

NASA GRC – Repair Sewers Phase 9
Solicitation Number NNC10ZCH028E
AMENDMENT #1

Modifications/Clarifications:

1. All Storm water management details and notes are on Sheets C-536 and C-537 not C-534 and C-535.
2. For catch basin and inlet sediment control the contractor shall use Flexstorm inlet filters or an approved equal. Dandy Bags shall not be used
3. Sheet 533: Concrete Section Clarification: The section shall be 8” ODOT Item 401 with 6” x 6” W8.5 x W8.5 WWF, 10” Compacted ODOT 304 with an under drain, ODOT Item 204 compacted sub base. The under drain will not be necessary under the PSL concrete slabs in the base bid. Please note transverse and longitudinal joints will be required per ODOT standard drawings BP 2.1 and BP 2.2. There will be expansion joints required every 300 feet and as shown on construction documents.
4. Sheet C-106: TC refers to top of curb. For the concrete pads there is a variable height curb to aid in the transition of the grade.
5. Sheet C-114: The solid waste excavation area in option 1 has been modified.
6. Sheet M-511: The gas regulator station detail has been modified.
7. The option 2 scope has been modified to include the following:
 - a. Removal and disposal of 9 trees with an average caliper of 2’ and 1 tree with a caliper of 4’. The trees must be chipped on-site into 2” or less chips and recycled.
 - b. Installation of 9 prairie fire crab apple trees with a minimum caliper of 2”.

Attachments:

1. Alternate Fence detail.
 2. Modified drawing C-114.
 3. Modified drawing M-511.
 4. Specification section 33 11 00; Water distribution
-

Question and Answers:

1. Question: Could orange construction fence be used instead of 6' high temporary chain link fencing for temporary safety zones/work areas.

Answer: Yes, but the attached detail must be followed for supporting and securing the fence.

2. Question: Regarding proposed CB 5 on sheet C 201 in the base bid what is anticipated for ground conditions during installation of the new structure? What type of shoring will be required by NASA for this installation? Is that area of work all aggregate, fill materials or clay soils?

Answer: The anticipated ground conditions will be Clay fill soil. The shoring method is up to the contractor. The contractor is required to prepare shoring plans per the Glenn Safety Manual and OSHA regulations.

3. Question: Will a full time on site safety supervisor representing the general contractor be required for the base bid and both options?

Answer: No, contract clause H.12 has been removed from the contract.

4. Question: Will a full time on site project manager representing the general contractor be required for the base bid and both options?

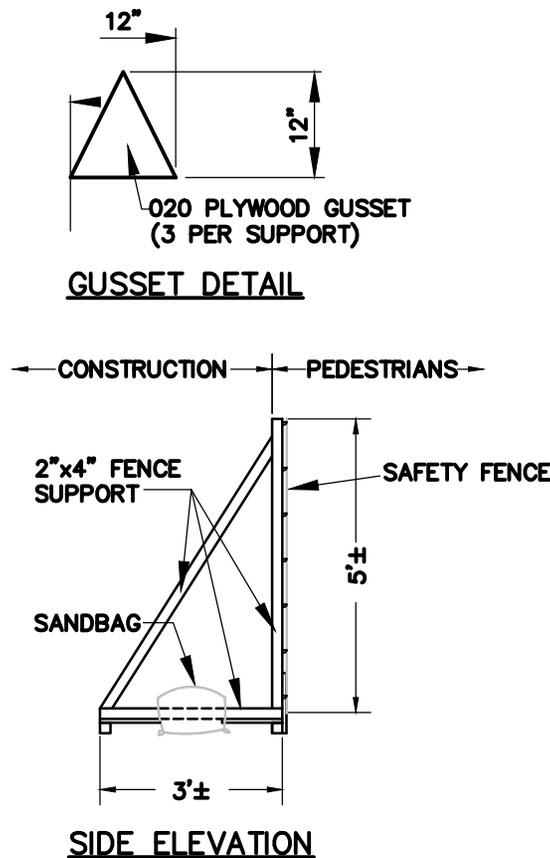
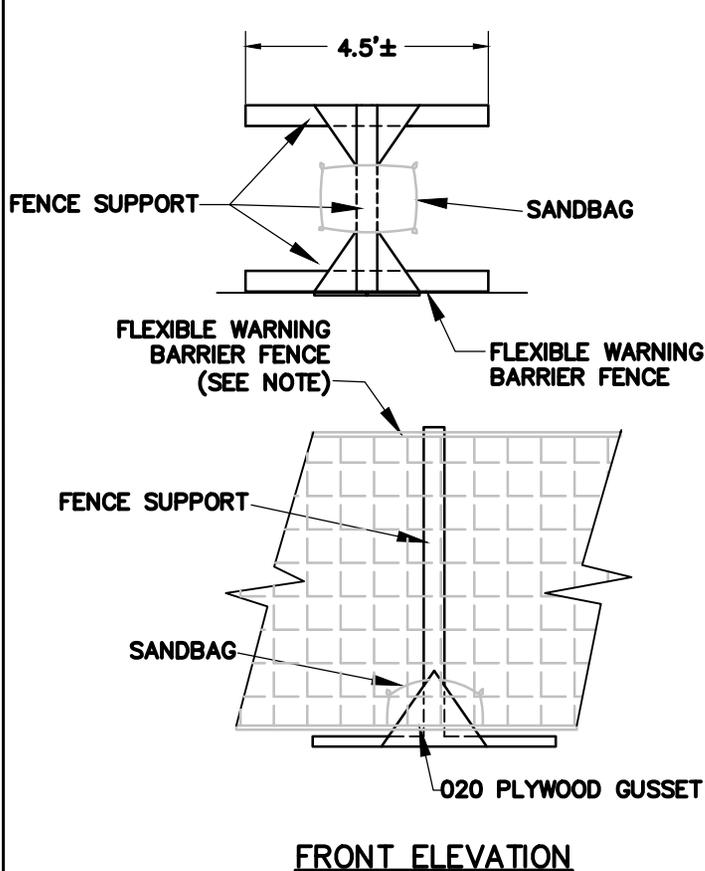
Answer: No. Per contract clause H.11, the contractor is required to have an onsite project superintendent representing the general contractor whenever work is being performed.

5. Question: Will geotechnical data be available to contractors for this project?

Answer: No. The site consists on clay soils.

6. Question: Will a separate specification section be provided for the proposed IWS lines and Waterline relocation work? (Specifying any special requirements, type of pipe, requirements for bedding and backfill....)

Answer: The IWS sewers and structures shall be installed per the sanitary sewer details and specifications. The IWS pipe material shall be what is shown on the contract drawings. A water distribution specification is attached.



Flexible Warning Barrier Fence
Free Standing Support
Detail 'A'

Not to Scale

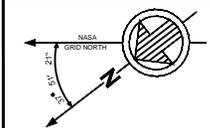
NOTE:

1. CONTRACTOR SHALL INSTALL FLEXIBLE WARNING BARRIER FENCE WHERE INDICATED AND WHERE NECESSARY TO PROVIDE A COMPLETE BARRIER TO THE CONSTRUCTION SITE. FENCE FABRIC SHALL MEET THE FOLLOWING SPECIFICATIONS:

- COLOR: INTERNATIONAL ORANGE
- HEIGHT: 5 FEET
- STANDARD MESH OPENING: 1.5 INCH NOMINAL
- STANDARD WEIGHT: 250 LB PER ROLL
- TENSILE YIELD (RANGE): 1800 - 2650 PSI
- ULTIMATE TENSILE STRENGTH: 2000 - 2300 PSI
- IMPACT LOAD (RANGE): 5.4 - 6.1 N M
- ELONGATION AT BREAK: 660%
- SERVICE TEMPERATURE RANGE: -18 TO 93 DEGREES C

THE FABRIC SHALL BE SUPPORTED AT A MAXIMUM OF 10 FOOT INTERVALS BY FREE-STANDING METAL OR WOOD SUPPORTS, SIMILAR IN CONFIGURATION TO THAT SHOWN IN DETAIL "A" OR APPROVED ALTERNATE. NO FENCE POSTS SHALL BE DRIVEN INTO ANY PAVEMENT. THE FABRIC SHALL BE TIED TO EVERY SUPPORT WITH A MINIMUM OF 5 WIRE TIES IN A MANNER THAT WILL NOT CAUSE HARM OR INJURY.

THE CONTRACTOR SHALL PERFORM DAILY INSPECTIONS OF CONSTRUCTION FENCE AND REPAIR AND MAINTAIN THE FENCE AS NECESSARY.



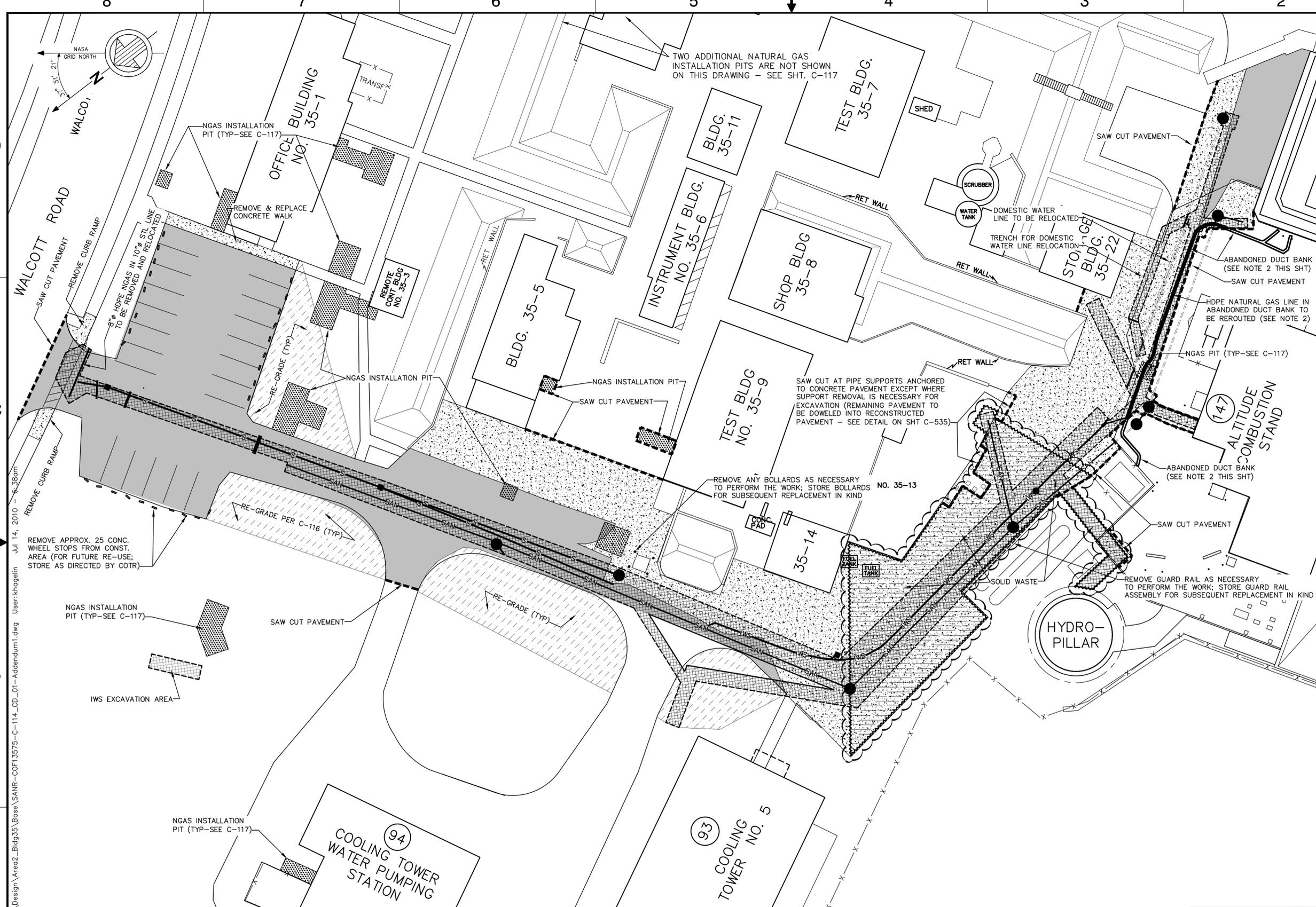
NASA Glenn Research Center
Cleveland, Ohio 44135

Sewers Phase 9

Temporary Construction Fence
Detail for Addendum 1



kwh	1/1
07/14/2010	



- NOTES:**
- CONTRACTOR TO PROTECT ALL APPURTENANCES FASTENED TO PAVEMENT. CONTRACTOR TO COORDINATE WITH NASA FOR TEMPORARY REMOVAL OR DIRECTION.
 - IT IS NECESSARY TO REROUTE APPROXIMATELY 80 LINEAL FEET OF 1 1/2" HDPE NATURAL GAS LINE FOR INSTALLATION OF SANITARY SEWER IN THE AREA INDICATED ON THIS DRAWING. THE EXISTING GAS LINE SHARES A 12"x24"± CONCRETE ENCASED DUCT BANK WITH TWO ABANDONED 6" PVC ELECTRICAL CONDUITS FROM WHICH CABLES HAVE BEEN PULLED. THE TOP OF THE DUCT BANK IS MARKED WITH RED DYE. THIS DUCT BANK SHALL BE REMOVED AS REQUIRED AND THE NATURAL GAS LINE REROUTED AWAY FROM THE SANITARY SEWER INSTALLATION TRENCH AND MANHOLES AS INDICATED ON DRAWING C-115

- LEGEND**
- SOLID WASTE SOIL EXCAVATION AREA
 - DEMOLISH AND REMOVE CONCRETE PAVEMENT
 - DEMOLISH AND REMOVE ASPHALT PAVEMENT
 - APPROXIMATE LIMITS OF NATURAL GAS PIPE INSTALLATION PIT (AS NECESSARY FOR INSTALLATION)
 - APPROXIMATE LIMITS OF SEWER INSTALLATION TRENCH OR PIT (AS NECESSARY FOR INSTALLATION)
 - LIMITS OF SITE GRADING FOR DRAINAGE IMPROVEMENT
 - SAW CUT EXISTING PAVEMENT
 - REMOVE EXIST. UTILITY LINE
 - ABANDON EXIST. UTILITY LINE
 - REMOVE CATCH BASIN
 - REMOVE MANHOLE

BID ADDENDUM 1 - MODIFIED SOLID WASTE SOIL EXCAVATION AREA 07-14-2010

Demolition and Excavation Plan

Scale: 1" = 20'

FD
BUILDING SOLUTIONS FOR RESEARCH

SYSTEM ID SSWR	FACILITY ID	CONFIG CTRL
DR. kwh	DES. JD	
D.ENG. JD	TECH LEAD/BR CH	
PROJ. MGR.	DIV CHIEF:	
FAC/SYS MGR:		
RELEASE STATUS:		

CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	TECH LEAD:	FAC-SYS MGR:	REV DATE:
EDMS REVISION			

CAD DRAWING - DO NOT REVISE MANUALLY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHN H. GLENN RESEARCH CENTER
LEWIS FIELD
CLEVELAND, OHIO

REPAIR SEWER SYSTEMS
PHASE 9 OPTION 1 (BLDG 35)

DEMOLITION AND EXCAVATION
PLAN

SIZE	BLDG/SYS	PROJECT ID	DISCP	TYP SEQ
		CD SANR - COF13575		- C 114
AREA:	SHEET 1 OF 1			
UNITS: ENGLISH	SOFTWARE: AutoCad C3d 2010	REVISION		
SCALE: 1" = 20'	OFFICIAL DATE: 06/10/10			

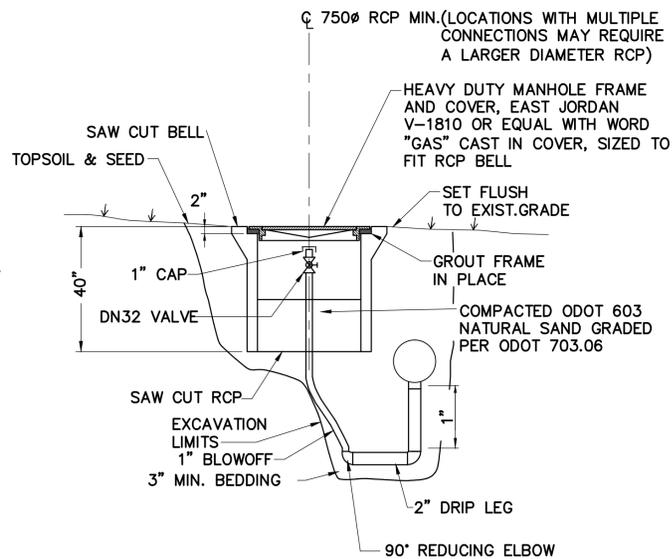
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Jul 14, 2010 8:38am User: khagalin
 \\gr200605070\Repair_Sewers Ph 9\Civil\Design\Area2_Bldg35\Bases_SANR-COF13575-C-114_CD_01-Addendum1.dwg

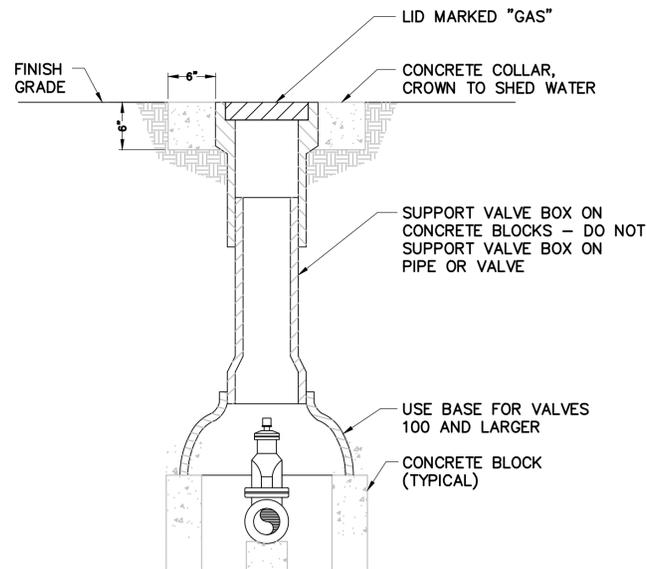
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FOR POLYETHYLENE PIPING, VALVE SHALL BE DN32 PSV POLYETHYLENE SHUTOFF VALVE BY PERFECTION CORPORATION WITH PE3408 SDR 11 ENDS.



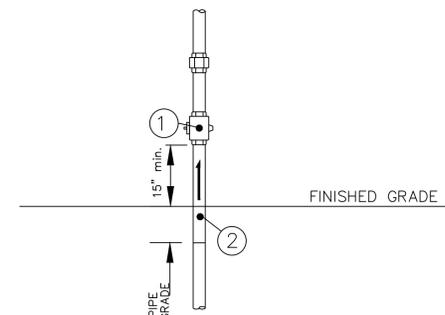
LOW POINT BLOWOFF
INSTALLATION
TYPICAL DETAIL
NOT TO SCALE

2



STANDARD CURB BOX
DETAIL
NOT TO SCALE

5



STANDARD BUILDING RISER
DETAIL
NOT TO SCALE

6

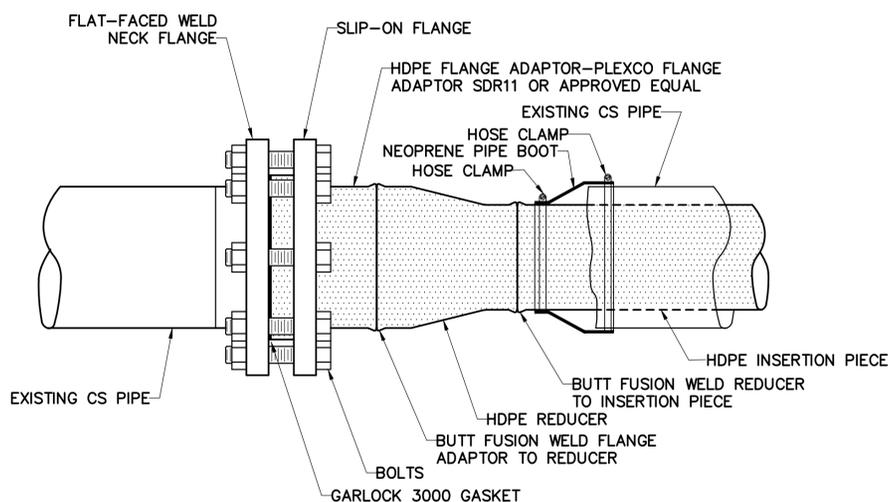
GENERAL NOTE

1. ALL PIPING SUPPORTS TO BE STAINLESS STEEL
2. ALL CARBON STEEL PIPE TO BE PRIMED AND PAINTED TWO FINISH COATS SAFETY YELLOW

- ① CARBON STEEL PLUG VALVE
- ② SINGLE SEAL ANODELESS RISER 'ELSTER PERFECTION' OR EQUAL

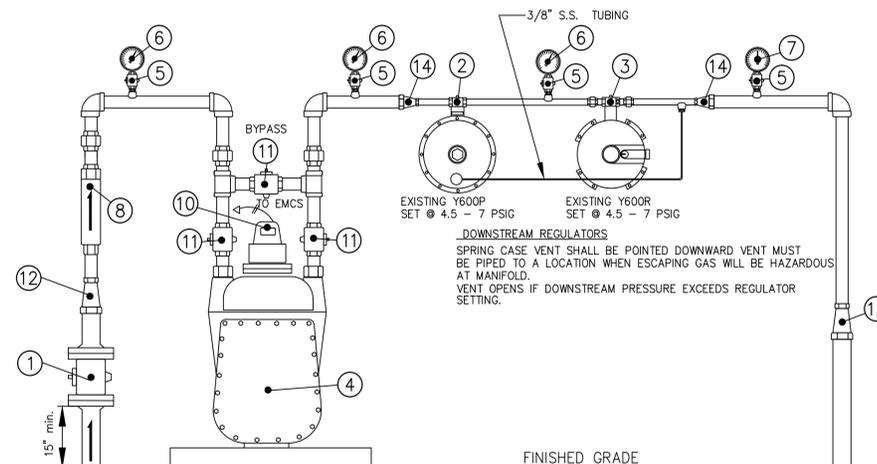
GENERAL

1. EQUIPMENT LISTED ON THESE DRAWINGS BY MANUFACTURER'S BRAND NAME IS TO DENOTE THE QUALITY AND SALIENT FEATURES FOR EQUAL PRODUCTS ONLY.
2. INSTALLATION DIMENSIONS RELATIVE TO EQUIPMENT STRUCTURE AND PIPE ARE APPROXIMATE AND SHALL BE VERIFIED IN THE FIELD. CONTRACTOR IS RESPONSIBLE FOR VERIFYING DIMENSIONS AFTER PURCHASE OF VALVES AND EQUIPMENT.
3. CONTRACTOR SHALL PROVIDE PIPE AND EQUIPMENT SUPPORTS IN FIELD TO SUIT LOCAL CONDITIONS. ADJUST PIPE SUPPORTS TO PROVIDE FREE LATERAL MOVEMENT OF PIPE.
4. ALL PIPING ELEVATIONS ARE TO THE CENTERLINE OF PIPE UNLESS OTHERWISE NOTED.
5. MECHANICAL SCHEMATICS ARE DIAGRAMMATIC ONLY AND DO NOT SHOW ALL FITTINGS NECESSARY TO COMPLETE THE WORK. THE CONTRACTOR SHALL PROVIDE ALL THE NECESSARY FITTINGS AND OFFSETS TO COMPLETE THE INSTALLATION AND PROVIDE A FUNCTIONAL SYSTEM.



HDPE TO CARBON STEEL
PIPE CONNECTION
TYPICAL DETAIL
NOT TO SCALE

3



THE EXISTING REUSED (DOWNSTREAM) REGULATORS WILL BE THE NATURAL GAS PRIMARY REGULATORS AND MUST BE SET AT A LOWER SUPPLY PRESSURE. THE EXISTING REUSED (UPSTREAM) REGULATORS WILL MONITOR DOWNSTREAM PRESSURE. IF DOWNSTREAM REGULATORS FAIL THE UPSTREAM REGULATORS WILL TAKE OVER PRESSURE CONTROL.

GENERAL NOTE:

1. SUPPORT GAS METER AND REGULATOR STATION ON 4" THICK CONCRETE PAD ON GRADE TO PROVIDE STABLE INSTALLATION
2. ALL PIPING SUPPORTS TO BE STAINLESS STEEL
3. ALL CARBON STEEL PIPE TO BE PRIMED AND PAINTED TWO FINISH COATS SAFETY YELLOW

- ① 3"Ø FLANGED CARBON STEEL PLUG VALVE
- ② EXISTING REUSED "FISHER" MODEL Y600P MONITOR REGULATOR, w/ 3/8" DOWNSTREAM CONTROL PORT, SET AT 15 PSIG
- ③ EXISTING REUSED "FISHER" MODEL Y600R MONITOR REGULATOR, w/ 3/8" DOWNSTREAM CONTROL PORT, SET AT 15 PSIG
- ④ EXISTING "AMERICAN METER CO" DIAPHRAGM METER w/REMOTE OUTPUT
- ⑤ 1/4" PLUG VALVE
- ⑥ PRESSURE GAUGE "ASHCROFT" TYPE 1009, LIQUID FILLED SS CASE, 1/4" NPT, BTM MTD 0-100 PSIG
- ⑦ PRESSURE GAUGE "ASHCROFT" TYPE 1490, BRASS CASE, 1/4" NPT, BTM MTD 0-30 PSIG
- ⑧ "KLEANLINE" FILTER FROM AMERICAN METER, SCREWED 1 PSIG DROP 36,400 CFH FOR 2" NPT
- ⑨ SINGLE SEAL ANODELESS RISER "ELSTER PERFECTION" OR EQUAL
- ⑩ "IMAC", R1 PULSE COUNTER AND R4 REMOTE TOTALIZER w/4-20mA OUTPUT, 120/230 VOLTS AC REQUIRED
- ⑪ 2"Ø CARBON STEEL PLUG VALVE
- ⑫ 2" X 3" CARBON STEEL REDUCING FITTING
- ⑬ OMITTED
- ⑭ 2" X 3" CARBON STEEL REDUCING FITTING

REGULATOR STATION
DETAIL
NOT TO SCALE

4

VALVE AND HANDHOLE SCHEDULE

INSTALLATION DETAIL	CENTERLINE STATION	SERVICE DESCRIPTION	VALVE DIAMETER	DUAL PURGE	VALVE MATERIAL	CASTING	RCP HANDHOLE DIAMETER
4-M500	6+009	BLDG 35 REGULATOR STATION	SEE DET.	NO	SEE DET.	N/A	N/A
5-M500	7+002	BLDG 35-1/2 SERVICE	Ø80	NO	SEE DET.	STD CURB BOX	N/A
2-M500	7+014	BLDG 35 L.P. BLOWOFF	Ø32	NO	HDPE	V-1810-4	600
2-M500	8+020	BLDG 35-5/9 SERVICE	Ø80	NO	HDPE	STD CURB BOX	N/A
2-M500	9+002	BLDG 94 SERVICE	Ø80	NO	HDPE	STD CURB BOX	N/A

BID ADDENDUM 1 - MODIFIED REGULATOR STATION DETAIL 07-14-2010

CHG	NUM	DESCRIPTION	APP/DATE
REVISIONS			
LAST APPROVED	TECH LEAD:	FAC-SYS MGR:	REV DATE:
EDMS REVISION			

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CLEVELAND, OHIO

REPAIR SEWER SYSTEMS
PHASE 9 OPTION 1 (BLDG 35)

NATURAL GAS REPAIR
VALVE AND HANDHOLE SCHEDULE
AND TYPICAL DETAILS

SIZE BLDG/SYS PROJECT ID DISCP TYP SEQ
CD SANR - COF13575 - M 511

AREA: SHEET 1 OF 1

UNITS: ENGLISH SOFTWARE: AutoCad C3d 2010 REVISION

SCALE: AS NOTED OFFICIAL DATE: 6/10/2010

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SYSTEM ID	FACILITY ID	CONFIG CTRL
DR.	DES.	
D.ENG.		
PROJ. MGR.	TECH LEAD/BR CH	
FAC/SYS MGR:	DIV CHIEF:	
RELEASE STATUS:		

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SECTION 33 11 00

WATER DISTRIBUTION
10/06

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO HB-17 (2002; Errata 2003; Errata 2005) Standard Specifications for Highway Bridges

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION
(AREMA)

AREMA Eng Man (2008) Manual for Railway Engineering

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300 (2004) Hypochlorites

AWWA B301 (2004) Liquid Chlorine

AWWA C104/A21.4 (2008) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

AWWA C105/A21.5 (2008) Polyethylene Encasement for Ductile-Iron Pipe Systems

AWWA C110/A21.10 (2008) Ductile-Iron and Gray-Iron Fittings for Water

AWWA C111/A21.11 (2000) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

AWWA C115/A21.15 (2005) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges

AWWA C151/A21.51 (2002; Errata 2002) Ductile-Iron Pipe, Centrifugally Cast, for Water

AWWA C153/A21.53 (2006) Ductile-Iron Compact Fittings for Water Service

AWWA C200 (2005) Steel Water Pipe - 6 In. (150 mm) and Larger

AWWA C203 (2008) Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel

and Tape - Hot-Applied

- AWWA C205 (2007) Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. (100 mm) and Larger - Shop Applied
- AWWA C206 (2003) Field Welding of Steel Water Pipe
- AWWA C207 (2007) Standard for Steel Pipe Flanges for Waterworks Service-Sizes 100 mm through 3600 mm 4 in. through 144 in.
- AWWA C208 (2007) Standard for Dimensions for Fabricated Steel Water Pipe Fittings
- AWWA C209 (2006) Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections and Fitting for Steel Water Pipe
- AWWA C210 (2007) Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
- AWWA C300 (2004) Reinforced Concrete Pressure Pipe, Steel-Cylinder Type
- AWWA C301 (2007) Prestressed Concrete Pressure Pipe, Steel-Cylinder Type
- AWWA C303 (2002) Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type
- AWWA C500 (2002; R 2003) Metal-Seated Gate Valves for Water Supply Service
- AWWA C502 (2005) Dry-Barrel Fire Hydrants
- AWWA C503 (2005) Wet-Barrel Fire Hydrants
- AWWA C504 (2006) Standard for Rubber-Seated Butterfly Valves
- AWWA C508 (2001) Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS
- AWWA C509 (2001) Resilient-Seated Gate Valves for Water Supply Service
- AWWA C600 (2005) Installation of Ductile-Iron Water Mains and Their Appurtenances
- AWWA C605 (2005) Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
- AWWA C606 (2006) Grooved and Shouldered Joints

AWWA C651 (2005; Errata 2005) Standard for Disinfecting Water Mains

AWWA C700 (2002; Errata 2008) Standard for Cold Water Meters - Displacement Type, Bronze Main Case

AWWA C701 (2007) Standard for Cold-Water Meters - Turbine Type for Customer Service

AWWA C702 (2001) Cold-Water Meters - Compound Type

AWWA C703 (1996; R 2004) Cold-Water Meters - Fire Service Type

AWWA C704 (2008) Propeller-Type Meters for Waterworks Applications

AWWA C706 (1996; R 2005) Direct-Reading, Remote-Registration Systems for Cold-Water Meters

AWWA C707 (2005) Encoder-Type Remote-Registration Systems for Cold-Water Meters

AWWA C800 (2005) Underground Service Line Valves and Fittings

AWWA C900 (2007; Errata 2008) Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Distribution

AWWA C901 (2008) Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13mm) Through 3 In. (76 mm), for Water Service

AWWA C905 (1997) Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 14 In. Through 48 In. (350 mm through 1,200 mm)

AWWA C906 (2007) Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) through 63 In., (1,575 mm) for Water Distribution and Transmission

AWWA C909 (2002) Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 IN through 12 IN (100 mm Through 300 mm), for Water Distribution

AWWA C950 (2007) Fiberglass Pressure Pipe

AWWA M11 (2004) Manual: Steel Pipe: A Guide for Design and Installation

AWWA M23 (2002) Manual: PVC Pipe - Design and

Installation

AWWA M9 (2008) Manual: Concrete Pressure Pipe

ASME INTERNATIONAL (ASME)

ASME B16.1 (2005) Standard for Gray Iron Threaded Fittings; Classes 125 and 250

ASME B16.15 (2006) Cast Bronze Threaded Fittings Classes 125 and 250

ASME B16.18 (2001; R 2005) Cast Copper Alloy Solder Joint Pressure Fittings

ASME B16.22 (2001; R 2005) Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

ASME B16.26 (2006) Standard for Cast Copper Alloy Fittings for Flared Copper Tubes

ASME B16.3 (2006) Malleable Iron Threaded Fittings, Classes 150 and 300

ASME B16.4 (2006) Standard for Gray Iron Threaded Fittings; Classes 125 and 250

ASME B18.2.2 (1987; R 2005) Standard for Square and Hex Nuts

ASME B18.5.2.1M (2006) Metric Round Head Short Square Neck Bolts

ASME B18.5.2.2M (1982; R 2005) Metric Round Head Square Neck Bolts

ASTM INTERNATIONAL (ASTM)

ASTM A 307 (2007b) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

ASTM A 47/A 47M (1999; R 2004) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process

ASTM A 48/A 48M (2003; R 2008) Standard Specification for Gray Iron Castings

ASTM A 53/A 53M (2007) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A 536 (1984e1; R 2004) Standard Specification for Ductile Iron Castings

ASTM A 563	(2007a) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A 563M	(2007) Standard Specification for Carbon and Alloy Steel Nuts (Metric)
ASTM A 746	(2003) Standard Specification for Ductile Iron Gravity Sewer Pipe
ASTM B 32	(2008) Standard Specification for Solder Metal
ASTM B 42	(2002e1) Standard Specification for Seamless Copper Pipe, Standard Sizes
ASTM B 61	(2008) Standard Specification for Steam or Valve Bronze Castings
ASTM B 62	(2002) Standard Specification for Composition Bronze or Ounce Metal Castings
ASTM B 88	(2003) Standard Specification for Seamless Copper Water Tube
ASTM B 88M	(2005) Standard Specification for Seamless Copper Water Tube (Metric)
ASTM C 150	(2007) Standard Specification for Portland Cement
ASTM C 94/C 94M	(2009) Standard Specification for Ready-Mixed Concrete
ASTM D 1527	(1999; R 2005) Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
ASTM D 1599	(2005) Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings
ASTM D 1784	(2008) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 1785	(2006) Standard Specification for Poly(Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2235	(2004) Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
ASTM D 2241	(2005) Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)

ASTM D 2282 (1999; R 2005)
Acrylonitrile-Butadiene-Styrene (ABS)
Plastic Pipe (SDR-PR)

ASTM D 2464 (2006) Standard Specification for Threaded
Poly(Vinyl Chloride) (PVC) Plastic Pipe
Fittings, Schedule 80

ASTM D 2466 (2006) Standard Specification for
Poly(Vinyl Chloride) (PVC) Plastic Pipe
Fittings, Schedule 40

ASTM D 2467 (2006) Standard Specification for
Poly(Vinyl Chloride) (PVC) Plastic Pipe
Fittings, Schedule 80

ASTM D 2468 (1996a) Acrylonitrile-Butadiene-Styrene
(ABS) Plastic Pipe Fittings, Schedule 40

ASTM D 2564 (2004e1) Standard Specification for
Solvent Cements for Poly(Vinyl Chloride)
(PVC) Plastic Piping Systems

ASTM D 2657 (2007) Heat Fusion Joining Polyolefin Pipe
and Fittings

ASTM D 2774 (2008) Underground Installation of
Thermoplastic Pressure Piping

ASTM D 2855 (1996; R 2002) Standard Practice for
Making Solvent-Cemented Joints with
Poly(Vinyl Chloride) (PVC) Pipe and
Fittings

ASTM D 2996 (2001; R 2007e1) Filament-Wound
"Fiberglass" (Glass-Fiber-Reinforced
Thermosetting-Resin) Pipe

ASTM D 2997 (2001; R 2007e1) Centrifugally Cast
"Fiberglass" (Glass-Fiber-Reinforced
Thermosetting-Resin) Pipe

ASTM D 3139 (1998; R 2005) Joints for Plastic Pressure
Pipes Using Flexible Elastomeric Seals

ASTM D 3839 (2008) Underground Installation of
"Fiberglass" (Glass-Fiber-Reinforced
Thermosetting-Resin) Pipe

ASTM D 4161 (2001; R 2005) "Fiberglass"
(Glass-Fiber-Reinforced
Thermosetting-Resin) Pipe Joints Using
Flexible Elastomeric Seals

ASTM F 1483 (2005) Oriented Poly(Vinyl Chloride),
PVC-O, Pressure Pipe

ASTM F 402 (2005) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings

ASTM F 477 (2008) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80 (2008) Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1961 (2007) Standard on Fire Hose

NFPA 24 (2006) Standard for the Installation of Private Fire Service Mains and Their Appurtenances

NFPA 325 (1994) Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids

NFPA 49 (2003) Hazardous Chemicals Data

NFPA 704 (2006) Identification of the Hazards of Materials for Emergency Response

UNDERWRITERS LABORATORIES (UL)

UL 246 (1993; Rev thru Dec 1998) Hydrants for Fire-Protection Service

UL 262 (2004) Standard for Gate Valves for Fire-Protection Service

UL 312 (2004) Check Valves for Fire-Protection Service

UL 789 (2004; Rev thru Aug 2008) Indicator Posts for Fire-Protection Service

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-3 (1992) Recommended Practice for the Installation of Polyvinyl Chloride (PVC) Pressure Pipe (Nominal Diameters 4-36 Inch)

UBPPA UNI-B-8 (2000) Recommended Practice for the Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe (Nominal Diameters 6-12 Inch)

1.2 Related Requirements (LEED)

Section 01 35 43.98 ENVIRONMENTAL PROTECTION PROCEDURES for disposal of construction and demolition waste.

1.3 DESIGN REQUIREMENTS

1.3.1 Water Distribution Mains

Provide water distribution mains indicated as 4-12 inch lines of ductile-iron. Provide water main accessories, gate valves and check valves as specified and where indicated.

1.3.2 Water Service Lines

Provide water service lines indicated as 6-12 inch lines from water distribution main to building service at a point approximately 5 feet from building. Water service lines shall be ductile iron pipe appurtenances, and valves as specified for water mains may also be used for service lines. Provide water service line appurtenances as specified and where indicated

1.4 SUBMITTALS

Government approval is required for all submittals. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Piping Materials

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Hydrants

Valve boxes

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on and rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings;

Local/Regional Materials; (LEED)

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Piping

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Piping

Shop-applied lining and coating

SD-05 Design Data

Design calculations of water piping

SD-06 Test Reports

Bacteriological Disinfection.

Test results from commercial laboratory verifying disinfection

SD-07 Certificates

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Shop-applied lining and coating

Lining

Fire hydrants

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project

SD-08 Manufacturer's Instructions

Delivery, storage, and handling

Installation procedures for water piping

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves and hydrants free of dirt and debris.

1.5.2 Handling

Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take

special care to avoid injury to coatings and linings on pipe and fittings; make repairs if coatings or linings are damaged. Do not place any other material or pipe inside a pipe or fitting after the coating has been applied. Carry, do not drag pipe to the trench. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Store rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

PART 2 PRODUCTS

2.1 WATER DISTRIBUTION MAIN MATERIALS

2.1.1 Piping Materials

2.1.1.1 Ductile-Iron Piping

- a. Pipe and Fittings: Pipe, AWWA C151/A21.51, Pressure Class 350 Thickness Class 53. Fittings, AWWA C110/A21.10 or AWWA C153/A21.53 ; fittings with push-on joint ends conforming to the same requirements as fittings with mechanical-joint ends, except that the bell design shall be modified, as approved, for push-on joint. Fittings shall have pressure rating at least equivalent to that of the pipe. Ends of pipe and fittings shall be suitable for the specified joints. Pipe and fittings shall have cement-mortar lining, AWWA C104/A21.4, standard thickness.
- b. Joints and Jointing Material:
 - (1) Joints: Joints for pipe and fittings shall be push-on joints or mechanical joints unless otherwise indicated.
 - (2) Push-On Joints: Shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly, AWWA C111/A21.11.
 - (3) Mechanical Joints: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets, AWWA C111/A21.11.

2.1.2 Valves, Hydrants, and Other Water Main Accessories

2.1.2.1 Gate Valves on Buried Piping

AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be nonrising stem type with double-disc gates and mechanical-joint ends or push-on joint ends as appropriate for the adjoining pipe, (2) AWWA C509 shall be nonrising stem type with mechanical-joint ends or resilient-seated gate valves 3 to 12 inches in size, and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 350 psi, and shall have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined. Materials for UL 262 valves shall conform to the reference standards specified in

AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have O-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair. In lieu of mechanical-joint ends and push-on joint ends, valves may have special ends for connection to sleeve-type mechanical coupling. Valve ends and gaskets for connection to sleeve-type mechanical coupling shall conform to the applicable requirements specified for the joint or coupling. Valves shall be of one manufacturer.

2.1.2.2 Fire Hydrants

Dry-barrel type. Paint hydrants with at least one coat of primer and two coats of yellow enamel paint, except use red enamel paint for tops of hydrants in non-potable water systems. Stencil hydrant number and main size on the hydrant barrel using black stencil paint.

- a. Dry-Barrel Type Fire Hydrants: Dry-barrel type hydrants, AWWA C502 or UL 246, "Base Valve" design, shall have 6 inch inlet, 5 1/4 inch valve opening, one 4 1/2 inch pumper connection, and two 2 1/2 inch hose connections. Inlet shall have mechanical-joint or push-on joint end; end shall conform to the applicable requirements as specified for the joint. Size and shape of operating nut, cap nuts, and threads on hose and pumper connections shall be as specified in AWWA C502 or UL 246. The traffic type hydrant shall have special couplings joining upper and lower sections of hydrant barrel and upper and lower sections of hydrant stem and shall be designed to have the special couplings break from a force not less than that which would be imposed by a moving vehicle; hydrant shall operate properly under normal conditions.

2.1.2.3 Valve Boxes

Provide a valve box for each gate valve on buried piping. Valve boxes shall be of cast iron of a size suitable for the valve on which it is to be used and shall be adjustable. Cast-iron boxes shall have a minimum cover and wall thickness of 3/16 inch. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches. Cast-iron box shall have a heavy coat of bituminous paint.

2.1.2.4 Sleeve-Type Mechanical Couplings

Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall provide for confinement and compression of the gaskets. For ductile iron pipe, the middle ring shall be of cast-iron and the follower rings shall be of malleable or ductile iron. Cast iron, ASTM A 48/A 48M not less than Class 25. Malleable and ductile iron shall, conform to ASTM A 47/A 47M and ASTM A 536, respectively. Gaskets shall be designed for resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111/A21.11. Bolts shall be track-head type, ASTM A 307, Grade A, with nuts, ASTM A 563,

Grade A; or round-head square-neck type bolts, ASME B18.5.2.1M and ASME B18.5.2.2M with hex nuts, ASME B18.2.2. Bolts shall be 5/8 inch in diameter; minimum number of bolts for each coupling shall be 5 for 6 inch pipe, 6 for 8 inch pipe, and 8 for 12 inch pipe. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint. Mechanical couplings shall provide a tight flexible joint under all reasonable conditions, such as pipe movements caused by expansion, contraction, slight setting or shifting in the ground, minor variations in trench gradients, and traffic vibrations. Couplings shall be of strength not less than the adjoining pipeline.

2.2 WATER SERVICE LINE MATERIALS

2.2.1 Piping Materials

2.2.2 Ductile-Iron Piping

Comply with "Ductile-Iron Piping" subparagraph under paragraph "Water Distribution Main Materials."

2.2.3 Water Service Line Appurtenances

2.2.3.1 Gate Valves 3 Inch Size and Larger on Buried Piping

Gate valves 3 inch size and larger on buried piping AWWA C500 or UL 262 and of one manufacturer. Valves, AWWA C500, nonrising stem type with double-disc gates. Valves, UL 262, inside-screw type with operating nut, split wedge or double disc type gate, and designed for a hydraulic working pressure of 175 psi. Materials for UL 262 valves conforming to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have O-ring stem seals and shall be bolted and constructed so as to permit easy removal of parts for repair. Valves shall have ends suitable for joining to the pipe used; push-on joint ends or mechanical-joint ends for joining to ductile-iron pipe or gaskets and pipe ends, AWWA C111/A21.11.

2.2.3.2 Curb Boxes

Provide a curb box for each curb or service stop. Curb boxes shall be of cast iron of a size suitable for the stop on which it is to be used. Provide a round head. Cast the word "WATER" on the lid. Each box shall have a heavy coat of bituminous paint.

2.2.3.3 Valve Boxes

Provide a valve box for each gate valve on buried piping. Valve boxes shall be of cast iron of a size suitable for the valve on which it is to be used and shall be adjustable. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches. Cast-iron box shall have a heavy coat of bituminous paint.

2.2.3.4 Disinfection

Chlorinating materials shall conform to the following:

Chlorine, Liquid: AWWA B301.

Hypochlorite, Calcium and Sodium: AWWA B300.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES

3.1.1 General Requirements for Installation of Pipelines

These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs.

3.1.1.1 Location of Water Lines

Terminate the work covered by this section at a point approximately 5 feet from the building, unless otherwise indicated. Where the location of the water line is not clearly defined by dimensions on the drawings, do not lay water line closer horizontally than 10 feet from any sewer line. Do not lay water lines in the same trench with gas lines or electric wiring.

Where water piping is required to be installed within 3 feet of existing structures, the water pipe shall be sleeved as required in Paragraph "Casting Pipe". The Contractor shall install the water pipe and sleeve ensuring that there will be no damage to the structures and no settlement or movement of foundations or footings.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 31 23 02.

3.1.1.3 Pipe Laying and Jointing

Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe in a neat workmanlike manner accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where indicated and where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall not be less than 3 1/2 feet.

3.1.1.4 Connections to Existing Water Lines

Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line.

3.1.2 Special Requirements for Installation of Water Mains

3.1.2.1 Installation of Ductile-Iron Piping

Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the requirements of [AWWA C600](#) for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.

- a. Jointing: Make push-on joints with the gaskets and lubricant specified for this type joint; assemble in accordance with the applicable requirements of [AWWA C600](#) for joint assembly. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer. Make mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of [AWWA C600](#) for joint assembly and the recommendation of Appendix A to [AWWA C111/A21.11](#).
- b. Allowable Deflection: The maximum allowable deflection shall be as given in [AWWA C600](#). If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.
- c. Pipe Anchorage: Provide concrete thrust blocks for pipe anchorage. Thrust blocks shall be in accordance with the requirements of [AWWA C600](#) for thrust restraint, except that size and positioning of thrust blocks shall be as indicated. Use concrete, [ASTM C 94/C 94M](#), having a minimum compressive strength of [2,500 psi](#) at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.
- d. Exterior Protection: Completely encase buried ductile iron pipelines with polyethylene tube or sheet, using Class A polyethylene film, in accordance with [AWWA C105/A21.5](#).

3.1.2.2 Installation of Valves and Hydrants

- a. Installation of Valves: Install gate valves, [AWWA C500](#) and [UL 262](#), in accordance with the requirements of [AWWA C600](#) for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to [AWWA C500](#). Install gate valves, [AWWA C509](#), in accordance with the requirements of [AWWA C600](#) for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to [AWWA C509](#). Make and assemble joints to gate valves as specified for making and assembling the same type joints between pipe and fittings.

- b. Installation of Hydrants: Install hydrants in accordance with AWWA C600 for hydrant installation and as indicated. Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Install hydrants with the 4 1/2 inch connections facing the adjacent paved surface. If there are two paved adjacent surfaces, contact the Contracting Officer for further instructions.

3.1.3 Installation of Water Service Piping

3.1.3.1 Location

Connect water service piping to the building service where the building service has been installed. Where building service has not been installed, terminate water service lines approximately 5 feet from the building line at the point indicated; such water service lines shall be closed with plugs or caps.

3.1.3.2 Service Line Connections to Water Mains

Connect service lines to the main with a rigid connection and install a gate valve on service line below the frostline. Connect service lines to ductile-iron water mains in accordance with AWWA C600 for service taps.

3.1.4 Special Requirements for Installation of Water Service Piping

3.1.4.1 Installation of Metallic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of AWWA C600 for pipe installation, unless otherwise specified.

a. Jointing:

(1) Screwed Joints: Make screwed joints up tight with a stiff mixture of graphite and oil, inert filler and oil, or graphite compound; apply to male threads only. Threads shall be full cut; do not leave more than three threads on the pipe exposed after assembling the joint.

(2) Flanged Joints: Make flanged joints up tight, taking care to avoid undue strain on flanges, valves, fittings, and accessories.

3.1.4.2 Disinfection

Prior to disinfection, obtain Contracting Officer approval of the proposed method for disposal of waste water from disinfection procedures. Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 and 0.5 parts per million, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service. Disinfection of systems supplying nonpotable

water is not required.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

Prior to hydrostatic testing, obtain Contracting Officer approval of the proposed method for disposal of waste water from hydrostatic testing. The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete.

3.2.2 Testing Procedure

Test water mains and water service lines in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements." Test ductile-iron water mains and water service lines in accordance with the requirements of [AWWA C600](#) for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints or push-on joints shall not exceed the amounts given in [AWWA C600](#); no leakage will be allowed at joints made by any other method. Test water service lines in accordance with applicable requirements of [AWWA C600](#) for hydrostatic testing. No leakage will be allowed at flanged joints and screwed joints.

3.2.3 Special Testing Requirements

For pressure test, use a hydrostatic pressure [50 psi](#) greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than [2 inches](#) in diameter, hydrostatic test pressure shall be not less than [200 psi](#). Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

3.3 CLEANUP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

-- End of Section --