connections.
- 3.1.5 Installation methods placing a tensile load on the PE pipe shall be done in accordance with ASTM F1804, Standard Practice for Determining Allowable Tensile Load for Polyethylene (PE) Gas Pipe During Pull-in Installation.
- 3.1.6 Each main shall be installed with at least 5 feet clearance from any existing or proposed above ground structure including but not limited to buildings, retaining walls and any below grade footing and/or foundation(s). If 5 feet clearance cannot be obtained, the proposed clearance shall be approved and documented by RPR prior to installation.
- 3.1.7 All PE to PE main connections shall be made by socket fusion, sidewall fusion, electrofusion, or butt fusion.
- 3.1.8 For PE main with a nominal diameter of 2 inches or less, socket fusion, electrofusion, and sidewall fusion shall be permitted.
- 3.1.9 For PE main with a nominal diameter of 4 inches and larger, butt fusion shall be the preferred method of joining. Electrofusion shall be permitted, with RPR approval, in the case of:
 - Tie-ins to existing gas mains
 - Valve nests in new pipe
 - Any connection where the pipe could be in a bind
- 3.1.10 PE pipe ends shall be temporarily sealed to prevent water and debris from entering the pipe. Materials used for temporarily sealing the pipe ends shall be approved by the RPR prior to use.
- 3.1.11 A fused on cap shall be installed when pipe ends are exposed for longer than one week. RPR reserves the right to require fused on end caps.
- 3.1.12 All main shall be pigged prior to pressure testing and introducing natural gas to the pipeline.
- 3.1.13 Above ground pipeline markers (KUB Item #362420) shall be installed directly over, where possible, or as close to the pipeline in areas where frequent excavation occurs, major intersections, railroad or railroad spur crossings, any type of water crossing such as a creek, stream, or river and/or per the RPR's requests.
- 3.1.14 After installation, all main shall be confirmed as locatable by tracer wire by RPR. Unlocatable natural gas main will not be accepted by OWNER.
- 3.1.15 All equipment shall be properly calibrated per the manufacturer's guidelines.

3.2 HANDLING OF MATERIALS

- 3.2.1 PE pipe and components shall be stored to prevent damage from ultraviolet (UV) rays. PE pipe and components with a print line dating back further than 729 calendar days shall not be installed.
- 3.2.2 For multiyear projects, CONTRACTOR shall submit, for approval, a pipe storage and protection plan to the OWNER. The pipe storage and protection plan shall address long term storage (greater than 729 calendar days) including how to protect pipe from UV degradation.
- 3.2.3 PE pipe may be stored by stacking, but only permitted if stacked pipe is lying flat.
- 3.2.4 When PE pipe is transported, it shall be loaded, transported and unloaded in a manner to prevent damage

- 3.2.5 PE pipe shall be stored with manufacturer end caps in place.
- 3.2.6 When transporting pipe segments, pipe shall not be dragged across any type of hard surface such as pavement or rocks without protection from damage. RPR reserves the right to reject any pipe dragged across any type of pavement, rocks or other hard surfaces.
- 3.2.7 A self-performed, thorough inspection of the pipe and components shall be conducted to guarantee quality assurance prior to installation and backfilling. Any damages to the pipe shall be communicated to the RPR for review prior to installation. If found after installation, damages shall be reported immediately to the RPR. Natural gas shall not be introduced into the pipe without the RPR's approval after review of the damages. In the event damage (e.g., scratches, gouges, and deformation from stressing the pipe) is present and the pipe wall thickness is compromised greater than 10%, the damaged section shall be cut out and not used. RPR reserves the right to fail segments or sections of damaged pipe or components. These damaged sections shall be replaced with no additional cost to the OWNER.
- 3.2.8 CONTRACTOR shall not perform any repairs to existing pipe or new pipe that has been placed into service.

3.3 INSTALLATION METHODS

3.3.1 Open Trench

- 3.3.1.1 Main shall be laid and continuously supported on undisturbed or well-compacted soil. At a minimum, well compacted soil is defined as machine tamped. PE pipe shall not be laid on blocks, rocks or large dirt clods. Refer to **SECTION 3.8 BACKFILL** for defined backfill requirements.
- 3.3.1.2 Main shall be installed along the bottom of the trench to accommodate for expansion and contraction.
- 3.3.1.3 When fusing coil pipe to coil pipe, join the coils so the curvature of one coil is directly opposite to the curvature of the other coil to minimize bending stresses at the joint.
- 3.3.1.4 Prior to backfilling, the trench shall be examined to ensure the main is continuously supported at all points. #12-gauge solid copper tracer wire (KUB Item #383448) shall be installed within 6 inches of the main.
- 3.3.1.5 Warning tape (KUB Item #371534) shall be installed 12 to 18 inches below existing or proposed grade directly above the PE main.
- 3.3.1.6 The trench width shall be wide enough to allow for inspection once pipe is lowered into the trench as well as for proper compaction around the pipe to prevent trench settlement. The minimum requirements for trench width are in **TABLE 1: Minimum Trench Width**.

TABLE 1: Minimum Trench Width

Pipe Size (inches)	Trench Width (inches)	
	Soil (minimum)	Rock (minimum)
2	6	12
4	8	12
8	12	18
12	18	24

- 3.3.1.7 When lowering pipe and/or components into the trench and/or excavations, the pipe shall not be subjected to excessive twisting and/or bending stresses. At lower temperatures, flexibility of the pipe is greatly reduced and could potentially be damaged by excessive force. RPR reserves the right to reject any and all pipe and/or components that may have been compromised due to excessive stresses.
- 3.3.2 **Horizontal Directional Drilling (Boring)**
- 3.3.2.1 PE pipe installed by horizontal directional drilling shall have #12-gauge steel copper-clad tracer wire (KUB #363069) pulled with the pipe. Multiple tracer wires (no less than 2) should be pulled together

in the event a tracer wire breaks during installation ensuring natural gas main is locatable after installation.

- 3.3.2.2 A frac-out plan shall be provided to RPR for review prior to boring. All materials and equipment to mitigate a frac-out, as stated in the frac-out plan, shall be readily available on site prior to beginning the bore. If a frac-out occurs, the frac-out plan shall be immediately implemented, followed by immediate notification to the RPR.
- 3.3.2.3 When pulling the pipe through reamed borehole, the tensile loads in **TABLE 2: Maximum Allowable Tensile Loads** shall not be exceeded. RPR shall be notified one full business day prior to pull back operations and may require on-site presence during pull back operations. An appropriately sized Condux International, Inc break away swivel weak link device shall be used during pull back activities. Break away weak link devices other than the Condux International products shall be submitted for approval to GSE prior to use.

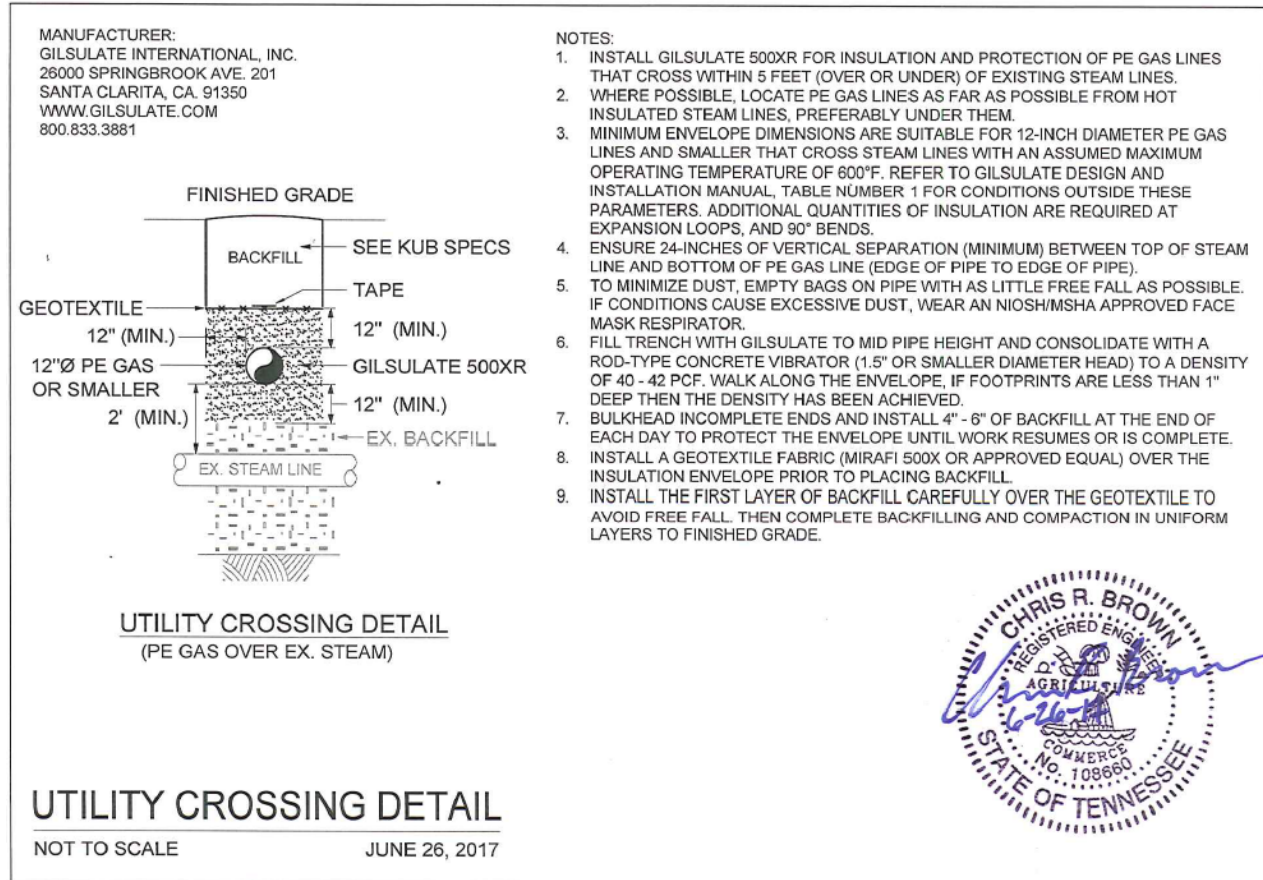
TABLE 2: Maximum Allowable Tensile Loads

Nominal Pipe Size (inches)	Allowable Tensile Load (pounds)	Swivel Size (millimeters)	Pin Rating (pounds)	Pin Color
2	1,441	22	1,400	Green/Red
4	4,990	35	4,500	Slate/Yellow
6	10,832	51	10,000	Green
8	15,855	64	14,000	Brown
12	34,607	76	25,000	Blue

3.4 CLEARANCE FROM OTHER UTILITIES

- 3.4.1 A minimum of 12 inches of clearance shall be maintained from all other utilities. If minimum clearance requirements cannot be met, additional protective measures shall be required and approved by RPR prior to installation.
- 3.4.2 Natural gas mains shall not be installed directly above or below any other underground utility in parallel sequence, even if 12 inches of clearance can be maintained.
- 3.4.3 Third party utility owners, such as natural gas, petroleum, steam and intercontinental utilities, have special requirements when crossing their infrastructure. When encountered, OWNER shall obtain written permission prior to crossing a third-party utility. Main shall be installed based on the third party special requirements.
- 3.4.4 When crossing a heat source, including, but not limited to a steam line, installation of PE pipe shall follow the utility crossing detail, **Detail 1: Crossing a Heat Source**, as shown below:

DETAIL 1: Crossing a Heat Source



3.5 DEPTH

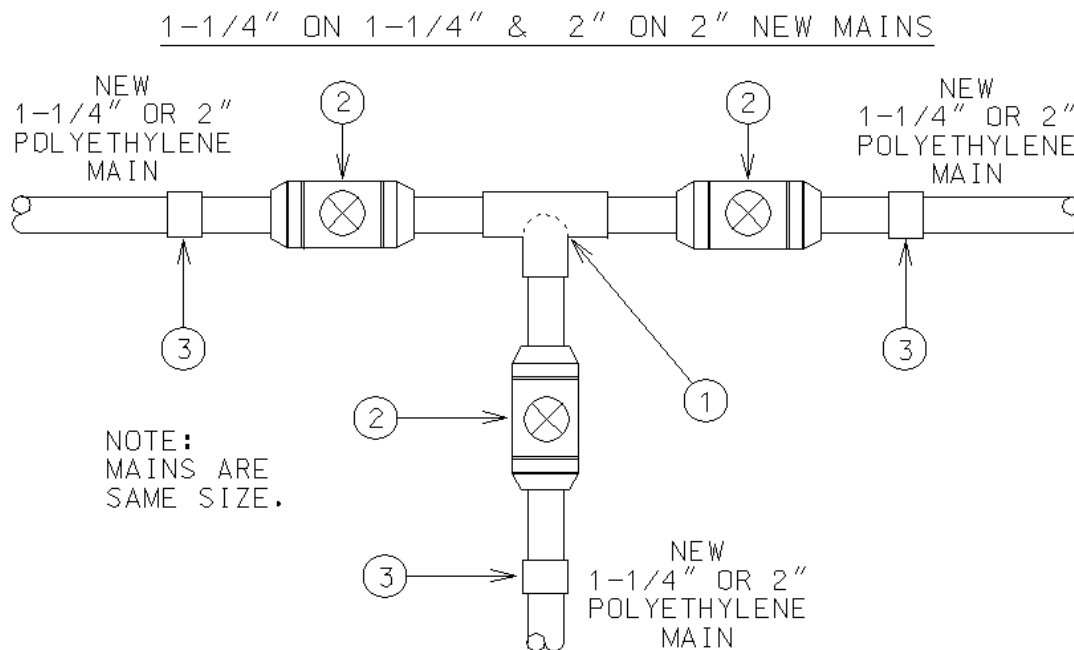
- 3.5.1 Natural gas mains shall be installed at a depth between 36 inches and 60 inches from the top of the main to finished grade.
- 3.5.2 If depth requirements cannot be met, approval shall be obtained from RPR prior to installation. Mains installed shallower than 36 inches may be required to have additional protective measures.

3.6 VALVES AND TEES

3.6.1 General

- 3.6.1.1 Valves shall not be installed in existing or proposed pavement, unless stated in project drawings or approved by RPR.
- 3.6.1.2 Valves shall be installed as close to the tee as possible, unless stated in project drawings or approved by RPR.
- 3.6.1.3 For clarity, tracer wire and connections are not shown in figures below but are required.
- 3.6.2 **See the following figures and material lists for New PE Main to New PE Main Tee Installations with 3 PE Valves. For valve arrangements not covered under these details, refer to the project specific drawings.**

Figure 15720-A: 3-Valve Tee for 1-1/4" or 2" New PE Main



Material List for Figure 15720-A1

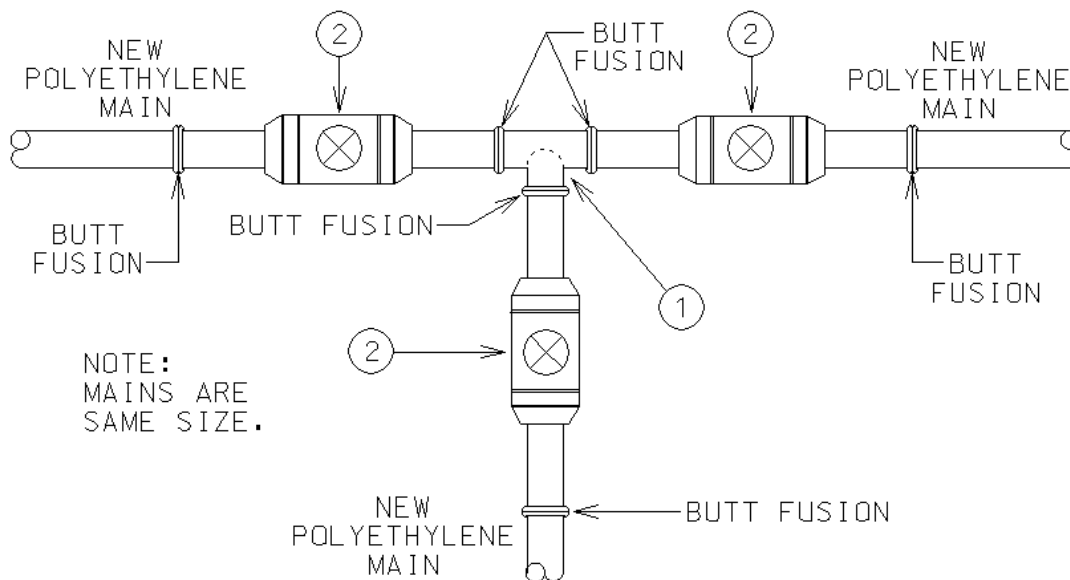
Item	Quantity	KUB Item #	Description
1	1	382739	1-1/4 inch PE Socket Fusion Tee
2	3	371724	1-1/4 inch PE Valve
3	3	384032	1-1/4 inch PE Socket Fusion Coupling

Material List for Figure 15720-A2

Item	Quantity	KUB Item #	Description
1	1	382978	2 inch PE Socket Fusion Tee
2	3	371740	2 inch PE Valve
3	3	383810	2 inch PE Socket Fusion Coupling

Figure 15720-B: 3-Valve Tee for 4"-12" New PE Main

4" ON 4", 6" ON 6", 8" ON 8", & 12" ON 12" NEW MAINS



Material List for Figure 15720-B4

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	3	360473	4 inch PE Valve

Material List for Figure 15720-B6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	3	360693	6 inch PE Valve

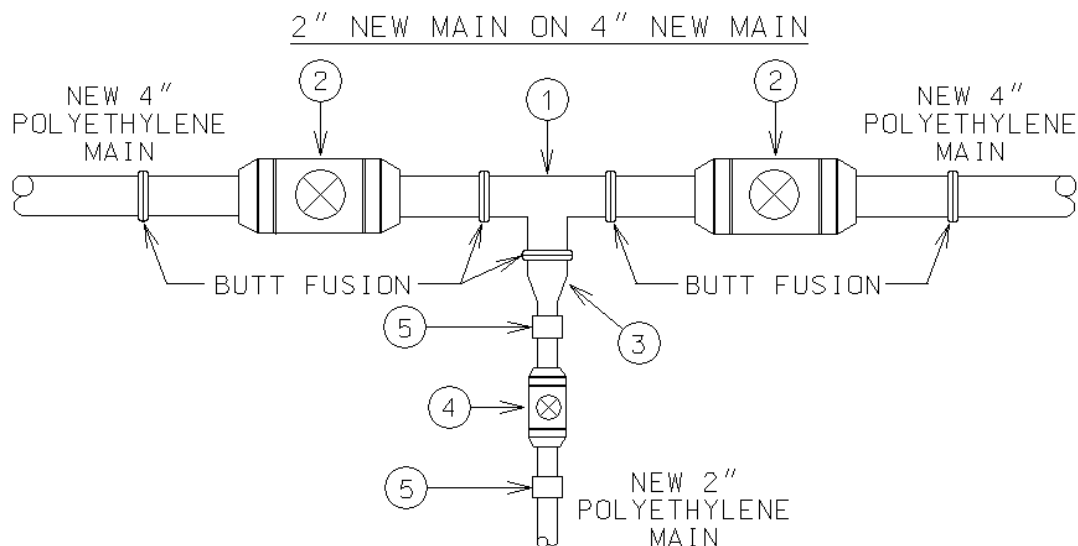
Material List for Figure 15720-B8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	3	361034	8 inch PE Valve

Material List for Figure 15720-B12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	3	361045	12 inch PE Valve

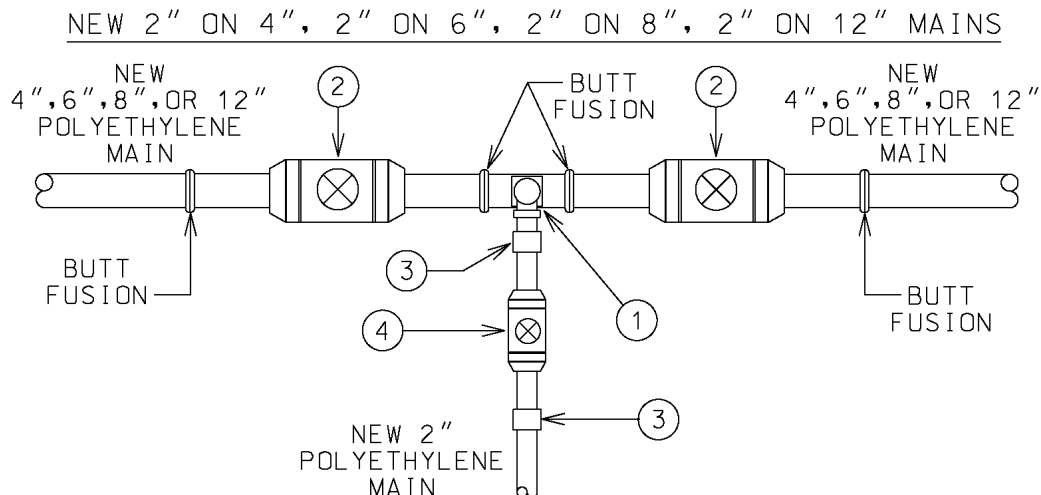
Figure 15720-C: 3-Valve Tee for 2" to 4" New PE Main



Material List for Figure 15720-C

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	2	360473	4 inch PE Valve
3	1	380352	4 inch x 2 inch PE Reducer
4	1	371740	2 inch PE Valve
5	2	383810	2 inch PE Socket Fusion Coupling

Figure 15720-D: 3-Valve Tee for 2" to 4-12" New PE Main



Material List for Figure 15720-D4

Item	Quantity	KUB Item #	Description
1	1	380311	4 inch x 2 inch PE Tapping Tee
2	2	360473	4 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve

Material List for Figure 15720-D6

Item	Quantity	KUB Item #	Description
1	1	380840	6 inch x 2 inch PE Tapping Tee
2	2	360693	6 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve

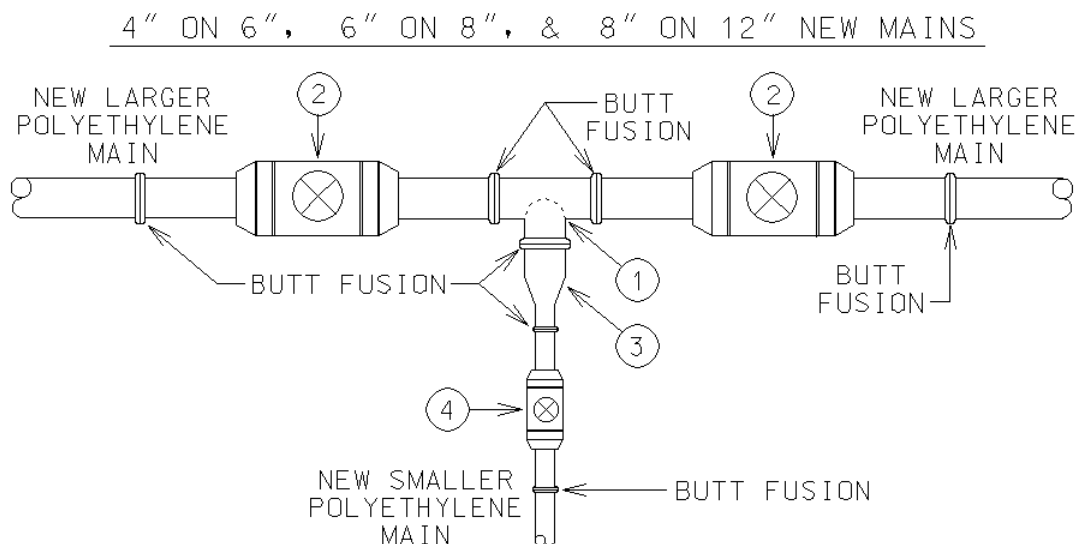
Material List for Figure 15720-D8

Item	Quantity	KUB Item #	Description
1	1	374835	8 inch x 2 inch PE Tapping Tee
2	2	361034	8 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve

Material List for Figure 15720-D12

Item	Quantity	KUB Item #	Description
1	1	360891	12 inch x 2 inch PE Tapping Tee
2	2	361045	12 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve

Figure 15720-E: 3-Valve Tee for 4" to 6", 6" to 8", and 8" to 12" New PE Main



Material List for Figure 15720-E6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	2	360693	6 inch PE Valve
3	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
4	1	360473	4 inch PE Valve

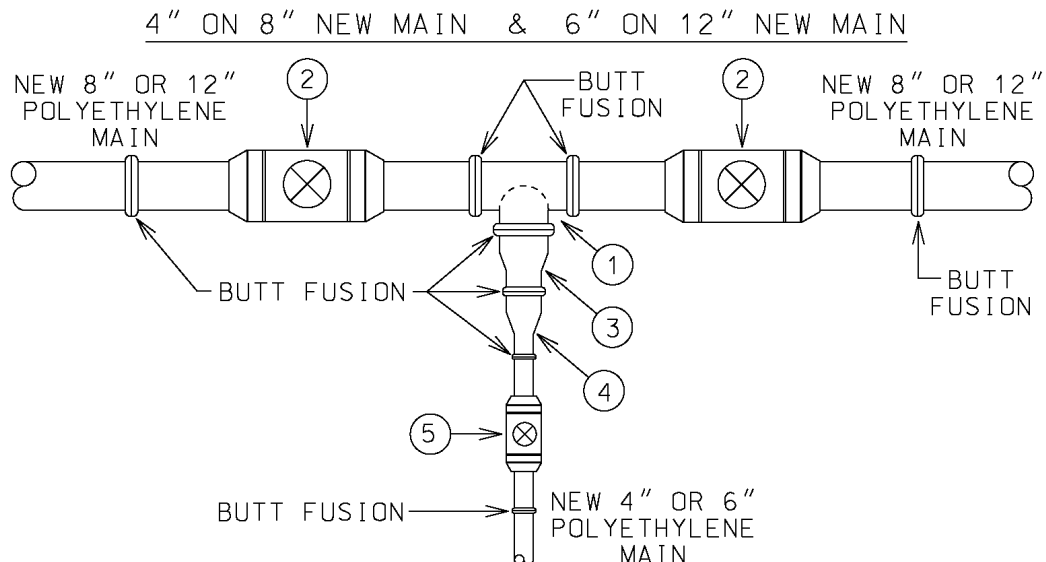
Material List for Figure 15720-E8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	2	361034	8 inch PE Valve
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	360693	6 inch PE Valve

Material List for Figure 15720-E12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	2	361045	12 inch PE Valve
3	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
4	1	361034	8 inch PE Valve

Figure 15720-F: 3 -Valve Tee for 4" to 8" and 6" to 12" New PE Main



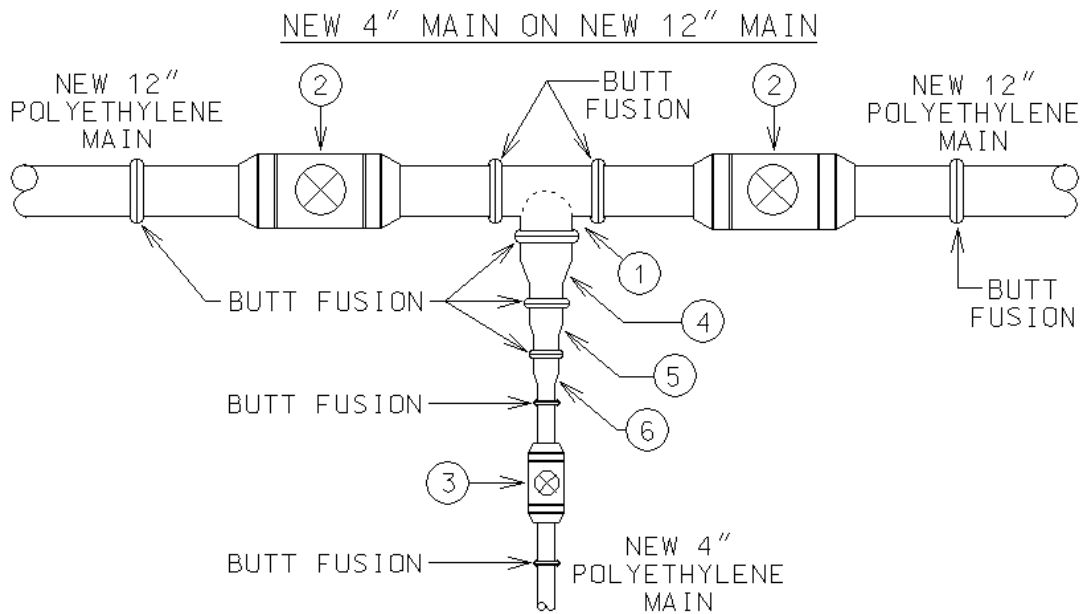
Material List for Figure 15720-F8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	2	361034	8 inch PE Valve
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
5	1	360473	4 inch PE Valve

Material List for Figure 15720-F12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	2	361045	12 inch PE Valve
3	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
4	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
5	1	360693	6 inch PE Valve

Figure 15720-G: 3-Valve Tee for 4" to 12" New PE Main

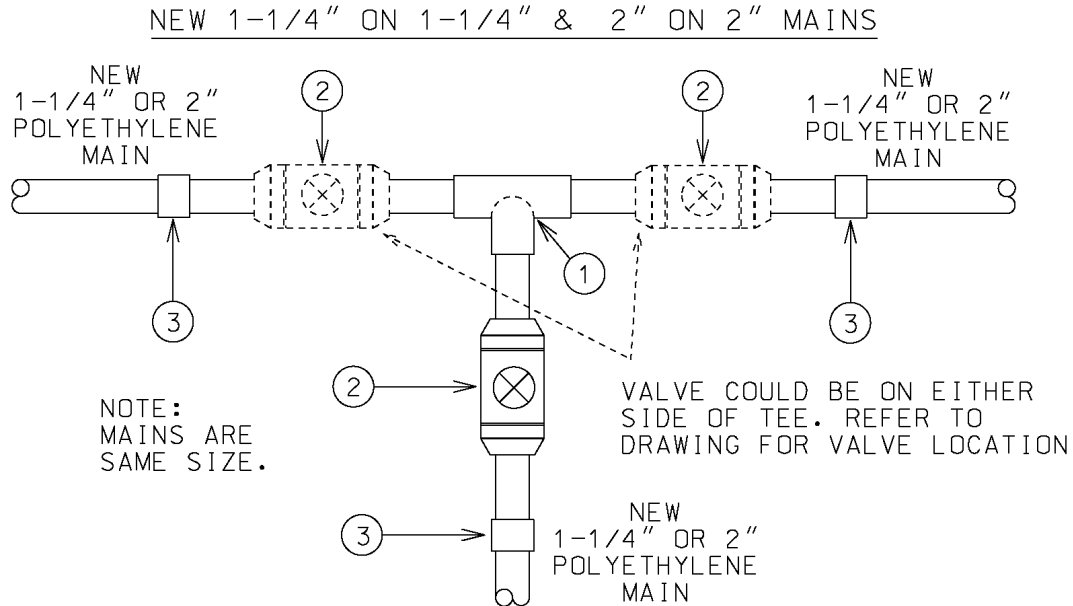


Material List for Figure 15720-G

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	2	361045	12 inch PE Valve
3	1	360473	4 inch PE Valve
4	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
5	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
6	1	372110	6 inch x 4 inch PE Butt Fusion Reducer

- 3.6.3 See the following figures and material lists for New PE Main to New PE Main Tee Installations with 2 PE Valves For valve arrangements not covered under these details, refer to the project specific drawings.

Figure 15720-H: 2-Valve Tee for 1-1/4 inch or 2 inch New PE Main



Material List for Figure 15720-H1

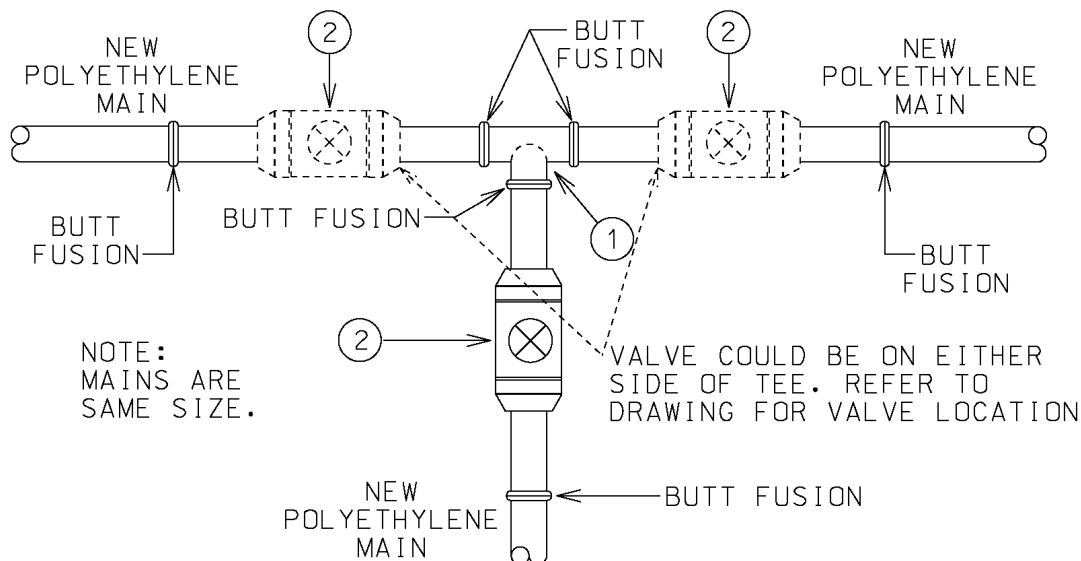
Item	Quantity	KUB Item #	Description
1	1	382739	1-1/4 inch PE Socket Fusion Tee
2	2	371724	1-1/4 inch PE Valve
3	3	384032	1-1/4 inch PE Socket Fusion Coupling

Material List for Figure 15720-H2

Item	Quantity	KUB Item #	Description
1	1	382978	2 inch PE Socket Fusion Tee
2	2	371740	2 inch PE Valve
3	3	383810	2 inch PE Socket Fusion Coupling

Figure 15720-I: 2-Valve Tee for 4-12 inch New PE Main

NEW 4" ON 4", 6" ON 6", 8" ON 8", & 12" ON 12" MAINS



Material List for Figure 15720-I4

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	2	360473	4 inch PE Valve

Material List for Figure 15720-I6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	2	360693	6 inch PE Valve

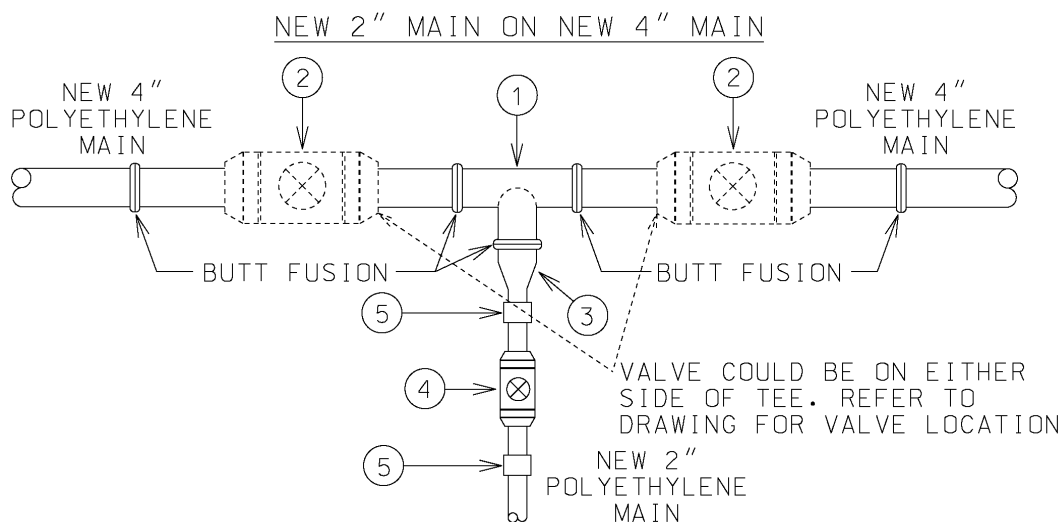
Material List for Figure 15720-I8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	2	361034	8 inch PE Valve

Material List for Figure 15720-I12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	2	361045	12 inch PE Valve

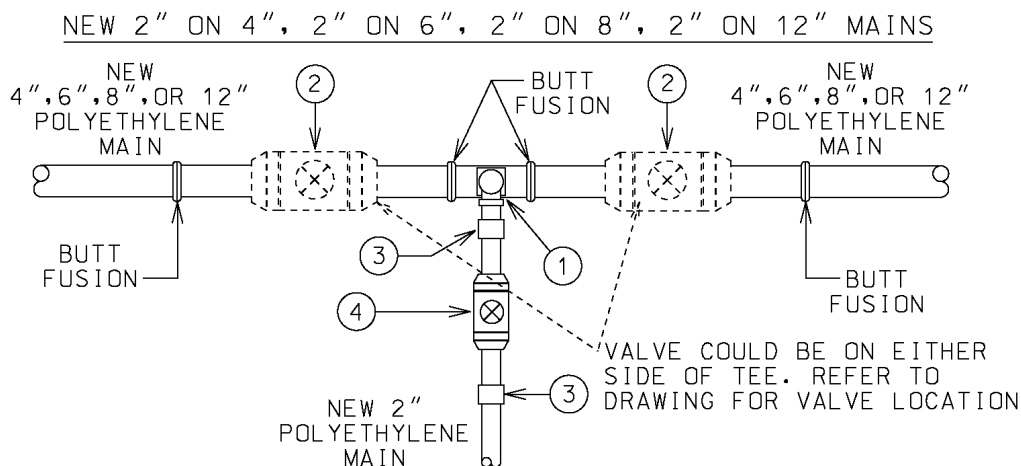
Figure 15720-J: 2-Valve Tee for 2 inch to 4 inch New PE Main



Material List for Figure 15720-J

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	1	360473	4 inch PE Valve
3	1	380352	4 inch x 2 inch PE Reducer
4	1	371740	2 inch PE Valve
5	2	383810	2 inch PE Socket Fusion Coupling

Figure 15720-K: 2-Valve Tee for 2 inch to 4-12 inch New PE Main



Material List for Figure 15720-K4

Item	Quantity	KUB Item #	Description
1	1	380311	4 inch x 2 inch PE Tapping Tee
2	1	360473	4 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve

Material List for Figure 15720-K6

Item	Quantity	KUB Item #	Description
1	1	380840	6 inch x 2 inch PE Tapping Tee
2	1	360693	6 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve

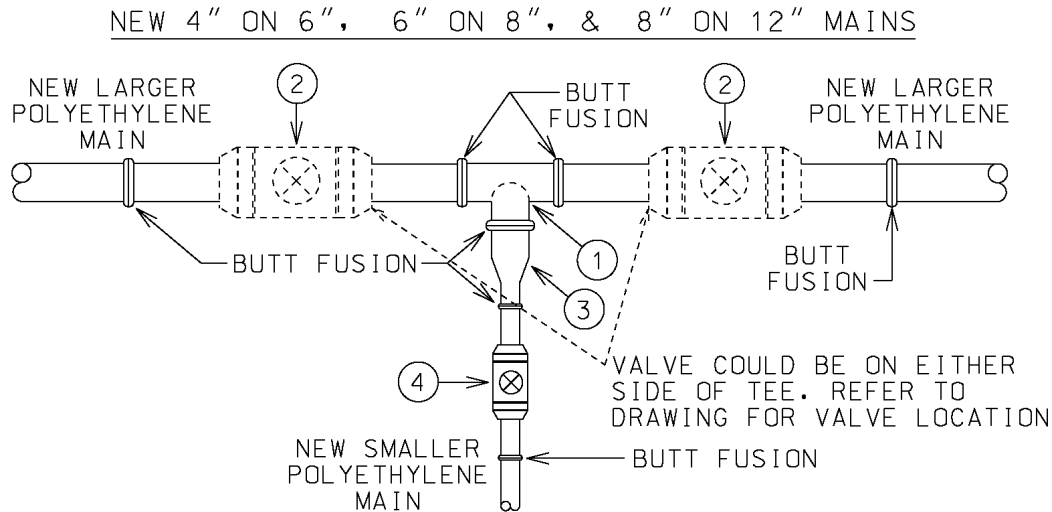
Material List for Figure 15720-K8

Item	Quantity	KUB Item #	Description
1	1	374835	8 inch x 2 inch PE Tapping Tee
2	1	361034	8 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve

Material List for Figure 15720-K12

Item	Quantity	KUB Item #	Description
1	1	360891	12 inch x 2 inch PE Tapping Tee
2	1	361045	12 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve

Figure 15720-L: 2-Valve Tee for 4 inch to 6 inch, 6 inch to 8 inch, and 8 inch to 12 inch New PE Main



Material List for Figure 15720-L6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	1	360693	6 inch PE Valve
3	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
4	1	360473	4 inch PE Valve

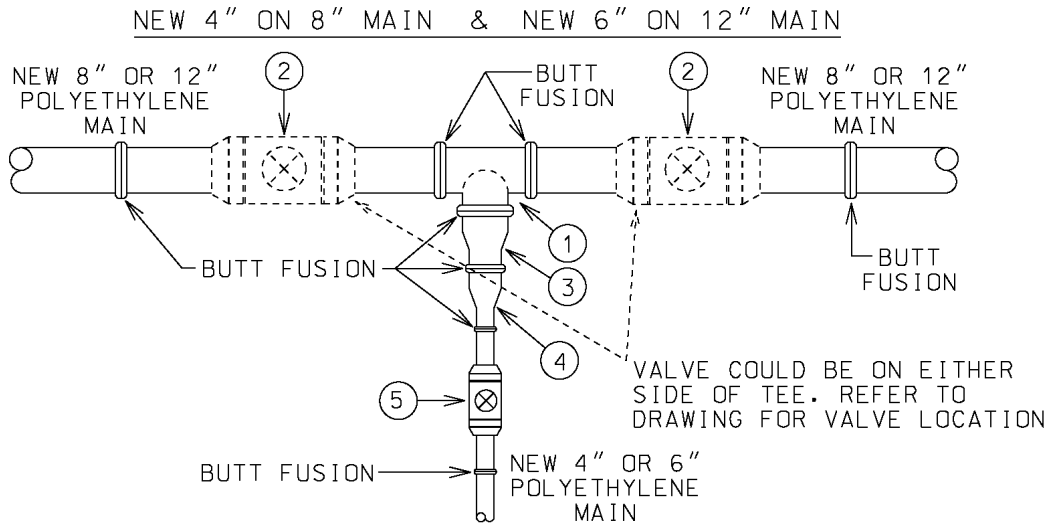
Material List for Figure 15720-L8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	1	361034	8 inch PE Valve
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	360693	6 inch PE Valve

Material List for Figure 15720-L12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361045	12 inch PE Valve
3	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
4	1	361034	8 inch PE Valve

Figure 15720-M: 2 -Valve Tee for 4 inch to 8 inch and 6 inch to 12 inch New PE Main



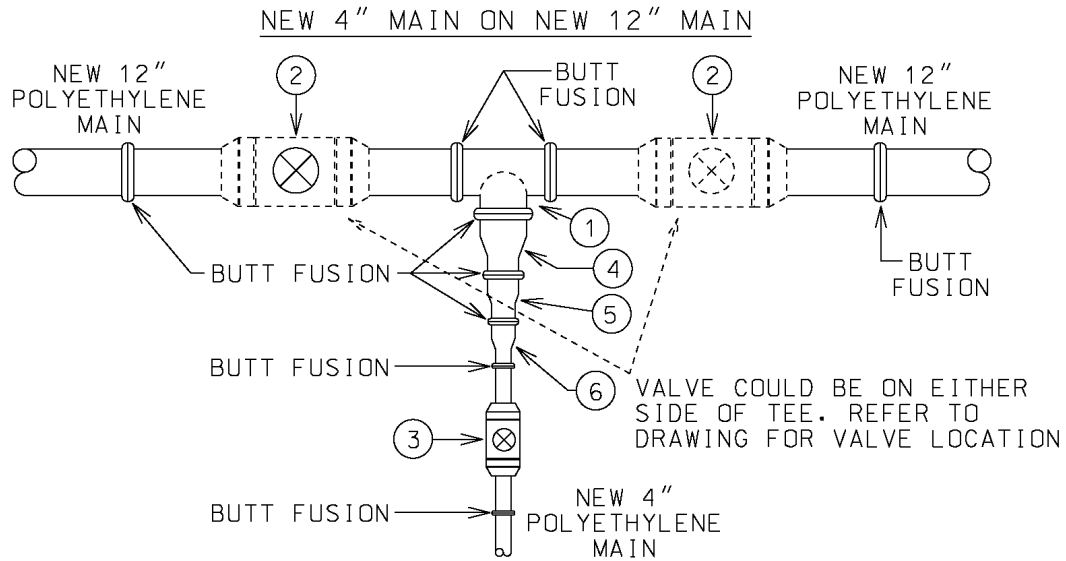
Material List for Figure 15720-M8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	1	361034	8 inch PE Valve
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
5	1	360473	4 inch PE Valve

Material List for Figure 15720-M12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361045	12 inch PE Valve
3	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
4	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
5	1	360693	6 inch PE Valve

Figure 15720-N: 2-Valve Tee for 4 inch to 12 inch New PE Main

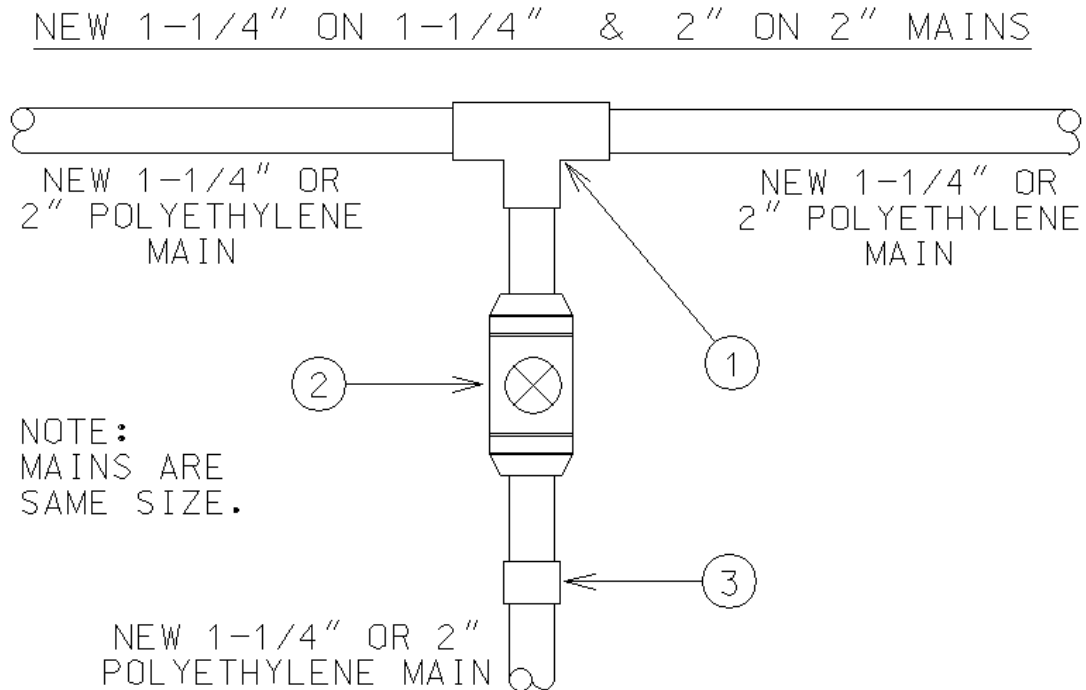


Material List for Figure 15720-N

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361045	12 inch PE Valve
3	1	360473	4 inch PE Valve
4	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
5	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
6	1	372110	6 inch x 4 inch PE Butt Fusion Reducer

- 3.6.4 See the following figures and material lists for New PE Main to New PE Main Tee Installations with 1 PE Valve. For valve arrangements not covered under these details, refer to the project specific drawings.

Figure 15720-O: 1-Valve Tee for 1-1/4 inch or 2 inch New PE Main



Material List for Figure 15720-O1

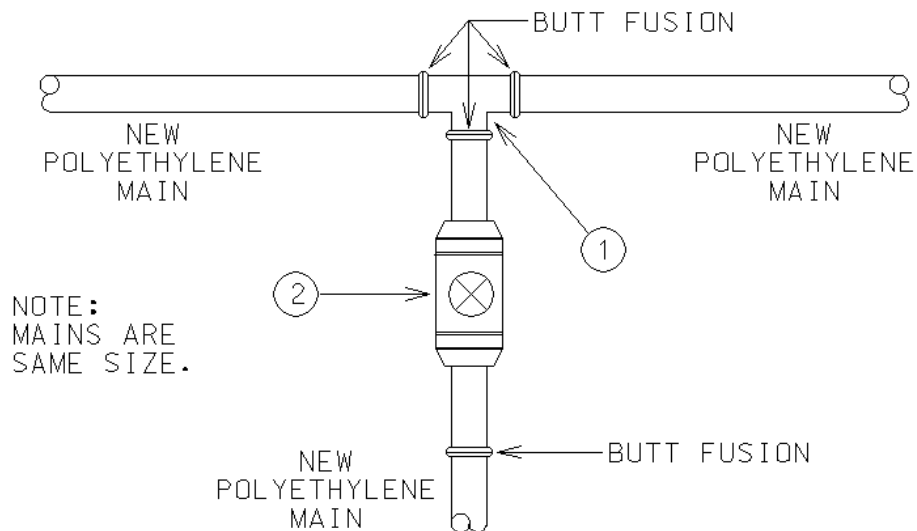
Item	Quantity	KUB Item #	Description
1	1	382739	1-1/4 inch PE Socket Fusion Tee
2	1	371724	1-1/4 inch PE Valve
3	1	384032	1-1/4 inch PE Socket Fusion Coupling

Material List for Figure 15720-O2

Item	Quantity	KUB Item #	Description
1	1	382978	2 inch PE Socket Fusion Tee
2	1	371740	2 inch PE Valve
3	1	383810	2 inch PE Socket Fusion Coupling

Figure 15720-P: 1-Valve Tee for 4-12 inch New PE Main

NEW 4" ON 4", 6" ON 6", 8" ON 8", & 12" ON 12" MAINS



Material List for Figure 15720-P4

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	1	360473	4 inch PE Valve

Material List for Figure 15720-P6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	1	360693	6 inch PE Valve

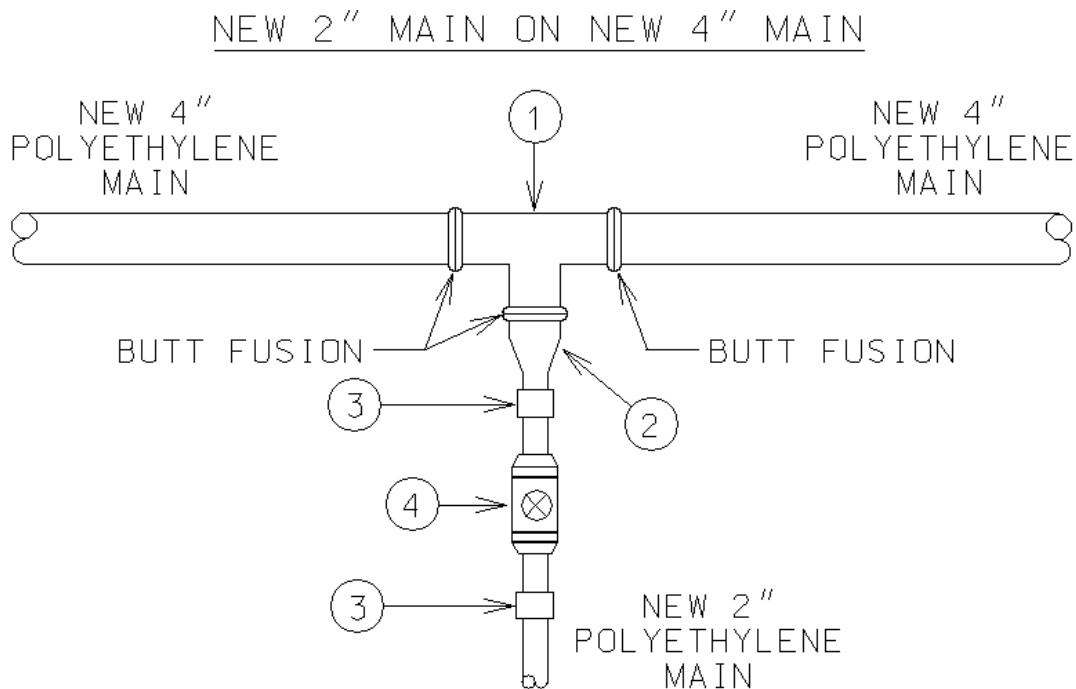
Material List for Figure 15720-P8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	1	361034	8 inch PE Valve

Material List for Figure 15720-P12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361045	12 inch PE Valve

Figure 15720-Q: 1-Valve Tee for 2 inch to 4 inch New PE Main

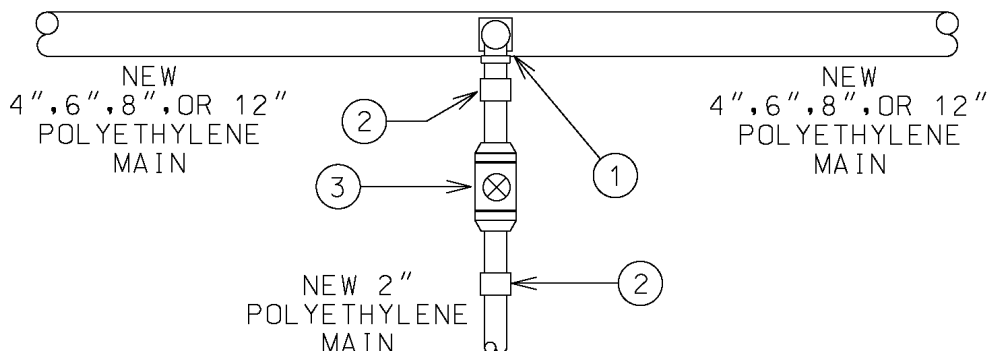


Material List for Figure 15720-Q

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	1	380352	4 inch x 2 inch PE Reducer
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve

Figure 15720-R: 1-Valve Tee for 2 inch to 4-12 inch New PE Main

NEW 2" ON 4", 2" ON 6", 2" ON 8", & 2" ON 12" MAINS



Material List for Figure 15720-R4

Item	Quantity	KUB Item #	Description
1	1	380311	4 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	1	371740	2 inch PE Valve

Material List for Figure 15720-R6

Item	Quantity	KUB Item #	Description
1	1	380840	6 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	1	371740	2 inch PE Valve

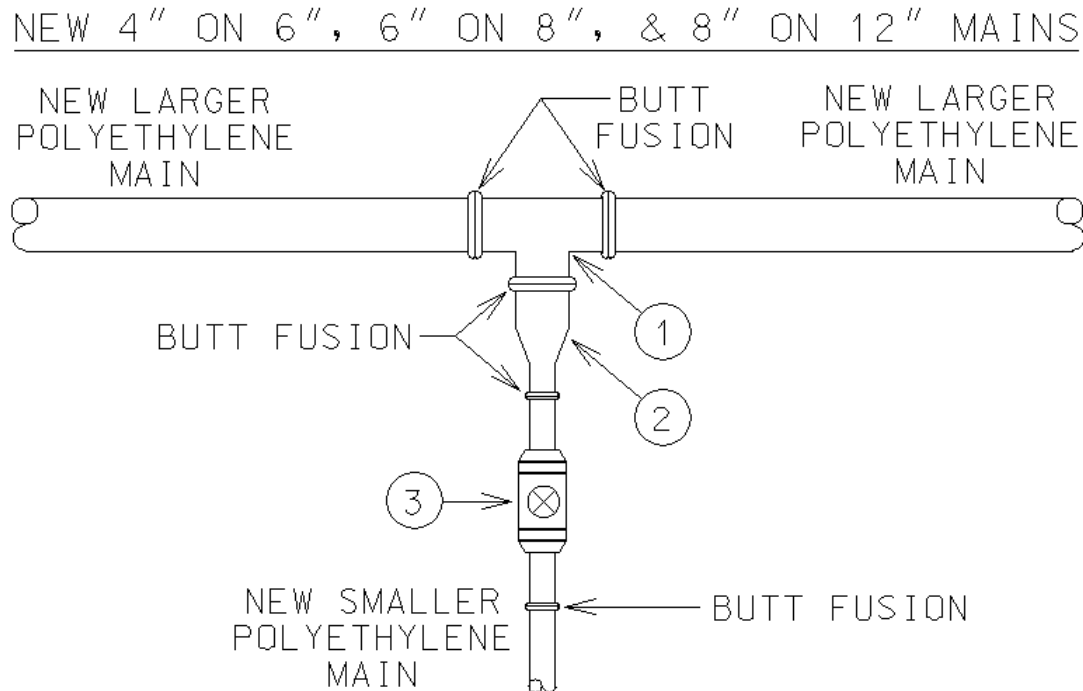
Material List for Figure 15720-R8

Item	Quantity	KUB Item #	Description
1	1	374835	8 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	1	371740	2 inch PE Valve

Material List for Figure 15720-R12

Item	Quantity	KUB Item #	Description
1	1	360891	12 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	1	371740	2 inch PE Valve

Figure 15720-S: 1- Valve Tee for 4 inch to 6 inch, 6 inch to 8 inch, and 8 inch to 12 inch New PE Main



Material List for Figure 15720-S6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
3	1	360473	4 inch PE Valve

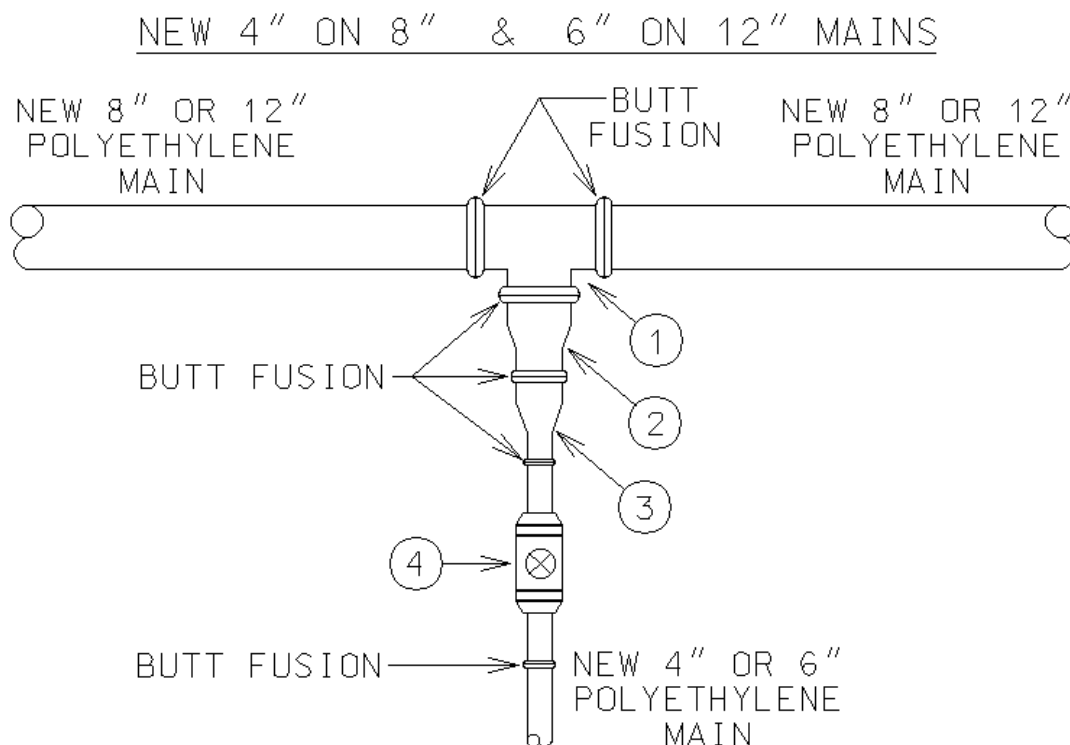
Material List for Figure 15720-S8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
3	1	360693	6 inch PE Valve

Material List for Figure 15720-S12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
3	1	361034	6 inch PE Valve

Figure 15720-T: 1-Valve Tee for 4 inch to 8 inch and 6 inch to 12 inch New PE Main



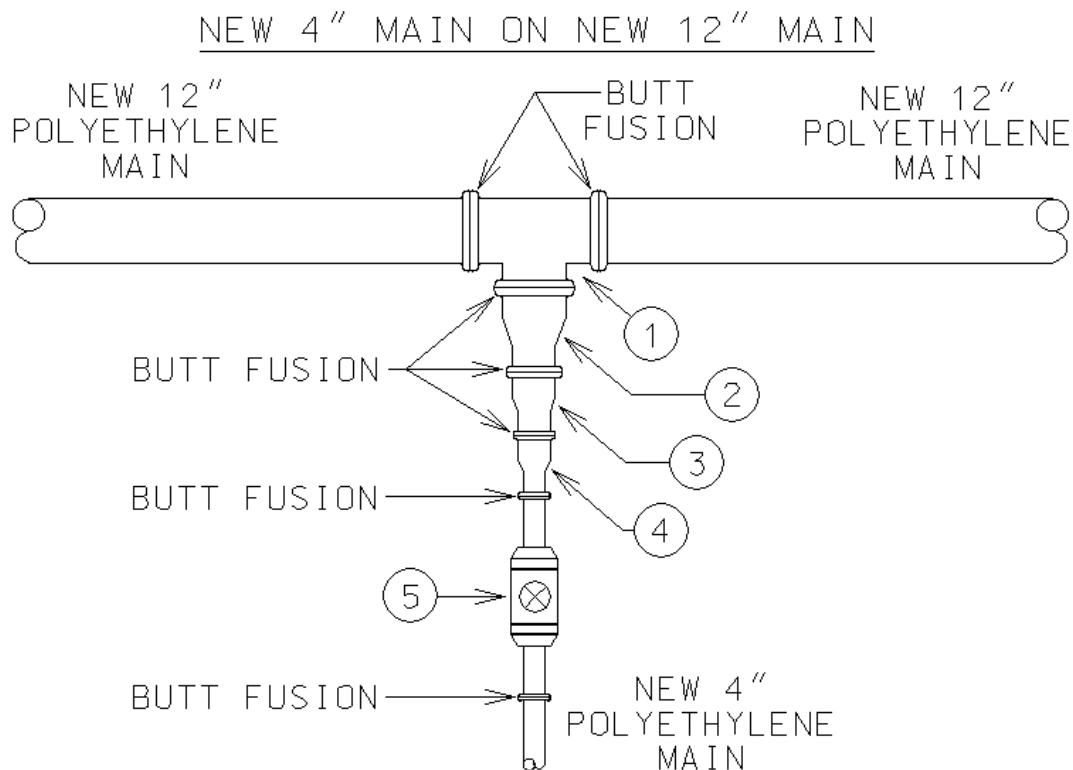
Material List for Figure 15720-T8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
3	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
4	1	360473	4 inch PE Valve

Material List for Figure 15720-T12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	360693	6 inch PE Valve

Figure 15720-U: 1-Valve Tee for 4 inch to 12 inch New PE Main



Material List for Figure 15720-U

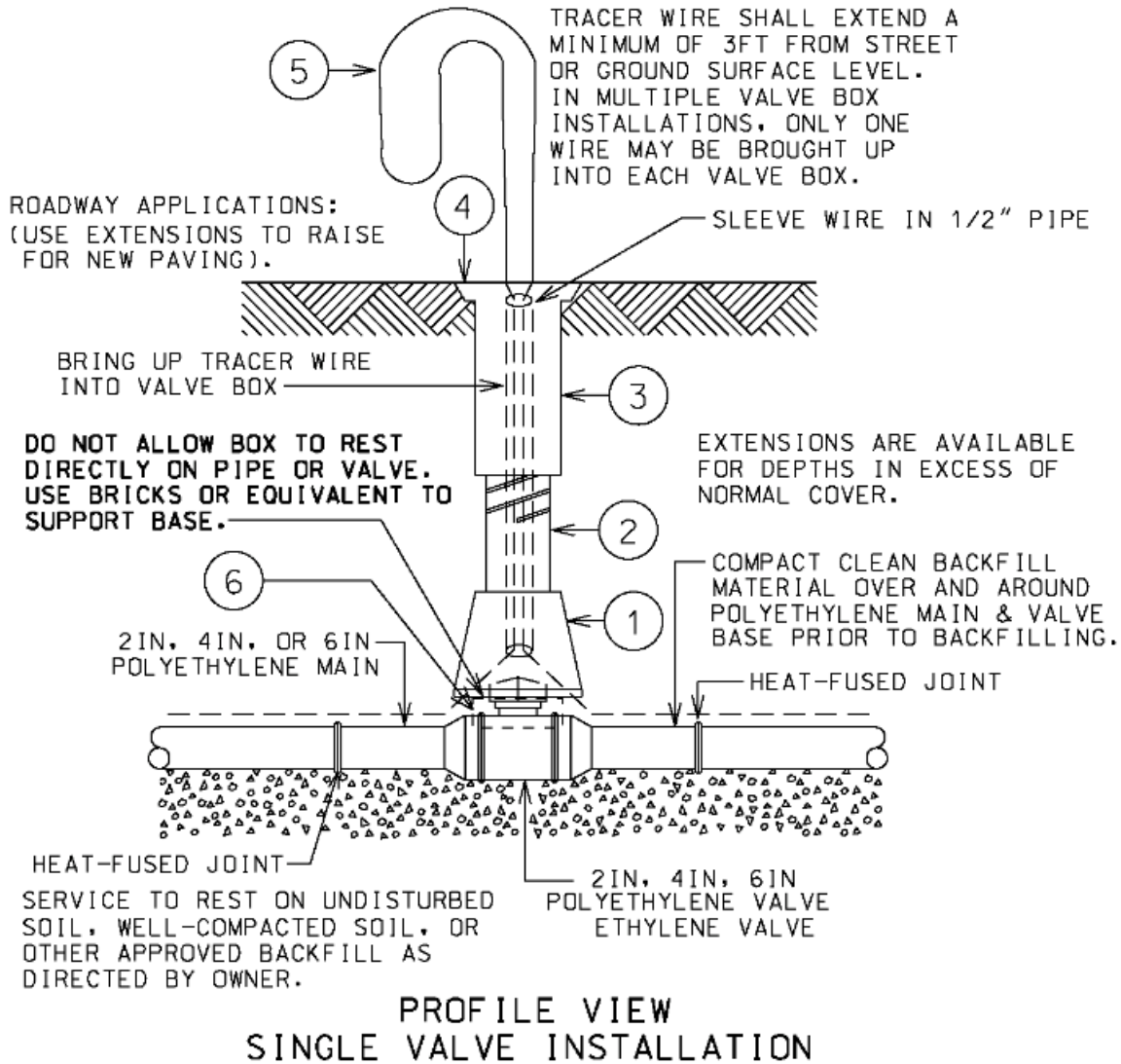
Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
5	1	360473	4 inch PE Valve



3.7 VALVE BOXES

- 3.7.1 Tracer wire shall be looped in multi-valve clusters.
- 3.7.2 See the following figures and material lists for valve box installation – Figure 15720-V - Refer to **SECTION 3.3 INSTALLATION METHODS** and **SECTION 3.8 BACKFILL** requirements.
- 3.7.3 For pipe 8” and larger, refer to project specific details.

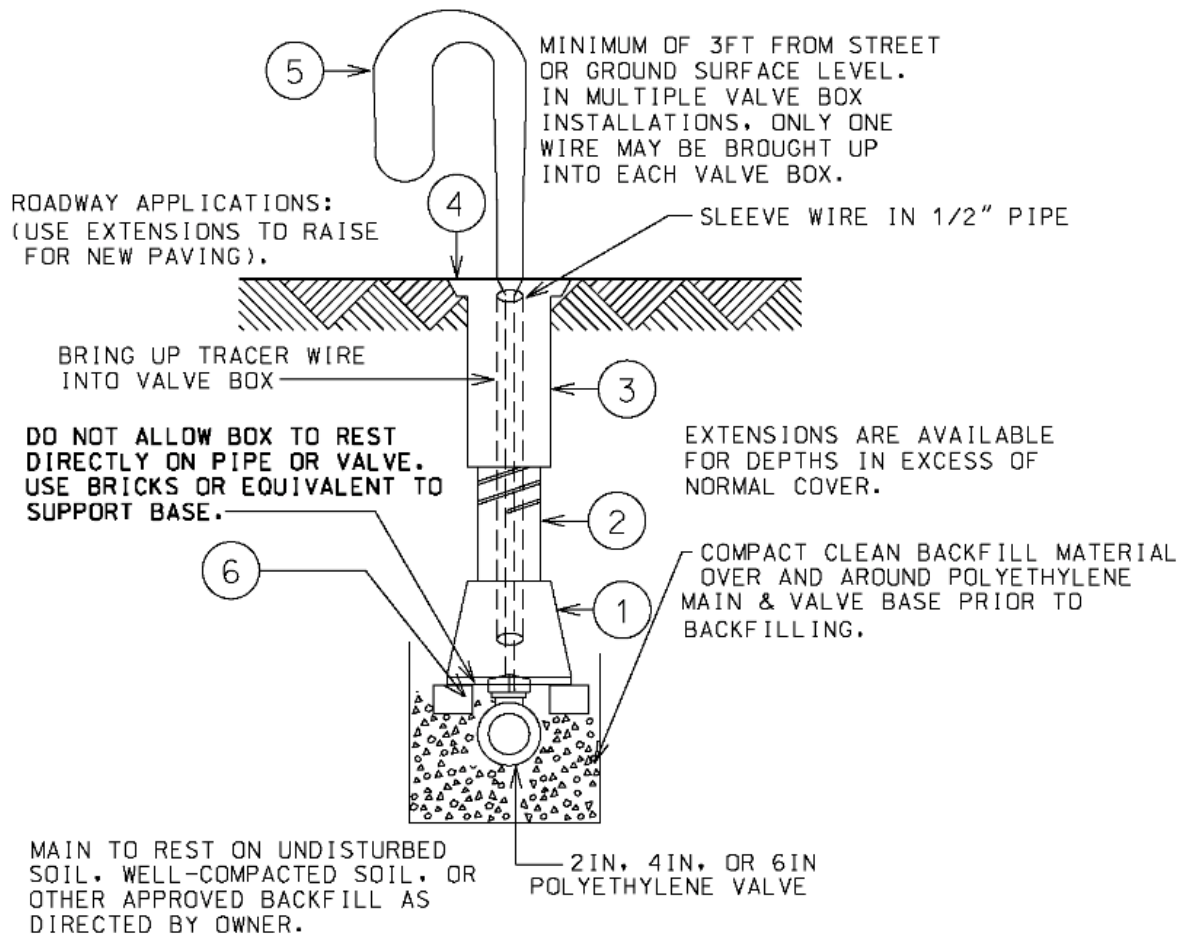
Figure 15720-V1: Single Valve Installation Profile View



Material List for Figure 15720-V

Item	Quantity	KUB Item #	Description
1	1	294074	Valve Box Base Section
2	1	360440	Valve Box Middle Section
3	1	360451	Valve Box Top Section
4	1	383398	Valve Box Lid
5	1-Lot	383448* 363069*	Tracer Wire *Either Wire Is Acceptable In This Application
6	1-Lot	290783	Bricks To Support Valve Box

Figure 15720-V2: Single Valve Installation Cross Section View



CROSS SECTION VIEW
SINGLE VALVE INSTALLATION

Material List for Figure 15720-V

Item	Quantity	KUB Item #	Description
1	1	294074	Valve Box Base Section
2	1	360440	Valve Box Middle Section
3	1	360451	Valve Box Top Section
4	1	383398	Valve Box Lid
5	1-Lot	383448* 363069*	Tracer Wire <i>*Either Wire Is Acceptable In This Application</i>
6	1-Lot	290783	Bricks To Support Valve Box



3.8 BACKFILL

- 3.8.1 Backfill shall be free from any material that could cause damage to the pipe including, but not limited to: large rocks, sharp rocks, large dirt clods and/or any construction debris or trash.
- 3.8.2 In rocky excavation zones, a minimum of 6 inches of clean and compacted fill material shall be installed prior to the pipe being lowered into the trench. The pipe is then installed and side filled to the required trench width with clean and well-compacted fill material. Pipe shall be covered with a minimum of 6 inches of clean and well-compacted fill material prior to final backfill.
- 3.8.3 Clean backfill is defined as native materials, manufactured fill and/or delivered soil containing a maximum particle size as indicated in **TABLE 3: Maximum Particle Size For Backfill** below or approved by RPR.

TABLE 3: Maximum Particle Size For Backfill

Nominal Pipe Size (inches)	Maximum Particle Size Including Rocks (inches)
Up to 4	1/2
6-12	3/4

- 3.8.4 Backfill shall be free from contaminants. If native material has smell, sheen, discoloration, debris or any uncommon substances, work shall stop immediately and RPR notified. All native materials shall be held on site in a manner to limit cross contamination.
- 3.8.5 Backfill and side fill shall be well compacted around all pipe and components with special care taken not to damage the pipe and components during compaction. At a minimum, well compacted soil is defined as machine tamped.
- 3.8.6 Backfill shall be installed in manner that protects the main from damages including, but not limited to, bends, crushing, gouges, and punctures.
- 3.8.7 Large rock is defined as having a diameter greater than 2 inch. If large rock is discovered during the excavation process, CONTRACTOR shall use clean backfill as defined in **SECTION 3.8.3**.
- 3.8.8 Backfilling a trench/excavation in a non-paved area shall be well compacted in a manner to prevent future below grade settling. At a minimum, well compacted soil is defined as machine tamped in lifts no greater than 12 inch lifts.
- 3.8.9 Backfilling in a paved area shall be in compliance with TDOT, Town of Farragut, City of Knoxville and Knox County requirements as noted in the project drawings.
- 3.8.10 Tracer wire shall be installed as stated in **SECTION 3.3.1.4**.
- 3.8.11 Warning tape shall be installed as stated in **SECTION 3.3.1.5**.

3.9 PROJECT PLAN

- 3.9.1 CONTRACTOR is responsible for developing a project plan for each project. The project plan shall be submitted to and approved by the RPR.
- 3.9.2 The project plan shall consist of a narrative and schedule (Gantt Chart) showing all construction activities from mobilization to substantial completion, i.e. the practices that will be employed on site and proposed order of events including installation, pigging, temporary bypasses for one way feeds, pressure testing, purging natural gas into the new pipelines, performing final tie-ins to existing pipelines and condemning existing pipelines. The schedule should include resource levels, subcontractors, and a list of employees of both the contractor and subcontractors intended to work on the jobsite.

3.9.3 A separate startup plan is required 3 business days prior to pigging, pressure testing, installing temporary bypasses, purging, and performing tie-ins describing the detailed work steps and timeline that will be taken for that specific task.

3.9.4 The project plan shall be project specific and address the approach to the entire project or individual zones of the project. The project may be divided into zones to limit customer impact on larger projects by completing smaller sections of the project from start to finish. Project drawings will dictate the zone size and limits.

3.10 PIGGING

3.10.1 RPR shall be notified, at a minimum, one full business day prior to pigging main(s). RPR is required on site for the final pig run.

3.10.2 Main shall be pigged until proven to be clean and dry. Based on the last pig run, there shall be no loose debris and no free liquids. RPR reserves the right to require additional pigging. RPR may require additional pigs to be new and unused.

3.10.3 Pigging shall be planned and performed in a manner to minimize additional fittings and pipe connection points.

3.10.4 The pig shall be caught as it exits pipe in a manner that ensures prevention of property damage, injury to employees, and injury to the public.

3.10.5 If any main ends are not tied up, a fused on end cap shall be installed to assure main stays clean of debris and liquids.

3.11 PRESSURE TESTING

3.11.1 Pressure testing shall be performed for all main and appurtenances after installation.

3.11.2 Prior to pressure testing, pipe shall be restrained against possible movement. Backfill is appropriate restraint.

3.11.3 All main and appurtenances shall be pressure tested with inert gas or air free of contaminants to a minimum of 100 psig and a maximum of 110 psig. The pressure test shall establish an MAOP of 60 psig and detect any potentially hazardous leaks.

3.11.4 Pressure testing shall be performed with a Kuhlman Unit or RPR approved device.

3.11.5 Kuhlman unit or equivalent shall have GPS capabilities that can track latitude and longitude.

3.11.6 Kuhlman unit or equivalent shall be able to immediately print test results on paper receipt. Test receipt shall include the following information: street address, latitude / longitude, start / end time, start / end date, duration, initial and final pressures, pressure deviation, test medium, device serial number and calibration date.

3.11.7 Kuhlman unit or equivalent shall be labeled with last calibration date in a readily visible area. Units shall be calibrated within 365 calendar days from last calibration date unless required earlier by the manufacturer. Calibration verification shall be maintained by the CONTRACTOR for a minimum of 1 year.

3.11.8 Pressure testing durations vary depending upon nominal pipe size and length. For pressure testing duration requirements, follow **TABLE 4: Pressure Testing Durations for Mains**.

TABLE 4: Pressure Testing Durations for Mains

Pipe Length (feet)	Nominal Pipe Size (inch)			
	2 and smaller	4	8	12
0-50	15 min	15 min	15 min	30 min
51-250	15 min	30 min	1 hr	1 hr
251-500	30 min	30 min	2 hr	2 hr 15 min
501-1,000	30 min	1 hr	4 hr	4 hr at 1.5 x MAOP + 5 hr at 60 psig
1001-2,000	1 hr	2 hr	4 hr at 1.5 x MAOP + 4 hr at 60 psig	4 hr at 1.5 x MAOP + 14 hr at 60 psig
2,001-6,500	2 hr	GSE Plan Required	GSE Plan Required	GSE Plan Required
6,501-10,000	GSE Plan Required	GSE Plan Required	GSE Plan Required	GSE Plan Required

1. If the pipe length to be tested is not included in this Table, a plan for pressure testing shall be submitted to and approved by the OWNER as a part of the startup plan.
2. It is the OWNER's intent to limit pressure tests for 8-inch and 12-inch pipe to 2,000 feet or less. OWNER reserves the right to reject proposed pressure tests not within the limits of **TABLE 4**.
3. Pipe length includes the entire length to be tested in a single pressure test.

3.11.9 Pressure tests shall not be performed against active valves or squeeze-off tools.

3.11.10 Air or inert gas at 60 psig shall remain within mains prior to introducing natural gas to the pipe.

3.11.11 Pressure test records proving a passing test shall be submitted to and approved by RPR before natural gas is introduced into the main.

3.12 TIE-INS

3.12.1 GENERAL

3.12.1.1 Prior to performing a tie-in to existing main, the depth of the existing and newly installed main shall be confirmed to meet the MFSS minimum depth of 24 inches. The RPR shall be notified if the MFSS minimum depth is not met and additional protection may be required.

3.12.1.2 All squeeze-offs of PE pipe shall be in accordance with KUB's squeeze-off procedures. Squeeze-off tools shall comply with ASTM F1563, Standard for Tools to Squeeze-off Polyethylene (PE) Gas Pipe or Tubing.

3.12.1.3 For clarity, tracer wire and connections are not shown in figures below but are required.

3.12.1.4 To prevent unintended customer outages, RPR shall check existing valve positions within the applicable areas to ensure system conditions are understood just prior to tie-in activities. RPR shall

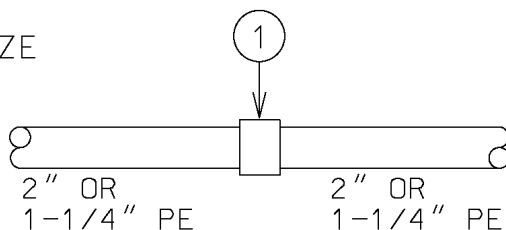
coordinate with System Operations on all valve operations and shall install pressure gauges as per the startup plan to monitor pressures during tie-in activities. The CONTRACTOR shall not proceed with the tie-in until this is completed.

- 3.12.1.5 When performing a final tie-in, eliminate the tapping tee used for the purge whenever possible prior to connecting the new main to the existing main. When impossible, CONTRACTOR shall provide the location(s) of remaining tapping tee(s) to RPR for documentation as well as provide a completed NGUS on the tapping tee(s) and components.
- 3.12.1.6 Sidefill around all natural gas components shall be well compacted prior to final backfilling. At a minimum, well compacted soil is defined as machine tamped.
- 3.12.1.7 A minimum of one (1) 9-pound magnesium anode and test station shall be installed at a tie-in to existing steel natural gas main if project drawings do not specify installation. Anodes and test stations shall be installed per **SECTION 15500**.
- 3.12.1.8 All steel components shall be coated and cathodically protected prior to backfilling. Refer to **SECTION 15500** and **SECTION 15600** for details.
- 3.12.1.9 All final tie-in connection points shall be soap tested at operating pressure.
- 3.12.2 **See the following figures and material lists for Straight Tie-ins for PE Main to PE Main. For tie-in arrangements not covered under these details, refer to the project specific drawings.**

Figure 15720-W: Straight Tie-in for 1-1/4 inch to 1-1/4 inch or 2 inch to 2 inch PE Main

2" TO 2" & 1-1/4" TO 1-1/4" PE MAIN TO PE MAIN

NOTE: MAINS
ARE SAME SIZE



Material List for Figure15720-W1

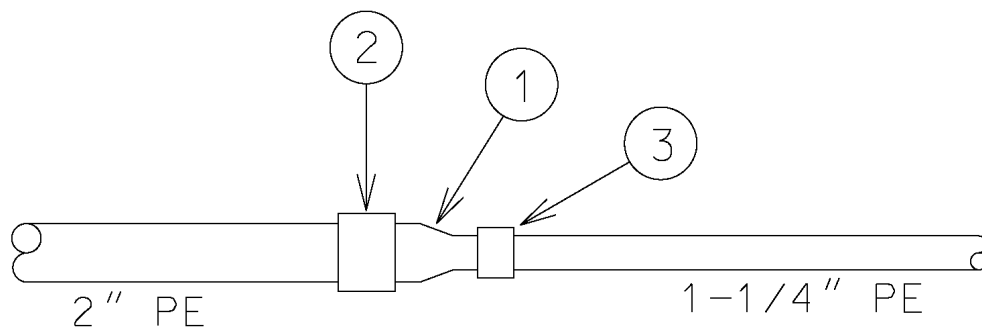
Item	Quantity	KUB Item #	Description
1	1	384032	1-1/4 inch PE Socket Fusion Coupling

Material List for Figure 15720-W2

Item	Quantity	KUB Item #	Description
1	1	383810	2 inch PE Socket Fusion Coupling

Figure 15720-X: Straight Tie-in for 1-1/4 inch to 2 inch PE Main

2" PE MAIN TO 1-1/4" PE MAIN

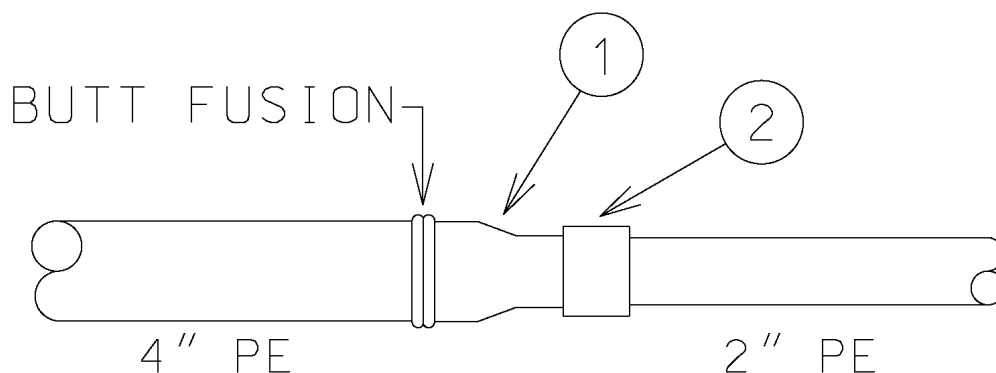


Material List for Figure 15720-X

Item	Quantity	KUB Item #	Description
1	1	382689	2 inch x 1-1/4 inch PE Socket Fusion Reducer
2	1	383810	2 inch PE Socket Fusion Coupling
3	1	384032	1-1/4 inch PE Socket Fusion Coupling

Figure 15720-Y: Straight Tie-in for 4 inch to 2 inch PE Main

4" PE MAIN TO 2" PE MAIN



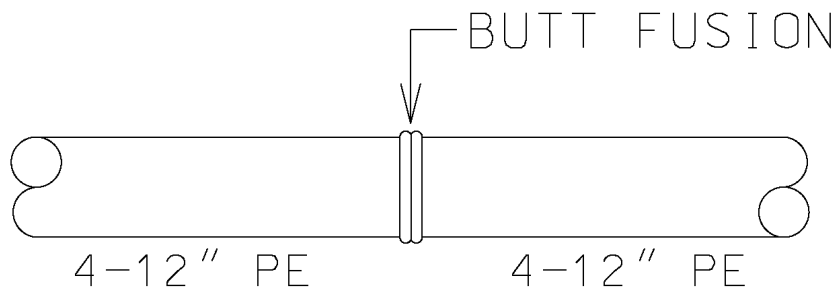
Material List for Figure 15720-Y

Item	Quantity	KUB Item #	Description
1	1	380352	4 inch x 2 inch PE Reducer
2	1	383810	2 inch PE Socket Fusion Coupling

Figure 15720-Z: Straight Tie-in for 4-12 inch to 4-12 inch PE Main

4-12" PE MAIN TO 4-12" PE MAIN

NOTE: MAINS
ARE SAME SIZE



4 inch PE Main to 4 inch PE Main – Figure 15720-Z4

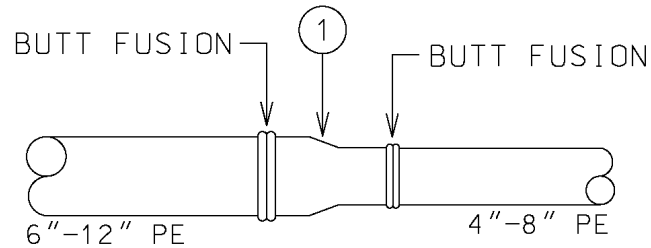
6 inch PE Main to 6 inch PE Main – Figure 15720-Z6

8 inch PE Main to 8 inch PE Main – Figure 15720-Z8

12 inch PE Main to 12 inch PE Main – Figure 15720-Z12

Figure 15720-AA: Straight Tie-in for 4 inch to 6 inch, 6 inch to 8 inch, and 8 inch to 12 inch PE Main

4" TO 6", 6" TO 8", AND 8" TO 12" PE MAIN TO PE MAIN



Material List for Figure 15720-AA6

Item	Quantity	KUB Item #	Description
1	1	372110	6 inch x 4 inch PE Butt Fusion Reducer

Material List for Figure 15720-AA8

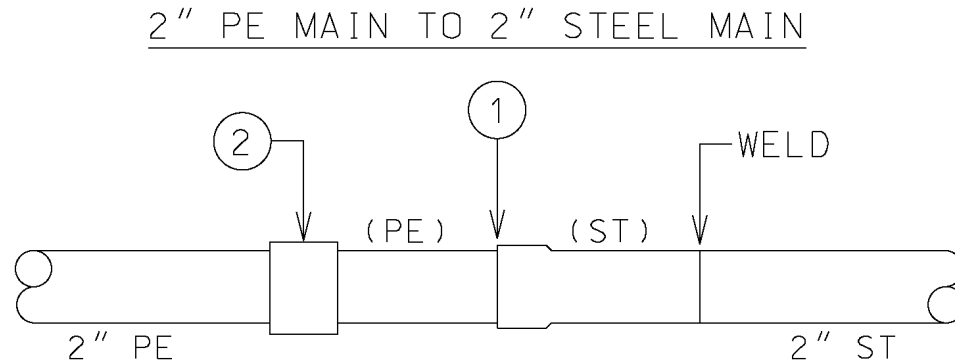
Item	Quantity	KUB Item #	Description
1	1	374710	8 inch x 6 inch PE Butt Fusion Reducer

Material List for Figure 15720-AA12

Item	Quantity	KUB Item #	Description
1	1	361012	12 inch x 8 inch PE Butt Fusion Reducer

- 3.12.3 See the following drawings and material lists for Straight Tie-ins for PE Main to Steel Main. Refer to SECTION 3.12.7 and SECTION 3.12.8 for additional steel requirements. For tie-in arrangements not covered under these details, refer to the project specific drawings.

Figure 15720-BB: Straight Tie-in for 2 inch PE Main to 2 inch Steel Main

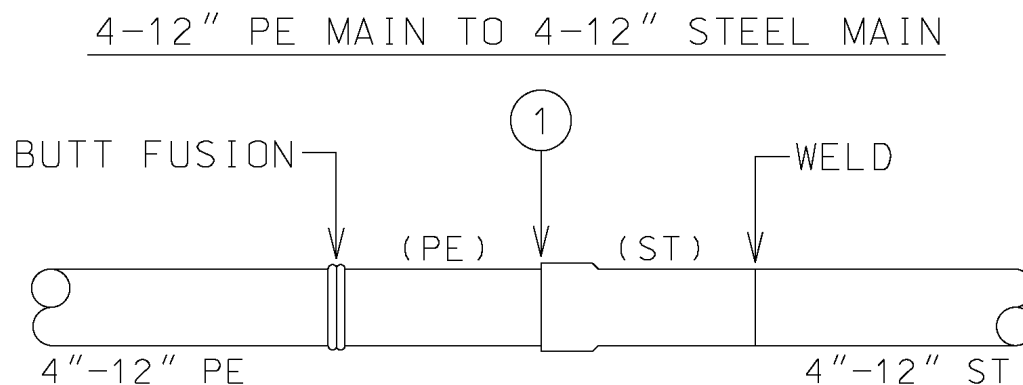


NOTE : MAINS
 ARE SAME SIZE

Material List for Figure 15720-BB

Item	Quantity	KUB Item #	Description
1	1	363256	2 inch PE x 2 inch Steel Transition Fitting
2	1	383810	2 inch PE Socket Fusion Coupling

Figure 15720-CC: Straight Tie-in for 4-12 inch PE Main to 4-12 inch Steel Main



NOTE : MAINS
 ARE SAME SIZE

Material List for Figure 15720-CC4

Item	Quantity	KUB Item #	Description
1	1	380337	4 inch PE x 4 inch Steel Transition Fitting

Material List for Figure 15720-CC6

Item	Quantity	KUB Item #	Description
1	1	374595	6 inch PE x 6 inch Steel Transition Fitting

Material List for Figure 15720-CC8

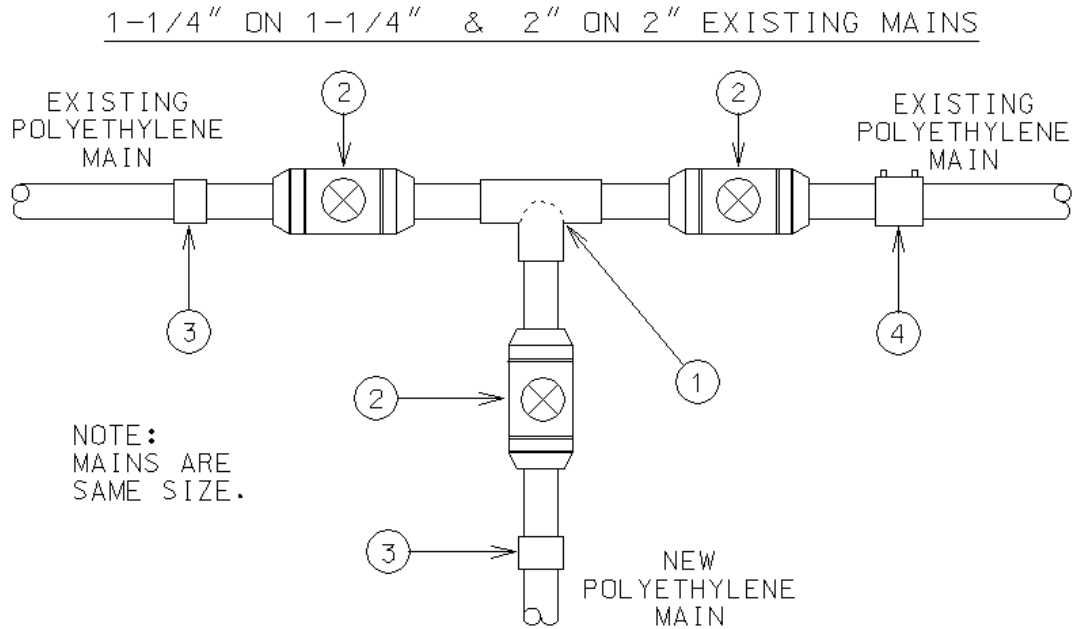
Item	Quantity	KUB Item #	Description
1	1	374819	8 inch PE x 8 inch Steel Transition Fitting

Material List for Figure 15720-CC12

Item	Quantity	KUB Item #	Description
1	1	360957	12 inch PE x 12 inch Steel Transition Fitting

- 3.12.4 See the following drawings and material lists for New PE Main to Existing PE Main Tee Installations with 3 PE Valves. For tie-in arrangements not covered under these details, refer to the project specific drawings.

Figure 15720-DD: 3-Valve Tee for New 1-1/4 inch or 2 inch PE Main to Existing 1-1/4 inch or 2 inch PE Main



Material List for Figure 15720-DD1

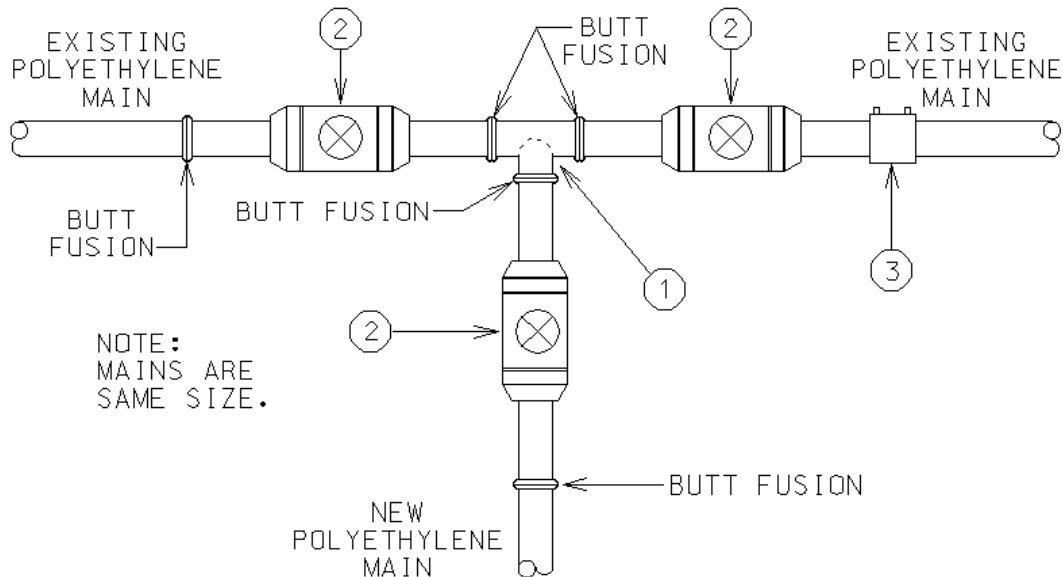
Item	Quantity	KUB Item #	Description
1	1	382739	1-1/4 inch PE Socket Fusion Tee
2	3	371724	1-1/4 inch PE Valve
3	2	384032	1-1/4 inch PE Socket Fusion Coupling
4	1	361716	1-1/4 inch PE Electrofusion Coupling

Material List for Figure 15720-DD2

Item	Quantity	KUB Item #	Description
1	1	382978	2 inch PE Socket Fusion Tee
2	3	371740	2 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	361727	2 inch PE Electrofusion Coupling

Figure 15720-EE: 3-Valve Tee for New 4-12 inch PE Main to Existing 4-12 inch PE Main

4" ON 4", 6" ON 6", 8" ON 8", & 12" ON 12" EXIST MAINS



Material List for Figure 15720-EE4

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	3	360473	4 inch PE Valve
3	1	374439	4 inch PE Electrofusion Coupling

Material List for Figure 15720-EE6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	3	360693	6 inch PE Valve
3	1	374454	6 inch PE Electrofusion Coupling

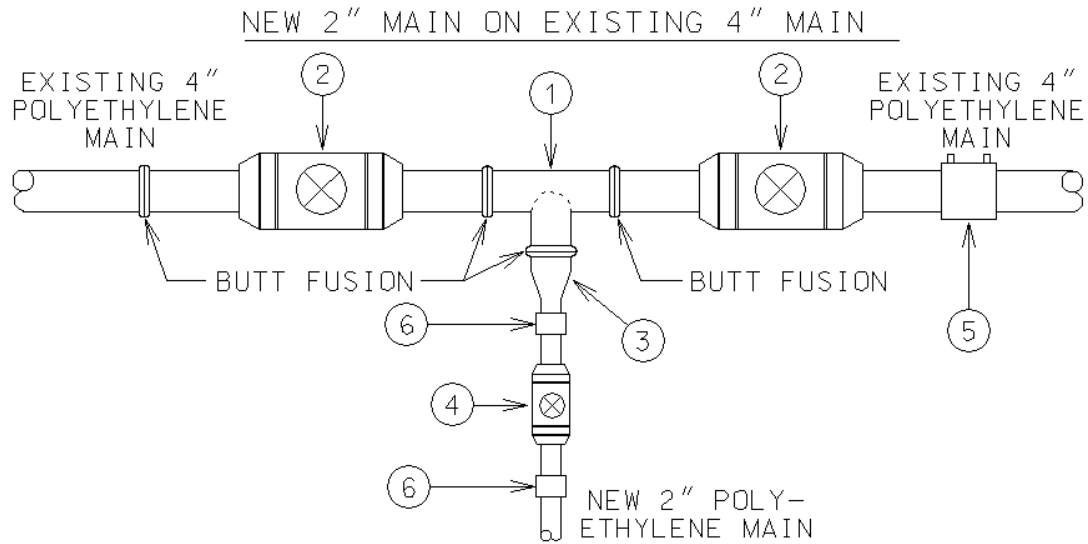
Material List for Figure 15720-EE8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	3	361034	8 inch PE Valve
3	1	374686	8 inch PE Electrofusion Coupling

Material List for Figure 15720-EE12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	3	361045	12 inch PE Valve
3	1	360979	12 inch PE Electrofusion Coupling

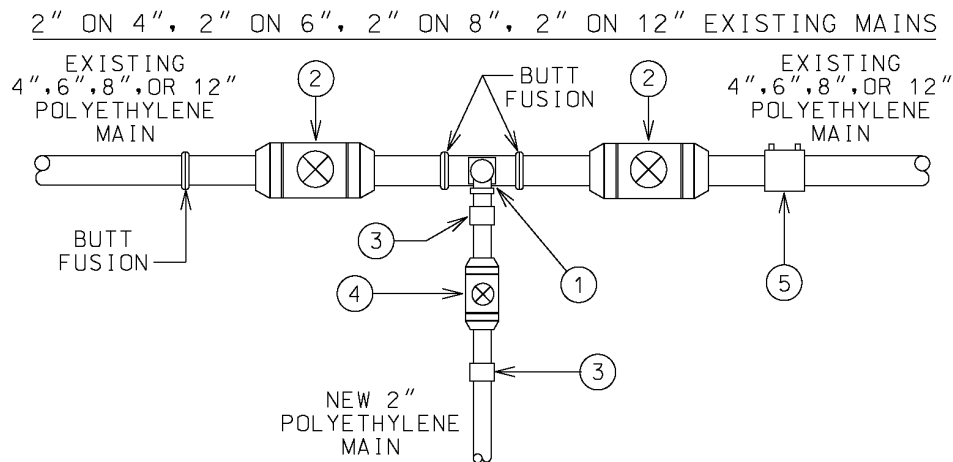
Figure 15720-FF: 3-Valve Tee for New 2 inch PE Main to Existing 4 inch PE Main



Material List for Figure 15720-FF

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	2	360473	4 inch PE Valve
3	1	380352	4 inch x 2 inch PE Reducer
4	1	371740	2 inch PE Valve
5	1	374439	4 inch PE Electrofusion Coupling
6	2	383810	2 inch PE Socket Fusion Coupling

Figure 15720-GG: 3-Valve Tee for New 2 inch PE Main to Existing 4-12 inch PE Main



Material List for Figure 15720-GG4

Item	Quantity	KUB Item #	Description
1	1	380311	4 inch x 2 inch PE Tapping Tee
2	2	360473	4 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve
5	1	374439	4 inch PE Electrofusion Coupling

Material List for Figure 15720-GG6

Item	Quantity	KUB Item #	Description
1	1	380840	6 inch x 2 inch PE Tapping Tee
2	2	360693	6 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve
5	1	374454	6 inch PE Electrofusion Coupling

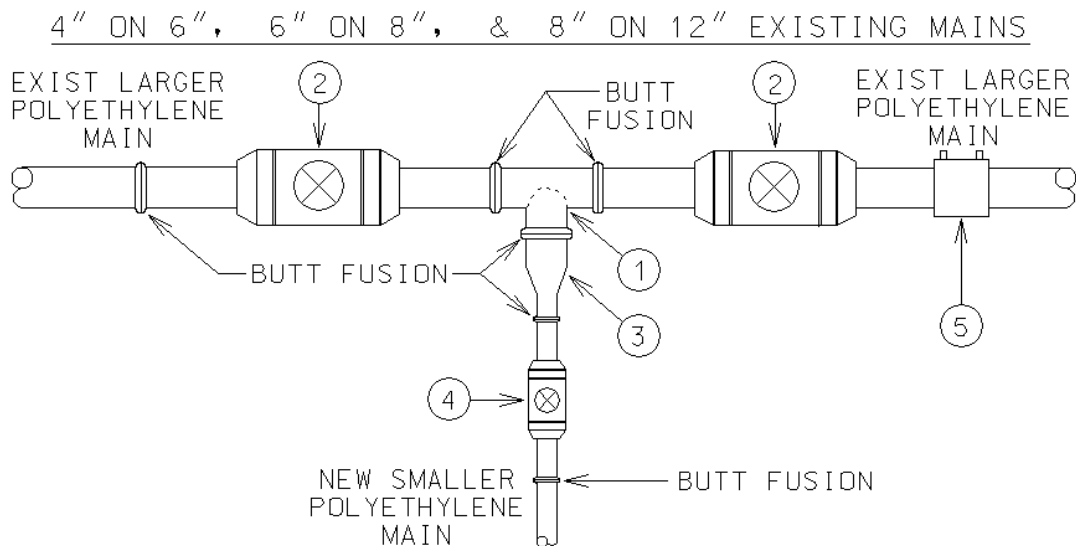
Material List for Figure 15720-GG8

Item	Quantity	KUB Item #	Description
1	1	374835	8 inch x 2 inch PE Tapping Tee
2	2	361034	8 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve
5	1	374686	8 inch PE Electrofusion Coupling

Material List for Figure 15720-GG12

Item	Quantity	KUB Item #	Description
1	1	360891	12 inch x 2 inch PE Tapping Tee
2	2	361045	12 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve
5	1	360979	12 inch PE Electrofusion Coupling

Figure 15720-HH: 3-Valve Tee for New 4 inch PE Main to Existing 6 inch PE Main, New 6 inch PE Main to Existing 8 inch PE Main, and new 8 inch PE Main to Existing 12 inch PE Main



Material List for Figure 15720-HH6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	2	360693	6 inch PE Valve
3	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
4	1	360473	4 inch PE Valve
5	1	374454	6 inch PE Electrofusion Coupling

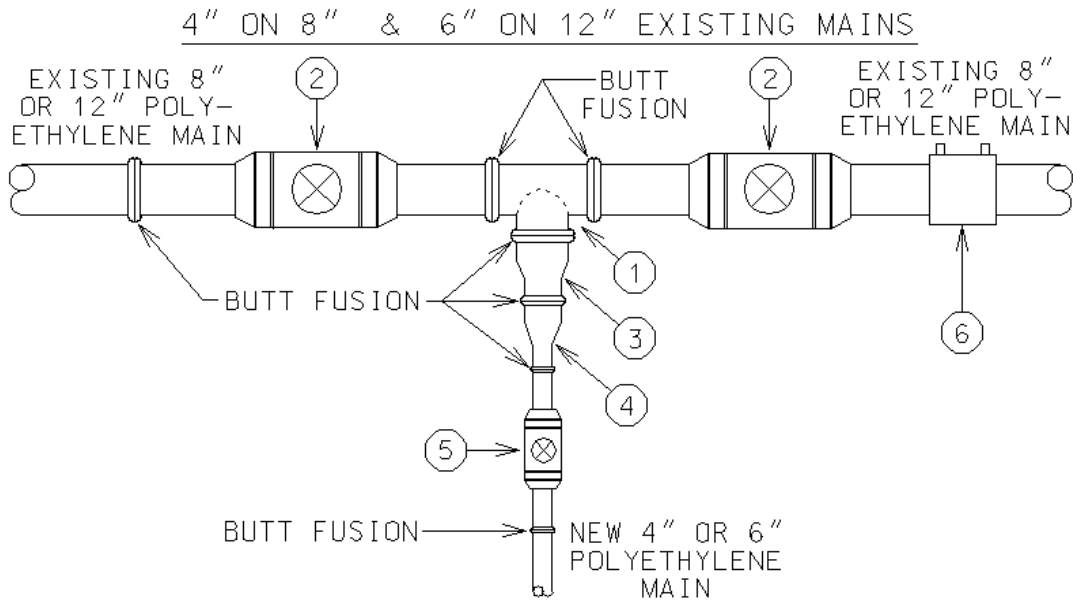
Material List for Figure 15720-HH8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	2	361034	8 inch PE Valve
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	360693	6 inch PE Valve
5	1	374686	8 inch PE Electrofusion Coupling

Material List for Figure 15720-HH12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	2	361045	12 inch PE Valve
3	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
4	1	361034	8 inch PE Valve
5	1	360979	12 inch PE Electrofusion Coupling

Figure 15720-II: 3 -Valve Tee for New 4 inch PE Main to Existing 8 inch PE Main and New 6 inch PE Main to Existing 12 inch PE Main



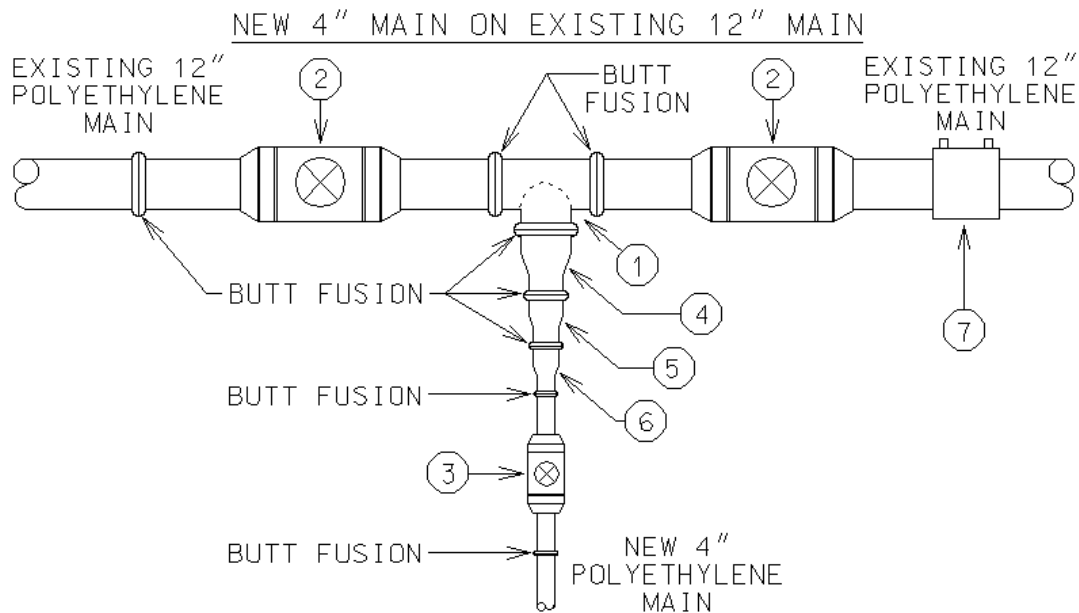
Material List for Figure 15720-II8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	2	361034	8 inch PE Valve
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
5	1	360473	4 inch PE Valve
6	1	374686	8 inch PE Electrofusion Coupling

Material List for Figure 15720-II12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	2	361045	12 inch PE Valve
3	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
4	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
5	1	360693	6 inch PE Valve
6	1	360979	12 inch PE Electrofusion Coupling

Figure 15720-JJ: 3-Valve Tee for New 4 inch PE Main to Existing 12 inch PE Main

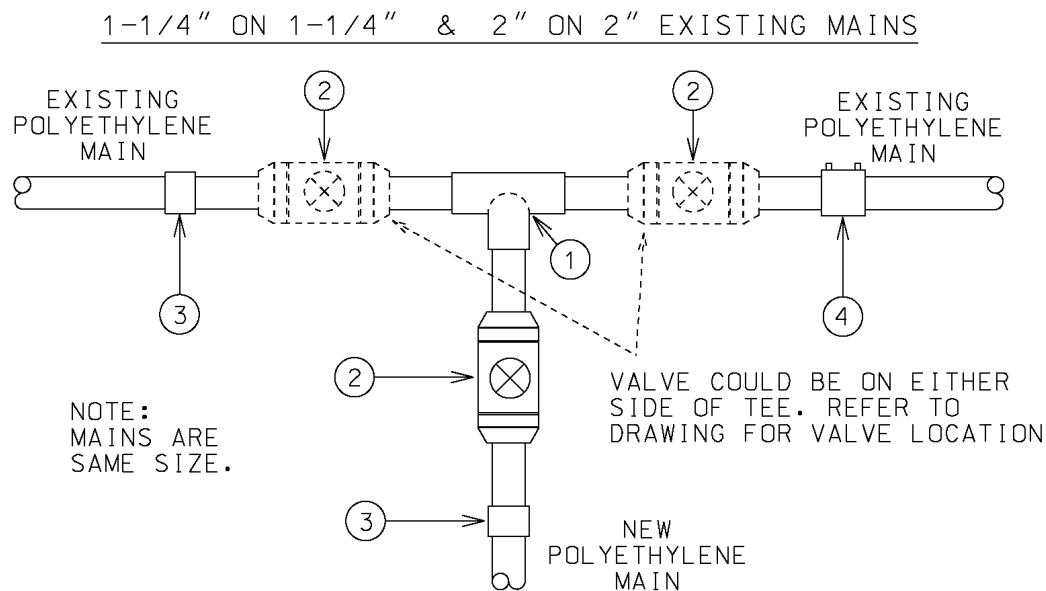


Material List for Figure 15720-JJ

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	2	361045	12 inch PE Valve
3	1	360473	4 inch PE Valve
4	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
5	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
6	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
7	1	360979	12 inch PE Electrofusion Coupling

- 3.12.5 See the following drawings and material lists for New PE Main to Existing PE Main Tee Installations with 2 PE Valves. For tie-in arrangements not covered under these details, refer to the project specific drawings.

Figure 15720-KK: 2-Valve Tee for New 1-1/4 inch or 2 inch PE Main to Existing 1-1/4 inch or 2 inch PE Main



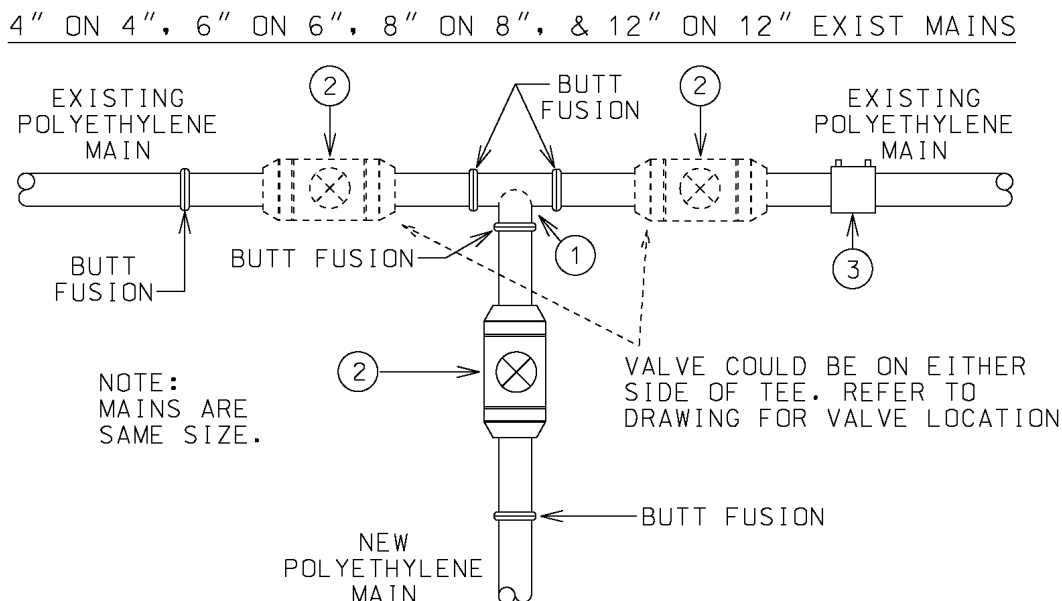
Material List for Figure 15720-KK1

Item	Quantity	KUB Item #	Description
1	1	382739	1-1/4 inch PE Socket Fusion Tee
2	2	371724	1-1/4 inch PE Valve
3	2	384032	1-1/4 inch PE Socket Fusion Coupling
4	1	361716	1-1/4 inch PE Electrofusion Coupling

Material List for Figure 15720-KK2

Item	Quantity	KUB Item #	Description
1	1	382978	2 inch PE Socket Fusion Tee
2	2	371740	2 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	361727	2 inch PE Electrofusion Coupling

Figure 15720-LL: 2-Valve Tee for New 4-12 inch PE Main to Existing 4-12 inch PE Main



Material List for Figure 15720-LL4

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	2	360473	4 inch PE Valve
3	1	374439	4 inch PE Electrofusion Coupling

Material List for Figure 15720-LL6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	2	360693	6 inch PE Valve
3	1	374454	6 inch PE Electrofusion Coupling

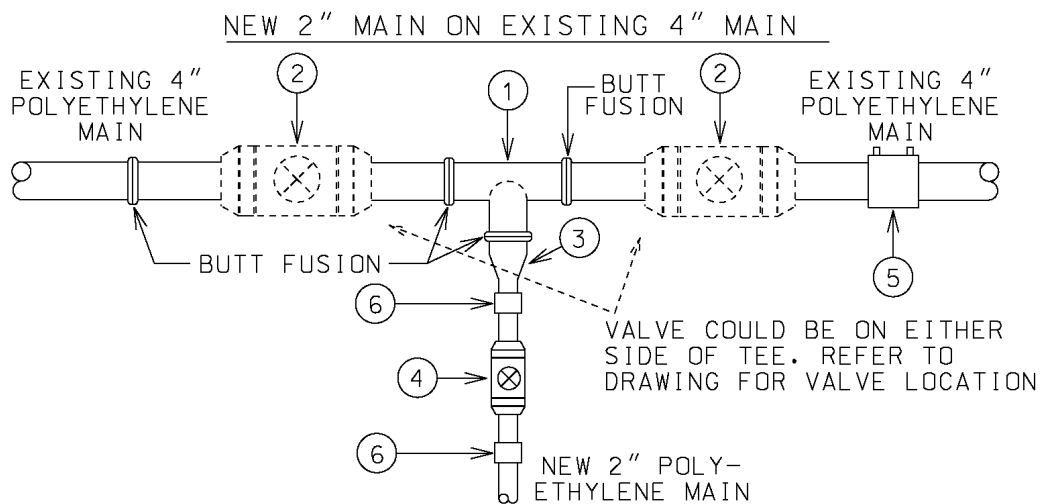
Material List for Figure 15720-LL8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	2	361034	8 inch PE Valve
3	1	374686	8 inch PE Electrofusion Coupling

Material List for Figure 15720-LL12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	2	361045	12 inch PE Valve
3	1	360979	12 inch PE Electrofusion Coupling

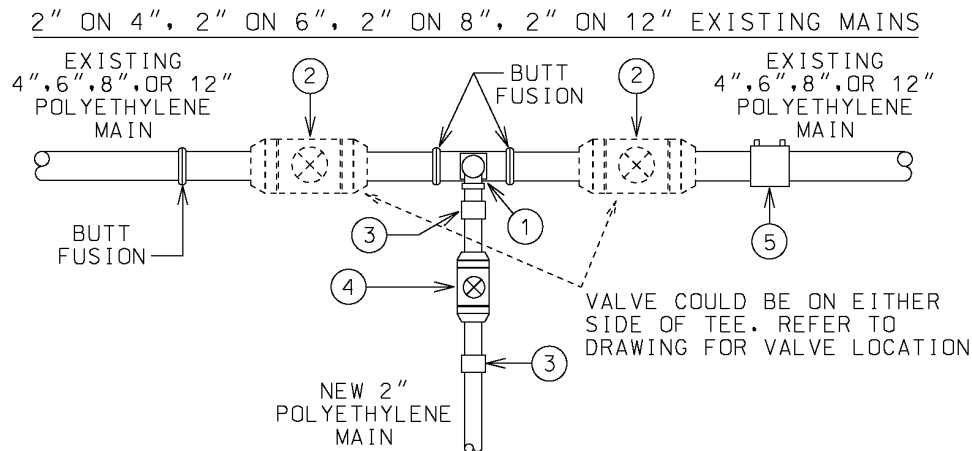
Figure 15720-MM: 2-Valve Tee for New 2 inch PE Main to Existing 4 inch PE Main



Material List for Figure 15720-MM

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	1	360473	4 inch PE Valve
3	1	380352	4 inch x 2 inch PE Reducer
4	1	371740	2 inch PE Valve
5	1	374439	4 inch PE Electrofusion Coupling
6	2	383810	2 inch PE Socket Fusion Coupling

Figure 15720-NN: 2-Valve Tee for New 2 inch PE Main to Existing 4-12 inch PE Main



Material List for Figure 15720-NN4

Item	Quantity	KUB Item #	Description
1	1	380311	4 inch x 2 inch PE Tapping Tee
2	1	360473	4 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve
5	1	374439	4 inch PE Electrofusion Coupling

Material List for Figure 15720-NN6

Item	Quantity	KUB Item #	Description
1	1	380840	6 inch x 2 inch PE Tapping Tee
2	1	360693	6 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve
5	1	374454	6 inch PE Electrofusion Coupling

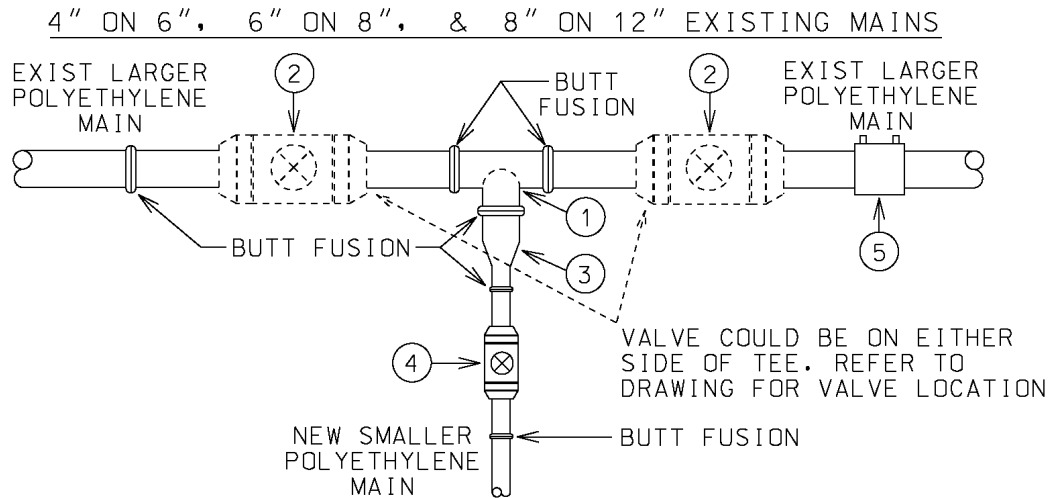
Material List for Figure 15720-NN8

Item	Quantity	KUB Item #	Description
1	1	374835	8 inch x 2 inch PE Tapping Tee
2	2	361034	8 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve
5	1	374686	8 inch PE Electrofusion Coupling

Material List for Figure 15720-NN12

Item	Quantity	KUB Item #	Description
1	1	360891	12 inch x 2 inch PE Tapping Tee
2	2	361045	12 inch PE Valve
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve
5	1	360979	12 inch PE Electrofusion Coupling

Figure 15720-OO: 2-Valve Tee for New 4 inch PE Main to Existing 6 inch PE Main, New 6 inch PE Main to Existing 8 inch PE Main, and New 8 inch PE Main to Existing 12 inch PE Main



Material List for Figure 15720-OO6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	1	360693	6 inch PE Valve
3	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
4	1	360473	4 inch PE Valve
5	1	374454	6 inch PE Electrofusion Coupling

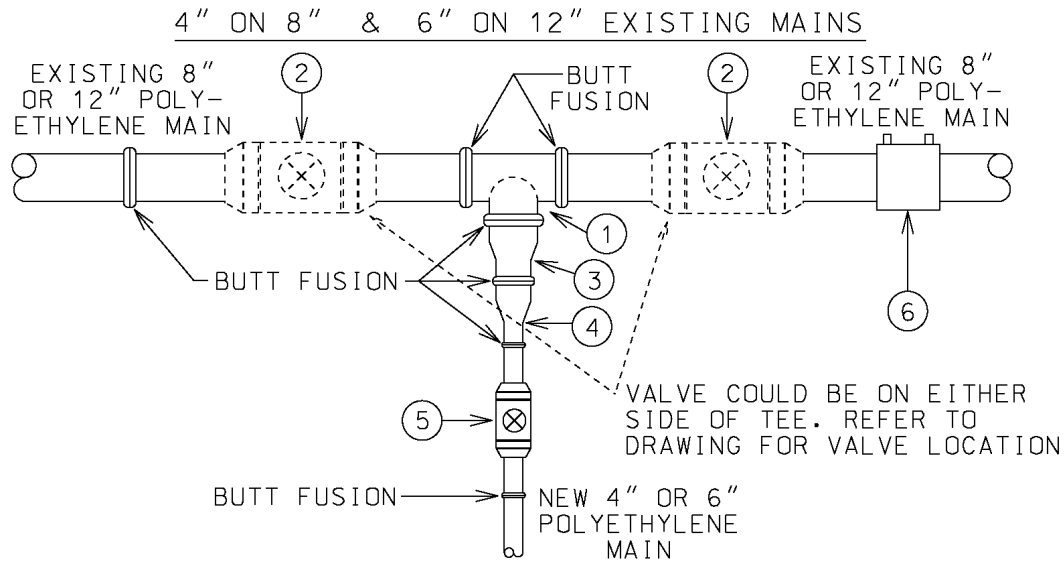
Material List for Figure 15720-OO8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	1	361034	8 inch PE Valve
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	360693	6 inch PE Valve
5	1	374686	8 inch PE Electrofusion Coupling

Material List for Figure 15720-OO12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361045	12 inch PE Valve
3	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
4	1	361034	8 inch PE Valve
5	1	360979	12 inch PE Electrofusion Coupling

Figure 15720-PP: 2-Valve Tee for New 4 inch PE Main to Existing 8 inch PE Main and New 6 inch PE Main to Existing 12 inch PE Main



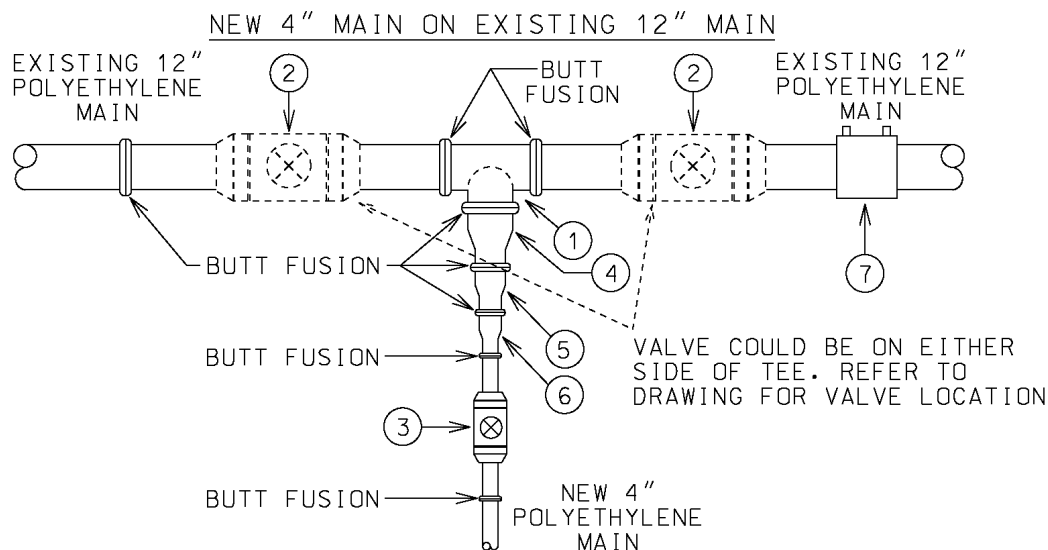
Material List for Figure 15720-PP8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	1	361034	8 inch PE Valve
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
5	1	360473	4 inch PE Valve
6	1	374686	8 inch PE Electrofusion Coupling

Material List for Figure 15720-PP12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361045	12 inch PE Valve
3	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
4	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
5	1	360693	6 inch PE Valve
6	1	360979	12 inch PE Electrofusion Coupling

Figure 15720-QQ: 2-Valve Tee for New 4 inch PE Main to Existing 12 inch PE Main



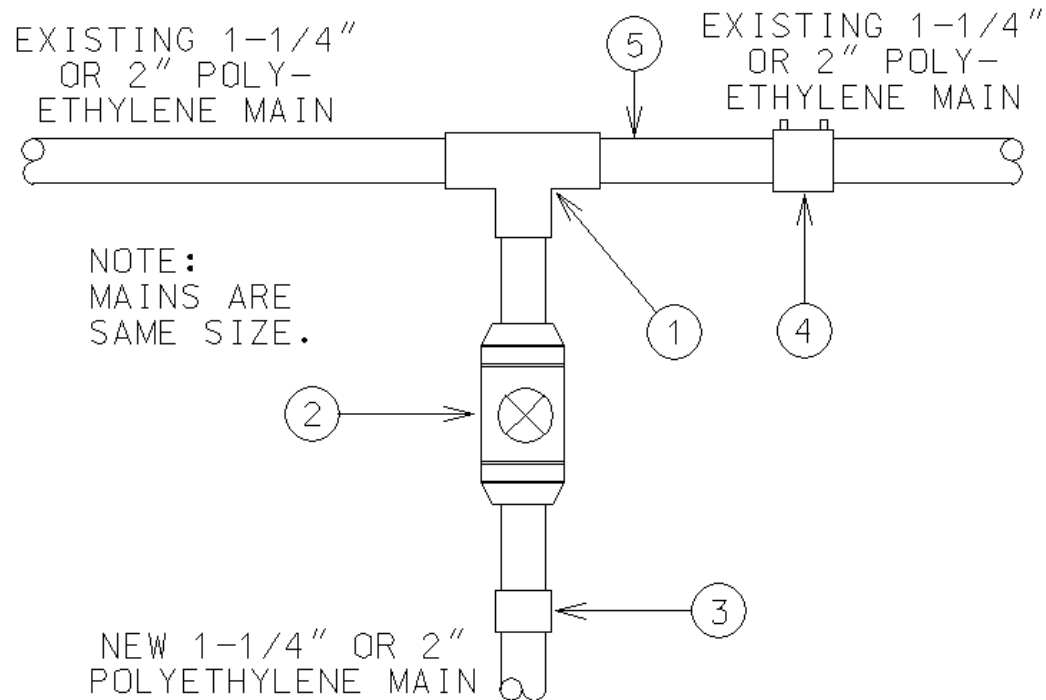
Material List for Figure 15720-QQ

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361045	12 inch PE Valve
3	1	360473	4 inch PE Valve
4	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
5	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
6	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
7	1	360979	12 inch PE Electrofusion Coupling

- 3.12.6 See the following figures and material lists for New PE Main to Existing PE Main Tee Installations with 1 PE Valve. For tie-in arrangements not covered under these details, refer to the project specific drawings.

Figure 15720-RR: 1-Valve Tee for New 1-1/4 inch or 2 inch PE Main to Existing 1-1/4 inch or 2 inch PE Main

1-1/4" ON 1-1/4" & 2" ON 2" EXISTING MAINS



Material List for Figure 15720-RR1

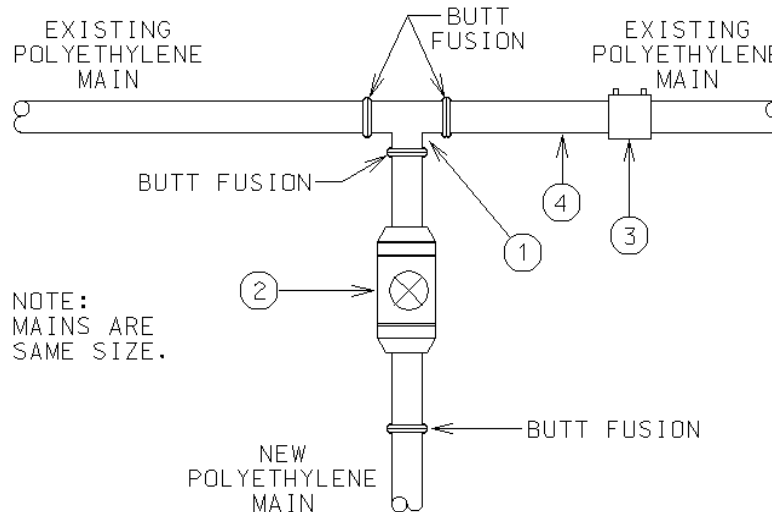
Item	Quantity	KUB Item #	Description
1	1	382739	1-1/4 inch PE Socket Fusion Tee
2	1	371724	1-1/4 inch PE Valve
3	1	384032	1-1/4 inch PE Socket Fusion Coupling
4	1	361716	1-1/4 inch PE Electrofusion Coupling
5	1-Lot	381200	1-1/4 inch PE Pipe

Material List for Figure15720-RR2

Item	Quantity	KUB Item #	Description
1	1	382978	2 inch PE Socket Fusion Tee
2	1	371740	2 inch PE Valve
3	1	383810	2 inch PE Socket Fusion Coupling
4	1	361727	2 inch PE Electrofusion Coupling
5	1-Lot	381175	2 inch PE Pipe

Figure 15720-SS: 1-Valve Tee for New 4-12 inch PE Main to Existing 4-12 inch PE Main

NEW POLYETHYLENE MAIN TEE & VALVE ON EXISTING PE MAIN
 4" ON 4", 6" ON 6", 8" ON 8", & 12" ON 12" MAINS



Material List for Figure 15720-SS4

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	1	360473	4 inch PE Valve
3	1	374439	4 inch PE Electrofusion Coupling
4	1-Lot	380998	4 inch PE Pipe

Material List for Figure 15720-SS6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	1	360693	6 inch PE Valve
3	1	374454	6 inch PE Electrofusion Coupling
4	1-Lot	380808	6 inch PE Pipe

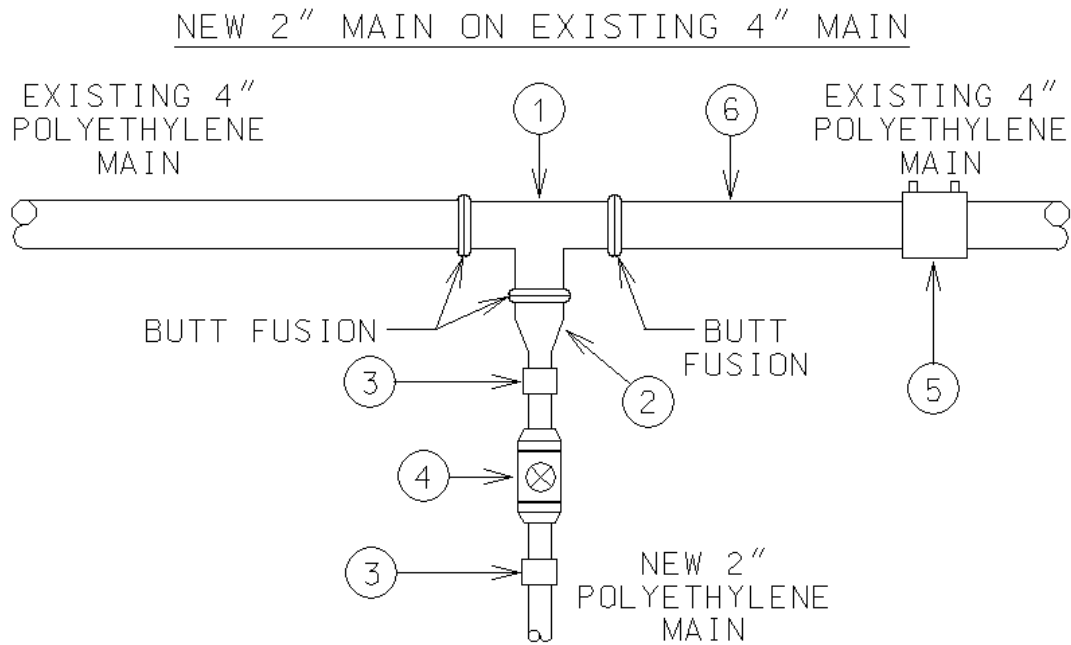
Material List for Figure 15720-SS8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	1	361034	8 inch PE Valve
3	1	374686	8 inch PE Electrofusion Coupling
4	1-Lot	374678	8 inch PE Pipe

Material List for Figure 15720-SS12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361045	12 inch PE Valve
3	1	360979	12 inch PE Electrofusion Coupling
4	1-Lot	360880	12 inch PE Pipe

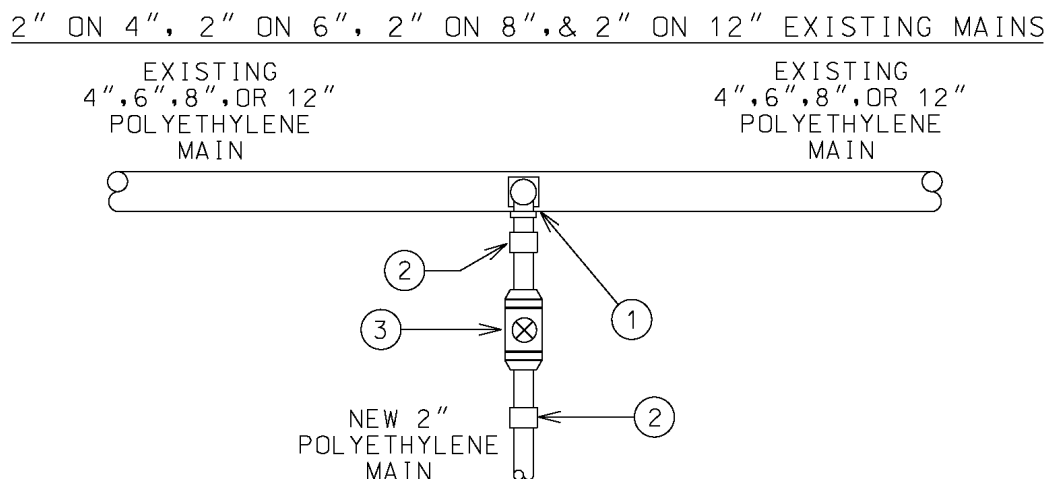
Figure 15720-TT: 1-Valve Tee for New 2 inch PE Main to Existing 4 inch PE Main



Material List for Figure 15720-TT

Item	Quantity	KUB Item #	Description
1	1	370106	4 inch PE Butt Fusion Tee
2	1	380352	4 inch x 2 inch PE Reducer
3	2	383810	2 inch PE Socket Fusion Coupling
4	1	371740	2 inch PE Valve
5	1	374439	4 inch PE Electrofusion Coupling
6	1-Lot	380998	4 inch PE Pipe

Figure 15720-UU: 1-Valve Tee for New 2 inch PE Main to Existing 4-12 inch PE Main



Material List for Figure 15720-UU4

Item	Quantity	KUB Item #	Description
1	1	380311	4 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	1	371740	2 inch PE Valve

Material List for Figure 15720-UU6

Item	Quantity	KUB Item #	Description
1	1	380840	6 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	1	371740	2 inch PE Valve

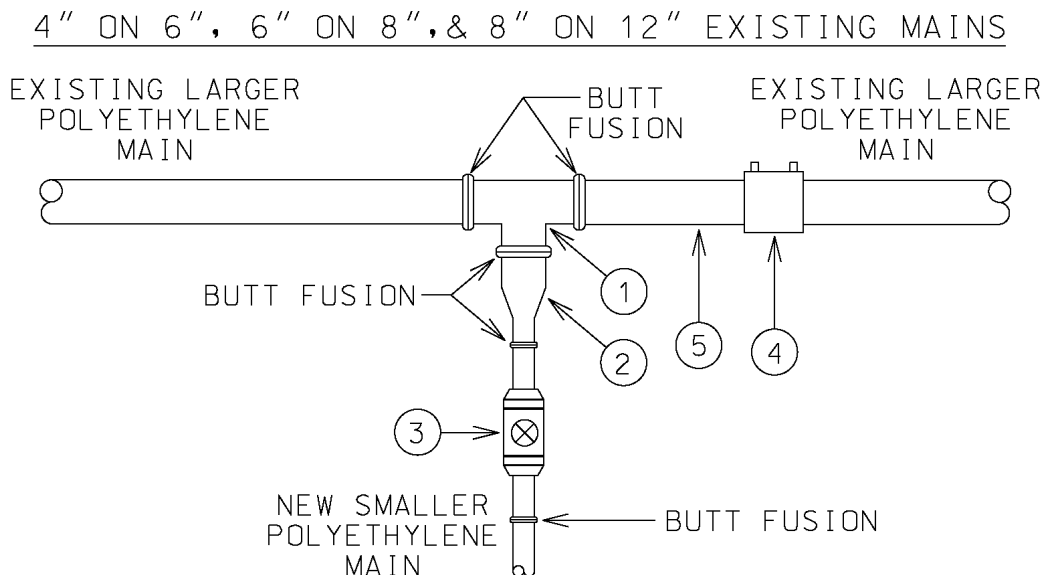
Material List for Figure 15720-UU8

Item	Quantity	KUB Item #	Description
1	1	374835	8 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	1	371740	2 inch PE Valve

Material List for Figure 15720-UU12

Item	Quantity	KUB Item #	Description
1	1	360891	12 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	1	371740	2 inch PE Valve

Figure 15720-VV: Valve Tee for New 4 inch PE Main to Existing 6 inch PE Main, New 6 inch PE Main to Existing 8 inch PE Main, and new 8 inch PE Main to Existing 12 inch PE Main



Material List for Figure 15720-VV6

Item	Quantity	KUB Item #	Description
1	1	380824	6 inch PE Butt Fusion Tee
2	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
3	1	360473	4 inch PE Valve
4	1	374454	6 inch PE Electrofusion Coupling
5	1-Lot	380808	6 inch PE Pipe

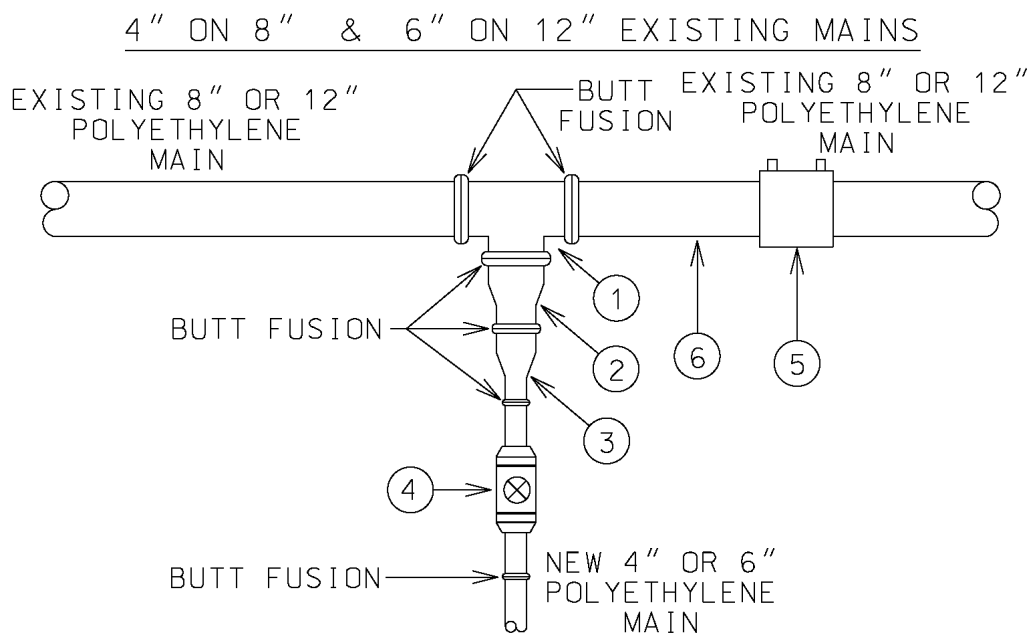
Material List for Figure 15720-VV8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
3	1	360693	6 inch PE Valve
4	1	374686	8 inch PE Electrofusion Coupling
5	1-Lot	374678	8 inch PE Pipe

Material List for Figure 15720-VV12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
3	1	361034	8 inch PE Valve
4	1	360979	12 inch PE Electrofusion Coupling
5	1-Lot	360880	12 inch PE Pipe

Figure 15720-WW: 1-Valve Tee for New 4 inch PE Main to Existing 8 inch PE Main and New 6 inch PE Main to Existing 12 inch PE Main



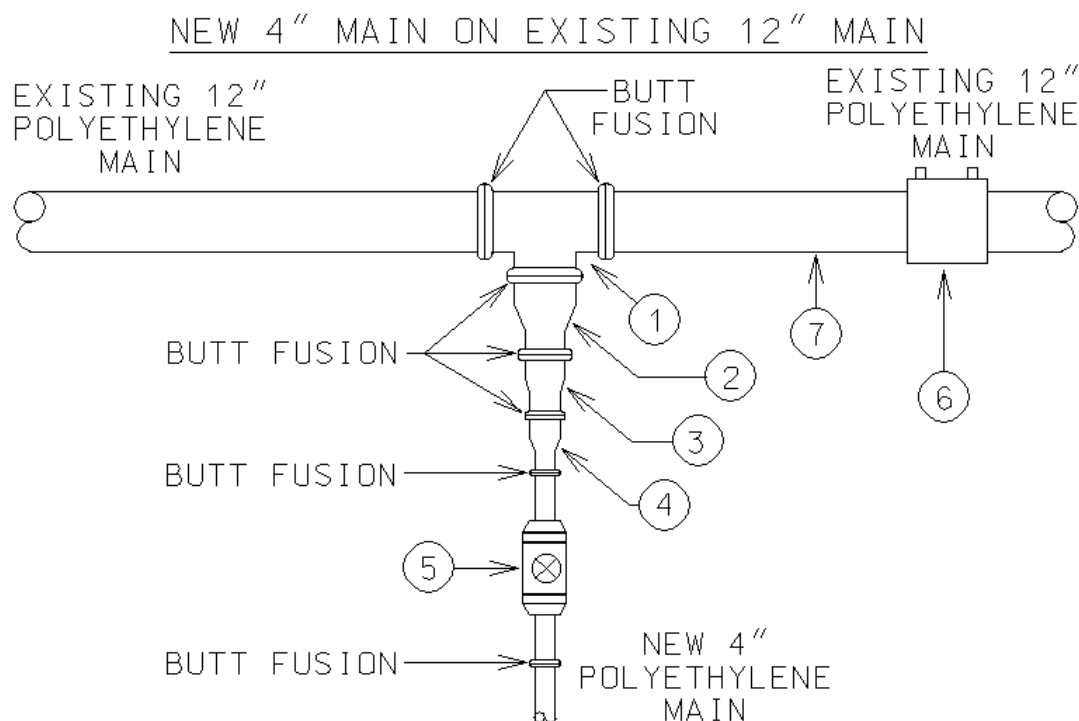
Material List for Figure 15720-WW8

Item	Quantity	KUB Item #	Description
1	1	374694	8 inch PE Butt Fusion Tee
2	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
3	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
4	1	360473	4 inch PE Valve
5	1	374686	8 inch PE Electrofusion Coupling
6	1-Lot	374678	8 inch PE Pipe

Material List for Figure 15720-WW12

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	360693	6 inch PE Valve
5	1	360979	12 inch PE Electrofusion Coupling
6	1-Lot	360880	12 inch PE Pipe

Figure 15720-XX: 1-Valve Tee for New 4 inch PE Main to Existing 12 inch PE Main



Material List for Figure 15720-XX

Item	Quantity	KUB Item #	Description
1	1	361023	12 inch PE Butt Fusion Tee
2	1	361012	12 inch x 8 inch PE Butt Fusion Reducer
3	1	374710	8 inch x 6 inch PE Butt Fusion Reducer
4	1	372110	6 inch x 4 inch PE Butt Fusion Reducer
5	1	360473	4 inch PE Valve
6	1	360979	12 inch PE Electrofusion Coupling
7	1-Lot	360880	12 inch PE Pipe

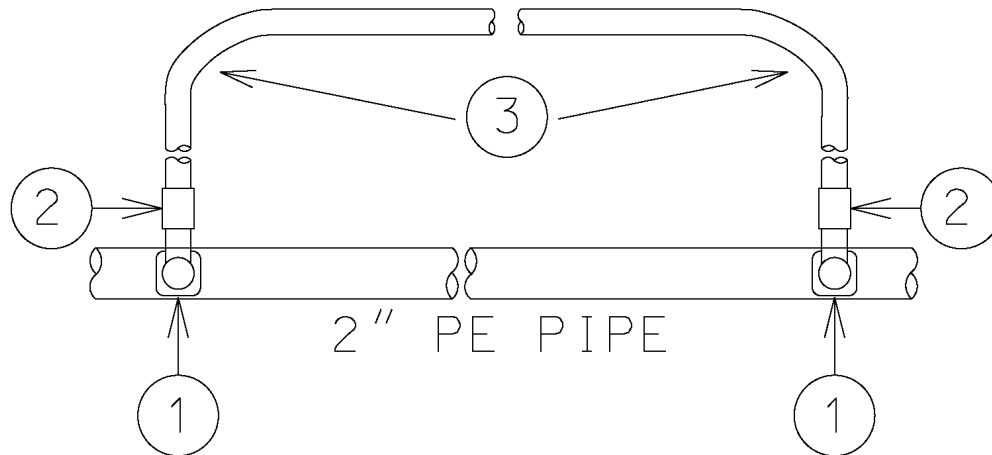


3.13 TEMPORARY BYPASSES

- 3.13.1 Temporary bypasses shall be installed per the project drawings to prevent customer outages when performing a tie-in to a one-way natural gas feed.
- 3.13.2 Temporary bypass plans and details shall be submitted as a part of the startup plan.
- 3.13.3 Temporary bypasses shall be installed as per the figures in this Section. If a temporary bypass is required but cannot conform to the figures in this Section, an additional design is required and must be submitted by the CONTRACTOR for approval prior to installation.
- 3.13.4 The temporary bypass shall be pressure tested in its entirety, including the taps. The requirements in **SECTION 3.11 PRESSURE TESTING** shall be followed for the installation of all temporary bypass units.
 - 3.13.4.1 To prevent unintended customer outages, RPR shall check valves within the applicable areas to ensure system conditions are understood just prior to installing a temporary bypass. RPR shall coordinate with System Operations on all valve operations. RPR shall install pressure gauges as per the startup plan to monitor pressures during tie-in activities. The CONTRACTOR shall not proceed with the tie-in until this is completed.
- 3.13.5 Temporary bypasses shall be condemned per **SECTION 3.15.5** after the tie-in is complete.
- 3.13.6 All temporary bypasses shall have a NGUS submitted for record keeping once the tie-in is complete and the bypass has been condemned. The NGUS shall have proof of pressure testing (receipt printed from a Kuhlman Unit or RPR approved equivalent) for the pipe segment and tap tee that remains in service.
- 3.13.7 Refer to the following figures and material lists for a temporary bypass on a one-way natural gas feed for PE Pipe. For bypass arrangements not covered under these details, refer to the project specific drawings.

Figure 15720-YY: 1 inch PE Temporary Bypass

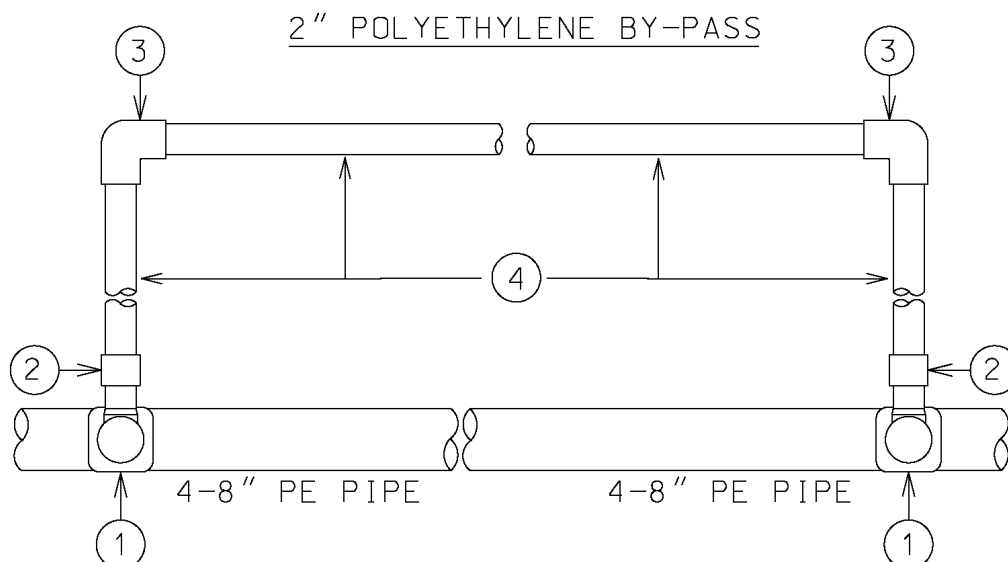
1 " POLYETHYLENE BY-PASS



Material List for Figure 15720-YY

Item	Quantity	KUB Item #	Description
1	2	380949	2 inch x 1 inch PE Tapping Tee
2	2	385013	1 inch PE Socket Fusion Coupling
3	1-Lot	386060	1 inch PE Pipe

Figure 15720-ZZ: 2 inch PE Temporary Bypass



Material List for Figure 15720-ZZ4

Item	Quantity	KUB Item #	Description
1	2	380311	4 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	2	382952	2 inch PE Socket 90 Degree Ell
4	1-Lot	381175	2 inch PE Pipe

Material List for Figure 15720-ZZ6

Item	Quantity	KUB Item #	Description
1	2	380840	6 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	2	382952	2 inch PE Socket 90 Degree Ell
4	1-Lot	381175	2 inch PE Pipe

Material List for Figure 15720-ZZ8

Item	Quantity	KUB Item #	Description
1	2	374835	8 inch x 2 inch PE Tapping Tee
2	2	383810	2 inch PE Socket Fusion Coupling
3	2	382952	2 inch PE Socket 90 Degree Ell
4	1-Lot	381175	2 inch PE Pipe

3.14 PURGING ACTIVITIES

- 3.14.1 Purging activities and purge point locations shall be performed as per the startup plan.
- 3.14.2 A fire extinguisher shall be manned and positioned, upwind if possible, from the purge point at all times during purging activities.
- 3.14.3 Natural gas shall be vented in a manner that is directed away from all ignition sources and done so to prevent natural gas from entering a structure.

- 3.14.4 Weather conditions shall be approved by RPR for purging activities. Factors will include rain and wind conditions that could make purging unsafe for employees or the public.
- 3.14.5 Natural gas shall be vented using a vent no larger than 1 inch without prior approval from OWNER. Vents shall extend above head height (approximately 6 feet above ground surface) for safe venting.
- 3.14.6 Piping shall be grounded to eliminate static discharge.
- 3.14.7 RPR must be notified no less than three full business days prior to the start of any purging activities and RPR must approve the request to purge.
- 3.14.8 RPR shall be present for all purging activities. Using a calibrated combustible gas indicator, RPR shall confirm purge is complete.
- 3.14.9 RPR shall contact Systems Operations no less than 30 minutes prior to starting purging activities.
- 3.14.10 Natural gas shall be purged from lowest elevation point using air or inert gas to the highest elevation point when possible.
- 3.14.11 The requirements in this Section shall be followed when purging natural gas from the main as well as introducing natural gas into main.
- 3.14.12 Tapping tee(s) and pipe used as purge points shall be pressure tested to the requirements in **SECTION 3.11 PRESSURE TESTING**. All purge points and components that remain in service after the purge is complete shall have a NGUS submitted for record keeping. The NGUS shall have proof of pressure testing (receipt printed from a Kuhlman Unit or RPR approved equivalent) for the pipe segment(s) and tap(s) that remain(s) in service.
- 3.14.13 After natural gas has been introduced into the pipeline, all valve box lids shall be painted yellow to designate the main is now active.

3.15 CONDEMNATION

3.15.1 Mains

- 3.15.1.1 CONTRACTOR shall perform condemnation activities per the RPR reviewed startup plan. Condemnation activities shall be performed in a manner to prevent customer outages. Condemnation shall occur only after proper purging as per **SECTION 3.14 PURGING ACTIVITIES**.
- 3.15.1.2 RPR shall be notified three full business days prior to condemning a natural gas main.
- 3.15.1.3 To prevent unintended customer outages, RPR shall coordinate with System Operations to check and confirm the position of all valves within the applicable areas and system conditions are understood just prior to condemnation activities. RPR shall install pressure gauges as per the startup plan to monitor pressures during condemnation activities.
- 3.15.1.4 Once natural gas has been purged from the main, a mechanical, weld or fusion cap sealing the pipe shall be installed. Cap shall be of the same material as the main being condemned, i.e. PE cap for PE main, metallic cap for metallic main, etc.

3.15.2 Valves and Valve Boxes

- 3.15.2.1 Valves shall be condemned in place with the main, and the valve boxes shall be condemned by removing the valve box lid, demolishing or removing the valve box top section and backfilling as required in **SECTION 3.8 BACKFILL**.
- 3.15.2.2 If valve boxes are not immediately demolished or removed when natural gas is purged from the main, valve box lids shall be painted white until demolishing.

3.15.3 Test Stations

- 3.15.3.1 Test stations shall be condemned by cutting wires and removing test station housing.
- 3.15.3.2 If test station is housed in a valve box, the valve box shall be condemned by removing the valve box lid, demolishing or removing the valve box top section and backfilling as required in **SECTION 3.8 BACKFILL**.



- 3.15.3.3 If test stations housed in a valve box are not immediately demolished when the steel gas main is taken out of service, the valve box lids shall be painted white until demolishing.
- 3.15.4 **Mains on Bridges**
- 3.15.4.1 Mains on bridges shall be condemned by physically removing all above ground main and its components. Fused, mechanical, or welded end caps shall be installed on the pipeline that is abandoned below ground.
- 3.15.5 **Temporary Bypasses**
- 3.15.5.1 Temporary bypasses shall be condemned in closest proximity to the gas main while in accordance with manufacturers' squeeze off procedures (no less than 26 inches from the outlet of the tee unless a valve is present) with a fusion end cap and an OWNER supplied marker ball (KUB Item #363718) placed at the end of the piping.
- 3.15.5.2 Bypass piping shall be removed from the trench or have end caps fused on each end if abandoned in place.
- 3.16 CLEAN UP AND RESTORATION**
- 3.16.1 Follow clean up and restoration requirements stated in **SECTION 00700 General Conditions** and **SECTION 01560 Work In Easements and Right-Of-Ways**.
- 3.17 RECORD KEEPING**
- 3.17.1 **Pressure Test Records**
- 3.17.1.1 Proof of pressure testing (receipt printed from a Kuhlman Unit or approved equivalent) shall be submitted to the RPR after testing requirements have been completed for approval. Upon approval, natural gas may be introduced to the main.
- 3.17.1.2 Documentation shall be provided to the RPR that properly illustrates the segments of main tested as a single unit.
- 3.17.1.3 All pressure test documentation shall be signed by the qualified person responsible for performing the pressure test.
- 3.17.2 **Test Station Natural Gas Utility Sheet (NGUS)**
- 3.17.2.1 A Natural Gas Utility Sheet (NGUS) shall be completed for every test station installed or condemned within the project scope.
- 3.17.2.2 Test station NGUS's shall be submitted to the RPR within two business days of completed installation or condemnation.
- 3.17.3 **Boring Profile**
- 3.17.3.1 If required per the project scope, a final boring profile (electronic is preferred) shall be submitted to RPR within two business days of completed bore.
- 3.17.3.2 The electronic format shall consist of, at a minimum, a table illustrating pitch and depth for the length of every other rod for crossings including, but not limited to, creeks, railroads, railroad spurs, intersections, road crossings and/or when pipe is installed outside of the specified requirements in **SECTION 3.5 DEPTH**

END OF SECTION