TECHNICAL SPECIFICATIONS

THE ISLAND WATER ASSOCIATION, INC.

SANIBEL, FLORIDA

Revised

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01 00 00 General Requirements

01 14 00 Work Restriction

01 14 33 Work in Rights-of-Way

01. General

A. All work in the right-of-way shall be in accordance with an approved Lee County Right-of Way Permit and/or City of Sanibel, Right-of-Way Construction Permit, and all other applicable permits.

B. After hours work must be approved by IWA and must conform to Lee County and City of Sanibel requirements.

END OF SECTION

01 21 00 Allowances

01 21 31 Taxes

01. Pursuant to Chapter 212, Florida Statutes, The Island Water Association, Inc is a nonprofit water system and is exempt from the payment of Florida sales and use tax on real property rented, transient rental property rented, tangible personal property purchased or rented or services purchased.

END OF SECTION

01 31 00 Project Management and Coordination

01 31 13 Project Coordination

01. General: The contractor shall check all plans and figures which have a direct bearing on their location and shall be responsible for the proper location of these valves and appurtenances during construction. All work shall be completed in a workmanlike manner by competent workmen in full compliance with all applicable sections of these Specifications.

This section includes administrative provisions for coordinating construction operations on Projects, including but not limited to:

1. General project coordination
2. Project meetings
3. Sequence of events

B. REFERENCES

1. Not Used

02. PRODUCTS

A. Not Used.

03. EXECUTION

1. General Project Coordination:

a A field manager shall be designated as the point of contact to coordinate construction activities with the IWA. Inspections are required on all underground water utility installations and may be installed under the field supervision of an engineering firm approved by IWA.

b No connection to the IWA system shall be allowed without authorization from IWA and a minimum of 24-hours of notice, unless otherwise specified. A reasonable amount of time shall be allowed if member notification is necessary due to service interruption. Many situations may require more than 24 hours of notice.

c Permission must be obtained from IWA for all interruptions of service: Interruption of service must be kept to a minimum. When service interruptions are necessary, The IWA will determine what time of day to schedule a service interruption. In some instances, they must be scheduled late at night, such as 2 a.m. or 3 a.m. The IWA will notify the affected members of a scheduled service interruption.

d All pipe joints, fittings, sewer crossings and thrust blocks must be left exposed for inspection by IWA prior to backfill. If any joints, fittings, sewer crossings or thrust blocks are covered without IWA inspection, the IWA representative may require them to be exposed for inspection.

e Directional drill logs shall be supplied to the IWA and indicate depth below grade at regular horizonal intervals no greater than 10 feet.

f An IWA representative must be present when microbial samples are to be collected.

g Any question not covered by these specifications shall be referred to the IWA representative and shall be resolved to his satisfaction prior to proceeding.

2. Project meetings:

    a Prior to the start of any construction a pre-construction meeting with IWA, the contractor, and the engineer of record must be scheduled.

    b Project meetings shall be conducted on site unless otherwise specified.

3. Sequence of events:

    a Obtain all applicable permits including, but not limited to, utilities, vegetation, wildlife, Florida Department of Health, etc.

    b Locate all existing utilities.

    c Stake location of new pipeline alignment.

    d Install new pipeline making a temporary connection (see Standard Details).

    e Perform satisfactory flush of the entire pipeline.

    f Perform satisfactory hydrostatic testing. An IWA representative shall be present to witness the test for the duration of the hydrostatic testing.

    g Perform satisfactory sterilization of all new or altered components.

    h Deliver to IWA a copy of clearance from state department of health and state department of environmental regulation.

    i Remove temporary connection and install permanent fittings.

j For pipe replacement projects, operate systems in parallel until all service laterals are transferred and subsequently abandon the “old” main.

k Restore entire area.

l Deliver to IWA a copy of certificate of completion from the engineer of record, certified record drawings and/or operation and maintenance manuals.

END OF SECTION

02 00 00 Existing Conditions

02 41 00 Demolition

02 41 13 Selective Site Demolition

02 41 13.23 Utility Line Removal

01. GENERAL

A. Section includes the acquisition of all necessary permits, all labor, materials, equipment, and all other items necessary for the proper abandonment of utility lines, removal and disposal of piping, equipment, roadways, trash, concrete or any other material or equipment in accordance with all applicable rules and permits. Utility lines shall be abandoned in place unless otherwise specified. The work includes, but is not limited to, proper removal of the existing blow-offs, fire hydrants, valves boxes, and all other items necessary to decommission the existing portion of water line to be replaced as well as excavation, installation, backfilling, installation of fittings, tamping, and protection of people and property necessary for proper abandonment.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. Earthwork 31 00 00

02. PRODUCTS

03. EXECUTION

A. Visit the site and inspect all existing structures. Observe and record any defects which may exist in buildings or structures adjacent to but not directly affected by the demolition work.

B. Carry out demolition so that adjacent structures, which are to remain, are not endangered. Schedule the work so as not to interfere with the day-to-day operation of the existing facilities. Provide dust control and make provisions for safety

C. Obtain the from the owner and engineer approval prior to commencing the demolition.

D. Exercise care to break concrete well for removal in reasonably small masses. Where only parts of a structure are to be removed, cut the concrete along limiting lines with a suitable saw so that damage to the remaining structure is held to a minimum.

E. Undertake no demolition work until all mechanical and electrical services affected by the work have been properly disconnected. Cap, reroute or reconnect interconnecting

piping or electrical services that are to remain in service either permanently or temporarily in a manner that will not interfere with the operation of the remaining facilities and carefully protect all mechanical and electrical equipment against dust and debris.

F. Perform testing and air purging where the presence of hazardous chemicals, gases, flammable materials or other dangerous substances is apparent or suspected, and eliminate the hazard before demolition is started.

G. The use of explosives will not be permitted.

H. Remove all debris during demolition and do not allow debris to accumulate in piles. Remove debris from site immediately.

I. Provide safe access to and egress from all working areas at all times with adequate protection.

J. Remove all debris, rubbish, scrap pieces, equipment, and materials resulting from the demolition unless otherwise indicated. Take title to all demolished materials and remove such items from the site.

K. Demolition work shall be performed so as to leave no voids once completed.

L. Service abandonment shall include cutting and capping the lateral at the meter or by closing the corporation stop on the old main and removal of the old curb stop from the meter box.

M. Fire hydrants will be removed as directed by the Fire Chief.

N. As required, grouting shall be an acceptable means of abandonment. Grout shall completely fill the abandon main and shall be filled using a sand cement mixture pumped into the pipeline. The Contractor shall provide eccentrically tapped end caps to allow for pumping the mixture into the pipeline and to allow venting air to assuring the pipeline is adequately filled. The end caps and PVC ball valves shall be left in place after the pipe is filled. The mixture shall be allowed to set for one (1) hour prior to cutting and removing the riser piping. The Owner/Engineer shall be allowed to examine the pump inlet and venting pipe to determine the pipeline being abandoned is adequately filled.

END OF SECTION

02 82 00 Asbestos Remediation

02 82 13 Asbestos Abatement

02 82 13.33 Asbestos Abatement for Utilities

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for the proper abatement of Asbestos Cement (AC) pipe in accordance with all applicable rules and permits. The work includes, but is not limited to, transportation, excavation, installation, backfilling, installation of fittings, tamping, disposal, and protection of people property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. 62-257, Florida Administrative Code (FAC)
2. 40 Code of Federal Regulations (CFR) 61, subpart M, National Emission Standards for Asbestos

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. Existing AC pipe in the ground shall never be removed or otherwise disturbed unless it becomes unavoidable or impractical. AC pipe shall never be crushed and buried in place. If AC pipe is disturbed or removed from the ground, it shall be handled properly (bagged) and disposed of in an approved landfill, if less than 260 linear feet of pipe is involved. If over 260 feet of AC pipe is damaged in any way, all aspects of state regulations shall be followed.

B. When AC pipe is cutting is unavoidable the cutting blade and the pipe being cut must be continually flooded with water to prevent airborne dust. Appropriate personal protective equipment (PPE) must be used.

END OF SECTION

03 00 00 Concrete

01. GENERAL

A. Section includes the acquisition of all necessary permits, all labor, materials, equipment, and all other items necessary for the proper installation of concrete as indicated or as directed for the purpose of piping improvements in accordance with all applicable rules and permits The work includes, but is not limited to, excavation, installation, backfilling, mixing, tamping, forming, concrete placing, and protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ACI 347, Recommended Practice for Concrete Formwork
2. ACI 304, Recommended Practice for measuring, Mixing, Transporting, and Placing Concrete
3. ASTM C94, Ready-Mixed Concrete
4. ASTM C143, Standard Test Method for Slump of Hydraulic Cement Concrete
5. ASTM C150, Standard Specification for Portland Cement, for Type I or Type II.
6. ASTM C33, Standard Specification for Concrete Aggregates
7. ASTM A615, Standard Specification for Deformed and Plan Carbon-Steel Bars for Concrete Reinforcement, for Grade 60.
8. ASTM A1064, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

02. PRODUCTS

A. All products shall conform to the latest Concrete Standards Institute (CSI).

B. Aggregates for concrete, mortar or grout shall be natural sand, gravel or crushed stone meeting the requirements of CSI

C. Cement used on the work shall be first class Portland cement. If high early strength cement is used in any special part of the work, it shall be a true Portland cement with no chemicals or other substances added to expedite hardening. High early strength cement shall be used only when ordered or permitted by the IWA. No cement shall be used which is more than six (6) months old, which has not been adequately protected from moisture and dampness, or which shows any sign of deterioration.

D. Water used in mixing concrete shall be clean and shall not contain deleterious amounts of acids, alkalis, or organic materials. All water shall be furnished from approved sources.

E. Reinforcing bars shall be new billet steel.

F. Wire mesh for concrete reinforcement shall be of mesh and weight shall be cold-drawn steel wire. conforming to standards of the. Mesh shall be electrically welded rectangular or square fabric

G. Form materials shall provide sufficient stability to withstand pressure of placed concrete without bow or deflection.

H. Waterstops, used in joints, shall be #10 gage steel sheet, 4-inch wide, welded continuous through the joint, unless detailed otherwise.

01. EXECUTION

A. Delivery:

1. Immediately upon receipt at the site, cement that is to be site mixed shall be stored in a dry, weather tight building, properly ventilated and with provisions for prevention of moisture absorption.

B. Strength:

1. Concrete used on the work shall have a 7-day compressive strength of not less than 2300 psi and a 28-day compressive strength of not less than 3500 psi.

C. Forming:

1. Use wood or metal forms, straight and free from warp, clean, and sufficient strength to resist springing during the process of depositing concrete against them. Use full depth of the concrete forms.

2. Formwork shall be constructed so that concrete members and structures are of correct size, shape, alignment, elevation, and position. The contractor shall clean and adjust forms prior to concrete placement. Apply form release agents for wet forms, as required. Retighten forms during and after concrete placement if required to eliminate mortar leaks.

3. Thoroughly clean all forms before reuse and inspect forms immediately before concrete is placed. Remove deformed, broken, or defective forms from the work.

4. Coat the entire inside surfaces of forms with a suitable form release agent just prior to placing concrete. Form release agent is not permitted on the reinforcing steel.

D. Reinforcement:

1. Reinforcing mesh and bars shall be protected from the weather.

2. Reinforcing steel bars to be embedded in concrete shall be of a type approved by the IWA. They shall be free from defects, kinks, and from bends that cannot be readily and fully straightened in the field. Use individual hi-chairs with welded cross ties or circular hoops to support top bars in slabs thicker than 8 inches.

3. Reinforcing mesh and bars shall be positioned, supported and secured against displacement. Locate and supports with metal chairs, runners, bolsters, spacers and hangers, as required. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

4. Install welded wire fabric in lengths, as long as possible, lapping at least one mesh

5. Installation of embedded items shall be set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by cast-in-place concrete. Use setting diagrams, templates and instructions provided by others for locating and setting.

E. Mixing:

1. Concrete shall be proportioned to give the proper workability without using more than six (6) gallons of water per sack of cement. The slump shall be not less than two (2) inches nor more than four (4) inches.

2. All concrete must be thoroughly mixed. It may be transit mixed, machine mixed on the job or hand mixed.

3. Under any method, mixing shall be adequate to provide a completely homogeneous mix of uniform color and consistency. Machine mixing shall be of not less than two (2) minutes duration per batch after all the ingredients have been added to the mixer. When the concrete is mixed by hand, it shall be done on a watertight platform or surface, and the ingredients shall be turned together at least six (6) times.

F. Placing:

1. Concrete shall be transported rapidly from its point of mixing to the forms and shall be deposited as closely to its final position in a manner which will hold segregation of ingredients to a minimum. The concrete shall be thoroughly vibrated or spaded, or both, to prevent voids, pockets, or honeycomb.

2. When concrete is placed when the temperature is 40 degrees F. or less or when such temperatures are expected within 24 hours, adequate precautions shall be taken to prevent the concrete from damage when freezing. The concrete shall be housed and heated. The air around the

concrete shall be kept moist and heating units shall be placed to avoid overheating or too rapid drying of the concrete.

G. Finishing:

1. Nonslip Broom Finish shall be applied to exterior concrete and sidewalks. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route.

H. Protection:

1. Concrete surfaces exposed to the atmosphere shall be kept wet or moist for a period of not less than seven (7) days after pouring.
2. Sidewalks and slabs may be cured by spraying with a Membrane-Forming curing compound, applied as per manufacturer's recommendations. This material shall not be used on any interior slabs to which an applied finish is to be bonded.
3. Do not permit construction equipment used to backfill to travel against and over cast-in-place concrete structures until the specified concrete strength has been obtained, as verified by concrete test cylinders. In special cases where conditions warrant, the above restriction may be modified providing the concrete has gained sufficient strength, as determined from test cylinders, to satisfy design requirements for the removal of forms and the application of load.

I. Testing:

1. Sampling and testing of concrete materials shall be made at the contractor’s expense in accordance with ASTM designations using an independent approved laboratory.

J. Patching:

1. Any concrete which is not formed as shown on the drawings, or is out of alignment or level or shows a defective surface, shall be considered as not conforming with the intent of these specifications and shall be removed from the job by the contractor at his expense, unless the contractor receives written permission to patch the defective area. This shall be done in accordance with the procedures above. Honeycomb consisting of ½-inch diameter holes or greater shall be considered a defective surface. Permission to patch any such area shall not be considered a waiver to require complete removal of the defective work if the patching does not satisfactorily restore the quality of the concrete and appearance of the surface.
2. As the forms are removed, fins, rough edges, and offsets shall be ground smooth. Holes to ½-inch, slight honeycomb, and minor defects shall be wet and filled with a 1:2 mix of cement mortar, matching color of

surrounding concrete, and then troweled to a uniform plane. As soon as they have been troweled, the patched areas shall be sprayed with a curing compound, which will not destroy future bonding properties. Three (3) days after application of curing compound, the entire surface shall be finished by wetting and applying a 1:2 mix of cement mortar with a cement brick. Using the brick, mortar shall be rubbed into pits or indentations and excess mortar rubbed off to provide a uniformly textured surface. When the surface has dried, all loose sand and dust shall be removed and the surface then hosed down with water.

END OF SECTION

10 00 00 Specialties

10 14 00 Signage

10 14 53 Traffic Signage

01. GENERAL

A. Section includes the acquisition of all applicable permits, all labor, materials, equipment, and all other items necessary for the proper installation and maintenance of signage in accordance with guidelines established by the Florida Department of Transportation (FDOT) and all applicable rules and permits. The work includes, but is not limited to, installation and maintenance of signage, barricades, barriers, guard rails, patching, flagging, and protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. Florida Department of Transportation, Traffic Control Through Work Zones.
2. Florida Department of Transportation on Traffic Controls and State Practices for Street and Highway Construction Maintenance and Utility Operations.
3. Department of Labor under the authorization of the William-Steiger Occupational Safety and Health Act of 1970.
4. Florida Workers' Compensation Laws.

C. SUBMITTALS

1. Traffic plans and schedules shall be submitted to the City of Sanibel DOT and/or Lee County DOT and approved in writing before starting work.

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. Maintenance of traffic shall include access to businesses at all times and shall restrict access to residential sites of periods not to exceed two hours only during working hours and complete access during non-working times.

B. The roadway shall be maintained and the travelway shall kept clear of all workmen and equipment during the work.

C. City Roads may not be closed to traffic during working hours. A minimum of one-way traffic may be maintained during working hours with full traffic being returned during non-working hours.

D. Notice shall be given to the City of Sanibel, Lee County Division of Transportation, Sheriff, Ambulance, Fire Department, and all other applicable agencies at least one day in advance, whenever it will be necessary to limit traffic to one lane continuously for more than four hours.

E. Strict adherence to all applicable safety regulations shall be followed and accordance with the applicable safety regulations.

F. Where detours are permitted, all necessary barricades and signs as required to divert the flow of traffic shall be provided. While traffic is detoured, the construction operations shall be expedited.

END OF SECTION

31 00 00 Earthwork

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for the proper implementation of earthwork in accordance with all applicable rules and permits. The work includes, but is not limited to the acquisition of all necessary permits, clearing and grubbing, selective clearing/removal and trimming, grading, shaping, excavating, backfilling, compaction, dewatering, erosion control, and protection of people property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc. Standard Details, SD05

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. Locate all structures and utilities along the proposed utility alignment in order to avoid conflicts. Where actual conflicts are unavoidable, work shall be coordinated with the facility owner and performed so as to cause as little interference as possible with the service rendered by the facility disturbed. Facilities or structures damaged in the prosecution of the work shall be repaired and/or replaced immediately, in conformance with current standard practices of the industry, or according to the direction of the owner of such facility.

B. The site of all excavations for structures shall first be cleared of all trees and obstruction preparatory to excavation.

C. The excavations shall be of sufficient size and only of sufficient size to permit the work to be economically and properly constructed in the manner and of the size specified. Wherever the nature of the ground will permit, the bottom of the excavation shall have the shape and dimensions of the underside of the structure. Refer to plans for limits as to when sheeting and trench will be required.

D. The work shall conform all work pertaining to the earthwork as shown on the Plans, the City of Sanibel Utility Permit, and as described in these specifications. In the event there are conflicting specifications, the specification with the best quality shall prevail.

E. Earth excavation, and backfill shall be made to the widths and depths necessary for constructing the pipelines included in this document and includes the excavation of any material defined as earth which is desirable to be excavated for any purpose pertinent to the construction of the work.

F. The term "earth" as used herein shall include all materials which in the opinion of the IWA, do not require blasting, barring, or wedging for their removal from their original beds. Specifically excluded are all ledge and bedrock and boulders larger than one (1) cubic yard in volume and other materials classified as rock.

G. The term "rock" includes all materials which, in the opinion of IWA, require blasting, barring, wedging and/or special impact tools such as jack hammers, sledges, chisels, or similar devices specifically designed for use in cutting or breaking rock for removal from their original beds and which have compressive strengths in their natural undisturbed state in excess of 300 psi. Boulders or masonry larger than one cubic yard in volume are classed as rock excavation.

H. The method of making excavations below groundwater shall be submitted in detail and approval obtained before commencement of such work.

I. Exercise extreme care to avoid unnecessary disturbance of developed private property along the route of the construction. Trees, shrubbery, gardens, lawns, and other landscaping, which in the opinion of the engineer must be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.

END OF SECTION

31 11 00 Clearing and Grubbing

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for the proper implementation of the clearing and grubbing in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, installation, backfilling, clearing grubbing, tamping, and protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. City of Sanibel Utility Permit
2. City of Sanibel Vegetation Permit.

C. DEFINITION

1. Clearing: Clearing is the removal from the ground surface and disposal, within the designated areas, of trees, brush, shrubs, down timber, decayed wood, other vegetation, rubbish and debris as well as the removal of fences.
2. Grubbing: Grubbing is the removal and disposal of all stumps, buried logs, roots larger than 1-1/2 inches, matted roots and organic materials.

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. The area within the limits shown on the Plans for excavation, shall be cleared of fences, selected trees, logs, stumps, rubbish or other perishable or objectionable matter.

B. Stumps and roots between slope stakes in cuts within paved areas and in embankments with cuts of more than three (3) feet deep shall be removed to a depth of eighteen (18) inches below the subgrade. Outside of slope limits and under embankments more than three (3) feet deep, all trees, stumps, brush, etc., shall be cut off, if permitted, approximately level with the surface, except growth designated for preservation.

C. All grubbed material shall be removed to county approved disposal areas.

D. Grub and remove tree stumps and shrubs felled within the (property limits) (right-of-way) to an authorized disposal site. Fill depressions created by such removal with material suitable for backfill.

E. Do not start earthwork operations in areas where clearing and grubbing is not complete, except that stumps and large roots may be removed concurrent with excavation.

F. Comply with erosion, sediment control and storm management measures as specified in section 31 25 14 Stabilization Measures for Erosion and Sedimentation Control.

G. Remove stumps and root mats to a depth of not less than 18 inches below the subgrade of sloped surfaces.

H. Fill all depressions made by the removal of stumps or roots with material suitable for backfill.

I. Strip existing topsoil from areas that will be excavated or graded prior to commencement of excavating or grading and place in well-drained stockpiles in approved locations.

END OF SECTION

31 12 00 Selective Clearing

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for the proper implementation of selective clearing in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, trimming, disposal, clearing, tamping, and protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. City of Sanibel Utility Permit
2. City of Sanibel Vegetation Permit

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. Selective clearing shall be 4-feet on either side of the staked proposed alignment.

B. The trees and native vegetation within the pipeline route shall only be trimmed within allowable limits as set by the Permits. All cleared and trimmed material shall be removed to a county approved disposal area.

C. Remove trees and shrubs within the (limits of the right-of-way) (property limits) as described in the applicable permit.

D. Do not cut or damage trees outside the (right-of-way) (property limits) unless shown to be removed or unless written permission has been obtained from the property owner. Furnish three copies of the written permission before removal operations commence.

E. Protect trees and shrubs within the (construction site) (right-of-way) (construction strip) that are so delineated or are marked in the field to be saved from defacement, injury and destruction. Work within the limits of the tree drip line with extreme care using either hand tools or equipment that will not cause damage to trees.

F. Do not disturb or cut roots unnecessarily. Do not cut roots 1-1/2 inches and larger unless approved. Immediately backfill around tree roots after completion of construction in the vicinity of trees.

G. Protect vegetation from damage caused by emissions from engine-powered equipment. During working operations, protect the trunk, foliage and root system of all trees to be saved with boards or other guards placed as shown and as required to prevent damage, injury and defacement.

H. Do not pile excavated materials within the drip line or adjacent to the trunk of trees. Do not allow runoff to accumulate around trunk of trees. Do not fasten or attach ropes, cables, or guy wires to trees without permission. When such permission is granted, protect the tree before making fastening or attachments by providing burlap wrapping and softwood cleats.

I. Remove shrubs to be saved, taking a sufficient earth ball with the roots to maintain the shrub. Temporarily replant, if required, and replace at the completion of construction in a condition equaling that which existed prior to removal.

J. Replace in kind if the transplant fails.

END OF SECTION

31 22 00 Grading

31 22 13 Rough Grading

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for the proper site rough grading as indicated or as directed for the purpose of piping improvements in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, installation, backfilling, tamping, and protection of people and property.

B. REFERENCES

1.

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. Rough subgrades shall be formed and compacted in accordance with the drawings to within a tolerance of 1½ inches. Soft areas in the subgrade shall be removed and replaced with select fill.

END OF SECTION

31 22 16 Fine Grading

31 22 16.13 Roadway Subgrade Reshaping

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for the proper roadway subgrade reshaping in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, installation, backfilling, tamping, and protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc. Standard Details, SD26

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. The sub-base construction shall be performed in accordance with "Sub-Section 160-8 Construction Methods" as described in the Florida DOT "Standard Specifications for Road and Bridge Construction, 1977". The subgrade shall be stabilized using Florida DOT Type B Stabilization as described in Subsection 160-6 of the Florida DOT Specifications.

B. The sub-base shall be tested by a certified independent testing laboratory. The sub-base bearing value determinations will be made by the Limerock Bearing Ratio Method and shall be stabilized to LBR of 20%. The subgrade compaction requirements will be equal or greater to a Modified Proctor density (AASHO T-180) of 98 percent. The number and locations of the sub-base tests shall be as established by the City of Sanibel.

END OF SECTION

31 22 19 Finish Grading

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for the proper finish grading in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, installation, backfilling, tamping, and protection of people and property.

B. REFERENCES

1.

02. PRODUCTS

A. Topsoil stockpiled during excavation may be used. If additional topsoil is required to replace topsoil removed during construction, it shall be obtained off site at no additional cost to the Island Water Association, Inc.. Topsoil shall be fertile, natural surface soil, capable of producing all trees, plants, and grassing specified herein.

03. EXECUTION

A. Areas to be sodded and/or seeded shall be cleared of all rough grass, weeds, and debris, and brought to an even grade. The areas shall then be brought to proper grade, free of sticks, stones, or other foreign matter over 1-inch in diameter or dimension. The surface shall conform to finish grade, less the thickness of sod, free of water-retaining depressions, the soil friable and of uniformly firm texture.

B. Contractor shall be responsible to establish and maintain the finish grade until plantings or other surface features are established and until final acceptance. Should washouts occur they shall be promptly corrected at the contractor’s expense.

C. Perform grading in a manner to prevent accumulation of water within the area. Where necessary or where shown, extend finish grading to ensure that water will be carried to drainage ditches, and the site area left smooth and free from depressions holding water.

END OF SECTION

31 23 00 Excavation and Fill

31 23 13 Subgrade Preparation

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for the proper subgrade preparation in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, layer compaction, backfilling, tamping, and protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc. Standard Details, SD05
2. AASHTO T180, Standard Method of Test for Moisture-Density Relation of Soil
3. Limerock Bearing Ratio Method Subsection 160 of the Florida DOT Specifications
4. Standard Specifications for Road and Bridge Construction", Section 250 of the State of Florida DOT
5. Standard Specifications for Road and Bridge Construction", Section 300 of the State of Florida DOT

02. PRODUCTS

A. The limerock base course material shall be in accordance with Standard Specifications for Road and Bridge Construction", Section 250 of the State of Florida DOT and shall be primed according to Standard Specifications for Road and Bridge Construction", Section 300 of the State of Florida DOT. The limerock materials shall be obtained from a State of Florida DOT approved pit.

B. The limerock base shall be tested by a certified independent testing laboratory. The material shall have the optimum moisture content and shall be compacted to a density not less than 98 per cent of the maximum density as determined by AASHTO T180, Standard Method of Test for Moisture-Density Relation of Soil.. The minimum density which will be acceptable at any location outside the traveled roadway, such as intersections, crossovers, turnoffs, etc., shall be 95 percent of such maximum. The number and locations of the limerock base tests shall be as established by the City of Sanibel Utility Permit

03. EXECUTION

A. The limerock material shall be placed and spread in uniform layers, without segregation of size, to such loose depth that when compacted, the layer will have

a maximum of 4-inch thickness. The limerock shall be mixed until a uniform mixture is obtained.

B. The surface of any layer shall be maintained in its finished condition until the succeeding layer is placed. The base shall always be properly drained.

C. Priming or placement of pavement shall not proceed until the limerock base is approved in accordance with applicable permits.

D. Restoration of the base course shall not proceed until the sub-base preparation is approved in accordance with all applicable permits.

END OF SECTION

31 23 16 Excavation

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper excavation in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, dewatering, shoring, spoil placement, tamping, and protection of people and property.

B. REFERENCES

1.

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. All necessary precautions shall be taken to prevent injury to the public due to open trenches. Night watchmen may be required where special hazards exist, or police protection provided for traffic while work is in progress.

B. Whenever an excavation site or trench is left unattended or when an area is not within 100 feet of observation, the excavation site or trench shall be filled and/or protected by other means to prevent accidental or unauthorized entry. Such protection shall include barricades and other protection devices including temporary fencing, snow fencing, or temporary "structure" tape.

C. All excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times.

D. Excavated material to be used for backfill shall be neatly deposited at the sides of the trenches where space is available. Where stockpiling of excavated material is required, provide for natural drainage and prevent unsightly appearance.

E. Store excavated and other material a sufficient distance away from the edge of any excavation to prevent its falling or sliding back into the excavation and to prevent collapse of the wall of the excavation. Provide not less than 2 feet clear space between the top of any stockpile and other material and the edge of any excavation

F. In case the materials encountered at the elevations shown are not suitable, or in case it is found desirable or necessary to go to an additional depth, the excavation shall be carried to such additional depth as may be directed in writing. The excavated space shall be refilled with either Class D concrete or selected fill materials, as ordered. Additional earth excavation so ordered and concrete or selected fill materials ordered for filling such additional excavation shall be included as normal excavation work.

G. Wherever the excavation of fill is carried beyond or below the lines and grades shown or given, unless otherwise specified, all such excavated space shall be

refilled with such material and in such manner as may be directed in order to insure the stability of the road bed. Beneath all structures or pipelines, space excavated shall be refilled with Class D concrete or selected fill materials, as ordered.

H. For excavation in which pipe will be laid, the rock shall be excavated to a depth of at least six (6) inches below the bottom of the barrel and bell of the pipe for pipe sizes up to and including 42 inch and filled into the proper grade with selected fill material properly shaped and compacted to provide uniform support for the barrel of the pipe. The placing, compacting, and shaping of the selected fill material shall be included as part of the rock excavation

I. Earth suitable for final grading and landscaping and excavated material suitable for backfilling or embankments, shall be stockpiled separately on the site in approved locations. The excess clean material removed from the excavation shall be transported and stockpiled at designated areas. All trash, such as tree limbs, broken concrete, asphalt, and pipe scraps shall be removed from the islands to a county-approved disposal area. Surplus excavated material and excavated material unsuitable for backfilling or embankments shall be stockpiled at the site approved locations.

J. Before starting trench excavation, all obstructions which are to be removed or relocated shall be cleared away. The width of trenches shall be such as to provide adequate space for work men to place and joint the pipe properly but shall be kept to a minimum. The clear width of the trench at the level of the top of the pipe shall not exceed the sum of the outside diameter of the pipe barrel plus 16 inches for pipe plus 2 feet for pipe more than 33 inches in diameter.

K. As far as possible, the bottom of the trench shall be shaped to fit the underside of the pipe. Where the nature of the soil is such that this cannot be readily accomplished, granular material shall be placed in the bottom of the trench and shaped to provide a continuous, firm bearing for the pipe barrel. Bell holes shall be provided for proper making of the joints.

L. Rock excavation shall include the excavation and disposal of all rock within the boundary lines and grades shown on the Plans.

M. Shore or slope banks to the angle of repose to prevent slides or cave-ins. Also see section 31 41 00 Shoring.

N. During excavation and any site work, storm water pollution prevention measures shall be taken to ensure that water quality criteria are not violated in the receiving water body and all state and local regulatory requirements are met.

O. Keep the open excavated trench preceding the pipe laying operation and the unfilled trench, with pipe, to a minimum length which causes the least disturbance. Provide ladders for a means of exit from the trench as required by applicable safety and health regulations.

P. In some instances, trees, shrubs, utilities, sidewalks and other obstructions may be encountered, the proximity of which may be a hindrance to opencut trench excavation. In such cases, excavate by means of short tunnels to protect such obstructions against damage. Construct the short tunnel by hand, auger, or other approved method approximately 6 inches larger than the diameter of pipe bells encasement. Consider such short tunnel work incidental to the construction of pipelines or conduits and all appurtenances.

Q. Carry the excavation to such additional depth and width as authorized in writing, for the following reasons:

    1. In case the materials encountered at the elevations shown are not suitable.
    2. In case it is found desirable or necessary to go to an additional depth, or to an additional depth and width.

R.

END OF SECTION

31 23 19 Dewatering

01. GENERAL

A. Section Includes all labor, equipment, and materials necessary for the proper installation of a dewatering system. The work includes the satisfactory installation and removal all the required equipment in accordance with all applicable rules and permits. The work includes but is not limited to the installation of well points, headers, pumps, and protection of people and property. The use of mud hogs, trash pumps and other similar equipment is not considered dewatering.

B. REFERENCES

1. Florida Department of Environmental Protection
2. Water Management District
3. City of Sanibel

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. Groundwater general:

1. All dewatering operations must be permitted in writing by the City of Sanibel prior to commencement.
2. Develop an excavation dewatering plan that considers site ground and groundwater conditions, the type and arrangement of the equipment to be used and the proper method of groundwater disposal. Prepare the dewatering plan before beginning excavations below groundwater. Maintain one copy of the dewatering plan at the project site to be available for inspection while all dewatering operations are underway.
3. Water pumped or drained from the work hereunder shall be disposed of in a suitable manner without damage to adjacent property or to other work under construction. Water shall not be discharged onto streets without adequate protection of the surface at the point of discharge. No water shall be discharged into sanitary sewers. No water containing settleable solids shall be discharged into storm sewers. All damage caused by dewatering the work shall be promptly repaired.
4. Dewatering system shall not inhibit pedestrian or vehicular traffic unless otherwise approved by Lee County or the City of Sanibel in advance.
5. All labor, material, equipment, techniques and methods to lower, control, maintain and handle the groundwater shall be provided and/or modified as necessary for construction methods and to monitor the effectiveness of this

installed system and its effect on adjacent facilities. Appropriate backup shall be provided if electrical power is primary energy source for dewatering system

B. Groundwater for trench excavations:

1. Pipe shall not be laid in water; a dry trench shall be maintained. Water shall be kept out of the trench until the jointing is completed. As a minimum, water levels shall be maintained at least 6 inches below the bottom of the trench.

2. Removal of water may be accomplished by pumping or pumping in connection with well point installation as the particular situation may warrant.

3. If the soils encountered at the trench grade are suitable for the passage of water, without destroying the sides or utility foundation of the trench, sumps may be provided at intervals at the side of the main trench excavation. Pumps shall be used to lower the water level by taking their suction from said sumps.

C. Ground water for other excavations:

1. At all times during the excavation period and until completion and acceptance of the work at final inspection, ample means and equipment shall be provided with which to remove promptly and dispose of properly all water entering any excavation or other parts of the work. The excavation shall be kept dry. No water shall be allowed to rise over or come in contact with masonry and concrete until the concrete and mortar have attained a set and not sooner than 12 hours after placing the masonry.

2. The development, drilling and abandonment of all wells used in dewatering systems shall comply with regulations of the Florida Department of Environmental Protection and the governing Water Management District. The system(s) of components shall be removed upon completion. If removal of the pipe is impractical, provide grout connections at 50-foot intervals, and fill the pipe with clay grout or cement and sand grout when the pipe has served its purpose.

END OF SECTION

31 23 23 Fill

31 23 23.13 Backfill

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper backfill in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, dewatering, shoring, tamping, and protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc. Standard Details, SD05.
2. ASTM D 1557 -Standard Test Methods for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 in Drop.

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. All excavation shall be backfilled to the original surface of the ground or to such other grades as may be shown or directed. For areas to be covered by topsoil, backfill shall be left six (6) inches below the finished grades shown on the Plans. In all backfilling, all compressible, putrescible, and destructible rubbish and refuse which might cause later settlement shall be removed from the backfill material and properly disposed of in an approved manner.

B. Material from on-site excavation may be used as common fill provided that it can be readily compacted to 90 percent of the maximum dry density obtainable by ASTM D 1557, and does not contain unsuitable material.

C. Transport and dispose of surplus excavated material and excavated material unsuitable for backfilling or embankments at an off-site disposal location.

D. Do not place large stone fragments in the pipe bedding or backfill to 1 foot over the top of pipes, nor nearer than 2 feet at any point from any pipe.

E. All material used as common fill is subject to approval. If there is insufficient on-site material, import whatever additional off-site material is required which conforms to the specifications.

F. When unsuitable subgrade material is encountered including rubbish, boggy, ashes, cinders, refuse, organic material, boggy or other unsuitable materials, such materials shall be removed a minimum of 6-inches below the bottom of the pipe or to a depth directed by the owner. The removed material shall be replaced with

stable backfill material that does not include very fine sand, uniformly graded sands and gravels, sand and silt, soft earth, or other materials that have a tendency to flow under pressure.

G. Backfill material shall be clean earth fill composed of sand, clay and sand, sand and stone, crushed stone, or an approved combination thereof. Where thrust blocks, encasements, or other below-grade concrete work have been installed, backfilling shall not proceed until the concrete has obtained sufficient strength to support the backfill load.

H. The backfill material shall be placed in layers approximately six (6) inches thick, each layer being thoroughly tamped and compacted in place. No stone fragments shall be placed in the backfill nearer than two (2) feet from the pipe or conduit at any point or from any concrete wall.

I. Excavated spaces around and above underground structures, tunnels, conduits and pipes not filled by hand backfill, and the excavated space around structures which extend up to or above finish grade may be backfilled by machine. The work shall be done in such a way as to prevent dropping of material directly on top of the conduit or pipe through any great vertical distance. In no case shall backfilling material from a bucket be allowed to fall directly on a structure or pipe, and in all cases the bucket shall be lower so that the shock of falling to earth will not cause damage.

J. The material shall be placed in uniform horizontal layers not over 2 feet in depth. Lumps shall be broken up and if there are any stones, pieces of crushed rock or lumps which cannot be readily broken up, they shall be distributed throughout the mass so that all interstices are solidly filled with fine material. The backfill shall be consolidated by flooding, puddling, or driving over it with the earth-handling equipment, except where special consolidation is shown or specified.

END OF SECTION

31 23 23.23 Compaction

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper compaction in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, dewatering, tamping, grading, testing, and protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc. Standard Details, SD05
2. The Island Water Association, Inc. Standard Details, SD26
3. AASHO T99, Standard Method of Test for the Compaction and Density of Soil

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. Compaction shall be accomplished using accepted standard methods (powered tampers, vibrators, etc.), with exception that the first two feet of backfilling over the pipe shall be compacted by hand-operated tamping devices. Flooding or puddling with water to consolidate backfill is not acceptable, except where sand is the only material utilized and encountered and the operation has been approved by the owner.

B. Do not use heavy compaction equipment over pipelines or other structures, unless the depth of fill is sufficient to adequately distribute the load.

C. The material to be consolidated at the time of compaction shall have a moisture content within 95 percent of the optimum density for compaction, as determined by the AASHO Standard Method of Test for the Compaction and Density of Soils, Des: T99, except that the soil shall be compacted in the specified mold in five equal lifts by a 10-pound hammer falling freely at a distance of 18 inches with 25 blows per layer.

D. When the materials are too dry, immediately before spreading the new layers, wet the surface of the preceding layer to an amount required to bring the material to the optimum moisture content specified.

E. When the material is too wet, it shall be allowed to dry until the optimum moisture content is reached.

F. Each layer of material shall be compacted by means of a Barco rammer, or other approved method which will give the desired results, until the density of

compaction is at least equal to 100 percent of the optimum density of the material as determined by the test specified above. Determination of the density of the material in place shall be in accordance with AASHO Des: T147.

G. Laboratory and field tests for consolidation shall be made by a qualified soil mechanics and foundations testing laboratory. The location of the test shall be as established by the City of Sanibel as a condition of the Utility Permit. Compaction density tests shall be made at all such backfill areas with spacing not to exceed 100 feet apart

H. Density tests for determination of compaction shall be made by an independent testing laboratory and certified by a Florida Registered, Professional Engineer. If any test results are unsatisfactory, the area shall re-excavate and re-compacted until the desired compaction is obtained.

I. Copies of all density test results shall be furnished to IWA. Failure to furnish these results will result in the project not being accepted by IWA.

J.

END OF SECTION

31 23 23.33 Flowable Fill

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for the proper installation of flowable fill in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, dewatering, shoring, tamping, pumping, and protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. Standard Specifications for Road and Bridge Construction", Section 121 of the State of Florida DOT
2. Florida Department of Transportation Specifications, Section 121 – Flowable Fill.

02. PRODUCTS

A. Design Mix to be used shall be as listed in FDOT Section 121-3 for excavatable fill. The Contractor shall submit to the Engineer a certified copy of the design mix to be used.

03. EXECUTION

A. If required under roadways, Flowable Fill may be substituted. If Flowable Fill is to be used, a fabric mesh shall be installed between the “first lift” and the Flowable Fill.

END OF SECTION

31 25 00 Erosion and Sedimentation Controls

31 25 14 Stabilization Measures for Erosion and Sedimentation Control

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper stabilization and sedimentation control. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, silt barrier installation, fencing, tamping, and protection of people and property.

B. REFERENCES

1. Southwest Florida Water Management Regulations
2. United States Environmental Protection Agency Regulations

02. PRODUCTS

A. Bales -clean, seed free cereal hay type.

B. Silt fencing.

C. Sodding section 32 92 23

03. EXECUTION

A. Temporary erosion controls include, but are not limited to, grassing, mulching, setting, watering, and reseeding onsite surfaces and spoil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits.

B. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits in accordance with the Florida Department of Environmental Protection, (FDEP).

C. The entire area of construction shall be surrounded by silt barriers during construction or as indicated on the plan.

D. Effective temporary erosion and sediment control measures shall be provided during construction or until final controls become effective.

E. Should any of the temporary erosion and sediment control measures fail to produce results which comply with the requirements of the State of Florida, the deficiency shall be immediately corrected at no cost to IWA.

END OF SECTION

31 41 00 Shoring

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper sheeting shoring and bracing. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, installation, dewatering, and protection of people and property.

B. REFERENCES

1.

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. All excavations shall be properly sloped, shored, sheeted, and braced to furnish acceptable working conditions; to prevent shifting of material; to prevent damage to the structures or other work; and to avoid delay to the work. Bracing shall be so arranged as not to place any strain on portions of completed work until the general construction has proceeded far enough to provide ample strength.

B. In general, sheeting for pipelines shall not be driven below the elevation of the top of the pipe. If, in order to obtain a dry trench or satisfactory working conditions, it is necessary to drive the sheeting below that elevation, the sheeting shall be cut off and left in place below the top of the pipe. Except as otherwise shown or directed, the sheeting and bracing shall be removed as the excavation is refilled in such a manner as to avoid the caving in of the bank or disturbance to adjacent areas or structures. The voids left by the withdrawal of the sheeting shall be carefully filled and compacted.

C. Shoring, sheeting and bracing used for the purpose of boring and jacking shall be performed is outlined in section 33 05 07.23 Utility Boring and Jacking.

END OF SECTION

32 00 00 Exterior Improvements

32 01 00 Operations and Maintenance of Exterior Improvements

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper maintenance of exterior improvements. The work includes the acquisition of all necessary permits, satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, replacing disturbed fences, signs, survey markers, culverts, inlets, paving, irrigation as the result of the installation of the new water main as well as grading and replacing all existing features disturbed during construction and the protection of people and property.

B. REFERENCES

1. Not Used

02. PRODUCTS

A. Materials required for this Section shall be of at least the same type and quality as materials that are to be restored. Where possible, reuse existing materials that are removed and then replaced, with the exception of concrete and flexible paving

03. EXECUTION

A. Inspect existing conditions of projects, including elements subject to damage or to movement during work operations.

B. Properly brace and protect trees, shrubs, poles and other elements which are to be preserved. Unless shown or specified otherwise, preserve all trees and large shrubs. Hold damage to the root structure to a minimum.

C. Make sure all cutting, fitting and patching fit together properly and remove and replace defective work that does not conform to permits and specifications.

D. All damage, as a result of work under this project, done to existing pavement, driveways, paved areas, curbs and gutters, sidewalks, shrubbery, grass, trees, utility poles, utility pipelines, conduits, drains, catch basins, or stabilized areas or driveways and including all obstructions not specifically named herein, shall be repaired in a manner satisfactory to the ENGINEER. Bid prices shall include the furnishing of all labor, materials, equipment, and incidentals necessary for the cutting, repair, and restoration of the damaged areas unless pay items for specific types of repair are included in the Bid Form.

E. Replacement of exterior improvements shall be restored to the preexisting grades unless otherwise specified.

F. Existing curbing, fencing, and guard rails shall be protected. If necessary, curbing shall be removed from joint to joint and replaced after backfilling. Concrete

which is damaged during construction shall be replaced with concrete of equal quality and dimension in accordance with section 03 00 00

G. Clean up shall include the remove all construction material, excess excavation, buildings, equipment, and other debris remaining on the job as a result of construction operations and shall render the site of the work in a neat and orderly condition. Work site clean-up shall follow construction operations without delay. Do all incidental work not otherwise specified, but obviously necessary for the proper completion of the Contract as specified and as shown on the drawings.

H. Mailboxes and fences within the road right-of-way or interfering with driveway construction shall be set aside. prior to the time work on it begins. Items removed shall be restored during the restoration work.

I. Keep the surface of the backfilled area of excavation in a safe condition and level with the remaining pavement until the pavement is restored in the manner specified herein. All surface irregularities that are dangerous or obstructive to traffic are to be removed.

J. Improvements to the land such as fences, walls, outbuildings, and other structures which of necessity must be removed, shall be replaced with equal quality materials and workmanship.

K. Any commercial signs, disturbed or removed, shall be restored to their original condition within 24 hours.

END OF SECTION

32 01 80 Operation and Maintenance of Irrigation

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper maintenance of irrigation. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, water supply, watering schedules, watering rates, and all irrigation necessary to maintain vegetated areas disturbed during construction and the protection of people and property.

B. REFERENCES

1. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Water - Section 983.

02. PRODUCTS

A. Water shall be suitable for irrigation and free from ingredients harmful to plant life.

03. EXECUTION

A. Section related to watering schedules, mowing, erosion,

B. Watering for establishment of plantings other than seed and sod shall follow best management practices.

C. Supply all water to the site, as required during seeding and sodding operations and through the maintenance period and until the work is accepted. furnish all necessary hose, equipment, attachments, and accessories for the adequate irrigation of lawns and planted areas as may be required. Make whatever arrangements may be necessary to ensure an adequate supply of water to meet the needs for his work.

D. Watering for establishment of sod and/or seed shall be immediately after placing. at a minimum rate of 1-inch per week or as directed by the Island Water Association, Inc. thereafter until final acceptance.

E. Temporary surface installed irrigation connected to the IWA system shall not exceed the IWA irrigation limit of 20 gallons per minute.

END OF SECTION

32 01 90 Operation and Maintenance of Planting

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper maintenance of planting. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, irrigating, vegetation replacement size and quantity, and the operation and maintenance of all vegetation disturbed during construction, as well as the protection of people and property.

B. REFERENCES

1.

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. During the course of construction, take special care and provide adequate protection in order to minimize damage to vegetation, surfaced areas, and structures within the construction right-of-way, easement or site, and take full responsibility for the replacement or repair thereof. Immediately repair any damage to private property created by encroachment thereon.

B. Should the removal or trimming of valuable trees, shrubs, or grass be required to facilitate the installation within the designated construction area, this work shall be done in cooperation with the County and/or local communities which the work takes place. Said valuable vegetation, removed or damaged, shall be replanted, if possible, or replaced by items of equal quality, and maintained until growth is re-established.

C. Top soil damaged in the course of work shall be replaced in kind with suitable material, graded to match existing grade.

END OF SECTION

32 12 00 Flexible Paving

32 12 16 Asphalt Paving

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of flexible paving. The work includes the satisfactory installation and/or removal of all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, grading, spreading, compacting, hauling, disposal, cutting, striping, painting, and the protection of people and property. All street and road repair shall be made in accordance with the details indicated on the drawings and in accordance with the applicable requirements of these Specifications and meeting the permit requirements and approval of the governing Department of Transportation agencies.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc. Standard Details, SD26
2. RC-70 bituminous material and shall comply with Section 300 of the State of Florida DOT "Standard Specifications for Road and Bridge Construction".
3. Sections 971 "Paint Materials" and 710-6 Application of Paint of the Florida DOT "Standard Specifications for Road and Bridge Construction"
4. Florida Department of Transportation, Section 331, Type S Asphalt Concrete

02. PRODUCTS

A. All materials utilized in flexible base pavement and base course shall be as specified in the latest version of the Florida Department of Transportation "Standard Specifications for Road and Bridge Construction". All materials and workmanship shall be first class and nothing herein shall be construed as to relieve the contractor from this responsibility.

03. EXECUTION

A. The road pavement shall be installed to the dimensions as shown and detailed on the Plans or the City of Sanibel Utility Permit. The base shall be primed with type RC-70 bituminous material and shall comply with Section 300 of the State of Florida DOT "Standard Specifications for Road and Bridge Construction".

B. The asphaltic paving surface shall be installed in accordance with the Florida Department of Transportation, Section 331, Type S Asphalt Concrete for Type S-I Asphalt Concrete.

C. The Island Water Association, Inc. reserves the right to require soil bearing or loading tests or materials tests, should the adequacy of the foundation or the quality of materials used be questionable. Costs of these tests shall be borne by the CONTRACTOR.

D. A field inspection by the City of Sanibel or governing Department of Transportation agency shall be made during the following phases of the road cut restoration:

    1. Sub-base stabilization.
    2. Base Course Installation and Compaction.
    3. Surface Course Installation (paving).

E. The City of Sanibel shall be notified forty-eight (48) hours before a phase of road cut restoration will be ready for inspection. The restorations shall not proceed until approval of the preceding phase has been granted by the City of Sanibel.

F. Pavement in traffic lanes shall be limited to a 24-hour period to complete the open-cut crossing. The road surface shall be repaved, with temporary pavement, if necessary, at the end of the 24-hour period.

G. Temporary roadways shall be in accordance with all applicable permits and shall be maintained in good condition throughout their use. Drainage shall be maintained through all existing ditches by the use of culvert pipe as necessary.

H. The striping and paving shall be to the dimensions as shown and detailed on the Plans and the City of Sanibel Utility Permit. The paint shall be furnished and installed in accordance with Sections 971 "Paint Materials" and 710-6 Application of Paint of the Florida DOT "Standard Specifications for Road and Bridge Construction".

I. Pavement or roadway surfaces cut or damaged shall be replaced by the CONTRACTOR in equal or better condition than the original, including stabilization, base course, surface course, curb and gutter or other appurtenances. The CONTRACTOR shall obtain the necessary permits prior to any roadway work. Additionally, the CONTRACTOR shall provide advance notice to the appropriate authority, as required, prior to construction operations.

    1. Roadway Restoration (within City of Sanibel Department of Transportation & Engineering jurisdiction): Restoration shall be in accordance with the requirements set forth in the “Right-of-Way Utility Construction Activities Policy” and these Standards. The materials of construction and method of installation, along with the proposed

restoration design for items not referred or specified herein, shall receive prior approval from City of Sanibel DOT.

J. Where existing pavement is to be removed, the surface shall be mechanical saw cut prior to trench excavation, leaving a uniform and straight edge parallel or perpendicular to the roadway centerline with minimum disturbance to the remaining adjacent surfacing. The width of cut for this phase of existing pavement removal shall be minimal.

K. Roadway Restoration (outside City of Sanibel Department of Transportation jurisdiction) – Work within the rights-of-way of public thoroughfares which are not under jurisdiction of City of Sanibel, shall conform to the requirements of the Governmental agency having jurisdiction or the Florida Department of Transportation, if no governmental agencies have jurisdiction. Work within State Highway right-of-way shall be in full compliance with all requirements of the permit drawings, and to the satisfaction of the Florida Department of Transportation.

L. Before removing pavement, the pavement shall be marked for cuts nearly paralleling pipelines and existing street lines. Asphalt pavement shall be cut along the markings with a jackhammer, rotary saw, or other suitable tool, leaving a uniform and straight edge with minimum disturbance to the remaining adjacent surface.

M. No pavement shall be machine pulled until completely broken and separated along the marked cuts.

N. The pavement adjacent to pipeline trenches shall neither be disturbed nor damaged. If the adjacent pavement is disturbed or damaged, irrespective of cause, the damaged pavement shall be removed and it shall be replaced at the CONTRACTORS expense.

O. The restoration of existing street paving, driveways, etc., shall be restored, replaced or rebuilt using the same type of construction as was in the original or better. Be responsible for restoring all such work, including sub-grade and base courses where present. Obtain and pay for such local or other governmental permits as may be necessary for the opening of streets. Meet any requirements other than those herein set forth which may affect the type, quality and manner of carrying on the restoration of surfaces by reason of jurisdiction of such governmental bodies.

P. In all cases, maintain, without additional compensation, all permanent replacement of street paving, done by the contractor under this Contract until accepted by the OWNER, including the removal and replacement of such work wherever surface depressions or underlying cavities result from settlement of trench backfill.

Q. Complete all the final resurfacing or re-paving of streets or roads, over the excavations and relay paving surfaces of roadbed that have failed or been damaged prior to acceptance by the OWNER.

R. All re-paving or resurfacing shall be done in accordance with Florida Department of Transportation Specifications, to which the following requirement of trench backfill will be added: Where pipeline construction crossed paved areas such as streets, the top 24 inches of trench below the road bases or concrete slabs shall be backfilled with compacted A-4 or better matter that will provide a bearing value of not less than 75 when tested by the Florida Department of Transportation Soil Bearing Test Methods.

S. The work shall consist of the application of bituminous prime and tack coats on the previously prepared base course in accordance with Section 300 of the FDOT Specifications

T. The work shall consist of the construction of plant-mixed hot bituminous pavement to the thickness indicated in the drawings conforming to Type III asphaltic concrete in accordance with Section 333 of the FDOT Specifications. The requirements for plant and equipment are specified in Section 320 and the general construction requirements for asphaltic concrete pavement are contained in Section 330 of the FDOT specifications.

U. All field testing shall be performed by an independent laboratory employed by the OWNER. All materials shall be tested and certified by the producer. Tests repeated because sub-grade or base does not meet specified compaction shall be at the CONTRACTOR's expense.

V. Sidewalks cut or damaged by construction shall be restored in full sections or blocks to a minimum thickness of four inches. Concrete curb or curb gutter shall be restored to the existing height and cross section in full sections or lengths between joints. Concrete shall be as specified on the drawings. Grassed yards, shoulders and parkways shall be restored to match the existing sections with grass seed or sod of a type matching the existing grass.

W. After all repair and restoration or paving has been completed, all excess asphalt, dirt, and other debris shall be removed from the roadways. All existing storm sewers and inlets shall be checked and cleaned of any construction debris.

END OF SECTION

32 16 00 Curbs, Gutters, Sidewalks, and Driveways

32 16 13 Curbs and Gutters

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of curbs and gutters. The work includes the satisfactory installation and/or removal of all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, grading, spreading, compacting, hauling, disposal, cutting, striping, painting, and the protection of people and property.

B. REFERENCES

C. References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc. Standard Details, SD26

02. PRODUCTS

A. Use 2,500 psi concrete except as modified herein for curbs and gutters.

03. EXECUTION

A. Construct all curbs and gutters in accordance with the City of Sanibel and/or Lee County Specifications.

B. Prior to the installation of any concrete, examine the excavation and forms for the proper grades, lines, and levels required to receive the new work. Ascertain that all excavation and compacted subgrades are adequate to receive the concrete to be installed. Correct all defects and deficiencies before proceeding with the work.

C. Investigate and verify location of existing improvements to which the new work is to be connected. Making necessary adjustment in line and grade to align the new work with the existing improvements must be approved by IWA and the City of Sanibel and/or Lee County prior to any change.

END OF SECTION

32 16 23 Sidewalks

02. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of sidewalks and shared use paths. The work includes the satisfactory installation and/or removal of all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, grading, spreading, compacting, hauling, disposal, cutting, striping, painting, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc. Standard Details, SD26

03. PRODUCTS

A. All products shall be in accordance with Lee County and/or the City of Sanibel standards.

B. Use 2,500 psi concrete except as modified herein for curbs and gutters

04. EXECUTION

A. Construct all curbs and gutters in accordance with the City of Sanibel and/or Lee County Specifications.

B. Sidewalks and shared use paths constructed of flexible pavement shall be restored in accordance with the Asphalt Paving section 32 12 16.

C. Sidewalks constructed of concrete shall be in accordance with the Concrete section 03 00 00.

D. Prior to the installation, examine the excavation and forms for the proper grades, lines, and levels required to receive the new work. Ascertain that all excavation and compacted subgrades are adequate to receive the concrete to be installed. Correct all defects and deficiencies before proceeding with the work.

E. Investigate and verify location of existing improvements to which the new work is to be connected. Making necessary adjustment in line and grade to align the new work with the existing improvements must be approved by IWA and the City of Sanibel and/or Lee County prior to any change.

END OF SECTION

32 16 33 Driveways

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of driveways. The work includes the satisfactory installation and/or removal of all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, grading, spreading, compacting, hauling, disposal, cutting, striping, painting, stamping, and the protection of people and property.

B. REFERENCES

1.

02. PRODUCTS

A. Concrete products shall be in accordance with Concrete 03 00 00

B. Asphalt products shall be in accordance with Flexible Paving 32 12 00

03. EXECUTION

A. All driveways shall be replaced including but not limited to asphalt, sand, and shell driveways.

B. The excess clean material removed from the trench excavation shall be transported and stockpiled to approved locations. All trash, such as tree limbs, broken concrete, asphalt and pipe scraps, shall be removed from the islands to a county approved disposal area.

C. Concrete driveways shall be neatly saw cut the driveway a minimum of 10 feet from the edge of the pavement. If there is an existing expansion joint located five (5) feet or less beyond the saw cut, the saw cut shall be located at the expansion joint. Remove all concrete from the saw cut to the edge of the pavement. If the driveway ends five (5) feet or less beyond the saw cut, the entire driveway shall be removed.

D. The saw cut shall extend a minimum of two (2) feet beyond the edge of the trench line.

E. Concrete driveways shall be restored, a close as reasonably possible, to their pre-existing condition.

F. Sand and shell driveways shall be restored. The base shall be thoroughly compacted. The sand or shell shall match the existing and be neatly blended to the remaining driveway.

G. Limerock and river rock driveways shall be thoroughly compact.

H. Inlaid brick and other decorative driveways shall be bore and jacked or directional drilled.

I. Asphalt driveways shall be neatly saw cut the driveway 2 feet wider than the trench. The asphalt shall be a minimum of 1½-inch thick.

END OF SECTION

32 84 00 Planting Irrigation

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper maintenance of planting irrigation. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, temporary irrigation installation, replacing irrigation heads, piping and all irrigation appurtenances disturbed during construction and the protection of people and property.

B. REFERENCES

1.

02. PRODUCTS

A. Products shall be as reasonably close as possible to the existing type, make and size as the exiting being repaired or replaced.

B. New temporary irrigation shall be in accordance with this section.

03. EXECUTION

A. Surface installed temporary irrigation with the water supply connections via an existing hose bibb connection shall be installed by the contractor, all other irrigation shall be installed by a contractor licensed and qualified to perform irrigation installations.

B. Repairs shall be tested for proper operation, any damage that results from the repair including irrigation heads, control valves, or other appurtenances shall be corrected by the contractor at no cost to IWA.

END OF SECTION

32 92 00 Turf and Grasses

32 92 23 Sodding

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation and maintenance of sod. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, replacing irrigation heads, piping and all irrigation components disturbed during construction and the protection of people and property.

B. REFERENCES

1. Florida Department of Transportation Standard Specifications for Road and Bridge Construction Sod -Section 981

02. PRODUCTS

A. Sod may be of either St. Augustine or Argentine Bahia grass or as that disturbed, as established prior to construction. It shall be well matted with roots. When replacing sod in areas that are already sodded, the sod shall be the same type as the existing sod.

B. The sod when installed shall be sufficiently thick to secure a dense strand of live grass and shall be live, fresh and uninjured at the time of planting. It shall have a soil mat of sufficient thickness adhering firmly to the roots to withstand all necessary handling. It shall be reasonably free of weeds and other grasses. It shall be planted as soon as possible after being dug and shall be shaded and kept moist from the time it is dug until it is planted.

03. EXECUTION

A. Following construction completion, the work area along the route of the installation shall be finish grade to elevations compatible with the adjacent surface, with grassing or hand raking required within developed areas.

B. Existing lawn surfaces damaged by construction shall be re-graded and re-sodded or re-seeded. These areas shall be maintained until all work under this Contract has been completed and accepted.

C. Sod should be handled in a manner to prevent breaking or other damage. Sod shall not be handled by pitch forks or by dumping from trucks or other vehicles. Care shall be taken at all times to retain the native soil on the roots of each sod segment during stripping and handling. Sod that has been damaged by handling during delivery, storage or installation will be rejected.

D. Sod panels shall be laid tightly together so as to make a solid sodded lawn area. On mounds and other slopes, the long dimension of the sod shall be laid

perpendicular to the slope. Immediately following sod laying the lawn areas shall be rolled with a lawn roller customarily used for such purposes, and then thoroughly watered.

E. Sod shall be placed at all areas where sod existed prior to construction, on slopes of 3 horizontal on 1 vertical (3:1) or greater, in areas where erosion of soils will occur. On areas where the sod may slide, due to height and slope it shall be pegged, with pegs driven through the sod blocks into firm earth, at suitable intervals.

F. Sufficient watering shall be done to maintain adequate moisture for optimum development of the seeded and sodded areas. Sodded areas shall receive no less than 1.5 inches of water per week for at least 2 weeks. Thereafter, apply water for a minimum of 60 days as needed until the sod takes root and starts to grow or until final acceptance, whichever is latest.

END OF SECTION

32 93 00 Plants

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation and maintenance of plants. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, replacing unsatisfactory plants, replacing piping and all irrigation components disturbed during construction and the protection of people and property.

B. REFERENCES

1. City of Sanibel Utility Right-of-Way Permit
2. Lee County Right-of-Way Permit

02. PRODUCTS

A. Not Used.

03. EXECUTION

A. Landscaping impacted during construction shall be replaced. The work area shall be raked and thoroughly clean the work area. Vegetation in the City of Sanibel is protected by law. The necessary vegetation permit shall be obtained. However, no vegetation shall be broken, cut, bent, moved, or otherwise damaged including but not limited to branches, limbs, trunks, roots, or complete plants of any species (except Brazilian Pepper). Only that vegetation that directly interferes with the prosecution of the work and is designated on the permit may be removed, no additional clearing without the proper permitting, and a ruling by the Department of Natural Resources of the City of Sanibel shall be allowed.

B. Prior to the commencement of construction, the pipeline shall be staked to determine which trees, shrubs, sod, gravel areas, etc. shall be relocated, destroyed or preserved in accordance with all applicable permits. Landscaping must not be cut, scraped, bent, broken or otherwise damaged which is to be preserved.

C. Upon completion of the job, the work area shall be thoroughly hand raked, all depressions shall be filled, compacted and all trash removed.

D. Additional information on finish grade can be located in section 31 22 19 Finish Grading.

END OF SECTION

33 00 00 Utilities

33 01 00 Operations and Maintenance of Utilities

33 01 10 Operations and Maintenance of Water Utilities

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper operation and maintenance of water utilities. The work includes the acquisition of all necessary permits, satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to pipe installation, trenching, boring, connections, flushing, disinfecting, transferring pipe and appurtenances, bedding, thrust blocks and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. NSF 61 and all applicable rules.
2. The Island Water Association, Inc. Standard Details.
3. The Island Water Association, Inc. Approved Manufacturers and Parts List.
4. Piping color coding shall conform to the Recommended Standards for Water Works, published by: Health Research Inc..

02. PRODUCTS

A. All materials shall be new.

B. All wetted parts shall conform to NSF61 standards.

03. EXECUTION

A. All work shall be in accordance with the latest rules and regulations.

B. Whenever there is an emergency or stoppage of work which is likely to endanger the excavation or adjacent structures, operate a full work force for 24 hours a day, including weekends and holidays, without intermission until the emergency or hazardous conditions no longer jeopardize the stability and safety of the work.

C. All work shall be inspected by an Authorized Representative of the Island Water Association, Inc. who shall have the authority to halt construction if, in the opinion of said representative, these specifications or standard construction practices are not being followed. Whenever any portion of these specifications is violated, the engineer or his authorized representative, shall, by written notice, order further construction to cease until all deficiencies are corrected.

D. Water mains shall be installed to a minimum depth of 30-inches. When a minimum bury depth of 30-inches is unavoidable the pipe material shall be changed to ductile iron. At the engineer's discretion, and when a bury depth of 30-inches is unavoidable, concrete encasement may also be required.

E. All piping requiring concrete encasement shall be protected using 8-mil polyethylene sheeting as outlined in Corrosion Protection 40 42 00.

END OF SECTION

33 01 10.53 Flushing of Water Utility Piping

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper flushing of water utility piping. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of fittings, taps, corporation stops, flow control valves, wyes, flanges, temporary pumps and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C651 Disinfecting Water Mains

02. PRODUCTS

A. Flush all water pipelines with clean water under the specified parameters.

03. EXECUTION

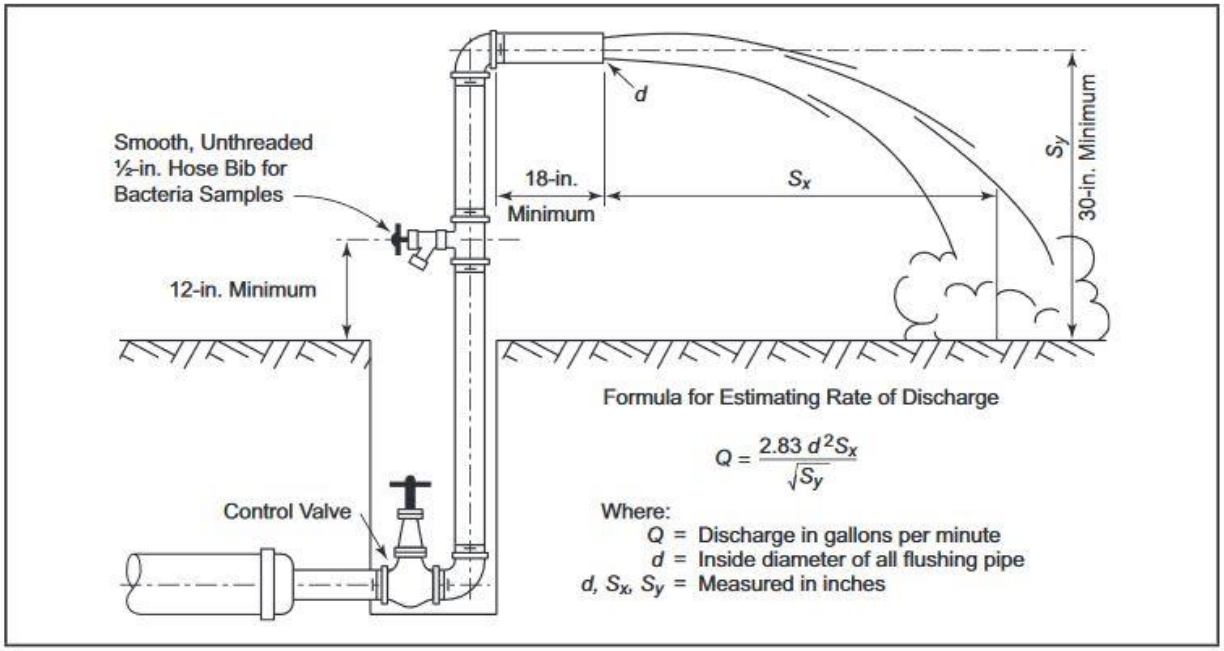
A. Each section of pipeline shall be slowly filled with water to avoid water hammer.

B. Piping shall be flushed sufficiently to displace any evidence of excessive air, matter, and discoloration without a nuisance or property damage. A flushing rate of 4 feet/second to provide a scouring flush is recommended. Flushing operations shall not adversely impact distribution system pressures or normal operations.

C. Flow to establish a minimum velocity of 4.0 feet per second (fps) during the flushing operation can be obtained using the following table.

Pipe Diameter (inches)	Flow Rate (gpm)
4	
6	
8	
10	
12	
14	
16	

D. Flow can be determined using the calculation shown in the following figure.



NOTE: This figure applies to pipes up to and including 8-in. (200-mm) diameter.

Suggested flushing configuration.

A velocity of about 4.0 ft/sec. can be estimated using the flushing configuration and the table below for pipe sizes up to and including 8 inches. Table created using Sy=30 inches, SCH 80 PVC with an average ID of 1.913 inches and flows to obtain 4.0 ft/sec.

Pipe Diameter (inches)	(Sx) Distance ft. (4.0 ft./sec.)
2	
2.5	
3	
4	
6	
8	

END OF SECTION

33 01 10.54 Cleaning of Water Utility Piping

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper cleaning of water utility piping. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of fittings, taps, corporation stops, flow control valves, wyes, flanges, temporary pumps and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C651 Disinfecting Water Mains

C. CONSTRAINTS

1. Pipe segments which include the installation of butterfly valves shall be segmented to avoid conflict between pigs and butterfly valves.
2. In areas where segmenting is not possible butterfly valves shall be installed once the pigging operation is completed.
3. The installation of butterfly valve spacers are an acceptable method to allow pigging operations in advance of final assembly.

D. FIELD CONDITIONS

1 The establishment of a temporary connection, at a suitable location to supply water for the pigging operation, and the location(s) of pigging receiving area(s), shall be installed in such a fashion as to reduce or eliminate adverse effects due to standing water that may result from pigging operations.

02. PRODUCTS

A. The Pigs shall be manufactured of an open cell polyurethane foam body and shall be able to traverse standard piping configurations such as 90° elbows, tees, crosses, wyes, and gate valves.

B. See Approved Manufacturers and Parts List, a separate document.

C. Clean all water pipelines with clean water under the specified parameters

03. EXECUTION

A. Pipeline shall be cleaned to remove most dirt, sludge, and other foreign matter accumulation from the interior wall of the pipeline. Equipment selected shall be capable of performing such cleaning. Satisfactory precautions shall be taken to

prevent scratching or scraping of interior wall surfaces or other damage to pipes that might be inflicted by the improper use of cleaning equipment.

B. Pipes 4-inch and larger shall be cleaned by use of "flushing pigs". The pigs shall be pushed the entire length of the new pipeline a minimum of 2 times. The pigs shall be reinserted and the process repeated until there is no visible matter and the water is completely clear as determined by the IWA representative.

C. Pig launchers, temporary connections and any other apparatus used for the insertion and retrieval of the pigs shall be completely removed once the pigging and flushing operations are complete.

D. Retrieval of butterfly valve spacers shall be performed in advance of final flushing and chlorination.

E. Flow shall be established to obtain a velocity of 2.5 feet per second (fps) during the pigging operation as established in the following table.

Pipe Diameter (inches)	Flow Rate (gpm)
4	100
6	200
8	400
10	625
12	900
14	1200
16	1600

F. Increased velocity can be used to discharge particulates in between pigging cycles if it is determined that the distribution system maintains adequate pressure, at the discretion of the IWA representative.

G. Pressure in the distribution system shall be monitored during pigging operations to ensure the distribution system maintains adequate pressure.

H. Pigging and flushing operations shall be controlled to prevented discharging chlorinated water or particulates into drainage systems or nearby waterways.

END OF SECTION

33 01 10.58 Disinfection of Water Utility Piping Systems

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper disinfection of water utility piping systems. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of fittings, taps, corporation stops, flow control valves, wyes, flanges, temporary pumps and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C651 Disinfecting Water Mains
2. 62-555.340, Florida Administrative Code, Disinfection and Bacteriological Evaluation of Public Water System Components

02. PRODUCTS

A. Chlorine used for disinfection shall conform to all applicable drinking water standards.

03. EXECUTION

A. All piping shall be subject to disinfection, except as otherwise specified.

B. Unless otherwise determined by IWA, the method of chlorination used for disinfection shall be by means of continuous injection with a mixture outlined in this section below.

C. Prior to disinfection the work shall be complete and shall be authorized by the engineer as having successfully completed the hydrostatic testing requirements.

D. The disinfecting mixture shall be sufficient to produce a dosage of 50 mg/L. Disinfecting mixture shall not exceed 200 mg/L. The disinfecting mixture shall have a minimum contact time of 24 hours. The residual shall be no less than 25 mg/L after 24 hours.

E. An IWA representative shall be present during the disinfection injection and at the end of the 24-hour disinfection duration. The contractor shall provide samples of the disinfection mixture downstream of the injection point and demonstrate the mixture meets the dosage requirements. The contractor shall also provide a sample of the disinfection mixture at the extremities and demonstrate the mixture meets the minimum dosage for the initial injection and meets or exceeds the requirements at the end of the contact time duration.

F. If the residual at the end of the 24-hour period drops below 25mg/L the piping disinfection shall be repeated until a satisfactory result is obtained.

G. Microbial samples shall be taken in accordance with 62-555.340 F.A.C.

H. When dichlorination is required the method shall be in accordance with all applicable regulations.

END OF SECTION

33 05 00 Common Work Result for Utilities

33 05 31 Buried Piping Installation

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation water utility piping systems. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, earth excavation, bedding, thrust blocks, backfilling, sheeting, retainer glands, shoring, bracing, stainless steel thrust rods, tamping, removal of water, the making of joints, installation of the pipe, at the locations called for, in conformity with the lines and grades given, and the construction of such services, joints, connections to existing pipes, testing and chlorination temporary pumps and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. F.A.C. 62-555.314, Location of Public Water System Mains.
2. The Island Water Association, Inc., Backflow Prevention and Cross Connection Control Program
3. The Island Water Association, Inc., Backflow Prevention and Cross Connection Control Specifications
4. The Island Water Association, Inc., Standard Details

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Pipe shall bear identification markings that will remain legible after normal handling, storage, and installation. Markings shall be applied in a manner that will not weaken or damage the pipe. Marking shall be applied at intervals of not more than 5 feet on the pipe. Marking on the pipe shall include the following:

1. Nominal size and OD base.
2. Dimension ratio.
3. AWWA pressure rating.
4. AWWA designation.
5. Manufacturer’s name and trademark.
6. Manufacturer’s production code, including day, month, year, shift, plant, and extruder of manufacturer.

03. EXECUTION

A. Deliver, store, and handle all products and materials in accordance with the manufacturer's recommendations. During transportation and delivery, take every precaution to prevent injury to the pipe and appurtenances during transportation and delivery to the site.

B. During loading and unloading, take extreme care in loading and unloading the pipe and appurtenances, work slowly with skids or suitable power equipment, and keep the items under perfect control at all times. Under no condition is the pipe or appurtenances to be dropped, bumped, dragged, pushed, or moved in any way that will cause damage. When handling the pipe and appurtenances with a crane, use suitable slings. Under no condition pass the sling through the pipe.

C. Use a nylon canvas type sling or other material designed to prevent damage to the pipe and coating. When handling reinforced concrete pipe or uncoated steel or ductile iron pipe, steel cables, chain or like slings are acceptable. Slings shall be of sufficient capacity for the load, and shall be inspected before use. Worn or defective equipment shall not be used. If in the process of transportation, handling, or laying, any pipe or fitting is damaged, replace or repair such pipe or pipes.

D. Provide suitable blocking and stakes installed to prevent pipe from rolling. Stockpiled pipe shall be suitably supported and shall be secured to prevent accidental rolling.

E. Store gaskets for pipe joints in a cool place and protect gaskets from light, sunlight, heat, oil, or grease until installed. Do not use any gaskets showing signs of checking, weathering or other deterioration. Do not use gasket material stored in excess of six months without approval.

F. All pipe, fittings, and appurtenances shall be carefully handled and protected against damage, impact shocks, and free fall and shall not be placed directly on rough rocky ground but in such instances shall be supported in a manner which will protect the pipe against injury whenever stored at such trench site or elsewhere. No pipe or ap[purtenances shall be installed where the lining or coating show defects that may be harmful as determined by the ENGINEER. Such damaged lining or coating shall be repaired, or a new undamaged pipe shall be furnished and installed.

G. All buried piping and appurtenances shall be installed in accordance with the manufacturer's recommendations.

H. Generally, lay all pipe with bells pointing ahead.

I. Installation shall be made with full length pipe segments unless otherwise impractical or impossible. Splicing pipe segments for installation in lieu of full-length pipes shall not be permitted.

J. Maintain lines and grades during installation. Keep lines clean during construction.

K. Inspect each pipe and fitting prior to installation to ensure that no damaged portions are installed.

L. The full length of each section of pipe shall rest solidly upon the pipe bedding material, with recesses excavated to accommodate the joints. The interior of the pipe shall be cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by means of plugs or other approved methods. A dry trench shall be maintained in accordance with the Dewatering section 31 23 19. When work is not in progress, open ends of the pipe shall be closed so that earth or other deleterious substances will not enter the pipe. All pipe shall have a minimum of 30-inchs of cover.

M. At all times, means shall be provided to prevent the pipe from floating.

N. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid.

O. Execute excavating and backfilling by methods which will prevent settlement or damage to other work

P. All ductile iron pipe shall be protected from corrosion as outlined in the section 40 42 00, Corrosion Protection.

Q. If a dry trench bottom has not been obtained due to improper or insufficient use of all known methods of trench dewatering, then the order to excavate below grade and place sufficient select fill material, crushed stone, or 2500 psi concrete over the trench bottom may be given.

R. If all efforts fail to obtain a stable dry trench bottom and it is determined that the trench bottom is unsuitable for pipe foundation, obtain an order, in writing, for the kind of stabilization to be constructed.

S. When the foundation material is of inadequate supporting value, a suitable foundation shall be provided by the removal of the unsuitable material and replaced with suitable material. Pipe shall not be laid on blocks or timbers or on other unyielding material.

T. All water mains shall have a minimum of 30 inches and a maximum of 36 inches of cover from finished grade unless otherwise specified.

U. Separation of water mains shall conform to F.A.C. 62-555.314, Location of Public Water System Mains.

V. Crossing Utilities shall include any extra work required in crossing culverts, water courses, drains, water mains, and other utilities, including all sheeting and bracing, extra excavation and backfill, or any other work required for the crossing, whether or not shown on the drawings.

W. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the ENGINEER may change the alignment and/or the grades. Such change shall be made by the deflection of joints or by the use of additional fittings. However, in no case shall the deflection in the joint exceed 70 percent of the maximum deflection recommended by the pipe manufacturer. No joint shall be misfit any amount which will be detrimental to the strength and water tightness of the finished joint.

X. Adapters to connect pipe or fittings to pipe or fittings of dissimilar materials shall be supplied by the contractor in accordance with the manufacturer recommendations.

Y. Notify the proper authority of the utility involved when relocation of these lines is required. Coordinate all work by the utility so that the progress of construction will not be hampered.

Z. Coordinate power pole bracing and temporary support with the power utility as may be required for water line construction.

AA. All new main extensions shall be protected by an approved backflow prevention device and an installed temporary water meter. The backflow prevention device shall be installed by the contractor and tested by IWA. The temporary water meter shall be purchased from IWA and installed by the contractor. This temporary connection will be used for all testing, flushing, and sterilizing; and shall not be removed until approval is granted by IWA. The contractor will be charged for all water used at the current IWA rates.

BB. All utilities and any other entity having service to the project area, prior to the time construction commences, shall be requested to identify and field locate all cable, conduits, water mains, service lines, manholes, service boxes, valve boxes, etc., required for construction of the project.

CC. All construction areas within the roadway will be cleared of material and debris and brought to uniform grade within 24 hours after the backfill has been placed.

DD. Construction areas will be restored to their original condition or better, all pavement cuts shall be vertical saw cuts. All property improvements including water lines, inlets culverts, ditches, sidewalks, roadways, entrance ways, parking lots, walkways, curbing, fences and mailboxes damaged during construction will be restored to the same or better condition than they were prior to construction.

END OF SECTION

33 05 31.10 Installing Bell-and-Spigot Joints

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of bell-and-spigot joints. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation bell-and-spigot joints, corrosion protection, shoring, corrosion protection, restraints and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C600, Installation of Ductile Iron Water Mains and Their Appurtenances
2. ANSI/AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
3. ASTM F477, Standard Specifications for Elastomeric Seals (Gaskets) for joining Plastic Pipe

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Elastomeric gaskets shall conform to ASTM F477 or equal approved by The Island Water Association, Inc.

03. EXECUTION

A. Cut out bell holes in the soil for each joint as required to permit the joint to be properly made and allow the barrel of the pipe to have full bearing throughout its length.

B. The joint shall be cleaned and properly lubricated prior to installation. Any debris on the connection shall be removed prior to joining.

C. Joint shall be inspected for damage or deformation prior to installation. Damaged or deformed joints shall not be installed.

D. Joints shall not be assembled in water. Water shall be removed from the trench prior to assembly.

E. The joint shall be assembled in accordance with the manufacturer’s recommendations. The joint shall be assembled to the insertion mark. Any joint that is inserted beyond the mark or lacks proper insertion shall be removed or

replaced. Care shall be taken to prevent the adjacent joint from inserting beyond the insertion mark during joint assembly.

F. Should external restraint be required, installation shall be in accordance with 33 05 31.18, Installing Restrained Joints.

G. Bell-and-spigot ends with rubber gaskets shall installed such that when combined they will provide water-tight joints under all operating conditions.

END OF SECTION

33 05 31.13 Installing Push-on Joints

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of push-on joints. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation push-on joints, corrosion protection, shoring, restraints, corrosion protection and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C600, Installation of Ductile Iron Water Mains and Their Appurtenances
2. ANSI/AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Joints shall be properly cleaned, inspected, and lubricated prior to installation.

B. Connections shall be made in straight alignment.

C. In assembling the rubber gasket joint, brush the gasket seat in the socket thoroughly with a wire brush and wipe the gasket with a cloth. Place the gasket in the socket with the large round end entering first so that the groove fits over the bead in the seat. Apply a thin film of lubricant to the inside surface of the gasket that will contact the entering pipe. Brush the plain end of the pipe to be entered thoroughly with a wire brush and place it in alignment with the bell of the pipe to which it is to be joined. Exert sufficient force on the entering pipe so that its plain end is moved past the gasket until it makes contact with the base of the socket to make the joint.

D. Before proceeding with backfilling, feel completely around the joint using a feeler gauge to confirm that the gasket is in its proper position. If the gasket can be felt out of position, withdraw the pipe and examine the gasket for cuts or breaks. If the gasket has been damaged, replace it with a new one before reinstalling the pipe.

END OF SECTION

33 05 31.16 Installing Mechanical Joints

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of mechanical joints. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation mechanical joints, corrosion protection, shoring, restraints, corrosion protection and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C111, Rubber-Gasketed Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
2. ANSI/AWWA C115, Flanged Ductile Iron Pipe with Threaded Flanges
3. ANSI/AWWA C600, Installation of Ductile Iron Water Mains and Their Appurtenances
4. ANSI/AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Pipe ends and fitting sockets shall be cleaned, inspected, and properly lubricated prior to installation.

B. Joint shall be assembled in straight alignment and the gasket installed evenly.

C. Bolts shall be tightened to provide even spacing between the gland and the face of the flange at all points around the socket.

D. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8 inches. Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6 inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid. The gaskets and followers shall then be pressed evenly and firmly into position. After the bolts have been inserted and all nuts have been made up finger-tight, diametrically opposite nuts shall be progressively

and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts.

E. Mechanical joints consisting of bell, socket, gland, gasket, bolts, and nuts shall conform to ANSI Standard A21.11. Bolts and nuts shall be high strength, low alloy, Cor-Ten, T-Head Type having hexagonal nuts. Bolts and nuts shall be machined through and nuts shall be tapped at right angles to a smooth bearing surface. Single sealed gasket push-on type joints shall conform to the requirements of ANSI A21.11.

END OF SECTION

33 05 31.18 Installing Restrained Joints

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of restrained joints. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation restrained joints, corrosion protection, shoring, restraints, corrosion protection and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, External Restraint Schedule, SD13, SD14, & SD15.

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Restraints shall be suitable for use with the material on which they are installed.

B. Restraint systems designed with break-away heads that shear at the proper torque shall be permitted and shall not be reused.

C. Installation of external restraints on bell and spigot joints shall not change the position of the “home” mark to cause either an over-inserted condition or an under-inserted condition.

D. Mechanical joint retainer glands may be used to restrain mechanical joint pipe and fittings to the plain end of ductile iron pipe and fittings when used in conjunction with thrust blocks of reduced size. The Utilities ENGINEER must approve thrust block size. Joint flexibility shall be maintained.

END OF SECTION

33 05 31.19 Fusing Joints

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of fused joints. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation fused joints, adapters, corrosion protection, shoring, restraints, corrosion protection and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ASTM F2620-13, Standard Practice for Heat Fusion Joining of Polyethylene Pipe.
2. The Island Water Association, Inc., Standard Details, SD06, SD20

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Mechanical joint adapters are required for all HDPE connections.

B. Technicians performing the fusing shall be qualified operators.

END OF SECTION

33 05 31.31 Hydrostatic Testing

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for satisfactory completion of hydrostatic testing. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, furnishing water, pumps, temporary meters, test equipment, chemicals, making temporary taps, conducting tests, collecting samples, and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C600 Installation of Ductile-Iron Water Mains and Their Appurtenances

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Test all water pipelines with clean water under the specified pressures.

03. EXECUTION

A. Conduct all tests in a manner to minimize as much as possible any interference with the day-to-day operations of existing facilities or other contractors working on the site.

A. All new or altered components including but not limited to water mains, saddles, hydrants, fittings, taps, and service laterals, shall be completely installed and restrained prior to testing.

B. In the event thrust blocks are poured, tests shall be made only after a minimum of 36 hours have elapsed after the last concrete thrust or reaction backing has been cast with high early strength concrete or at least 7 days after the last concrete thrust or reaction backing has been cast, using standard concrete.

C. The minimum testing duration shall be 2 hours.

D. The IWA representative and the engineer of record shall be present to observe satisfactory hydrostatic testing.

E. Unless otherwise determined by IWA the allowable makeup water shall conform to the latest above referenced ANSI/AWWA standard in this section. Allowable makeup water shall be a measure of the water to restore the initial test pressure. Makeup water shall be added at the end of the 2-hour test. A graduated device shall be used suitable for accurately measuring the volume of make-up water

displaced from the graduated device. The allowable leakage shall be determined by linear footage regardless of the number of joints, couplings, fittings, valves, or any other appurtenances on the water main.

F. All new or altered piping shall be subject to hydrostatic testing and no pipe installation shall be accepted until leakage for the section of line tested is less than the allowable.

G. The test pressure shall be 1.5 times the operating pressure or 150 psi, whichever is greater and shall not exceed 175 psi. as observed on a calibrated pressure gauge as measured at the point of lowest elevation. Record the pressure on the test form at 30-minute intervals.

H. All exposed pipes, fittings, valves, hydrants, and joints shall be examined for leakage during the test, any found to be leaking or defective shall be rejected by IWA.

I. Should the test fail, necessary repairs shall be accomplished by the contractor, the test repeated until results are within the established limits and shall include the necessary labor, water, pumps, and gauges at specified location(s) and all other items required to conduct the required testing and perform necessary repairs.

END OF SECTION

33 05 07 Trenchless Installation of Utility Piping

33 05 07.13 Utility Directional Drilling

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of pipe using directional drilling. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation fused joints, adapters, corrosion protection, shoring, restraints, corrosion protection and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD06, SD20

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. The work includes supplying all the directional drilling equipment and materials and restoring the site.

B. Directional drilling and pipe installation must be performed by a licensed underground contractor experienced in directional drilling. The directional drilling equipment shall be operated by experienced individuals trained by the manufacturer. Particular care shall be taken not to injure the pipe strength, coating and/or lining during delivery, storage and installation. The pulling force shall not exceed the pipe material safety pull strength as per the manufacturer's recommendation. Minimum pressures and flow rates shall be used during drilling operation as not to fracture the sub-grade material around and or above the bore.

C. The drilling mud used shall be totally inert and pose no environmental risk. The directional drilling operation shall be a closed system to minimize the discharge of water, drilling mud and cuttings to any surrounding land or bodies of water. The work area shall be enclosed by a 12-inch berm to contain unplanned spills or discharges. All tools, materials and equipment shall be provided necessary (such as ground sheets, silt fences, hay bales, absorbent pads, sediment curtains etc.) to contain the drilling fluids.

D. Control points shall be established sufficiently far from the tunnel operation not to be affected by construction operations.

E. Accuracy of alignment and grade and shall be maintained or the work corrected as required at no cost to IWA.

F. After completion of the directional drilling operation, all drilling fluids shall be removed from the site and the site shall be restored to original conditions. The depth of the pipe shall be monitored to maintain the proper depth. Care shall be taken to avoid exceeding the maximum bury depth When drilling under a paved roadway, the drilling shall be done in such a manner so as to maintain 5 feet (3 feet for driveways) of un-disturbed soil on each side of the roadway.

END OF SECTION

33 05 07.23 Utility Boring and Jacking

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of pipe using the utility boring and jacking method. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, removal of water, bracing, sheeting, shoring, tamping, restraining, backfilling installation of welded joints, adapters, corrosion protection, shoring, restraints, casing spacers and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. Welded steel casing per FDOT requirements
2. ASTM A 139 -Specification for Electric-Fusion (Arc) -Welded Steel Pipe (NPS in 4 in. and Over)

02. PRODUCTS

A. Use fill material consisting of 1-1/4 pounds of Bentonite per gallon of water during jacking to fill any voids between pipe and the earth.

B. Use manufacturers and materials for shoring, sheeting and bracing as recommended by the Licensed Professional Engineer who designed the shoring, sheeting, and bracing.

03. EXECUTION

A. When called for in the Plans, furnish and install a steel casing by jacking and boring.

B. Jacking pits shall not encroach onto private property.

C. Provide a jacking pit of adequate length to provide room for the jacking frame, the jacking head, reaction block, the jacks, rig, and jacking pipe. Construct the pit to be sufficiently wide to allow ample working space on each side of the jacking frame and sufficiently deep so that the invert of the pipe will be at the elevation desired for the completed line when placed on the guide frame. Tightly sheet the jacking pit and keep it dry at all times and provide adequate protective railings at the top.

D. The services of a Professional Engineer who is registered in the State of Florida to design all cofferdam, sheeting and bracing systems for roadway crossings shall be used for the execution of this work as necessary. After the systems have been

installed the Engineer shall submit a signed statement that the cofferdams and sheeting and bracing systems have been installed in accordance with his design.

E. Design the jacking frame so that it applies a uniform pressure over the entire pipe wall area of the pipe to be jacked. The casing pipe shall be adequately protected to prevent crushing or other damage under jacking pressures. Backstops shall be provided for adequately distributing the jack thrust without causing deformation of the soil or other damage.

F. Provide safe working conditions, to prevent shifting of material, to prevent damage to structures or other work, to avoid delay to the work, all in accordance with applicable safety and health regulations. Properly shore, sheet, and brace all excavations which are not cut back to the proper slope and where shown. Meet the general trenching requirements of the applicable safety and health regulations for the minimum shoring, sheeting and bracing for trench excavations.

G. Arrange shoring, sheeting and bracing so as not to place any strain on portions of completed work until the general construction has proceeded far enough to provide ample strength.

H. If the engineer is of the opinion that at any point the shoring, sheeting or bracing are inadequate or unsuited for the purpose, resubmission of design calculations and working drawings for that point may be ordered, taking into consideration the observed field conditions. If the new calculations show the need for additional shoring, sheeting and bracing, it should be installed immediately.

I. Periodically monitor horizontal and vertical deflections of sheeting. Submit these measurements for review.

J. Accurately locate all underground utilities and take the required measures necessary to protect them from damage. All underground utilities shall be kept in service at all times as specified

K. Adequately design the reaction blocks to carry the thrust of the jacks to the soil without excessive soil deflection in a manner which avoids any disturbance of adjacent structures or utilities.

L. Drive tight sheet piling in that portion of any excavation in paved or surface streets City collector and arterial streets and in State and County highways below the intersection of a one-on-one slope line from the nearest face of the excavation to the edge of the existing pavement or surface.

M. In general drive or place sheeting for pipelines to a depth at elevation equal to the top of the pipe as approved.

N. If it is necessary to drive sheeting below that elevation in order to obtain a dry trench or satisfactory working conditions, cut the sheeting off at the top of the pipe and leave in place sheeting below the top of the pipe.

O. In general, remove sheeting and bracing above the top of the pipe as the excavation is refilled in a manner to avoid the caving in of the bank or disturbance to adjacent areas

or structures. Sheeting shall be removed as backfilling progresses so that the sides are always supported or when removal would not endanger the construction of adjacent structures. When required to eliminate excessive trench width or other damages, shoring or bracing shall be left in place and the top cut off at an elevation 2.5 feet below finished grade, unless otherwise directed.

P. Carefully fill voids left by the withdrawal of the sheeting by jetting, ramming or otherwise.

Q. Obtain permission before the removal of any shoring, sheeting or bracing. Retain the responsibility for injury to structures or to other property or persons from failure to leave such shoring, sheeting and bracing in place even though permission for removal has been obtained.

R. Preload internal braces to 50 percent of the design loads.

S. Proof test tie backs to 133 percent of the design loads and lock off tie backs at 75 percent of the design loads.

T. In addition to sheeting specified or shown to be left in place, the engineer may order, in writing, any or all other shoring, sheeting or bracing to be left in place for the purpose of preventing injury to the structures, pipelines or to other property or to persons.

U. Advance the excavation by augering. Conduct augering with the proper equipment and procedure such that the carrier pipe and the casing pipe can be installed to the grades specified without disturbing the adjacent earth.

V. Casing pipe holes shall be mechanically bored through the soil by a cutting head on a continuous auger mounted inside the pipe. The auger shall extend a minimum distance beyond the end of the casing pipe to preclude formation of voids outside the pipe shell.

W. Any boring and jacking operations shall be done simultaneously, with continuous installation until the casing pipe is in final position. Correct line and grade shall be carefully maintained. Add-on sections of casing pipe shall be full-ring welded to the preceding length, developing water-tight total pipe strength joints. The casing installation shall produce no upheaval, settlement, cracking, movement or distortion of the existing roadbed or other facilities.

X. Water mains to be placed under all Lee County Department of Transportation & Engineering roadways shall be installed in a casing. The casing procedures shall conform to the requirements of Lee County DOT as outlined in “Administrative Code AC-11-12” and any supplements thereto. All work and materials shall be subject to inspection by DOT. Specific crossing requirements shall be obtained in advance from the authority having jurisdiction.

Y. Steel casing pipes crossing under County roadways shall be located at suitable approved alignments in order to eliminate possible conflict with existing or future

utilities and structures with a minimum 36 inches depth of cover between the top of the steel casing pipe and the surface of the roadway.

Z. Conduct hand mining only in casings that are sufficiently large enough to permit such operation. Provide adequate fresh air supply within the casing pipe and conduct all operations in accordance with the requirements of the U.S. Department of Labor Safety and Health Regulations for Construction promulgated under the Occupational Safety and Health Act 7 1970 (PL-91-596).

END OF SECTION

33 05 07.24 Casing Piping for Utility

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of casing pipe. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation welded joints, adapters, corrosion protection, shoring, restraints, corrosion protection and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD19
2. ASTM A139, Steel Casing Pipe

02. PRODUCTS

A. When steel casing is required for boring and jacking use new primed steel pipe, meeting the requirements of ASTM A 139, Grade B.

B. Steel encasement pipe shall conform to ASTM A252, Grade 2.

C. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Pipe joints shall be welded completely around the pipe by a certified welder. Pipe shall meet all AASHTO standards and Florida DOT requirements.

B. Provide full penetration butt welded pipe joints.

C. Casing shall extent beyond the edge of the roadway a minimum of 30 inches.

D. For all roadway crossings a steel or DR 11 HDPE casing pipe must be provided. The Department of Transportation having jurisdiction of said road and right-of-way must grant specific approval.

E. The casing for service laterals shall be in accordance with 34 14 17 Water Utility Service Laterals.

F. The spacers and hardware shall be stainless steel and be installed in accordance with the manufacturer’s instructions.

G. All 4-inch and larger jack and bores will require a welded steel casing with a factory-applied bituminous seal coat. The inside diameter of the casing shall be 6 inches greater than the outside diameter of the pipe bell. The pipe shall be centered in the casing using stainless steel casing spacers.

H. One spacer shall be placed not more than two feet from each end of the casing. Subsequent spacers shall be placed at 6-foot intervals within the casing. One spacer shall be placed on the spigot end of each segment at the line marking the limit of insertion into the bell. When the joint is complete, the spacer shall be in contact with the bell of the joint so that the spacer pushes the joint and relieves compression within the joint.

I. Bell restraints shall be installed at each joint inside the casing. Welded steel lugs "pig ears" shall be installed at each end of the casing.

END OF SECTION

33 05 07.43 Utility Impact Moling

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of pipe using the utility impact mole method. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation casing, adapters, corrosion protection, shoring, restraints, corrosion protection and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

1.

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Impact moling shall not be used for piping diameters larger than 2 inches.

B. Impact moling sending and receiving pits shall not be installed outside of the right-of-way.

END OF SECTION

33 05 09 Piping Specials and Fittings for Utilities

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of special components for utilities. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, fittings, adapters, couplings, thrust restraint, tapping sleeves and saddles, flushing assemblies, temporary connections, corrosion protection, shoring, restraints, corrosion protection and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C151, Ductile-Iron Pipe, Centrifugally Cast
2. ANSI/AWWA C104, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
3. ANSI/AWWA C550, C116/A21.16, Protective Interior Coatings for Valves and Hydrants

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Fittings:

1. Fittings shall be brass for pipes sizes less than 4-inch unless otherwise approved by the Island Water Association, Inc.
2. Upon approval, solvent welded PVC fittings, Schedule 80, with a rating of 200 psi may be used. At threaded joints between PVC and metal pipes, the metal shall contain a threaded socket and the PVC threaded spigot end. A metal spigot shall not, under any circumstances be screwed into a PVC socket.
3. Fittings 4-inch and larger shall be mechanical joint except as required for above ground piping.
4. All above ground fittings 4-inch and larger shall be flanged ductile iron unless otherwise approved and connected using stainless steel hardware.
5. When fittings are used in corrosive environments, whether internal, external, or both, and upon approval from IWA, fittings shall be PVC with external restraints. PVC fittings 4 inches and larger in diameter shall meet the requirements of applicable AWWA C900 and C905 specifications.

Fittings shall be manufactured entirely of PVC meeting ASTM D1784, shall be formed by a thermal-form process and be of one-piece construction, able to withstand 755 psi quick burst pressure-tested in accordance with ASTM D1599 and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM D1598. Bells shall be gasketed push on type conforming to ASTM D3139 with gaskets conforming to ASTM F477.

03. EXECUTION

A. All ductile iron fittings shall have a factory-applied bituminous seal coat over a cement mortar lining. All solid sleeves and any fittings where cement lining is unavailable such as end caps shall be coated with a 6 mil. to 8 mil. thick fusion bonded epoxy.

B. All follower glands shall be mechanical joint restraint type (megalug). Glands shall have twist-off nuts, properly used to ensure the actuating of the wedging action against the pipe. The contractor shall obtain permission from the IWA representative for the use of thrust blocks.

C. Where specified, holiday free coatings shall be applied, and at the discretion of The Island Water Association, Inc., may be required to be certified holiday-free.

END OF SECTION

33 05 09.13 Couplings for Utility Piping

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of couplings for utility piping. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation mechanical joints, adapters, flanges, split couplings, corrosion protection, shoring, restraints, corrosion protection and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

1.

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Flanged joints shall be made with series 300, stainless steel bolts.

B. Prior to assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned, the ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.

END OF SECTION

33 05 09.23 Adapters for Utility Piping

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of adapters for utility piping. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of adapters, corrosion protection, shoring, restraints, and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD19

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. HDPE flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion joining machine without the use of a stub-end holder. The sealing surface of the flange adapter shall be machined with a series of small v-shaped grooves to provide gasketless sealing, or to restrain the gasket against blow-out.

C. Flange adapters used for butterfly valves shall have a factory machined bevel to allow full operation of the butterfly valve. Backup rings shall be 304 stainless steel and fasteners shall be stainless steel.

03. EXECUTION

A. HDPE mechanical joint adapters shall be installed to join HPDE piping. See section 34 41 33 Polyethylene Utility Pipe for additional information.

B. Butterfly flange adapters shall be trial fit to the actual valve and then field tested for disc clearance and full rotation prior to butt fusion of the flange to the pipe line. After butt fusion and bolt up of the flange repeat this trial at each occurrence to ensure final install is properly centered thus again allowing valve disc clearance and full rotation.

C. Flange faces shall be centered and aligned to each other before assembling and tightening bolts. In no case shall the flange bolts be used to draw the flanges into alignment. Bolt threads shall be lubricated, and flat washers shall be fitted under the flange nuts. Bolts shall be evenly tightened according to the tightening pattern and torque step recommendations of the Manufacturer.

END OF SECTION

33 05 09.33 Thrust Restraint for Utility Piping

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of thrust restraint for utility piping. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of concrete, forms, external restraints, corrosion protection, shoring, and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD13
2. The Island Water Association, Inc., Standard Details, SD14

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Restraining devices shall be placed at all bends, tees, plugs, reducers, and other fittings and conform to the IWA Standard Details. Concrete thrust blocks may be used as additional restraint if approved by The Island Water Association, Inc.

B. Thrust blocks shall not be used in peat, organic clays, organic silts, or inorganic clays of high plasticity. A mechanical restraint shall be used in place of thrust blocks where reaction backing is required in the soils listed previously. The use of external restraints shall be installed in accordance with the IWA Details

C. Thrust blocks shall be installed in accordance with the IWA details

D. The use of precast thrust blocks is acceptable provided they meet the area requirements in the IWA details.

E. Thrust blocks shall be of 2,000 psi concrete and shall be placed against undisturbed earth. The blocks shall be placed so that the pipe and fitting joints will be accessible for repair.

F. Concrete shall be installed in accordance with section 03 00 00 Concrete.

END OF SECTION

33 05 09.34 Tapping Sleeves and Saddles

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of tapping sleeves and saddles. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of tapping sleeves and saddles, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD07 through SD12

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Tapping saddles shall be installed in accordance with Water Utility Service Laterals in section 33 14 17

B. Tapping sleeves shall be subject to a satisfactory hydrostatic test prior to tapping.

C. 4-inch and larger service taps and connections shall be installed using stainless steel tapping sleeve and flanged gate valves. Stainless steel tapping saddles with MJ gate valve connections are acceptable. Proper corrosion protection for any metal components shall be installed.

D. Flange faces shall be centered and aligned to each other before assembling and tightening bolts. In no case shall the flange bolts be used to draw the flanges into alignment. Bolt threads shall be lubricated, and flat washers shall be fitted under the flange nuts. Bolts shall be evenly tightened according to the tightening pattern and torque step recommendations of the Manufacturer.

END OF SECTION

33 05 09.53 Flushing Assembly (Blow-off)

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for complete installation of flushing assemblies. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of tapping sleeves and saddles, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD01

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Flushing assemblies shall not be installed in the bottom of a swale.

END OF SECTION

33 05 09.63 Temporary Connections

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for complete installation of temporary connections. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of tapping sleeves and saddles, meters, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes and specifications:

1. The Island Water Association, Inc., Standard Details, SD12.

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. All new water mains must be connected to the existing system as shown in the standard details. This temporary connection will be used for all flushing, testing, and sterilizing and shall not be removed until approval is granted from IWA. The temporary connection water meter shall be provided by IWA, unless otherwise directed and returned to IWA upon completion of the job. Meters and usage shall be billed at the current non-member rate.

B. Temporary flush out connections shall be installed on all dead-end water mains.

END OF SECTION

33 05 19 Ductile-Iron Utility Pipe

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for complete installation of ductile iron utility pipe. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of joints, restraints, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C151, Ductile-Iron Pipe, Centrifugally Cast
2. ANSI/AWWA C110, Ductile-Iron and Gray-Iron Fittings
3. ANSI/AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
4. ANSI/AWWA C104, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Where ductile iron is specified it shall be Class 51, or approved equal, mechanical joint or push-on type. All ductile iron pipe shall have a factory applied bituminous seal coat over a cement mortar lining.

C. The pipe shall have smooth dense interior surfaces and shall be free from fractures, excessive interior surface crazing and roughness.

03. EXECUTION

A. All pipe and fittings shall be installed in accordance with Buried Piping Installation 33 05 31.

B. All above ground potable water piping shall be painted blue.

C. All above ground ductile iron pipe shall be installed using flanged joints and stainless-steel hardware.

D. Shop applied interior linings and exterior coatings shall be applied evenly to the nominal thickness.

E. Every precaution shall be taken to prevent damage to the pipe cement mortar lining. If lining is damaged or found faulty at delivery site, the damaged or unsatisfactory portions shall be repaired in the field. All shop applied cement mortar lining shall be given a seal coat of asphaltic material on conformance with all applicable standards.

END OF SECTION

33 05 31 Thermoplastic Utility Pipe

33 05 31.11 Polyvinyl Chloride Pressure Pipe (PVC)

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for complete installation of PVC utility pipe. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of joints, restraints, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution
2. ANSI/AWWA C905, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 in. Through 48 in. (350 mm through 1,200 mm), for Water Transmission and Distribution

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Upon approval, solvent welded PVC may be used and shall be Schedule 80 with a pressure rating of 200 psi.

C. All 4-inch through 16-inch shall be Polyvinyl Chloride Pressure pipe, SDR-18, unless otherwise specified.

03. EXECUTION

A. All pipe and fittings shall be installed in accordance with Buried Piping Installation 33 05 31.

END OF SECTION

33 05 33 Polyethylene Utility Pipe

33 05 33.23 Polyethylene Pressure Pipe and Tubing (HDPE)

1. GENERAL

   A. Section includes all labor, materials, equipment, and all other items necessary for complete installation of HDPE pipe and tubing. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of joints, restraints, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

   B. REFERENCES

      References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

      1. ANSI/AWWA C901, Polyethylene (PE) Pressure Pipe and Tubing, 3/4 in. (19 mm) Through 3 in. (76 mm), for Water Service
      2. ANSI/AWWA C906, Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in. (100 mm Through 1,650 mm), for Waterworks
      3. ASTM D2239, Standard Specification for Polyethylene (PE) Plastic Pipe (SDIR-PR) Based on Controlled Inside Diameter, for SDR 9, 200 psi CTSI.
      4. ASTM D3350, Standard Specifications for Polyethylene Plastic Pipe and Fitting Materials
      5. ASTM D3261, Standard Specifications for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) plastic Pipe and Tubing

2. PRODUCTS

   A. See Approved Manufacturers and Parts List, a separate document.

   B. All piping less than 4 inches in diameter shall be copper tubing size (CTS) polyethylene tubing. Tubing for service laterals shall be of a type approved by the National Sanitation Foundation for use in transmitting fluids for human consumption. The tubing shall be blue in color.

   C. The Island Water Association, Inc. has the option of approving the use of HDPE up to 12 inches in diameter for water main crossings of roadways, ditches, canals, and environmentally sensitive lands. HDPE water mains shall have the same equivalent internal diameter and equivalent pressure class rating as the

corresponding PVC pipe, unless otherwise approved by The Island Water Association, Inc..

D. Where approved, HDPE for sizes 4-inch and larger shall be 200 psi, ductile iron pipe size (D.I.P.S) and shall have equally spaced colored markings in accordance with Recommended Standards for Water Works, published by: Health Research Inc..

E. All HDPE pipe, fittings, and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the items to be furnished.

F. Polyethylene fittings and custom fabrications shall be molded or fabricated by the pipe manufacturer. Butt fusion outlets shall be made to the same outside diameter, wall thickness, and tolerances as the mating pipe. All fittings and custom fabrications shall be fully rated for the same internal pressure as the mating pipe. Pressure de-rated fabricated fittings are prohibited.

03. EXECUTION

A. All HDPE pipe and fittings may be installed by the Buried Piping Installation method, section 33 05 31 and/or the Trenchless Installation of Utility Piping method, section 33 05 07 or a method approved by The Island Water Association, Inc. prior to construction.

B. Joining HDPE pipe sizes 4-inch and larger shall be accomplished by the Fusing Joints method unless otherwise directed. HDPE pipe sized smaller than 4-inch shall be joined using brass fittings suitable for use in accordance with the manufacturer’s recommendation.

C. Polyethylene pipe and fittings may be joined to other materials by means of mechanical joint adapters. Where mechanical joint adapters are impractical or impossible connections to other materials may be joined by means of flanged connections (flange adapters and back-up rings) or mechanical couplings designed for joining polyethylene pipe to another material. Mechanical couplings shall be fully pressure rated and fully thrust restrained such that when installed in accordance with manufacturer's recommendations, a longitudinal load applied to the mechanical cooling will cause the pipe to yield before the mechanical coupling disjoins. External joint restraints shall not be used in lieu of fully restrained mechanical couplings.

D. Service laterals connections to HDPE installed by heat fusion are prohibited.

E. Installations 4-inch and larger requiring a branching connection to HDPE shall be installed using mechanical or flanged joints and shall be properly restrained.

END OF SECTION

33 05 97 Identification and Signage for Utilities

33 05 97.16 Markers for Utility Identification

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for complete installation of markers for utility identification. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of markers, signs, tags, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD04

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. The locate device shall be 3M type “Water” Model EMS 1423 XR/ID

03. EXECUTION

A. The locating devices shall be verified they are in working order.

B. Balls shall be installed with a minimum separation of three feet of horizontal separation.

C. The locate devices shall be installed on tees and service connections where gate valves are not used, elbows, reducers, and where pipe materials or size changes.

END OF SECTION

33 05 97.17 Underground Utility Warning Tape

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for complete installation of underground utility warning tape. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of tape, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD05

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. The detectable marking tape shall be aluminum foil, plastic encased, 5 mil thick, 3-inch wide, blue, with the words “Caution: Buried Water Line Below” permanently printed in large letters.

03. EXECUTION

A. All new water mains shall have a detectable marking tape buried 12 inches deep directly above the water line.

B. Service laterals less than 4-inch do not require detectable marking tape.

C. Water mains installed using the directional drill method do not require the installation of detectable marking tape.

END OF SECTION

33 08 00 Commissioning of Utilities

33 08 10 Commissioning of Water Utilities

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for commissioning of water utilities. The work includes the satisfactory completion of all associated work and documentation in accordance with all applicable rules and permits. The work includes, but is not limited to, the completion of surveys, record drawings, microbial samples, punch list items, excavation backfilling, compaction, dewatering and other items necessary to complete the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

1. Not Used

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. The engineering firm shall be responsible for providing IWA with certified record drawings showing the location of all water mains fittings and appurtenances except as otherwise specified.

B. The engineering firm shall provide a testing report prior to placing the water system in service. Submit for review and approval a detailed bound report summarizing the leakage test data, describing the test procedure and showing the calculations on which the leakage test data is based including the length and diameter of the section of line tested including service laterals, a complete description of test procedures and methods, actual test time, pressure at the beginning and end of the test, the name of the inspector and tester and a description of any repairs.

C. Water mains will not be accepted by The Island Water Association, Inc. until all road construction, easements, restoration of all disturbed areas and utility installations are complete. All new water mains must be cleared for service, in writing, by all applicable agencies.

D. All pipe damaged prior to Substantial Completion or during warrantee period shall be repaired or replaced by the contractor.

E. Warrant all work to be free from defects in workmanship and materials for a period of one year from the date of completion of all construction. If work meets these specifications, a letter of acceptance, subject to the one-year warranty period, shall be given at the time of completion. A final acceptance letter shall be given upon final inspection at the end of the one-year warranty period, provided

the work still complies with these specifications. In the event deficiencies are discovered during the warranty period, they shall be corrected by the CONTRACTOR without additional charge to the OWNER before final acceptance. During the warranty period, the ENGINEER shall determine if warranty repairs or replacement work shall be performed by the CONTRACTOR. The decision of the ENGINEER shall be binding upon the CONTRACTOR.

F. Commissioning utilities shall be in accordance with 01 31 13 Project Coordination.

G. Cataloging of all underground utility installations for mapping purposes shall be performed by IWA. GPS location will be performed by IWA personnel and will be scheduled through the Construction Coordinator. The GPS locations obtained by IWA are not a substitute for thorough and accurate record drawings.

END OF SECTION

33 14 00 Water Utility Transmission and Distribution

33 14 11 Water Utility Distribution Piping

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for complete installation of water utility distribution piping. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of joints, restraints, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI/AWWA C905, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 in. Through 48 in. (350 mm through 1,200 mm), for Water Transmission and Distribution

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

END OF SECTION

33 14 17 Water Utility Service Laterals

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for complete installation of water utility service laterals. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, jack and boring, removal of water, bracing, sheeting, shoring, tamping, installing new tapping saddles, corporation stops or valves and service lines in casing where required, maintaining the system, installation of joints, restraints, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD08 – SD12, & SD25
2. AWWA C800, Underground Service Lines Valves and Fittings

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Service saddles 2-inch and smaller shall be full-circle bearing types stainless steel with threaded outlets.

C. Corporation stops and curb stops shall be fitted with a compression connection outlet with split-lock devices for polyethylene pipe.

03. EXECUTION

A. Service connections shall be installed at the locations and in the manner shown on the Drawings.

B. All new service connections must be protected by an approved backflow prevention device. There is a sperate specification for the installation of backflow prevention devices. Also, install new service lines as directed.

C. Service laterals with roadway crossings will include a new pipe and casing under the roadway unless otherwise directed.

D. All potable service taps shall be located in open/green areas unless specifically approved by The Island Water Association, Inc..

E. When practical, in new residential, commercial, or/and industrial subdivisions, the corporation stop or valve shall be located at the intersecting property line or in the center of the lot.

F. When relocation of an existing meter is required; the member is responsible for connecting the new relocated meter to the existing service line. The work includes excavation, installation, installing new tapping saddles, corporation stops or valves and service lines in casing as required, maintaining the system, protection of property and associated work.

G. When the removal of an existing meter pit is required it shall be to a minimum depth of 1 foot below grade. The pit shall be filled with clean fill providing room for the installation of the new meter.

H. When existing service laterals for fire protection require transfer it shall be performed as directed. The work shall include excavation, installation, installing new tapping saddle and a valve the same size as the existing fire line.

I. Service laterals shall be in accordance with the following table, unless otherwise specified.

Meter Size	Meter Box Size	Valve and Tap Size	Service Size	Bore & Jack Casing Size	Service Lateral Material
5/8"	10.5" x 17.5"	1"	1"	2"	Polyethylene
1"	10.5" x 17.5"	1"	1"	2"	Polyethylene
1-1/2"	12" x 20"	2"	2"	4"	Polyethylene
2"	13" x 24"	2"	2"	4"	Polyethylene
3"	22" x 35"	4"	4"	8"	C900 PVC*
4"	22" x 35"	4"	4"	8"	C900 PVC*

***** With Restrained (Mega-Lug) Ductile Iron Fittings and Bell Restraints in Casing

J. Service laterals with 1-inch nominal diameter shall be tapped with a 15/16-inch min. diameter hole. No services shall be transferred until approval is obtained from IWA. A representative from the IWA shall be present during the transfer of all services. The meter box shall be reinstalled to its original condition.

K. A full nominal diameter cutter shall be used for tapping.

L. Service lateral connection shall not be connected to HDPE unless it is impractical or impossible to avoid. Should service saddles connecting to HDPE be necessary, the service laterals shall be connected using a tapping saddle specifically designed the application.

END OF SECTION

33 14 19 Valves and Hydrants for Water Utility Service

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for complete installation of valves and hydrants for water utility service. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of hydrants, street valves, joints, restraints, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD02 and SD03
2. There is a separate specification for the installation of fire hydrants.
3. AWWA M17, Installation, Field Testing and Maintenance of Fire Hydrants

02. PRODUCTS

A. Not used

03. EXECUTION

A. Fire hydrant auxiliary valves shall be installed in accordance with section 40 05 58.10, Resilient-Wedge Gate Valves.

B. Hydrants are supplied by the appropriate fire district, except as otherwise specified.

C. The installation and locations of fire hydrants shall be in accordance with the appropriate fire district regulations. The installation of fire hydrants and fire hydrant locations must comply with the appropriate fire district regulations.

D. During loading, transportation and unloading, exercise care to prevent damage to materials. Fire hydrants should be unloaded carefully. The hydrant should be carefully lowered from the truck to the ground, not dropped. Only hoists and slings with adequate load capacity to handle the weight of the hydrant shall be used.

E. Hydrants should be stored in the fully closed position to prevent entry of foreign material that could cause damage to the seating surfaces. Whenever practical, hydrants should be stored indoors. If outside storage is required, means should be

provided to protect the operating mechanism. In outside storage, parts and flanges should be protected from the weather and foreign materials.

END OF SECTION

33 14 23 Enclosures for Water Utility Piping and Valves

33 14 23.33 Enclosures for Water Utility Air Valves

01. GENERAL

A. . Section includes all labor, materials, equipment, and all other items necessary for complete installation of enclosures for water utility air valves. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, installation of enclosures, air valves, restraints, corrosion protection, excavation backfilling, compaction, dewatering and other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD27

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Enclosures shall be installed plumb.

END OF SECTION

40 00 00 Interconnections

40 01 00 Operations and Maintenance of Interconnections

40 05 00 Common Work Result for Interconnections

40 05 57 Actuators for Valves and Gates

40 05 57.11 Manual Actuators

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of manual actuators. The work includes the satisfactory installation and removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, earth excavation, bedding, thrust blocks, backfilling, sheeting, retainer glands, shoring, bracing, stainless steel thrust rods, tamping, removal of water, the making of joints, installation of the actuator, other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

1. Not Used

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Valve actuators for buried service butterfly valves shall be manual gear operator with 2-inch square operating nut. Actuator shall be Dynatorq DT Series operators for buried service with submerged service seals, 316 stainless steel hardware and input shafts and shall be drilled and bored to direct mount the butterfly valve

C. All buried service valves shall have cast-iron, three-piece valve boxes as outlined in 40 05 89.10 Valve Boxes.

03. EXECUTION

A. Valve and actuators shall be fit and tested on the valve prior to installation.

END OF SECTION

40 05 58 Gate Valves

40 05 58.10 Resilient-Wedge Gate Valves

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of resilient wedge gate valves. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, bedding, thrust blocks, backfilling, sheeting, retainer glands, shoring, bracing, stainless steel thrust rods, tamping, removal of water, the making of joints, installation of the valve, valve boxes, valve pads, other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD02
2. ANSI/AWWA C509, Resilient-Seated Gate Valves for Water Supply Service
3. ANSI/AWWA C11-12, Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
4. ASTM A 126, Class B, Standard Specification for Gray Iron Casting for Valves, Flanges and Pipe Fittings
5. ANSI B16.1, Pipe Flanges and Fittings Package
6. ANSI B16.3, Malleable Iron Threaded Fittings Classes 150 and 300
7. ANSI B16.5, Pipe Flanges and Fittings
8. ASTM A276/ASTM A276M-17, Standard Specifications for Stainless Steel Bars and Shapes
9. MSS SP-60, Connecting Flange Joints Between Tapping Sleeves and Tapping Valves
10. MSS SP92, Valve Users Guide

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Gate valves shall be resilient-wedge gate valves and as far as possible shall be equipment of the same type from one manufacturer. Gate valves shall be

Mechanical Joint (MJ) by MJ except for tapping valves, which may be flat flange by MJ. All 2-inch valves shall be IPT by IPT.

C. All valves, 14-inch and larger, shall be mechanical joint manufactured by U.S. Pipe. There will be no exception as to manufacturer of the valves without written permission from IWA.

D. All valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve. Gate valves shall be non-rising stem with the stem made of case forged or rolled bronze. Two stem steals shall be provided and shall be of the O-ring type, with one above and one below the thrust collar. The valve body, bonnet and bonnet cover shall be of cast iron. All ferrous surfaces inside and outside shall have a fusion-bonded epoxy coating, 10 mils thick. The stem nut, made of bronze, shall be independent of the gate. All bonnet, body, stem clamp nut or bolt, and head bolts and nuts shall be of 316 stainless steel or approved equal. A 2-inch operating nut shall be provided and installed on the valve, for operating the valve. The sealing mechanisms shall consist of a cast iron gate having a vulcanized synthetic rubber coating. Valves shall turn counterclockwise to open.

E. All buried service valves shall have cast-iron, three-piece valve boxes as outlined in 40 05 89.10 Valve Boxes.

03. EXECUTION

A. Gate valves shall be installed where called for in the plans and shall be the sizes shown.

B. Stainless steel hardware shall be installed on the valve prior to delivery to project site and shall be inspected by IWA personnel prior to installation.

C. Flanged Joint connections shall be in accordance with section 33 05 09.13, Couplings for Utility Piping.

D. All valves shall be handled in a manner to prevent any injury or damage to any part of the valve. All joints shall be thoroughly cleaned and prepared prior to installation.

E. All valves shall be installed so that the valve stems are plumb.

F. Valves shall be carefully inspected, opened wide and then tightly closed and the various nuts and bolts shall be tested for tightness. Special care shall be taken to prevent any foreign matter from becoming lodged in the valve seat. All valves shall be tested, the resilient sealing mechanism shall provide zero leakage with the full working pressure on either side of the gate and zero pressure on the opposite side. Valves shall be installed with the stems vertically above the centerline of the pipe.

G. Any valve that does not operate correctly shall be removed and replaced.

END OF SECTION

40 05 64 Butterfly Valves

40 05 64.23 Resilient-Seated Butterfly Valves

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of resilient seated butterfly valves. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, bedding, thrust blocks, backfilling, sheeting, retainer glands, shoring, bracing, stainless steel thrust rods, tamping, removal of water, the making of joints, installation of the valve, valve boxes, valve pads, other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD02

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. All buried service valves shall have cast-iron, three-piece valve boxes as outlined in 40 05 89.10 Valve Boxes.

03. EXECUTION

A. Valves shall be installed vertically unless installed in a buried service application.

B. Buried service valves shall be installed horizontally with a buried service actuator suitable for submerged service and have installed a 2-inch square operating nut.

END OF SECTION

40 05 65 Check Valves

40 05 65.29 Wafer Check Valves

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of double disc check valves. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, bedding, thrust blocks, backfilling, sheeting, retainer glands, shoring, bracing, stainless steel thrust rods, tamping, removal of water, the making of joints, installation of the valve, valve boxes, valve pads, other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. ANSI B16.1, Pipe Flanges and Fittings Package

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Wafer check valves from 2-inch to 12-inch shall be fully-elastomer lined, epoxy coated, ductile iron body, and compatible with ANSI B16.1 flanges. Valves shall have EPDM rubber and 316 stainless steel for all wetted parts. Valve shall provide bubble-tight shutoff from 25 to 150 psi ΔP.

03. EXECUTION

END OF SECTION

40 05 67 Specialized Pressure and Flow-Control Valves

40 05 67.11 Reduced Pressure Zone Backflow Preventers

40 05 67.16 Double Check Valve Assembly Backflow Preventers

01. GENERAL

A. Backflow prevention is outlined in separate documents titled:

1. "Cross Connection Control and Backflow Prevention Program
2. "Cross Connection Control and Backflow Prevention Specifications"

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD12, SD21-SD24, and SD25.
2. AWWA C510-97, Standards for Double Check Valve Backflow Prevention Assembly
3. AWWA C511-97, Standard for Reduced-Pressure Principle Backflow Prevention assembly
4. University of Southern California, Manual of Cross-Connection Control, Chapter 10.

02. PRODUCTS

A. Not used

03. EXECUTION

END OF SECTION

40 05 76 Valves and Appurtenances

40 05 76.10 Tapping Sleeves and Valves

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of tapping sleeves and valves. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, bedding, thrust blocks, backfilling, sheeting, retainer glands, shoring, bracing, stainless steel thrust rods, tamping, removal of water, the making of joints, installation of tapping sleeves and valves, valve boxes, valve pads, other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD02, SD03, and SD07
2. AWWA C800, Underground Service Lines Valves and Fittings
3. ANSI/AWWA C509, Resilient-Seated Gate Valves for Water Supply Service
4. ANSI/AWWA C11-12, Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
5. ASTM A 126, Class B, Standard Specification for Gray Iron Casting for Valves, Flanges and Pipe Fittings
6. ANSI B16.1, Pipe Flanges and Fittings Package
7. ANSI B16.3, Malleable Iron Threaded Fittings Classes 150 and 300
8. ANSI B16.5, Pipe Flanges and Fittings
9. ASTM A276/ASTM A276M-17, Standard Specifications for Stainless Steel Bars and Shapes
10. MSS SP-60, Connecting Flange Joints Between Tapping Sleeves and Tapping Valves
11. MSS SP92, Valve Users Guide

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. Tapping saddles shall be stainless steel.

C. All buried service valves shall have cast-iron, three-piece valve boxes.

03. EXECUTION

A. No Line size tapping saddles are permitted. Line size connections shall be assembled using mechanical joint connections

B. Tapping saddles less than 1-1/2-inch shall be installed 45 degrees from the vertical in the direction of service.

C. Tapping saddles larger than 1-1/2-inch shall be installed horizontally in the direction of service unless otherwise directed.

END OF SECTION

40 05 76.11 Meter Boxes

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of meter boxes. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, bedding, backfilling, bracing, tamping, removal of water, installation of meter boxes. other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD08 through SD11.

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. Meter boxes shall be installed to finished grade.

B. Meter boxes size shall be in accordance with section 33 14 17, Water Utility Service Laterals.

END OF SECTION

40 05 76.23 Line Stops

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of line stops. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, bedding, thrust blocks, backfilling, sheeting, retainer glands, shoring, bracing, stainless steel thrust rods, tamping, removal of water, the making of joints, installation of line stops, valve boxes, valve pads, other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

1. Not Used

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. .Not used

END OF SECTION

40 05 89 Valve Accessories

40 05 89.10 Valve Boxes

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of valve boxes and valve pads. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, bedding, backfilling, bracing, tamping, removal of water, installation of valve boxes and valve pads, other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

References include, but are not limited to the following, and apply to the latest standards, codes, and specifications:

1. The Island Water Association, Inc., Standard Details, SD02 and SD03

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

B. All buried service valves shall have cast-iron, three-piece valve boxes. Valve boxes shall be provided with suitable heavy bonnets to extend to such elevation at the finished grade. The barrel shall be two-piece, screw type, having 5-1/4-inch shaft. Valve boxes shall be designed to prevent the transmission of surface loads directly to the valve or piping and shall be complete with cast iron covers. Covers shall have "WATER" cast into the top. The covers shall be so constructed as to prevent tipping or rattling.

03. EXECUTION

A. . Cast iron valve boxes shall be firmly supported and shall be kept centered and plumb over the operating nut of the valve. The box cover shall be flush with finished grade. Valve boxes shall be of the proper size for the installed depth and shall have sufficient adjustment to finished grade. In no case shall PVC pipe, or other materials, be substituted to adjust the valve box to finished grade.

B. Care shall be taken to prevent earth and other material from entering the valve box

C. Any valve box which is out of alignment or whose top does not conform to the finished ground surface shall be dug and reset. Before final acceptance of the work, all valve boxes shall be adjusted to finish grade. Valve operating risers shall be installed with any valves required to ensure that the operating nut is 30-inches or less from the finished grade surface.

END OF SECTION

40 42 00 Corrosion Protection

01. GENERAL

A. Section includes all labor, materials, equipment, and all other items necessary for proper installation of corrosion protection. The work includes the satisfactory installation and/or removal all the required materials, tools, and equipment in accordance with all applicable rules and permits. The work includes, but is not limited to, excavation, bedding, thrust blocks, backfilling, sheeting, retainer glands, shoring, bracing, stainless steel thrust rods, tamping, removal of water, the making of joints, installation of corrosion protection, valve boxes, valve pads, other items necessary to perform the Work, except as otherwise specified, and the protection of people and property.

B. REFERENCES

1. ASTN G62, Standard Test Methods for Holiday Detection in Pipeline Coatings

02. PRODUCTS

A. See Approved Manufacturers and Parts List, a separate document.

03. EXECUTION

A. . Polyethylene Wrapping: Corrosion protection of all metal including ductile iron pipe, fittings, valves, saddles etc. shall be provided by wrapping with polyethylene sheets with a minimum of 8-mil thickness. This wrapping shall completely cover the ductile iron pipe without holes and form a snug fit with a minimum one-foot overlap at all points and seams. These joints and seams shall be securely taped in place. Tape polyethylene wrap securely at all penetrations, fittings, valves, and joints.

B. All bolts not fitted with Cor-Ten fasteners shall be fitted with zinc caps, including but not limited to tapping saddles and repair clamps (“wraparounds”).

C. When holiday free coatings are specified, to ensure a holiday-free lining, documentation must be provided, prior to shipment, showing each section of the lined pipe has passed the holiday testing at production in accordance with all applicable standards.

D. Additionally, where other existing utilities are known to be cathodically protected, ductile iron pipe crossing said utility shall be protected for a distance of 20 feet to each side. If ductile iron pipe is to be installed parallel to and within 10 feet of cathodically protected pipe, then protection shall be provided for the entire length

END OF SECTION

APPROVED MANUFACTURERS AND PARTS LIST

THE ISLAND WATER ASSOCIATION, INC

SANIBEL, FLORIDA

Revised

January 2021

Item Type	Manufacturer	General Description	Detail Description	Vendor
Fastner	Tyler Union	BOLT TEE HEAD STEEL 5/8" X 3" LONG	For 3" MJ FITTINGS	Hughes Supply
Fastner	Tyler Union	BOLT TEE HEAD STEEL 3/4" X 4" LONG	For 4",6", 8", 10" & 12" MJ FITTINGS	Hughes Supply
Fastner	Tyler Union	BOLTS,SHOULDER, 3/4" X 4"	For 4",6", 8", 10" & 12" MJ FITTINGS	Hughes Supply
Fastner	Tyler Union	BOLT TEE HEAD STEEL 3/4" X 5"	For 16" & 20" MJ FITTINGS	Hughes Supply
Fastner	Tyler Union	BOLTS,SHOULDER, 3/4" X 4 1/2"	For 16" & 20" MJ FITTINGS	Hughes Supply
Fittings	Banjo	2" CAM-LOC DUST CAP #5535K44		McMaster Carr
Fittings	Banjo	2" CAM-LOC D - COUPLER #5535K32	NPT FEMALE X COUPLER (FEMALE COUPLER)	McMaster Carr
Fittings	Banjo	2" CAM-LOC A - ADAPTER #5535K34	ADAPTER X NPT FEMALE (MALE COUPLER)	McMaster Carr
Fittings	Banjo	2" CAM-LOC E - ADAPTER #5535K14	ADAPTER X HOSE SHANK	McMaster Carr
Fittings	Banjo	2" CAM-LOC C - COUPLER #5535K12	COUPLER X HOSE SHANK	McMaster Carr
Fittings	Ebaa Iron	4" MEGA LUG RING FOR DI	.	Hughes Supply
Fittings	Ebaa Iron	6" MEGA LUG RING FOR DI	.	Hughes Supply
Fittings	Ebaa Iron	8" MEGA LUG RING FOR DI	.	Hughes Supply
Other		GASKET METER 3/4" ROUND RED FIBRE	1/16 THICK, INDIVIDUAL	Hughes Supply
Fittings	Ebaa Iron	10" MEGA LUG RING FOR DI	.	Hughes Supply
Other		GASKET METER 1" ROUND RED FIBRE	1/16 THICK ,INDIVIDUAL	Hughes Supply
Fittings	Ebaa Iron	MEGA LUG RING FOR DI 20"	.	Hughes Supply
Fittings	Ebaa Iron	MEGA LUG RING FOR DI 16"	.	Hughes Supply
Fittings	Ebaa Iron	10" MEGA LUG RING FOR PVC	.	Hughes Supply
Fittings	Ebaa Iron	MEGA LUG RING 12" FOR PVC	.	Hughes Supply
Fittings	Ebaa Iron	MEGA LUG RING 12" FOR DI	.	Hughes Supply
Fittings	Ebaa Iron	MEGA LUG RING 16" FOR DI	.	Hughes Supply
Fittings	Ebaa Iron	MEGA LUG RING 16" FOR PVC	.	Hughes Supply
Fittings	Ebaa Iron	MEGA LUG RING 14" FOR DI	.	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET MISC.	Specify gasket type below:	Hughes Supply
Fittings	Flow Control Inc.	3" FLOW CONTROL COMPRESSION COUPLING PVC	COMPRESSION/COMPRESSION	Hughes Supply
Fittings	Flow Control Inc.	2 1/2" FLOW CONTROL COMPRESSION COUPLING PVC	COMPRESSION/COMPRESSION	Hughes Supply
Fittings	Flow Control Inc.	2" FLOW CONTROL COMPRESSION COUPLING PVC	COMPRESSION/COMPRESSION	Hughes Supply
Fittings	Flow Control Inc.	1 1/2" FLOW CONTROL COMPRESSION COUPLING PVC	COMPRESSION/COMPRESSION	Hughes Supply
Fittings	Flow Control Inc.	1 1/4" FLOW CONTROL COMPRESSION COUPLING PVC	COMPRESSION/COMPRESSION	Hughes Supply
Fittings	Flow Control Inc.	1" FLOW CONTROL COMPRESSION COUPLING PVC	COMPRESSION/COMPRESSION	Hughes Supply
Fittings	Flow Control Inc.	3/4" FLOW CONTROL COMPRESSION COUPLING PVC	COMPRESSION/COMPRESSION	Hughes Supply
Fittings	Flow Control Inc.	1/2" FLOW CONTROL COMPRESSION COUPLING PVC	COMPRESSION/COMPRESSION	Hughes Supply
Fittings	IPEX USA LLC	3/4" PIPE PVC PLAIN END GLUE JOINT SCHED 80	.	Hughes Supply
Fittings	IPEX USA LLC	1" PIPE PVC PLAIN END GLUE JOINT SCHED 80	.	Hughes Supply
Fittings	IPEX USA LLC	1 1/4" PIPE PVC PLAIN END GLUE JOINT SCHED 80	.	Hughes Supply
Fittings	IPEX USA LLC	1 1/2" PIPE PVC PLAIN END GLUE JOINT SCHED 80	.	Hughes Supply
Fittings	IPEX USA LLC	2" PIPE PVC PLAIN END GLUE JOINT SCHED 80	.	Hughes Supply
Fittings	IPEX USA LLC	2 1/2" PIPE PVC PLAIN END GLUE JOINT SCHED 80	.	Hughes Supply
Fittings	IPEX USA LLC	3" PIPE PVC PLAIN END GLUE JOINT SCHED 80	.	Hughes Supply
Fittings	IPEX USA LLC	4" PIPE PVC PLAIN END GLUE JOINT SCHED 80	.	Hughes Supply
Fittings	Romac	GASKET MECHANICAL JOINT 20" STANDARD MECHANICAL	INDIVIDUAL	Hughes Supply
Fittings	Romac	GASKET MECHANICAL JOINT 16" STANDARD MECHANICAL	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	3" CAP DUCTILE IRON MJ WITH 2" FIPT HOLE	EPOXY COATED	Hughes Supply
Fittings	Star	3" PLUG DUCTILE IRON EPOXY COATED	MECH JOINT w/ 2FIPT HOLE	Hughes Supply
Fittings	Star	3" ELBOW 45 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	3" ELBOW 90 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	3" SOLID SLEEVE DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	3" TEE DUCTILE IRON - EPOXY COATED	MECH JOINT	Hughes Supply
Fittings	Star	4" CAP DUCTILE IRON MJ WITH 2" FIPT HOLE	EPOXY COATED	Hughes Supply
Fittings	Star	4" PLUG DUCTILE IRON EPOXY COATED	MECH JOINT w/ 2FIPT HOLE	Hughes Supply
Fittings	Star	4" ELBOW 45 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	4" ELBOW 90 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	4" SOLID SLEEVE DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	4" TEE DUCTILE IRON - EPOXY COATED	MECH JOINT	Hughes Supply
Fittings	Star	4" ELBOW 11 1/4 deg. DUCTILE IRON EPOXY COATED	MECH JOINT	Hughes Supply
Fittings	Star	4" ELBOW 22 1/2 deg. DUCTILE IRON EPOXY COATED	MECH JOINT	Hughes Supply
Fittings	Star	6" CAP DUCTILE IRON MJ WITH 2" FIPT HOLE	EPOXY COATED	Hughes Supply
Fittings	Star	6" PLUG DUCTILE IRON EPOXY COATED	MECH JOINT w/ 2FIPT HOLE	Hughes Supply
Fittings	Star	6" ELBOW 45 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	6" ELBOW 90 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	6" ELBOW 11 1/4 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	6" ELBOW 22 1/2 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	6" SOLID SLEEVE DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	6" TEE DUCTILE IRON - EPOXY COATED	MECH JOINT	Hughes Supply
Fittings	Star	6" X 6" X 6" ANCHOR TEE - EPOXY COATED	ANCHOR X MECH JOINT	Hughes Supply
Fittings	Star	6" X 4 " REDUCER - EPOXY COATED	MECH JOINT	Hughes Supply
Fittings	Star	8" CAP DUCTILE IRON MJ WITH 2" FIPT HOLE	EPOXY COATED	Hughes Supply
Fittings	Star	8" PLUG DUCTILE IRON EPOXY COATED	MECH JOINT w/ 2FIPT HOLE	Hughes Supply
Fittings	Star	8" ELBOW 45 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	8" ELBOW 90 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	8" ELBOW 11 1/4 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	8" ELBOW 22 1/2 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	8" SOLID SLEEVE DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	8" TEE DUCTILE IRON - EPOXY COATED	MECH JOINT	Hughes Supply
Fittings	Star	8" X 8" X 6" ANCHOR TEE - EPOXY COATED	ANCHOR X MECH JOINT	Hughes Supply
Fittings	Star	8" X 6 " REDUCER - EPOXY COATED	MECH JOINT	Hughes Supply
Fittings	Star	10" CAP DUCTILE IRON MJ WITH 2" FIPT HOLE	EPOXY COATED	Hughes Supply
Fittings	Star	10" PLUG DUCTILE IRON EPOXY COATED	MECH JOINT w/ 2FIPT HOLE	Hughes Supply
Fittings	Star	10" ELBOW 45 deg . DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	10" ELBOW 90 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	10" SOLID SLEEVE DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	12" CAP DUCTILE IRON MJ WITH 2" FIPT HOLE	EPOXY COATED	Hughes Supply
Fittings	Star	12" PLUG DUCTILE IRON EPOXY COATED	MECH JOINT w/ 2FIPT HOLE	Hughes Supply
Fittings	Star	12" ELBOW 45 deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	12" ELBOW 90deg. DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	12" SOLID SLEEVE DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	14" CAP DUCTILE IRON MJ WITH 2" FIPT HOLE	EPOXY COATED	Hughes Supply
Fittings	Star	14" PLUG DUCTILE IRON EPOXY COATED	MECH JOINT w/ 2FIPT HOLE	Hughes Supply
Fittings	Star	14" SOLID SLEEVE DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	16" CAP DUCTILE IRON MJ WITH 2" FIPT HOLE	EPOXY COATED	Hughes Supply
Fittings	Star	16" PLUG DUCTILE IRON EPOXY COATED	MECH JOINT w/ 2FIPT HOLE	Hughes Supply
Fittings	Star	16" SOLID SLEEVE DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Star	20" CAP DUCTILE IRON MJ WITH 2" FIPT HOLE	EPOXY COATED	Hughes Supply
Fittings	Star	20" PLUG DUCTILE IRON EPOXY COATED	MECH JOINT w/ 2FIPT HOLE	Hughes Supply

Fittings	Star	20" SOLID SLEEVE DUCTILE IRON EPOXY COATED	MECH JOINT X MECH JOINT	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 3" TRANSITION	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 3" STANDARD MECHANICAL	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 4" TRANSITION	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 4" STANDARD MECHANICAL	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 6" TRANSITION	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 6" STANDARD MECHANICAL	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 8" TRANSITION	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 8" STANDARD MECHANICAL	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 10" TRANSITION	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 10" STANDARD MECHANICAL	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 12" TRANSITION	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 12" STANDARD MECHANICAL	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	GASKET MECHANICAL JOINT 14" STANDARD MECHANICAL	INDIVIDUAL	Hughes Supply
Fittings	Tyler Union	3" MEGA LUG RING FOR PVC	.	Hughes Supply
Fittings	Tyler Union	4" MEGA LUG RING FOR PVC	.	Hughes Supply
Fittings	Tyler Union	6" MEGA LUG RING FOR PVC	.	Hughes Supply
Fittings	Tyler Union	8" MEGA LUG RING FOR PVC	.	Hughes Supply
Meter Boxes	Brooks Products	SOLID TRAFFIC BEARING LIDS - SMALL #36		Hughes Supply
Meter Boxes	Brooks Products	SOLID TRAFFIC BEARING LIDS - MEDIUM #37	15 1/2 " X 22 1/4 "	Hughes Supply
Meter Boxes	Brooks Products	SOLID TRAFFIC BEARING LIDS - LARGE #38	18 " X 27 1/4"	Hughes Supply
Meter Boxes	Costal Precast	BLOCK CINDER/CEMENT 2-1/4" X 8" X 16"	PRE-CASTED, FLAT	cement industries
Meter Boxes	Costal Precast	BLOCK CINDER/CEMENT 8" X 8" X 16"	PRE-CASTED, BUILDING	cement industries
Meter Boxes	Old Castle	LID - FOR SMALL CONCRETE METER BOXES	CEMENT BODY (10.5 X 17.25)	Hughes Supply
Meter Boxes	Old Castle	BOX METER SMALL CONCRETE # 36	W/2 PIECE READER LID, (10.5 X 17.25)	Hughes Supply
Meter Boxes	Old Castle	BOX METER MEDIUM CONCRETE # 37	W/2 PIECE READER LID, (12 X 20)	Hughes Supply
Meter Boxes	Old Castle	BOX METER LARGE CEMENT # 38	W/2 PIECE READER LID, (13 X 24)	Hughes Supply
Meter Boxes	Old Castle	BOX METER EXTRA-LARGE CEMENT # 66	W/2 PIECE READER LID, O. D. 22 X 35	Hughes Supply
Meter Boxes	Sigma	BOX METER MEDIUM CDR 1118	FIBER COMPOSTIE W / LID	Hughes Supply
Meter Boxes	Sigma	BOX METER EXTRA LARGE CDR 1730	FIBER COMPOSTIE W / LID	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET METER 3/4" ROUND BLACK RUBBER	1/8 THICK, INDIVIDUAL or 1/16" THICK - SPECIFY	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET METER 1" ROUND BLACK RUBBER	1/8 THICK, INDIVIDUAL	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET FLANGE 2" ROUND 4 HOLE FULL FACED	BLACK RUBBER, 1/8 THICK, INDIVIDUAL	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET FLANGE 3" ROUND 4 HOLE FULL FACED	BLACK RUBBER, 1/8 THICK, INDIVIDUAL	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET FLANGE 4" ROUND 8 HOLE FULL FACED	BLACK RUBBER, 1/8 THICK, INDIVIDUAL	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET FLANGE 6" ROUND 8 HOLE FULL FACED	BLACK RUBBER, 1/8 THICK, INDIVIDUAL	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET FLANGE 8" ROUND 8 HOLE FULL FACED	BLACK RUBBER, 1/8 THICK, INDIVIDUAL	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET FLANGE 10" ROUND 12 HOLE FULL FACED	BLACK RUBBER, 1/8 THICK, INDIVIDUAL	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET FLANGE 12" ROUND 12 HOLE FULL FACED	BLACK RUBBER, 1/8 THICK, INDIVIDUAL	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET METER 1-1/2" ELIPTICAL BLACK RUBBER	FULL FACED, 1/8 THICK, INDIVIDUAL	Hughes Supply
Other	A.Y. McDonald Mfg. Co.	GASKET METER 1-1/2" ELIPTICAL BLACK RUBBER	DROP - IN, 1/8 THICK, INDIVIDUAL	Hughes Supply
Other	Costal Precast	VALVE PAD 30" X 30" X 6"	REINFORCED, W/L0 HOLES IN CENTER, 3000 PSI CONC.	cement industries
Other	Dixon	3" PUMP STRAINER X FIPT #4413K3	3/8 " ROUND HOLES	McMaster Carr
Other	Dixon	3" MALE CAMLOCK X HOSE BARB	ALUMINUM	Hughes Supply
Other	Dixon	3" FEMALE CAMLOCK X HOSE BARB	ALUMINUM	Hughes Supply
Other	Dixon	1-1/2" FEMALE CAMLOCK X HOSE BARB	ALUMINUM	Hughes Supply
Other	Dixon	1-1/2" MALE CAMLOCK X HOSE BARB	ALUMINUM	Hughes Supply
Other	Dixon	1-1/2" MALE CAMLOCK X MIPT	ALUMINUM	Hughes Supply
Other	Dixon	2-1/2" HYDRANT X 2" MIPT	BRASS - HYDRANT REDUCER	Hughes Supply
Other	Dixon	2-1/2" HYDRANT X 3/4" MIPT	BRASS - HYDRANT REDUCER	Hughes Supply
Other	Fortiline	All Thread 5/8"	.	House of threads
Other	JCM Industries, Inc.	BELL JOINT LEAK CLAMP 4"	(For CI/DI All Grades) (For PVC)	Hughes Supply
Other	JCM Industries, Inc.	BELL JOINT LEAK CLAMP 6"	(For CI/DI All Grades) (For PVC)	Hughes Supply
Other	JCM Industries, Inc.	BELL JOINT LEAK CLAMP 8"	(For CI/DI All Grades) (For PVC)	Hughes Supply
Other	Krylon	PAINT MARKING SPRAY 8 OZ AEROSOL	BLUE	Hughes Supply
Other	Krylon	PAINT MARKING SPRAY 8 OZ AEROSOL	ORANGE	Hughes Supply
Other	Krylon	PAINT MARKING SPRAY 8 OZ AEROSOL	HYDRANT YELLOW	Hughes Supply
Other	Krylon	PAINTMARKING SPRAY 8 OZ AEROSOL	RED	Home Depot
Other	Mars	ZINC CAPS 5/8 " FIPT - LARGE SIZE	CORROSION NUTS FOR SADDLES AND REPAIR CLAMPS	HUGHES SUPPLY
Other	Mars	ZINC CAPS 7 / 16 " FIPT - SMALL SIZE	CORROSION NUTS FOR SADDLES AND REPAIR CLAMPS	HUGHES SUPPLY
Other	Oatey	CEMENT PVC RAIN OR SHINE (BLUE)	1 QUART CAN WITH DAUBBER	Hughes Supply
Other	Oatey	CEMENT PVC UNI-WELD 1201 (GREY)	1 QUART CAN WITH DAUBBER	Hughes Supply
Other	Oatey	UNIWELD P.V.C CLEANER	1 QUART CAN WITH DAUBBER	Hughes Supply
Other	Oatey	TEFLON PASTE (RECTORSEAL)		Hughes Supply
Other	Phoenix	PIPE JOINT LUBRICANT	1 QUART CANS, PASTE, CLEAR	Hughes Supply
Other	Pollard Water	MARKING FLAGS LOCATOR W / I.W.A. LOGO BLUE	24" long	Sargent-Sowell, Inc.
Other	Quikrete	Hydraulic Cement	.	Hughes Supply
Other	Quikrete	CEMENT PORTLAND & REDI-MIX 80 LB BAGS	PRE-SANDED / PRE-MIXED	Home Depot
Other	Rockwell International	BELL JOINT LEAK CLAMP 10"	(For CI/DI All Grades) (For PVC)	Hughes Supply
Other	Rockwell International	BELL JOINT LEAK CLAMP 12"	(For CI/DI All Grades) (For PVC)	Hughes Supply
Other	Rockwell International	BELL JOINT LEAK CLAMP 14"	(For CI/DI All Grades) (For PVC)	Hughes Supply
Other	Rockwell International	BELL JOINT LEAK CLAMP 16"	(For CI/DI All Grades) (For PVC)	Hughes Supply
Other	Rockwell International	BELL JOINT LEAK CLAMP 20"	(For CI/DI All Grades) (For PVC)	Hughes Supply
Other	Rockwell International	REPAIR CLAMP 20" X 20" LONG	FOR DI, C-900 SS3 22.80 X 20 LONG	Hughes Supply
Other	Rockwell International	COLLAR LEAK CLAMP 8"	(For PVC, All Grades)	Hughes Supply
Other	Romac	REPAIR CLAMP 4" A.C. X 10" LONG	Romac, S.S.-1, 4.74 x 5.14 x 10 long	Hughes Supply
Other	Romac	REPAIR CLAMP 6" A.C. X 12" LONG	Romac, S.S.-2, 6.84 x 7.64 x 12 long	Hughes Supply
Other	Romac	REPAIR CLAMP 8" A.C. X 12" LONG	Romac, S.S.-2, 8.99 x 9.79 x 12 long	Hughes Supply
Other	Romac	REPAIR CLAMP 10" A.C. X 12" LONG	Romac, S.S -1, 11.85 x 12.25 x 12 long	Hughes Supply
Other	Romac	REPAIR CLAMP 12" A.C. X 18" LONG	Romac, S.S. -2 13.71 x 14.51 x 18 long	Hughes Supply
Other	Romac	REPAIR CLAMP 14" A.C. X 16" LONG	ROMAC SS2 16.75 X 16 LONG	Hughes Supply
Other	Romac	REPAIR CLAMP 4" X 10" LONG	FOR PVC , C-900, DI, X 10 LONG, RANGE = 4.50 - 4.80	Hughes Supply
Other	Romac	REPAIR CLAMP 6" X 12" LONG	FOR PVC , C-900, DI, X 12 LONG, RANGE = 6.63 - 6.90	Hughes Supply
Other	Romac	REPAIR CLAMP 8" X 12" LONG	FOR PVC , C-900, DI, X 12 LONG, RANGE = 8.63 - 9.05	Hughes Supply
Other	Romac	REPAIR CLAMP 10" X 12" LONG	FOR PVC , C-900, DI, X 12 LONG, RANGE = 10.75 -11.10	Hughes Supply
Other	Romac	REPAIR CLAMP 12" X 12" LONG	FOR PVC , C-900, DI, X 12 LONG, RANGE = 12.75 -13.20	Hughes Supply
Other	Romac	REPAIR CLAMP 14" X 16" LONG	FOR DI, C-900 SS2 15.80 x 16 LONG	Hughes Supply
Other	Romac	REPAIR CLAMP 16" X 20" LONG	FOR DI, C-900 SS3 18.30 X 20 LONG	Hughes Supply
Other	Romac	COLLAR LEAK CLAMP 2"	(For PVC, All Grades)	Hughes Supply
Other	Romac	COLLAR LEAK CLAMP 2-1/2"	(For PVC, All Grades)	Hughes Supply
Other	Romac	COLLAR LEAK CLAMP 3"	(For PVC, All Grades)	Hughes Supply
Other	Romac	COLLAR LEAK CLAMP 4"	(For PVC, All Grades)	Hughes Supply
Other	Romac	COLLAR LEAK CLAMP 6"	(For PVC, All Grades)	Hughes Supply
Other	Rubber & Accessories, Inc.	3" CLEAR SUCTION HOSE	.	Bob Dean Supply
Other	Rubber & Accessories, Inc.	1" CLEAR SUCTION HOSE		
Other	Rubber & Accessories, Inc.	1 1/4" CLEAR SUCTION HOSE		
Other	Rubber & Accessories, Inc.	2" CLEAR SUCTION HOSE		
Other	Spectracide	ANT AND ROACH SPRAY	16 OZ CANS	Home Depot

Other		STAKE WOOD SURVEY / MARKING	1 X 2 X 36 LONG	Home Depot
Other		GRASS SEED PENSACOLA BAHIA	.	Home Depot
Piping	Charter Plastics Inc.	3/4" PIPE FLEX TUBING C.T.S. - BLUE	P.E., C.T.S., CLASS 200, S.D.R.9, 3/4	Hughes Supply
Piping	Charter Plastics Inc.	1" PIPE FLEX TUBING C.T.S. - BLUE	P.E., C.T.S., CLASS 200, S.D.R.9, 1	Hughes Supply
Piping	Charter Plastics Inc.	1 1/2" PIPE FLEX TUBING C.T.S. - BLUE	P.E., C.T.S., CLASS 200, S.D.R.9, 1 1/2	Hughes Supply
Piping	Charter Plastics Inc.	2" PIPE FLEX TUBING C.T.S. - BLUE	P.E., C.T.S., CLASS 200, S.D.R.9, 2	Hughes Supply
Piping	North American Pipe	4" PIPE PVC INTEGERAL BELL GASKETED C-900	.	Hughes Supply
Piping	North American Pipe	6" PIPE PVC INTEGERAL BELL GASKETED C-900	.	Hughes Supply
Piping	North American Pipe	8" PIPE PVC INTEGERAL BELL GASKETED C-900	.	Hughes Supply
Piping	North American Pipe	10" PIPE PVC INTEGERAL BELL GASKETED C-900	.	Hughes Supply
Piping	North American Pipe	12" PIPE PVC INTEGERAL BELL GASKETED C-900	.	Hughes Supply
Piping	North American Pipe	14" PIPE PVC INTEGERAL BELL GASKETED C-900	.	Hughes Supply
Piping	North American Pipe	16" PIPE PVC INTEGERAL BELL GASKETED C-900	.	Hughes Supply
Piping	US Pipe	4" PIPE DUCTILE IRON CEMENT LINED BELL JOINT	.	Hughes Supply
Piping	US Pipe	6" PIPE DUCTILE IRON CEMENT LINED BELL JOINT	.	Hughes Supply
Piping	US Pipe	8" PIPE DUCTILE IRON CEMENT LINED BELL JOINT	.	Hughes Supply
Piping	US Pipe	10" PIPE DUCTILE IRON CEMENT LINED BELL JIONT	.	Hughes Supply
Piping	US Pipe	12" PIPE DUCTILE IRON CEMENT LINED BELL JOINT	.	Hughes Supply
Piping	US Pipe	14" PIPE DUCTILE IRON CEMENT LINED BELL JOINT	.	Hughes Supply
Piping	US Pipe	16" PIPE DUCTILE IRON CEMENT LINED BELL JOINT	.	Hughes Supply
Piping	US Pipe	20" PIPE DUCTILE IRON CEMENT LINED BELL JOINT	.	Hughes Supply
Piping	Yardley	3/4" PIPE FLEX TUBING I.P.S.	P.E., I.P.S., CLASS 160, I.S.D.R.9, 1	Hughes Supply
Piping	Yardley	1" PIPE FLEX TUBING I.P.S.	P.E., I.P.S., CLASS 160, I.S.D.R.9, 3/4	Hughes Supply
PVC Fittings	Spears	FLANGE 2" SCHEDULE 80 4 HOLE VAN STONE TYPE	SLIP/FLANGE	Hughes Supply
PVC Fittings	Spears	FLANGE 2" SCHEDULE 80 4 HOLE VAN STONE TYPE	FIPT/FLANGE	Hughes Supply
PVC Fittings	Spears	FLANGE 3" SCHEDULE 80 4 HOLE VAN STONE TYPE	SLIP/FLANGE	Hughes Supply
PVC Fittings	Spears	FLANGE 3" SCHEDULE 80 4 HOLE VAN STONE TYPE	FIPT/FLANGE	Hughes Supply
PVC Fittings	Spears	FLANGE 4" SCHEDULE 80 8 HOLE VAN STONE TYPE	SLIP/FLANGE	Hughes Supply
PVC Fittings	Spears	FLANGE 4" SCHEDULE 80 8 HOLE VAN STONE TYPE	FIPT/FLANGE	Hughes Supply
PVC Fittings	Spears	FLANGE 6" SCHEDULE 80 8 HOLE VANSTONE TYPE	FLANGE/ SLIP	Hughes Supply
PVC Fittings	Spears	FLANGE 2" SCHEDULE 80 - 4 HOLE BLIND	All PVC Construction	Hughes Supply
PVC Fittings	Spears	FLANGE 3" SCHEDULE 80 - 4 HOLE BLIND	All PVC Construction	Hughes Supply
PVC Fittings	Spears	FLANGE 4" SCHEDULE 80 - 8 HOLE BLIND	All PVC Construction	Hughes Supply
PVC Fittings	Spears	FLANGE 6" SCHEDULE 80 - 8 HOLE BLIND	All PVC Construction	Hughes Supply
PVC Fittings	Spears	FLANGE 8" SCHEDULE 80 - 8 HOLE BLIND	All PVC Construction	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 3" X 1-1/2" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 6" X 4" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER BUSHING 6" X 3" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 6" X 2" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 4" X 3" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 4" X 2" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 3" X 2-1/2" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 3" X 2" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 3" X 1" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 3" X 1" SCHEDULE 80 PVC	SLIP (GLUE) X THREAD (FIPT)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 2-1/2" X 2" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER BUSHING 2-1/2" X 1 1/2" SCHEDULE 80 PVC	PVC SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 2" X 1-1/2" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 2" X 1-1/2" SCHEDULE 80 PVC	SPIG/FIPT, GLUE/THREAD (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 2" X 1-1/4" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 2" X 1" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 2" X 1" SCHEDULE 80 PVC	SPIG/FIPT, GLUE/THREAD (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 1-1/2" X 1" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 1-1/4" X 1" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 1" X 3/4" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 1" X 3/4" SCHEDULE 80 PVC	SPIG/FIPT, GLUE/THREAD (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER BUSHING 1/2" X 1" SCHEDULE 80 PVC	PVC SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 3/4" X 1/2" SCHEDULE 80 PVC	SPIG/SPIG, GLUE/GLUE (FLUSH)	Hughes Supply
PVC Fittings	Spears	REDUCER-BUSHING 3/4" X 1/2" SCHEDULE 80 PVC	SPIG/FIPT, GLUE/THREAD (FLUSH)	Hughes Supply
PVC Fittings	Spears	TEE 1-1/4" X 1-1/4" X 1-1/4" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	END CAP 1-1/ SCHEDULE 80 PVC	SLIP ON TYPE, GLUE ON	Hughes Supply
PVC Fittings	Spears	END CAP 1-1/2" SCHEDULE 80 PVC	SLIP ON TYPE, GLUE ON	Hughes Supply
PVC Fittings	Spears	TEE 1-1/2" X 1-1/2" X 1-1/2" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 1-1/2" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 1-1/2" SCHEDULE 80 PVC	SLIP X FIPT, GLUE X THREAD	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 1-1/2" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	COUPLING 1-1/2" SCHEDULE 80 PVC	SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	ADAPTER FEMALE 1-1/2" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER MALE 1-1/2" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	END CAP 3/4 SCHEDULE 80 PVC	SLIP ON TYPE, GLUE ON	Hughes Supply
PVC Fittings	Spears	TEE 3/4" X 3/4" X 3/4" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 3/4" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 3/4" SCHEDULE 80 PVC	SLIP X FIPT, GLUE X THREAD	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 3/4" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	COUPLING 3/4" SCHEDULE 80 PVC	SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	ADAPTER FEMALE 3/4" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER MALE 3 SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER MALE 1" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER FEMALE 1" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	COUPLING 1" SCHEDULE 80 PVC	SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 1" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
		GRASS SEED RYE	.	Home Depot
PVC Fittings	Spears	ELBOW 45 deg 1" SCHEDULE 80 PVC	THREAD X THREAD	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 1" SCHEDULE 80 PVC	SLIP X FIPT, GLUE X THREAD	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 1" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 1" SCHEDULE 80 PVC	THREAD X THREAD	Hughes Supply
PVC Fittings	Spears	TEE 1" X 1" X 1" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	END CAP 1" SCHEDULE 80 PVC	SLIP ON TYPE, GLUE ON	Hughes Supply
PVC Fittings	Spears	PLUG 1" SCHEDULE 80 PVC	M.I.P.T. / HEX	Hughes Supply
PVC Fittings	Spears	ADAPTER MALE 2" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER FEMALE 2" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	COUPLING 2" SCHEDULE 80 PVC	SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 2" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 2" SCHEDULE 80 PVC	THREAD X THREAD	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 2" SCHEDULE 80 PVC	SLIP X FIPT, GLUE X THREAD	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 2" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 2" SCHEDULE 80 PVC	THREAD X THREAD	Hughes Supply
PVC Fittings	Spears	TEE 2" X 2" X 2" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply

PVC Fittings	Spears	END CAP 2" SCHEDULE 80 PVC	SLIP ON TYPE, GLUE ON	Hughes Supply
PVC Fittings	Spears	END CAP 2" SCHEDULE 80 PVC	THREADED, SCREW-ON TYPE	Hughes Supply
PVC Fittings	Spears	PLUG 2" SCHEDULE 80 PVC	M.I.P.T. / HEX	Hughes Supply
PVC Fittings	Spears	TEE REDUCING 2"X2"X1" SCHEDULE 80 PVC	SLIP X SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	TEE REDUCING 3"X3"X2" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	END CAP 3" SCHEDULE 80 PVC	SLIP ON TYPE, GLUE ON	Hughes Supply
PVC Fittings	Spears	TEE 3" X 3" X 3" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 3" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 3" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	COUPLING 3" SCHEDULE 80 PVC	SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	ADAPTER FEMALE 3" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER MALE 3" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	END CAP 2-1/2" SCHEDULE 80 PVC	SLIP ON TYPE, GLUE ON	Hughes Supply
PVC Fittings	Spears	TEE 2-1/2" X 2-1/2" X 2-1/2" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 2-1/2" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 2-1/2" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	COUPLING 2-1/2" SCHEDULE 80 PVC	SLIP X SLIP	Hughes Supply
		VIS-QUEEN WRAPPING PLASTIC	SARAN WRAP IN ROLLS	FERGUSON
PVC Fittings	Spears	ADAPTER FEMALE 2-1/2" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER MALE 2-1/2" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER MALE 4" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER FEMALE 4" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	COUPLING 4" SCHEDULE 80 PVC	SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 4" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	TEE REDUCING 4" X 4" X 2" SCHEDULE 80 PVC	SLIP X SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 4" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	TEE 4" X 4" X 4" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	END CAP 4" SCHEDULE 80 PVC	SLIP ON TYPE, GLUE ON	Hughes Supply
PVC Fittings	Spears	COUPLING 6" SCHEDULE 80 PVC	SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 6" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 6" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	TEE 6" X 6" X 6" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	END CAP 6" SCHEDULE 80 PVC	SLIP ON TYPE, GLUE ON	Hughes Supply
PVC Fittings	Spears	ADAPTER MALE 1/2" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER FEMALE 1/2" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	COUPLING 1/2" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 1/2" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 1/2" SCHEDULE 80 PVC	SLIP X FIPT, GLUE X THREAD	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 1/2" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	TEE 1/2" X 1/2" X 1/2" SCHEDULE 80 PVC	SLIP X SLIP X SLIP, GLUE TYPE	Hughes Supply
PVC Fittings	Spears	END CAP 1/2" SCHEDULE 80 PVC	SLIP ON TYPE, GLUE ON	Hughes Supply
PVC Fittings	Spears	ADAPTER MALE 1-1/4 " SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	ADAPTER FEMALE 1-1/4" SCHEDULE 80 PVC	SLIP X THREAD	Hughes Supply
PVC Fittings	Spears	COUPLING 1-1/4" SCHEDULE 80 PVC	SLIP X SLIP	Hughes Supply
PVC Fittings	Spears	ELBOW 45 deg 1-1/4" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 1-1/4" SCHEDULE 80 PVC	SLIP X FIPT, GLUE X THREAD	Hughes Supply
PVC Fittings	Spears	ELBOW 90 deg 1-1/4" SCHEDULE 80 PVC	SLIP X SLIP, GLUE X GLUE	Hughes Supply
Restraint Devices	Costal Precast	CONCRETE THRUST BLOCK	PRE-FORMED	Prefab Industries
Restraint Devices	Ebaa Iron	4 " BELL JOINT RESTRAINT	FOR C - 900	Hughes Supp;y
Restraint Devices	Ebaa Iron	12" BELL JOINT RESTRAINT	FOR C - 900	Hughes Supply
Restraint Devices	Sigma	6 " BELL JOINT RESTRAINT	FOR C - 900	Hughes Supply
Restraint Devices	Sigma	8 " BELL JOINT RESTRAINT	FOR C - 900	Hughes Supply
Restraint Devices	Tyler Union	10 " BELL JOINT RESTRAINT	FOR C - 900	Hughes Supply
Saddles	Romac	SADDLE TAPPING 4" A.C. X 1" FIPT	FOR AC PIPE - FOR 5.14 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 4" A.C. X 2" FIPT	FOR AC PIPE - FOR 5.14 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 6" A.C. X 1" FIPT	FOR AC PIPE - FOR 7.20 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 6" A.C. X 2" FIPT	FOR AC PIPE - FOR 7.20 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 8" A.C. X 1" FIPT	FOR AC PIPE - FOR 9.40 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 8" A.C. X 2" FIPT	FOR AC PIPE - FOR 9.40 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 10" A.C. X 1" FIPT	FOR AC PIPE - FOR 12.20 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 10" A.C. X 2" FIPT	FOR AC PIPE - FOR 12.20 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 12" A.C. X 1" FIPT	FOR AC PIPE - FOR 14.30 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 12" A.C. X 2" FIPT	FOR AC PIPE - FOR 14.30 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 2" X 1" FIPT	FOR PVC PIPE - X 1 FIPT FOR 2.38	Hughes Supply
Saddles	Romac	SADDLE TAPPING 2 1/2" X 1" FIPT	FOR PVC PIPE - X 1 FIPT FOR 2.88	Hughes Supply
Saddles	Romac	SADDLE TAPPING 3" X 1" FIPT	FOR PVC PIPE - X 1 FIPT FOR 3.50	Hughes Supply
Saddles	Romac	SADDLE TAPPING 3" X 2" FIPT	FOR PVC PIPE - X 2 FIPT FOR 3.50	Hughes Supply
Saddles	Romac	SADDLE TAPPING 4" X 1" FIPT	FOR PVC, C-900, DI, X 1 FIPT, RANGE = 4.50 - 4.80	Hughes Supply
Saddles	Romac	SADDLE TAPPING 4" X 2" FIPT	FOR PVC, C-900, DI, X 2 FIPT, RANGE = 4.50 - 4.80	Hughes Supply
Saddles	Romac	SADDLE TAPPING 6" X 1" FIPT	FOR PVC, C-900, DI, X 1 FIPT, RANGE = 6.63 - 6.90	Hughes Supply
Saddles	Romac	SADDLE TAPPING 6" X 2" FIPT	FOR PVC, C-900, DI, X 2 FIPT, RANGE = 6.63 - 6.90	Hughes Supply
Saddles	Romac	SADDLE TAPPING 8" X 1" FIPT	FOR PVC, C-900, DI, X 1 FIPT, RANGE = 8.63 - 9.05	Hughes Supply
Saddles	Romac	SADDLE TAPPING 8" X 2" FIPT	FOR PVC, C-900, DI, X 2 FIPT, RANGE = 8.63 - 9.05	Hughes Supply
Saddles	Romac	SADDLE TAPPING 10" X 1" FIPT	FOR PVC, C-900, DI, X 1 FIPT, RANGE = 10.75 - 11.10	Hughes Supply
Saddles	Romac	SADDLE TAPPING 10" X 2" FIPT	FOR PVC, C-900, DI, X 2 FIPT, RANGE = 10.75 - 11.10	Hughes Supply
Saddles	Romac	SADDLE TAPPING 12" X 1" FIPT	FOR PVC, C-900, DI, X 1 FIPT, RANGE = 12.75 - 13.20	Hughes Supply
Saddles	Romac	SADDLE TAPPING 12" X 2" FIPT	FOR PVC, C-900, DI, X 2 FIPT, RANGE = 12.75 - 13.20	Hughes Supply
Saddles	Romac	SADDLE TAPPING 14" X 1" FIPT	FOR PVC, C-900, DI, X 1 FIPT, RANGE = 14.00 - 15.30	Hughes Supply
Saddles	Romac	SADDLE TAPPING 14" X 2" FIPT	FOR PVC, C-900, DI, X 2 FIPT, RANGE = 14.00 - 15.30	Hughes Supply
Saddles	Romac	SADDLE TAPPING 16" X 1" FIPT	FOR DI/CI WITH 17.40 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 16" X 2" FIPT	FOR DI/CI WITH 17.40 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 14" A.C. X 1" FIPT	FOR AC PIPE - FOR 16.64 OD	Hughes Supply
Saddles	Romac	SADDLE TAPPING 14" A.C. X 2" FIPT	FOR AC PIPE - FOR 16.64 OD	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	HOSE BIBB 1/2" HEX SHOULDER - MIPT		Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	3/4" X 1" BRASS REDUCER BUSHING	FIPT X MIPT	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	3/4" BRASS BALL VALVE	MIPT X COMPRESSION FOR PVC	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	1" BRASS BALL VALVE	MIPT X COMPRESSION FOR PVC	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	2" BRASS 90 DEGREE	FIPT X FIPT	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	2" X 2" X 1" CTS TEE - BRASS	2" COMPRESSION X 1" FIPT	HUGHES SUPPLY
Service Brass	A.Y. McDonald Mfg. Co.	WYE - CTS BRASS MULTI-SERVICE CONNECTOR #4765	2" SINGLE X 1" MULTIPLE (4 PORT) FIPT	HUGHES SUPPLY
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP - CTS 1" COMPRESSION X 5/8" METER	FOR CTS - POLY PIPE	HUGHES SUPPLY
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP - CTS 1" COMPRESSION X 1" METER	FOR CTS - POLY PIPE	HUGHES SUPPLY
Service Brass	A.Y. McDonald Mfg. Co.	WYE - CTS BRASS MULTI-SERVICE CONNECTOR #08YS22	2" SINGLE X 1" MULTIPLE (2 PORT) COMPRESSION	HUGHES SUPPLY
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP 3/4" COMPRESSION CTS X 5/8" METER	MACDONALD or MUELLER	HUGHES SUPPLY
Service Brass	A.Y. McDonald Mfg. Co.	1-1/2" CTS MALE ADAPTER	C.T.S. X MIPT	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	1-1/2" CTS COUPLING	C.T.S. X C.T.S.	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	1-1/2" CTS FEMALE ADAPTER	C.T.S. X FIPT	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	2" CTS MALE ADAPTER	C.T.S. X MIPT	Hughes Supply

Service Brass	A.Y. McDonald Mfg. Co.	2" CTS COUPLING	C.T.S. X C.T.S.	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	2" CTS FEMALE ADAPTER	C.T.S. X FIPT	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	2" CTS TEES - COMPRESSION	Brass	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	RESETTERS METER 1" X 12" HIGH W / LOCK WING	Brass	Sunstate Meter
Service Brass	A.Y. McDonald Mfg. Co.	RESETTERS METER 1" X 10" HIGH W / LOCK WING	Brass	Sunstate Meter
Service Brass	A.Y. McDonald Mfg. Co.	RESETTERS METER 3/4" X 18" HIGH W / LOCK WING	Brass	Sunstate Meter
Service Brass	A.Y. McDonald Mfg. Co.	RESETTERS METER 3/4" X 9" HIGH W / LOCK WING	Brass	Sunstate Meter
Service Brass	A.Y. McDonald Mfg. Co.	RESETTERS METER 3/4" X 7" HIGH W / LOCK WING	Brass	Sunstate Meter
Service Brass	A.Y. McDonald Mfg. Co.	2" BRASS PLUG	.	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	1" BRASS PLUG	.	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	REDUCER-BUSHING BRASS 2-1/2" X 2"	Thread x Thread	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	REDUCER-BUSHING BRASS 2" X 1"	Thread x Thread	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	REDUCER-BUSHING BRASS 2" X 1-1/2"	Thread x Thread	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	REDUCER-BUSHING BRASS 1-1/2" X 1-1/4"	Thread x Thread	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	COUPLING REPAIR 2" COMPRESSION X COMPRESSION	For PVC Pipe - All Brass Body	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	COUPLING REPAIR 3/4" INSTA-TITE X INSTA-TITE	For IPS Pipe - All Brass Body	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	COUPLING REPAIR 3/4" INSTA-TITE X FEMALE I.P.T.	For IPS Pipe - All Brass Body	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	COUPLING REPAIR 3/4" INSTA-TITE X MALE I.P.T.	For IPS Pipe - All Brass Body	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	COUPLING REPAIR 1" INSTA-TITE X INSTA-TITE	For IPS Pipe - All Brass Body	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	COUPLING REPAIR 1" INSTA-TITE X FEMALE I.P.T.	For IPS Pipe - All Brass Body	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	COUPLING REPAIR 1" INSTA-TITE X MALE I.P.T.	For IPS Pipe - All Brass Body	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	METER COUPLING BRASS 3/4" 2-PIECE RIBBED	#4622 MacDonald 5/8 meter x 3/4MIPT	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	METER COUPLING BRASS 1" 2-PIECE RIBBED	1 meter x 1 MIPT	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	FLANGE METER BRASS 1-1/2" ELIPT F.I.P.T./FLNG	F.I.P.T. THREAD - 1-1/2	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	FLANGE METER BRASS 2" OVAL F.I.P.T. X FLNG	F.I.P.T. THREAD 2"	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP 3/4" FIPT X 5/8" METER COUPLING	with locking wing	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP 1" FIPT X 1" FIPT	with locking wing	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP 1" FIPT X 5/8" METER COUPLING	with locking wing	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP 1" FIPT X 1" METER COUPLING	with locking wing	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP 1-1/2" ELIPTICAL FLANGE X 1-1/2" FIPT	with locking wing	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	3/4" CORPERATION STOPS	MIPT x MIPT	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	HOSE BIBB 3/4" HEX SHOULDER - MIPT	W/METAL (BRASS) HANDLE, BAR TYPE	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP RIGHT ANGLE 3/4" FIPT X 5/8" METER COUPLING	with locking wing	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP RIGHT ANGLE 1" FIPT X 1" METER COUPLING	with locking wing	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CORP STOP 1" MIPT X MIPT	MULLER	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CURB STOP 2" FIPT X FIPT	WITH LOCKING WING	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CTS FEMALE 1" INSTA-TITE X FEMALE I.P.T.	For CTS Pipe - All Brass Body	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CTS MALE 1" INSTA-TITE X MALE I.P.T.	For CTS Pipe - All Brass Body	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CTS 90 DEGREE 1" COMPRESSION X 1" FIPT Brass	FOR CTS	Hughes Supply
Service Brass	A.Y. McDonald Mfg. Co.	CTS 90 DEGREE 3/4" COMPRESSION X 3/4" FIPT Brass	FIPT X COMPRESSION FOR CTS PIPE	Hughes Supply
Service Brass	Ford	2" CTS 90 DEGREE - BRASS	2" COMPRESSION X 2" FIPT	HUGHES SUPPLY
Service Brass	Ford	CTS TEES BRASS 1" X 1" X 1" COMPRESSION	FOR CTS	Hughes Supply
Service Brass	Matco	NIPPLES BRASS 2" X 6" LONG		
Service Brass	Matco	NIPPLES BRASS 2" X 24" LONG		
Service Brass	Matco	NIPPLES BRASS 2" X 36" LONG		
Service Brass	Matco-Norca	NIPPLES BRASS 2" X 6" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 2 " X 24" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 2" X 36" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	1" BRASS 90 DEGREE	FIPT X FIPT	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 3" X 3" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 2" X 4" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 2" X 3" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 2" X 2-1/2" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 2" X 2" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 1-1/2" X 3-1/2" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 1-1/2" X 3" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 1" X 2-1/2" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 1" X 2" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 3/4" X 3" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 3/4" X 2-1/2" LONG	THREADED ENDS	Hughes Supply
Service Brass	Matco-Norca	NIPPLES BRASS 3/4" X 2" LONG	THREADED ENDS	Hughes Supply
Service Brass	Mueller	CTS COUPLING 3/4" INSTA-TITE X INSTA-TITE	For CTS Pipe - All Brass Body	Hughes Supply
Service Brass	Mueller	CTS FEMALE 3/4" INSTA-TITE X FEMALE I.P.T	For CTS Pipe - All Brass Body	Hughes Supply
Service Brass	Mueller	CTS MALE 3/4" INSTA-TITE X MALE I.P.T.	For CTS Pipe - All Brass Body	Hughes Supply
Service Brass	Mueller	CTS COUPLING 1" INSTA-TITE X INSTA-TITE	For CTS Pipe - All Brass Body	Hughes Supply
Transition Couplings	Mueller	CAST COUPLING 12" - AC X DI Maxi-Step 12.71 x 14.39 or	Romac 501-14.40Bx13.55Bx14long W/epoxy coat&S.S. Bolts	Sunstate Meter
Transition Couplings	Romac	CAST COUPLING 8" - AC X DI / PVC - Hy-max 8.54 x 9.84	JCM 216-9.75x9.06x12 long W/epoxy coat&S.S. Bolts	Hughes Supply
Transition Couplings	Romac	CAST COUPLING 10" - AC X DI / PVC - Hy-max (need range)	OMNI # 442-12.20x11.60-443 W/epoxy coat&S.S. Bolts	Sunstate Meter
Transition Couplings	Romac	CAST COUPLING 14" AC X DI Maxi-Step	Romac 501-16.88x15.30x14 long W/epoxy coat&S.S. Bolts	Sunstate Meter
Transition Couplings	Romac	CAST COUPLING 6" -AC X DI / PVC - Hy-max (need range)	JCM 216-7.55x6.91x12 long W/epoxy coat&S.S. Bolts	Sunstate Meter
Valve Boxes	Mueller	VALVE BOX ADAPTER II 2"	FOR 2" MUELLER VALVES	Huhges Supply
Valve Boxes	Mueller	VALVE BOX ADAPTER II 3"	FOR 3" MUELLER VALVES	Hughes Supply
Valve Boxes	Mueller	VALVE BOX ADAPTER II 4" / 6"	FOR 4" and 6" MUELLER VALVES	Hughes Supp;y
Valve Boxes	Mueller	VALVE BOX ADAPTER II 8"	FOR 8" MUELLER VALVES	Hughes Supply
Valve Boxes	Mueller	VALVE BOX ADAPTER II 10"	FOR 10" MUELLER VALVES	Hughes Supply
Valve Boxes	Mueller	VALVE BOX ADAPTER II 12"	FOR 12" MUELLER VALVES	Hughes Supply
Valve Boxes	Star	1" RISER VALVE BOX - CAST IRON or DUCTILE IRON	.21 1/2" X 34 1/2"	Hughes Supply
Valve Boxes	Star	1 1/2" RISER VALVE BOX - CAST IRON or DUCTILE IRON	.	Hughes Supply
Valve Boxes	Star	2" RISER VALVE BOX - CAST IRON or DUCTILE IRON	.	Hughes Supply
Valve Boxes	Star	3" RISER VALVE BOX - CAST IRON or DUCTILE IRON	.	Hughes Supply
Valve Boxes	Star	4" RISER VALVE BOX - CAST IRON or DUCTILE IRON	.	Hughes Supply
Valve Boxes	Star	LID - VALVE BOX	WATER or FIRE - SPECIFY	Hughes Supply
Valve Boxes	Star	BOX - VALVE CAST IRON STANDARD SCREW TYPE	RUSSELL EXTRA HEAVY DUTY	Hughes Supply
Valve Boxes	Star	BOX - VALVE CAST IRON TALL SCREW TYPE	RUSSELL EXTRA HEAVY DUTY	Hughes Supply
Valve Boxes	Tyler Union	VALVE STEM EXTENSIONS	2 ' OR 3' SPECIFY SIZE	HUGHES SUPPLY
Valves	A.Y. McDonald Mfg. Co.	VALVE DISC 3/4" BRASS HAND WHEEL OPERATED	FEMALE IRON PIPE THREAD (FIPT) X FIPT	Hughes Supply
Valves	A.Y. McDonald Mfg. Co.	VALVE DISC 1" BRASS HAND WHEEL OPERATED	FEMALE IRON PIPE THREAD (FIPT) X FIPT	Hughes Supply
Valves	A.Y. McDonald Mfg. Co.	VALVE DISC 1-1/2" BRASS HAND WHEEL OPERATED	FEMALE IRON PIPE THREAD (FIPT) X FIPT	Hughes Supply
Valves	A.Y. McDonald Mfg. Co.	VALVE DISC 3" BRASS HAND WHEEL OPERATED	FEMALE IRON PIPE THREAD (FIPT) X FIPT	Hughes Supply
Valves	A.Y. McDonald Mfg. Co.	VALVE DISC 2" BRASS HAND WHEEL OPERATED	FEMALE IRON PIPE THREAD (FIPT) X FIPT	Hughes Supply
Valves	Mueller	VALVE GATE 2" Mueller w/ Stainless bolts	FIPT X FIPT	Hughes Supply
Valves	Mueller	VALVE GATE 3" Mueller w/ Stainless bolts	M/J X M/J	Hughes Supply
Valves	Mueller	VALVE GATE 4" Mueller w/ Stainless bolts	M/J X M/J	Hughes Supply
Valves	Mueller	VALVE GATE 6" Mueller w/ Stainless bolts	M/J X M/J	Hughes Supply
Valves	Mueller	VALVE GATE 8" Mueller w/ Stainless bolts	M/J X M/J	Hughes Supply
Valves	Mueller	VALVE GATE 10" Mueller w/ Stainless bolts	M/J X M/J	Hughes Supply
Valves	Mueller	VALVE GATE 12" Mueller w/ Stainless bolts	M/J X M/J	Hughes Supply
Valves	Mueller	VALVE GATE 14" Mueller w/ Stainless bolts	M/J X M/J	Hughes Supply

Valves	Mueller	VALVE GATE 16" Mueller w/ Stainless bolts	M/J X M/J	Hughes Supply

STANDARD DETAILS

THE ISLAND WATER ASSOCIATION, INC

SANIBEL, FLORIDA

Revised:

June 2020

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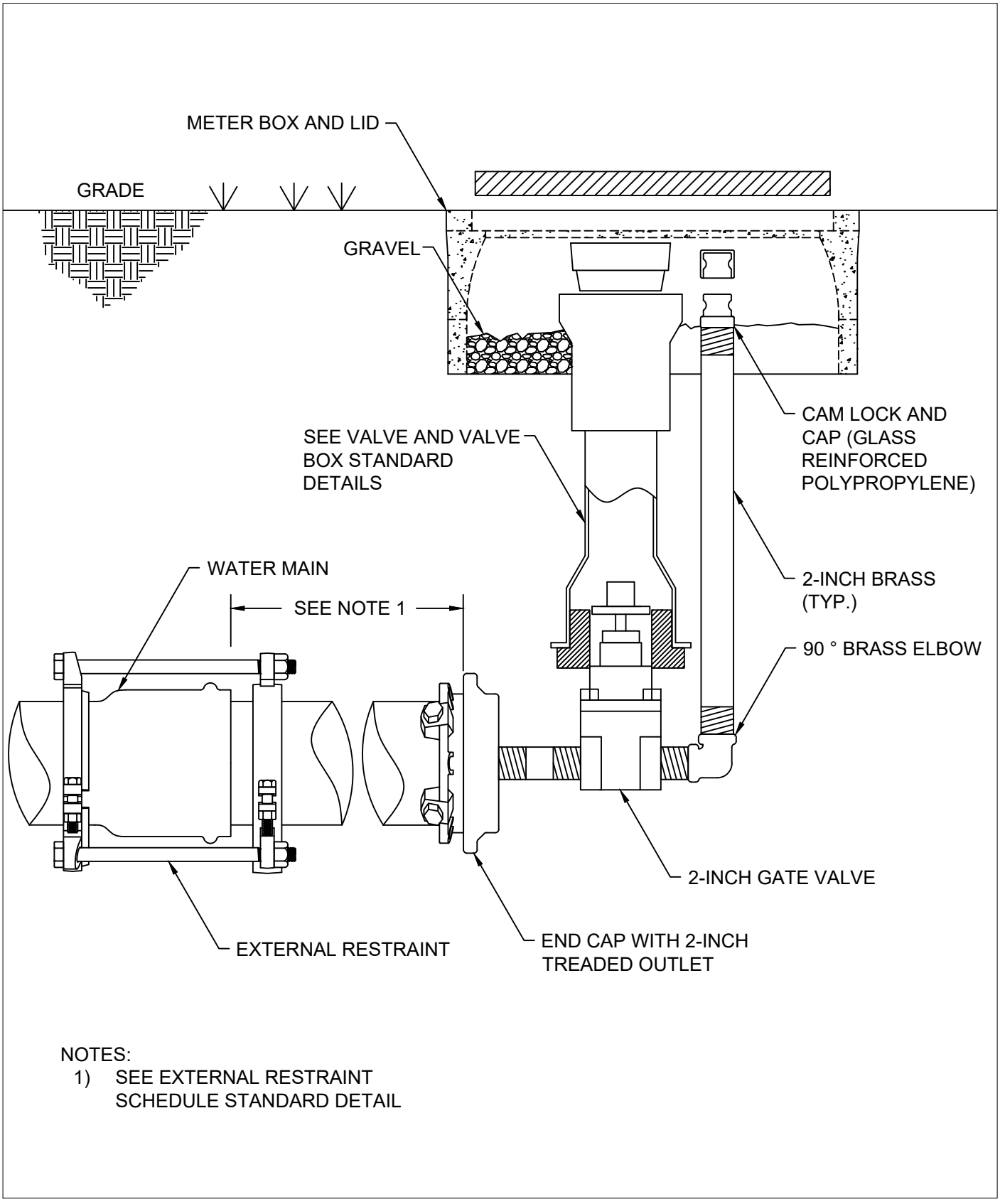
STANDARD DETAIL



NOTES:

1) SEE EXTERNAL RESTRAINT SCHEDULE STANDARD DETAIL

THE ISLAND WATER ASSOCIATION, INC
3651 SANIBEL-CAPTIVA ROAD, SANIBEL FL 33957
TELEPHONE: (239) 472-1502 - FAX: (239) 472-1505
www.islandwater.com

MANUAL BLOW-OFF ASSEMBLY

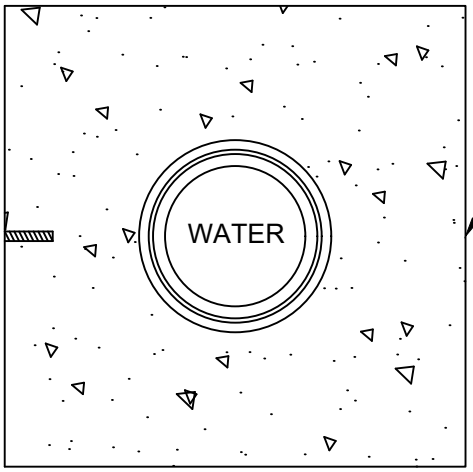
DATE REVISED	REV
6/20/2020	A

SD01

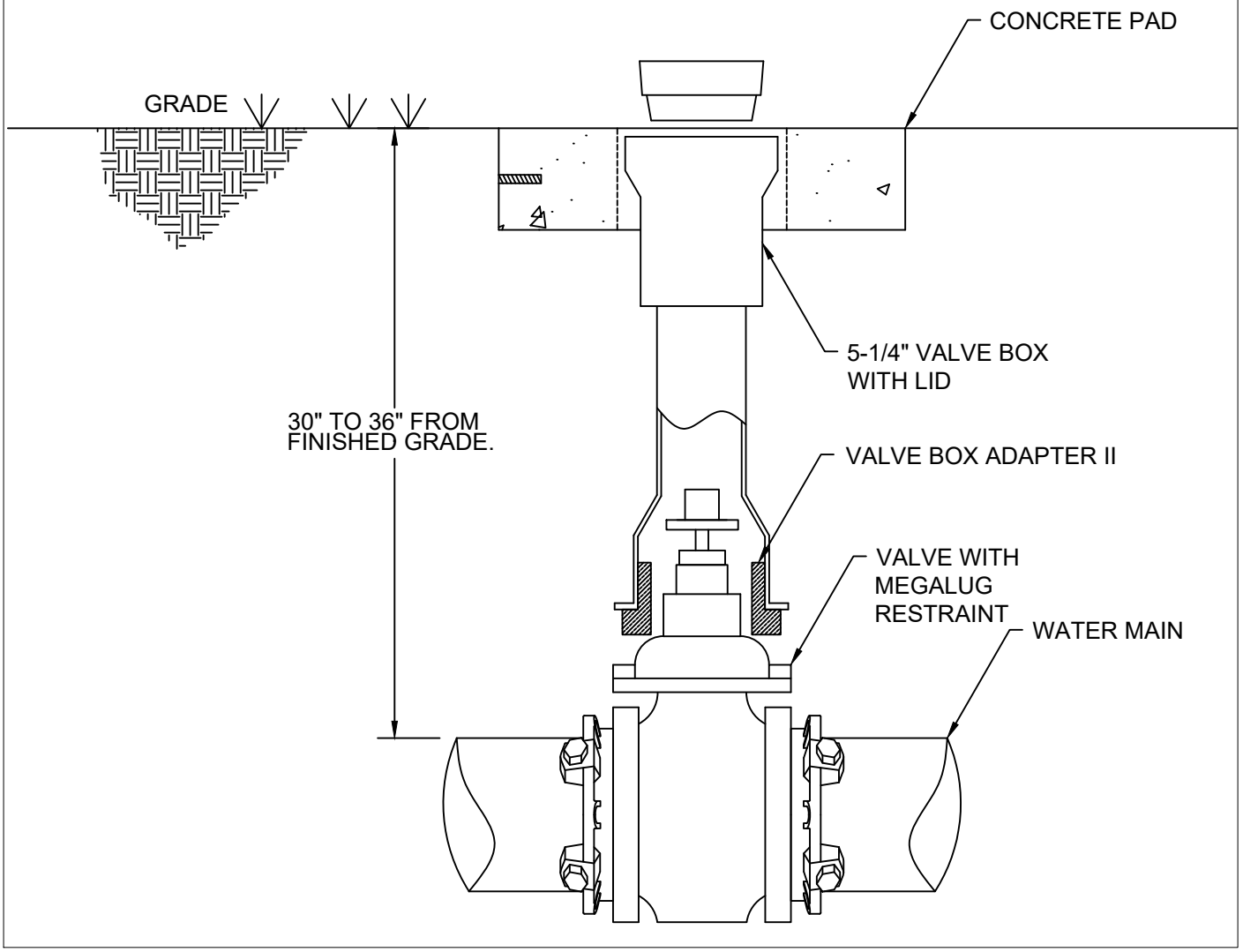
STANDARD DETAIL

NOTE:

1. CONCRETE PAD MUST BE FLUSH WITH FINISHED GRADE.
2. PVC PIPE SHALL NOT BE USED AS A SUBSTITUTE FOR THE VALVE BOX NOR SHALL PVC BE USED AS A VALVE BOX RISER.
3. VALVE PAD IS NOT NEED IN PAVED ROADWAY APPLICATIONS.
4. VALVE PADS SHALL BE SET WITH THE EDGE PARALLEL TO THE EDGE OF THE ROADWAY



SEE CAST IN PLACE VALVE PAD STANDARD DETAIL



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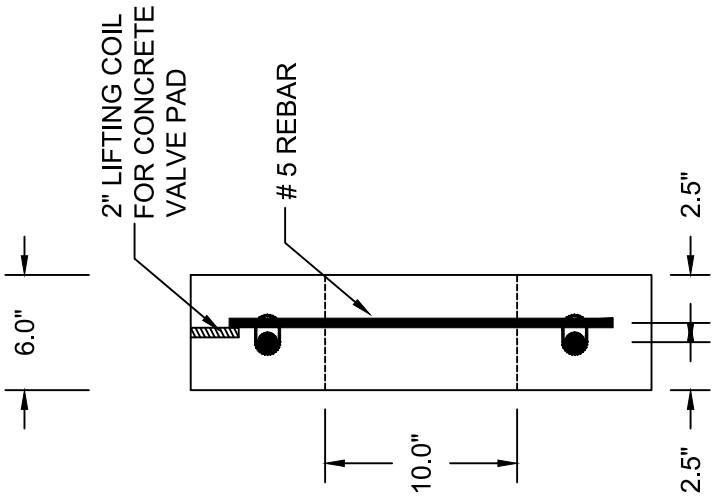
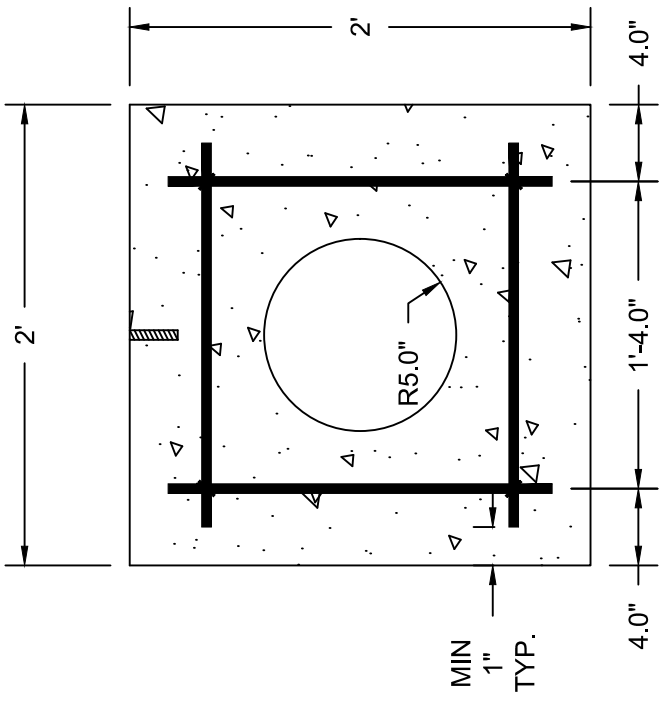
VALVE AND VALVE BOX

DATE REVISED	REV
6/20/2020	A

SD02

STANDARD DETAIL





MINIMUM 3000 PSI CONCRETE

NOTES:
1) WHEN MULTIPLE VALVES ARE INSTALLED, SUCH AS A DOUBLE OR A TRIO, THE ISOLATION VALVES SHALL BE SEPARATED TO ALLOW VALVE PADS TO BE INSTALLED WITHOUT CUTTING.
2) POURED VALVE PADS SHALL BE INSTALLED WITH ONE VALVE PAD PER ISOLATION VALVE.

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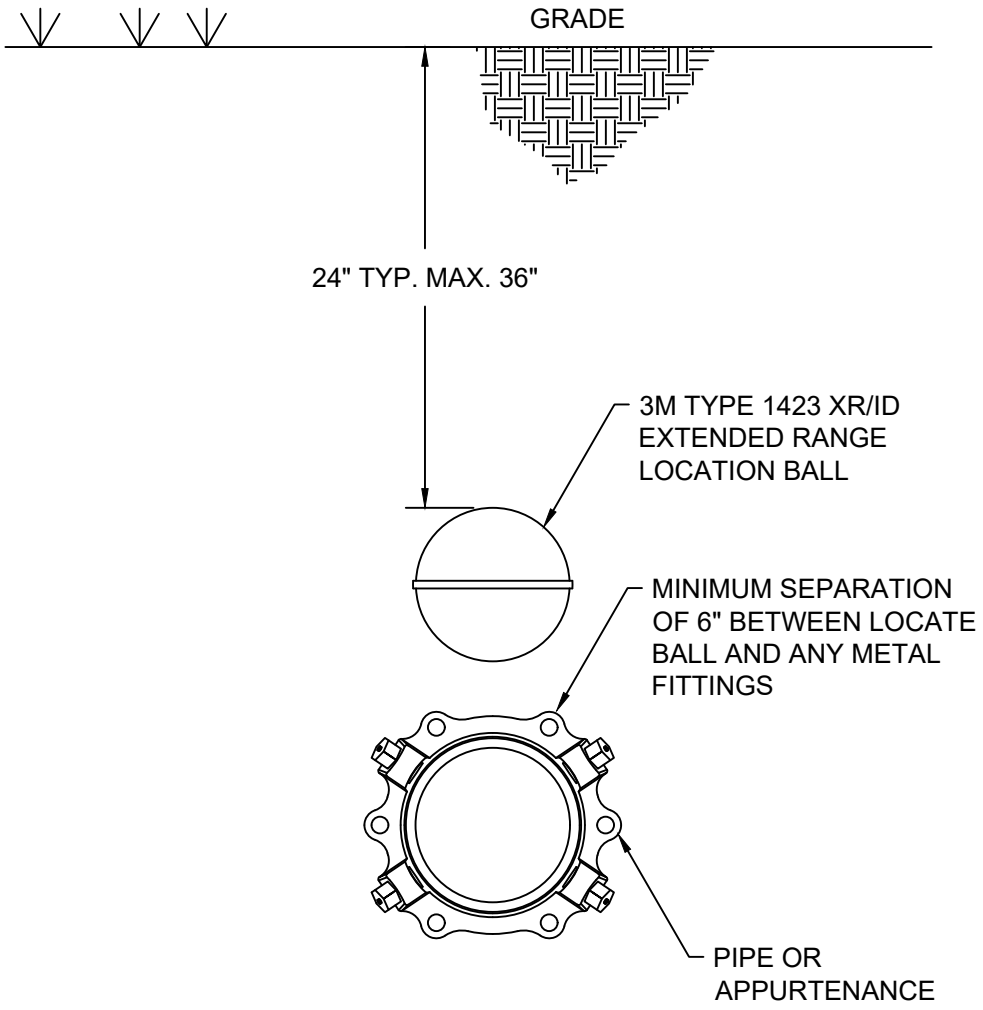
CAST IN PLACE VALVE PAD

DATE REVISED	REV
6/20/2020	A

SD03

STANDARD DETAIL



NOTE:

1. 3M DEVICES SHALL BE PLACED ON TAPPING SADDLES, FITTING, PIPE MATERIAL CHANGES, AND EVERY 500 FEET ALONG THE PIPE RUN.
2. 3M DEVICES SHALL NOT BE PLACED DEEPER THAN 36-INCHES.
3. NO DEVICE SHALL BE PLACES WITH 3-FEET HORIZONTALLY OF ANOTHER 3M DEVICE.

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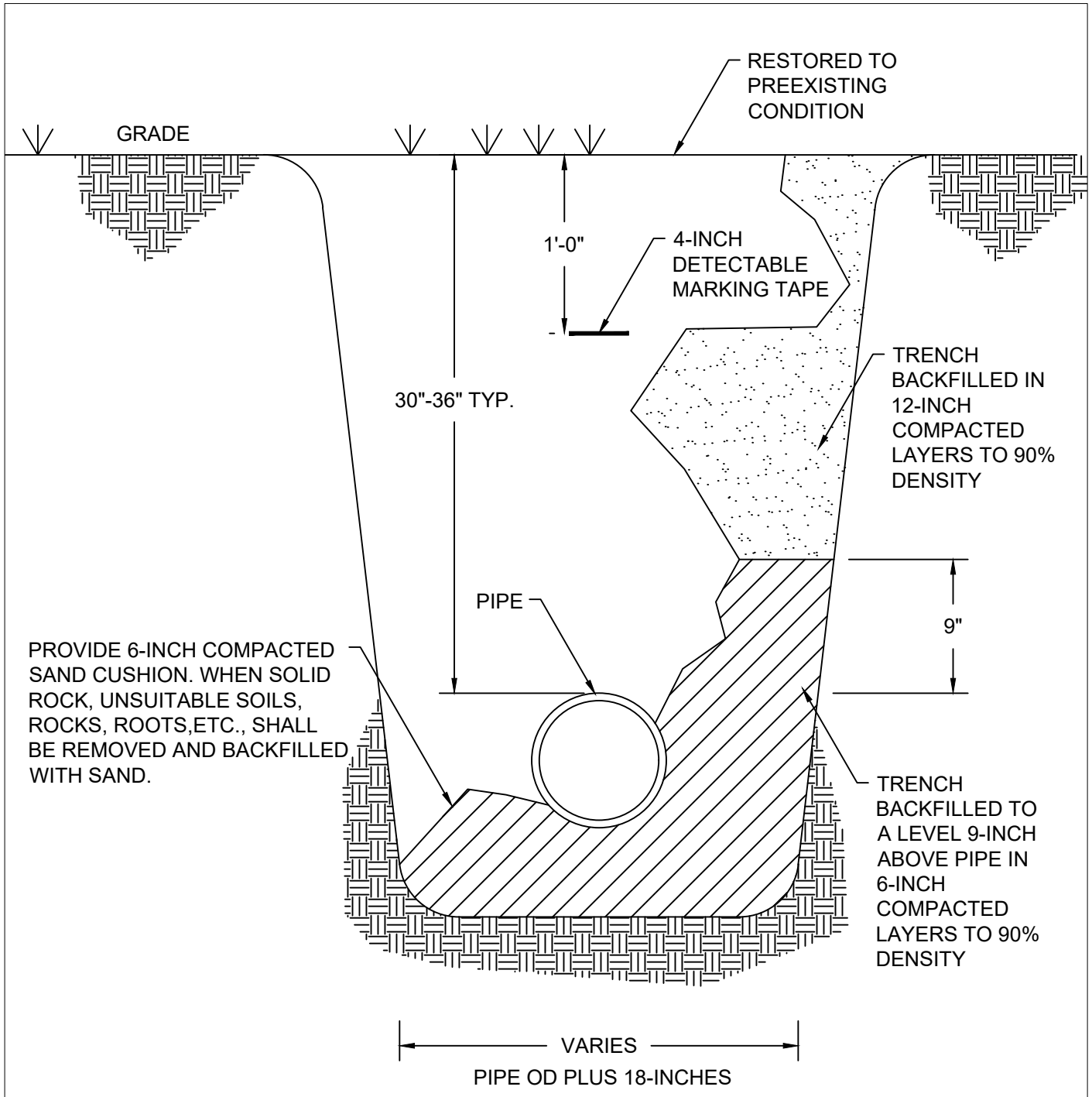
LOCATED DEVICE

DATE REVISED	REV
6/20/2020	A

SD04

STANDARD DETAIL



NOTES:

1. SHEETING AND BRACES ARE REQUIRED WHERE SLOPES ARE NOT STABLE.
2. TRENCHES MUST BE KEPT FREE OF WATER DURING CONSTRUCTION.

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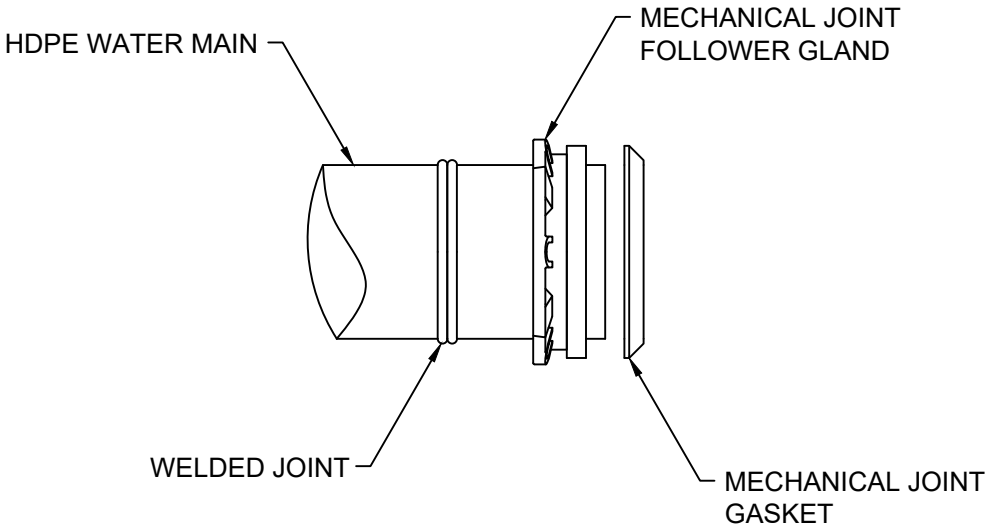
TRENCH

DATE REVISED	REV
6/20/2020	A

SD05

STANDARD DETAIL



NOTE:

1. PIPE AND ADAPTER SHALL HAVE THE SAME INSIDE AND OUTSIDE DIAMETER
2. PIPE AND ADAPTER SHALL BE COMPATIBLE MATERIALS FOR WELDING

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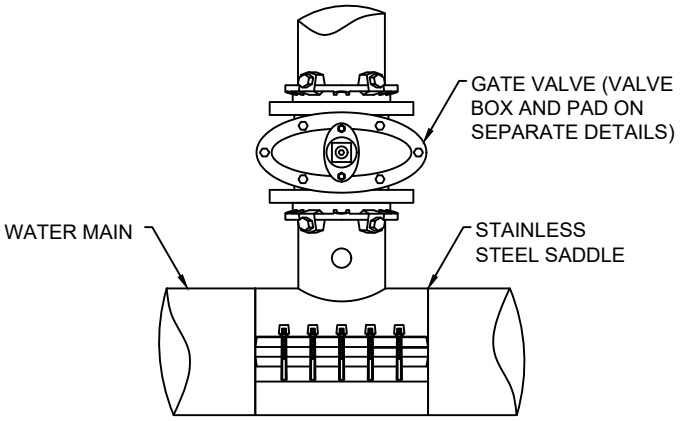
HDPE MECHANICAL JOINT ADAPTER

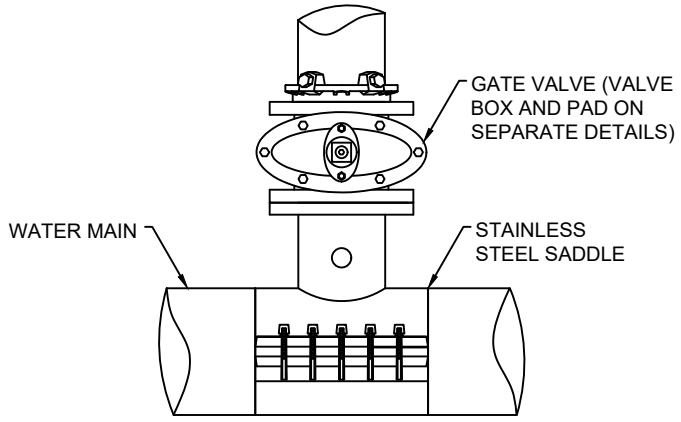
DATE REVISED	REV
6/20/2020	A

SD06

STANDARD DETAIL



MECHANICAL JOINT TAPPING SLEEVE



FLANGED TAPPING SLEEVE

NOTE:

1. BACK TAPS SHALL MAINTAIN A MINIMUM OF 6-INCHES OF VERTICAL SEPARATION BETWEEN THE TAPPED WATER MAIN AND THE CROSSING SERVICE LATERAL.
2. PRESSURE TESTS SHALL BE CONDUCTION IN ACCORDANCE WITH THE LATEST IWA SPECIFICATIONS.
3. LINE SIZE TAPS NOT PERMITTED WITHOUT PRIOR AUTHORIZATION FROM IWA.

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TAPPING SLEEVE

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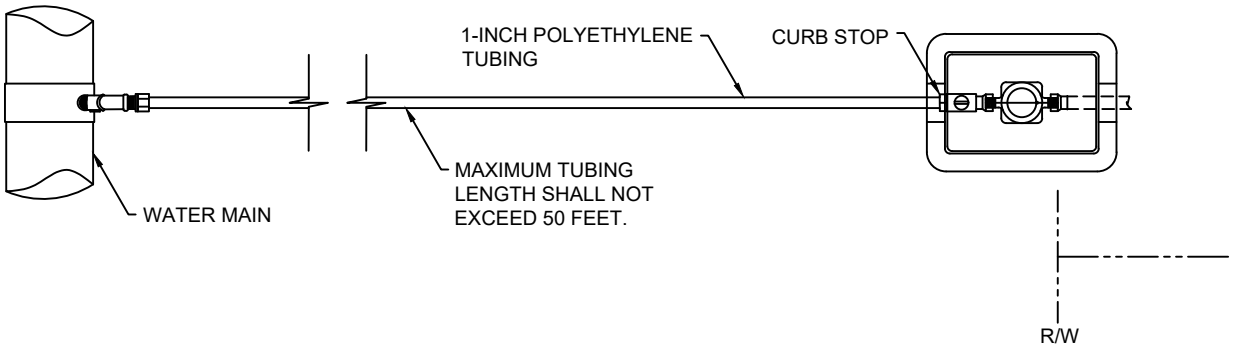
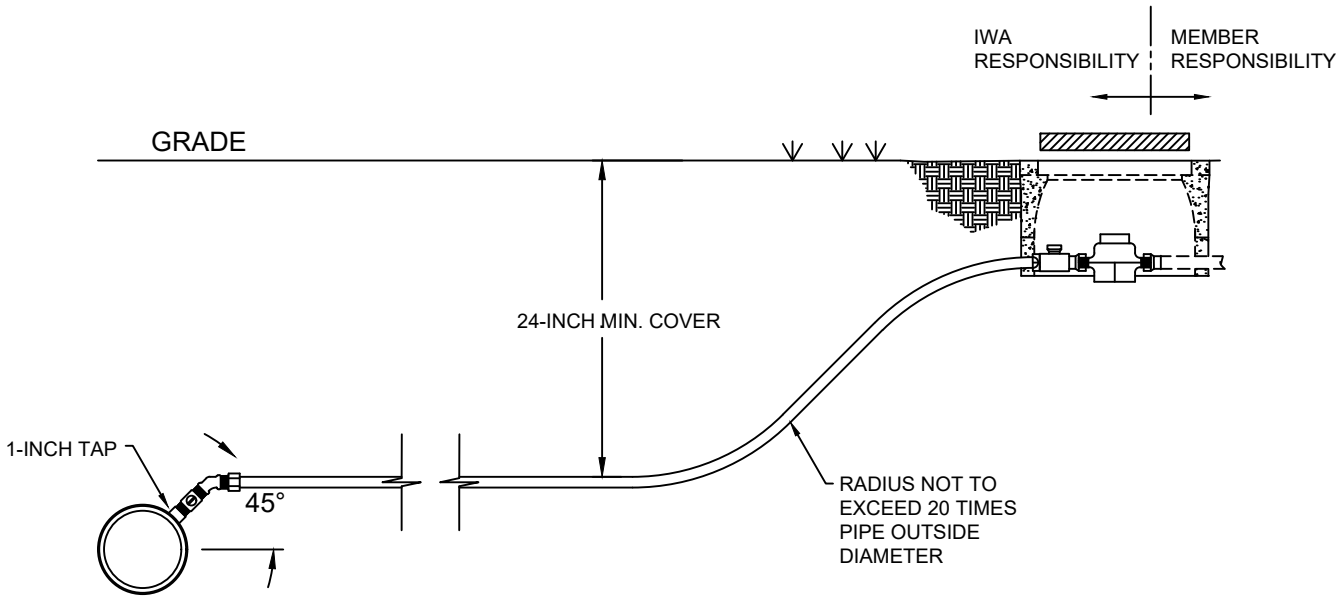
5/20/2020	A

SD07

STANDARD DETAIL



PLAN



PROFILE

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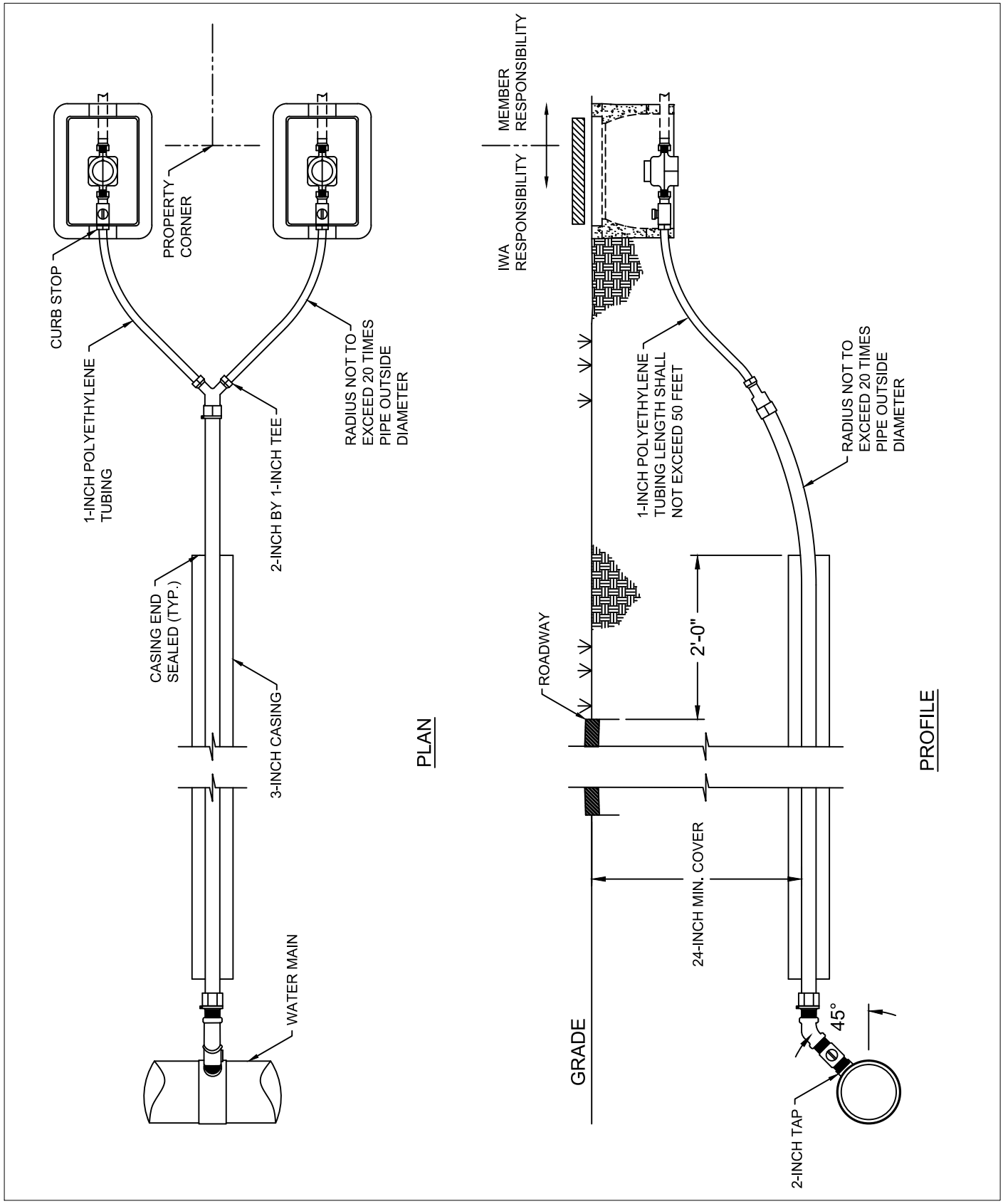
SINGLE METERED SERVICE LATERAL

DATE REVISED	REV
6/20/2020	A

SD08

STANDARD DETAIL



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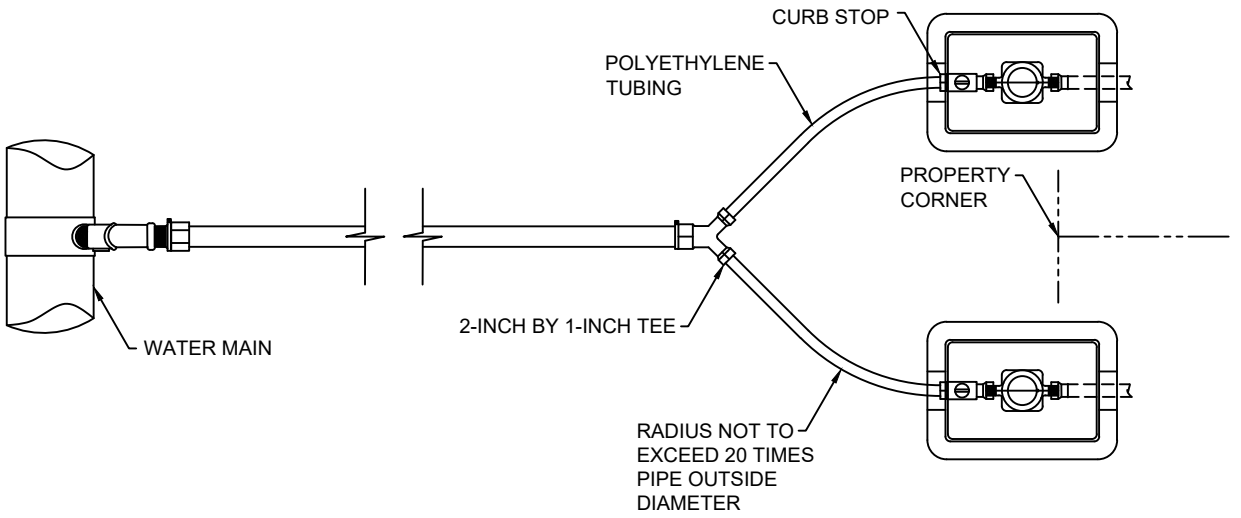
DOUBLE METERED SERVICE LATERAL
FOR ROAD CROSSING

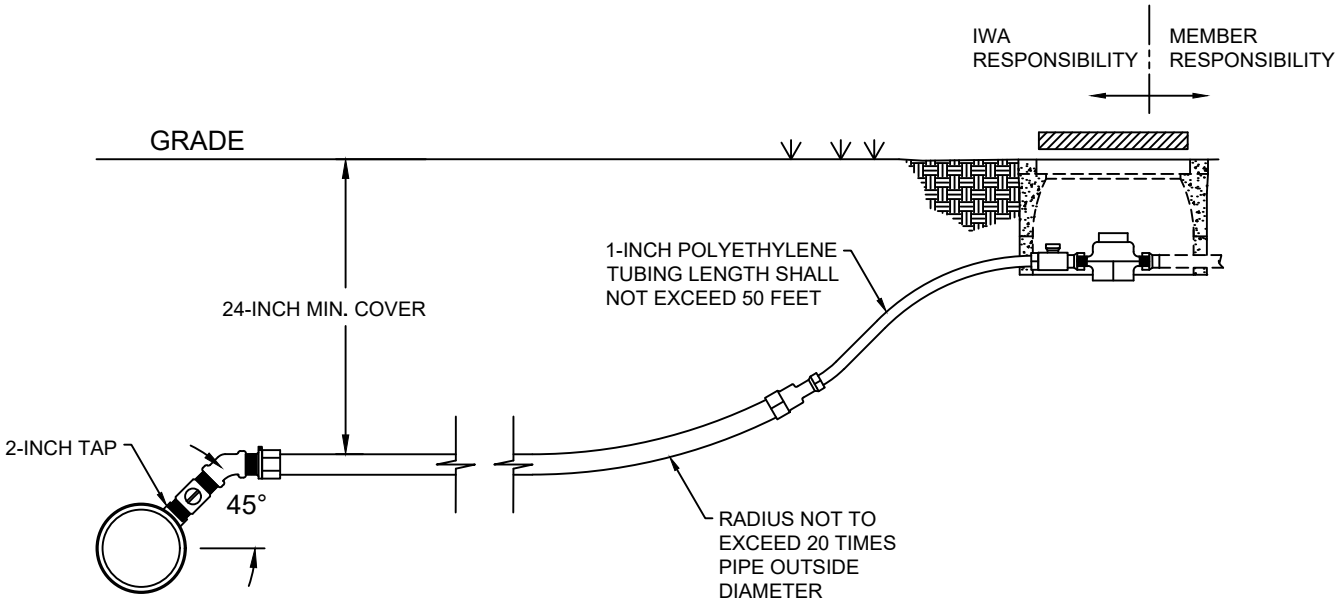
DATE REVISED	REV
6/20/2020	A

SD09

STANDARD DETAIL



PLAN



PROFILE

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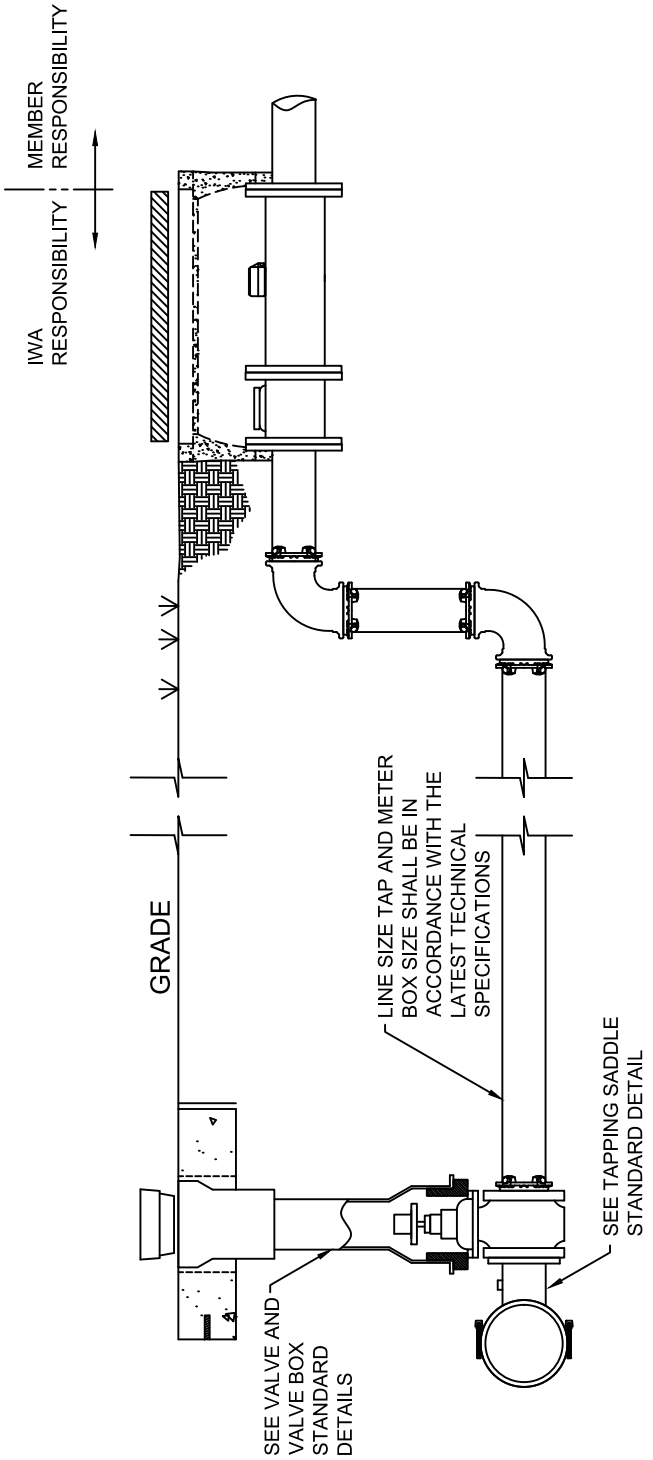
DOUBLE METERED SERVICE LATERAL
WITHOUT ROAD CROSSING

DATE REVISED	REV
6/20/2020	A

SD10

STANDARD DETAIL



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SERVICE LATERAL 1-1/2" AND LARGER

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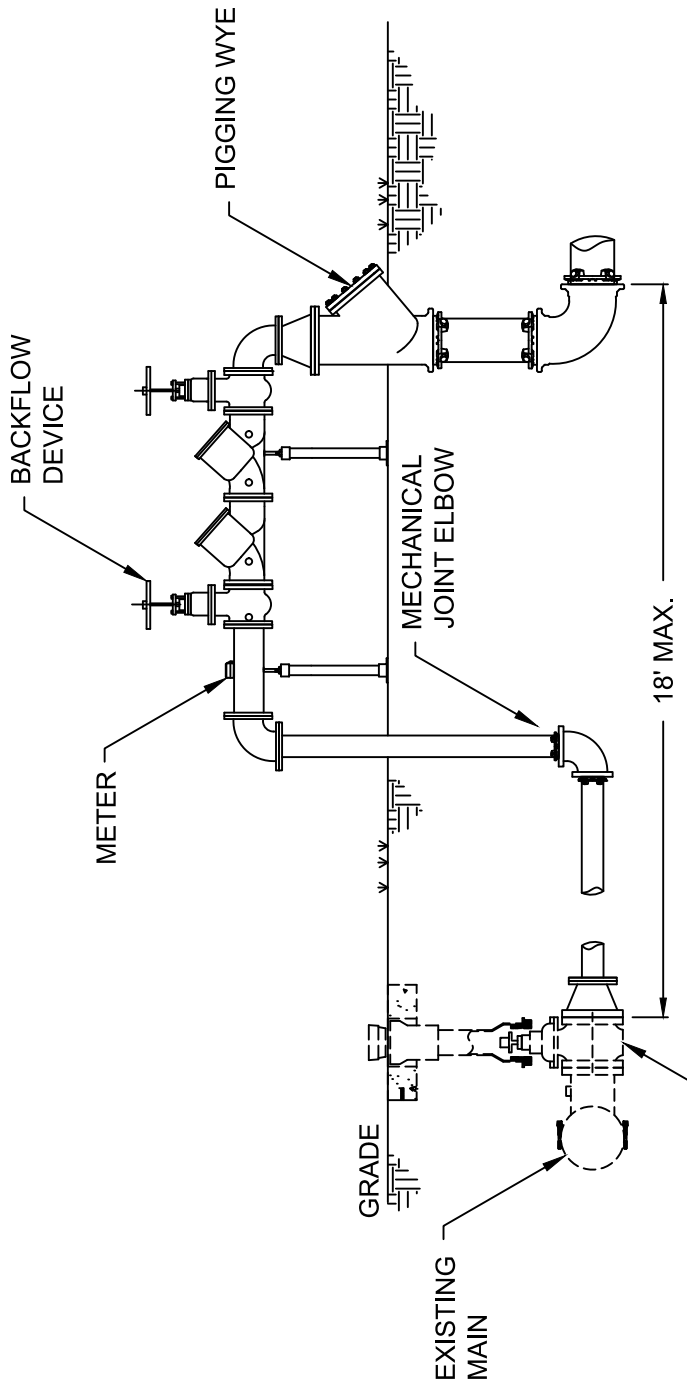
0-00-00	A

SD11

STANDARD DETAIL



NOTES:
1) METER AND BACKFLOW ASSEMBLY PROPERLY SIZED FOR PIGGING AND FLUSHING

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TEMPORARY CONNECTION

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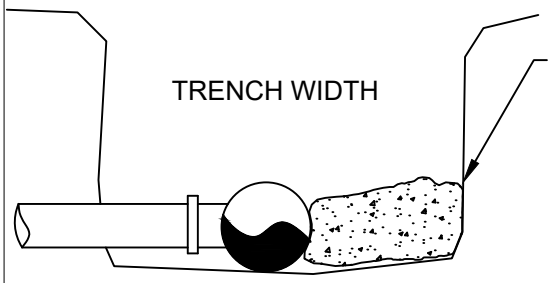
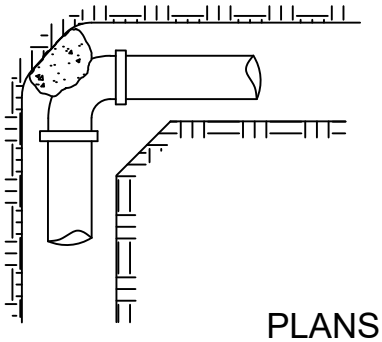
6/20/2020	A

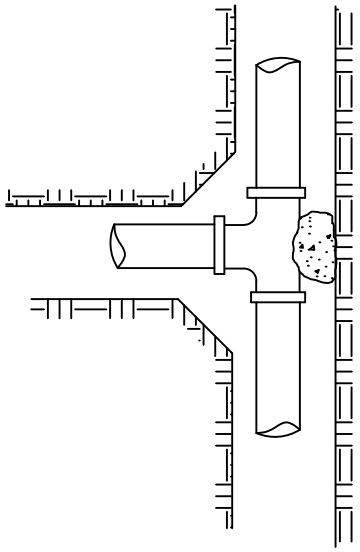
SD12

STANDARD DETAIL

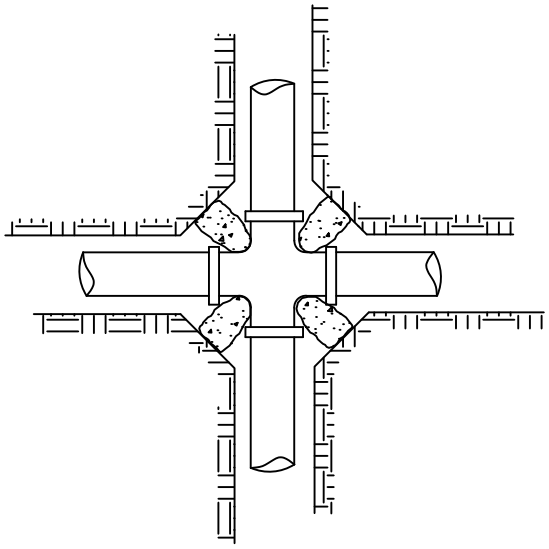


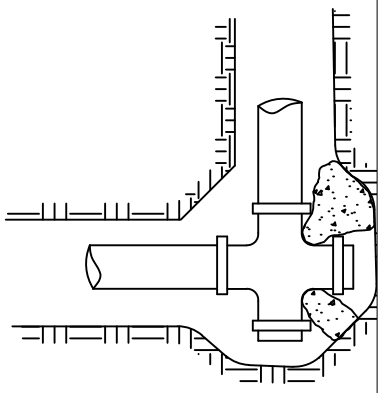
TYPICAL SECTION



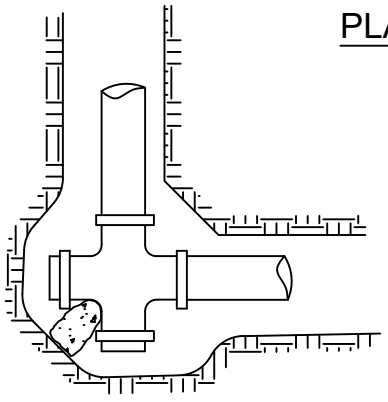


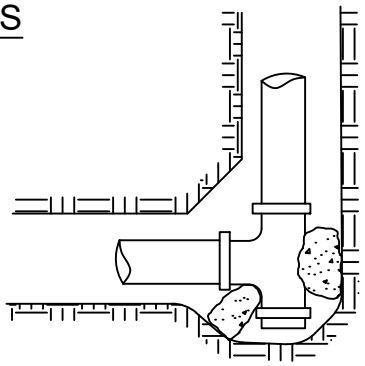
PLANS





PLANS





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THRUST BLOCK

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6/20/2020	A

SD13

STANDARD DETAIL

Minimum thrust block sizes in square feet of concrete contact with undisturbed soil on the vertical trench wall.

Pipe Size	Tee	90 deg.	45 deg.	22.5 deg	11.25 deg.
2"	1.0	2.0	1.0	1.0	1.0
4"	1.5	2.0	2.0	1.0	1.0
6"	2.0	3.0	2.0	1.5	1.0
8"	4.0	5.0	3.0	1.5	1.5
10"	5.0	7.0	3.5	2.5	2.0
12"	8.0	10.0	5.0	3.5	2.0
14"	11.0	14.0	7.5	4.4	2.5
16"	14.0	19.0	10.0	5.0	2.5
18"	18.0	24.0	13.0	7.5	3.0
20"	22.0	29.0	16.0	8.0	4.0

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THRUST BLOCK SCHEDULE

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SD14

STANDARD DETAIL

Restrained Length in feet for Ductile Iron (poly wrapped)

Size	Bend 90	45	22.5	11.25	Dead End	Tee
4	24	10	5	3	69	1
6	34	14	7	4	97	1
8	43	18	9	5	126	10
10	51	22	11	5	151	33
12	60	25	12	6	177	58
14	67	28	14	7	201	80
16	75	31	15	8	225	104
20	89	37	18	9	272	147

Restrained Length in feet for PVC

Size	Bend 90	45	22.5	11.25	Dead End	Tee
4	21	9	5	2	45	1
6	28	12	6	3	63	1
8	37	16	8	4	83	7
10	44	18	9	5	99	21
12	51	21	11	5	116	36
14	57	24	12	6	132	50
16	64	27	13	7	149	65
20	76	32	16	8	179	92

Soil type =SP
1.5 safety factor
trench type 3
30" cover
150 psi test pressure

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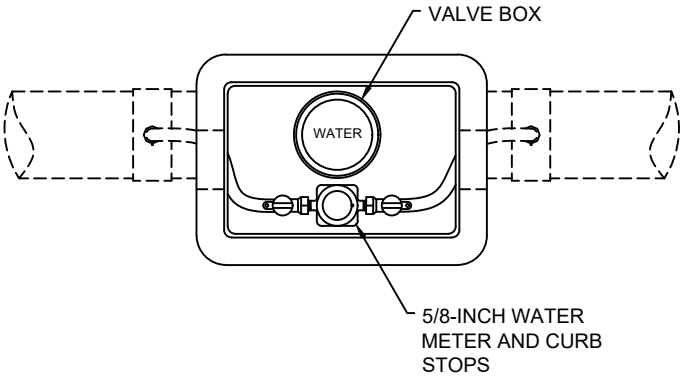
EXTERNAL RESTRAINT SCHEDULE

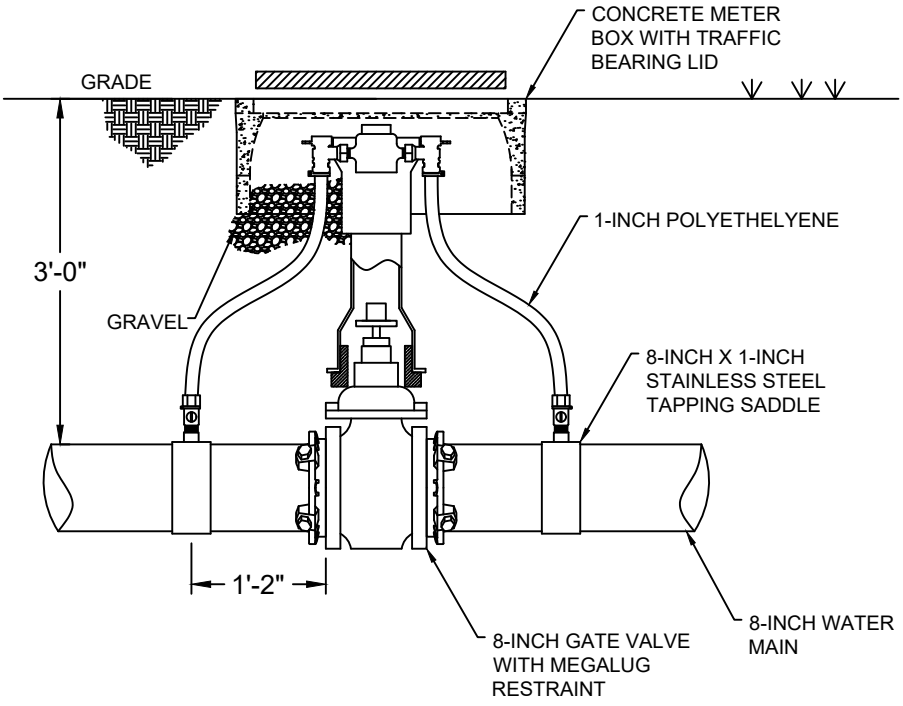
DATE REVISED 6/20/2020 | REV A

SD15

STANDARD DETAIL



PLAN



PROFILE

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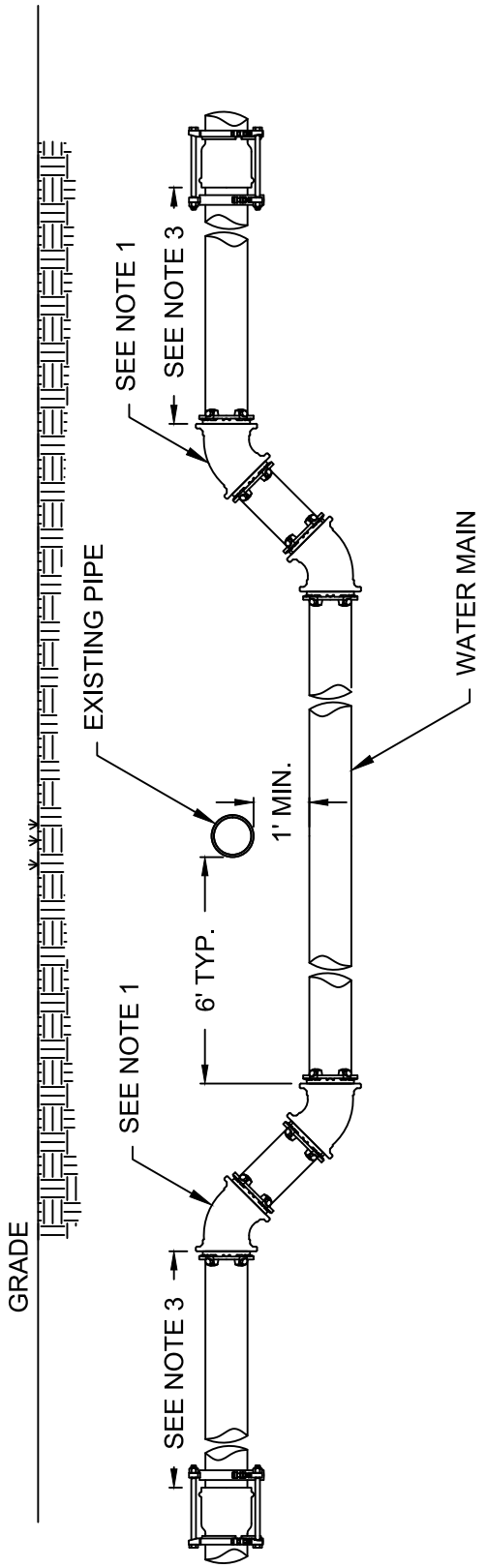
METERED LEAK DETECTOR
FOR
SUBAQUEOUS CROSSINGS

DATE REVISED	REV
6/20/2020	

SD16

STANDARD DETAIL



NOTES:
1) LOCATE DEVICES SHALL BE PLACED ABOVE THE TOP ELBOWS. SEE LOCATE DEVICE STANDARD DETAIL
2) WHEN WATER MAIN MUST BE BELOW THE MINIMUM SEPARATION IS 12-INCHES.
3) SEE EXTERNAL RESTRAINT SCHEDULE STANDARD DETAIL

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SPECIAL UTILITY CROSSING

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SD17

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SEPARATION

SD18

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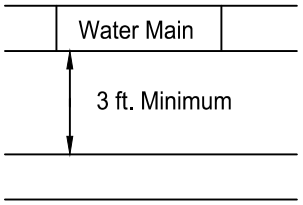
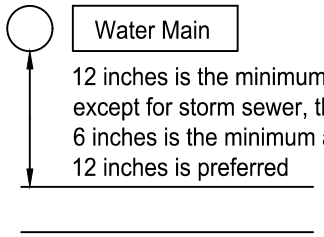
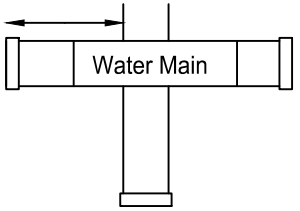
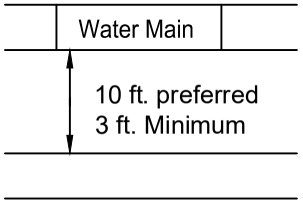
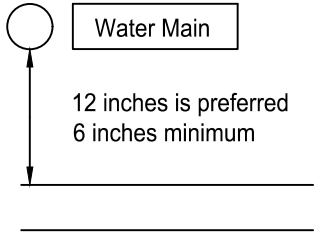
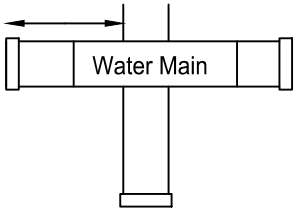
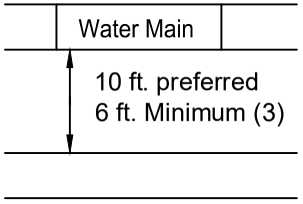
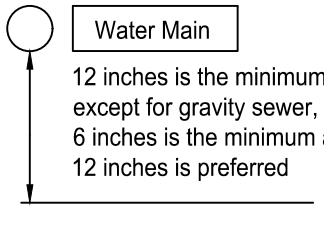
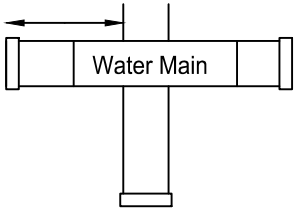
STANDARD DETAIL

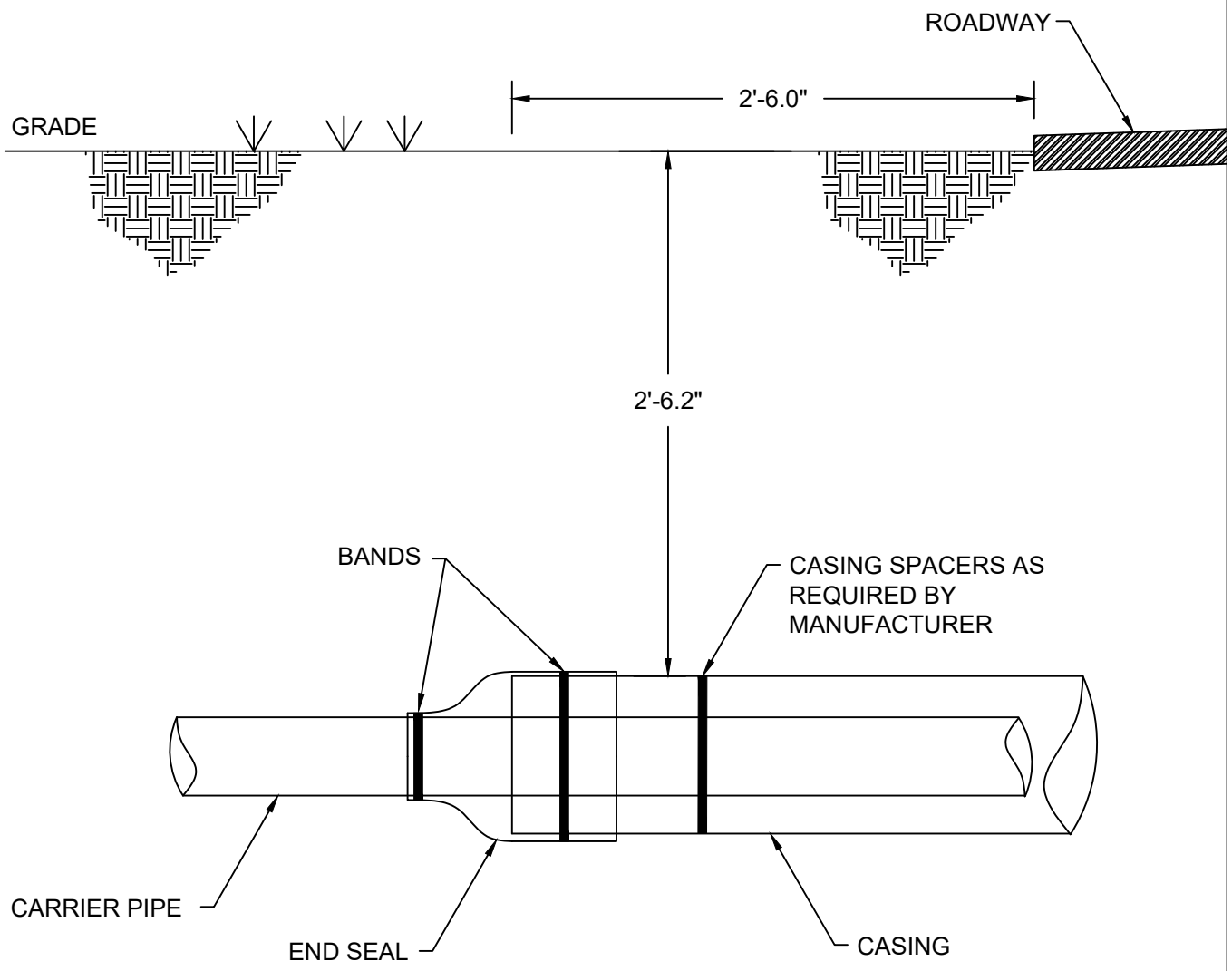
LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH F.A.C. RULE 62-555.314

Other Pipe	Horizontal Separation	Crossings (1)	Joint Spacing @ Crossings Joint Spacing @ Crossings
Storm Sewer, Stormwater Force Main, Reclaimed Water (2)		 12 inches is the minimum except for storm sewer, then 6 inches is the minimum and 12 inches is preferred	Alternate 3 ft. minimum 
Vacuum Sanitary Sewer		 12 inches is preferred 6 inches minimum	Alternate 3 ft. minimum 
Gravity or Pressure Sanitary Sewer, Sanitary Sewer Force Main, Reclaimed Water (4)		 12 inches is the minimum except for gravity sewer, then 6 inches is the minimum and 12 inches is preferred	Alternate 6 ft. minimum 
Other Sewage Treatment & Disposal System	10 ft. Minimum	---	---

(1) Water main should cross above other pipe. When water main must be below other pipe, the minimum separation is 12 inches
(2) Reclaimed Water regulated under Part III of Chapter 62-610, F.A.C.
(3) 3 ft. for gravity sanitary sewer where the bottom of the water main is laid at least 65 inches above the top of the gravity sanitary sewer
(4) Reclaimed water not regulated under Part III of Chapter 62-610, F.A.C.
(5) Additional information under paragraph 3g of 62-604, F.A.C.

Disclaimer - This document is for your convenience only. Please refer to F.A.C. Rule 62-555.314 for additional requirements

STANDARD DETAIL



NOTES:

1) THE DISTANCE BETWEEN SPACERS AND THEIR POSITION ON THE CARRIER PIPE IS TO BE IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATION.
2) CASING PIPE SHALL BE 2 NOMINAL DIAMETERS LARGER THAN THE CARRIER PIPE.

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BORE & JACK CASING

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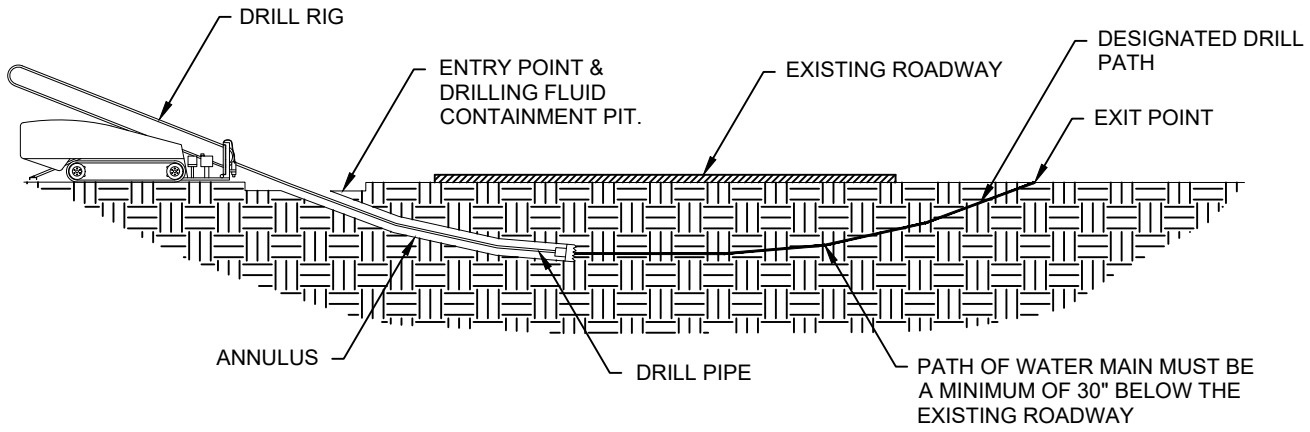
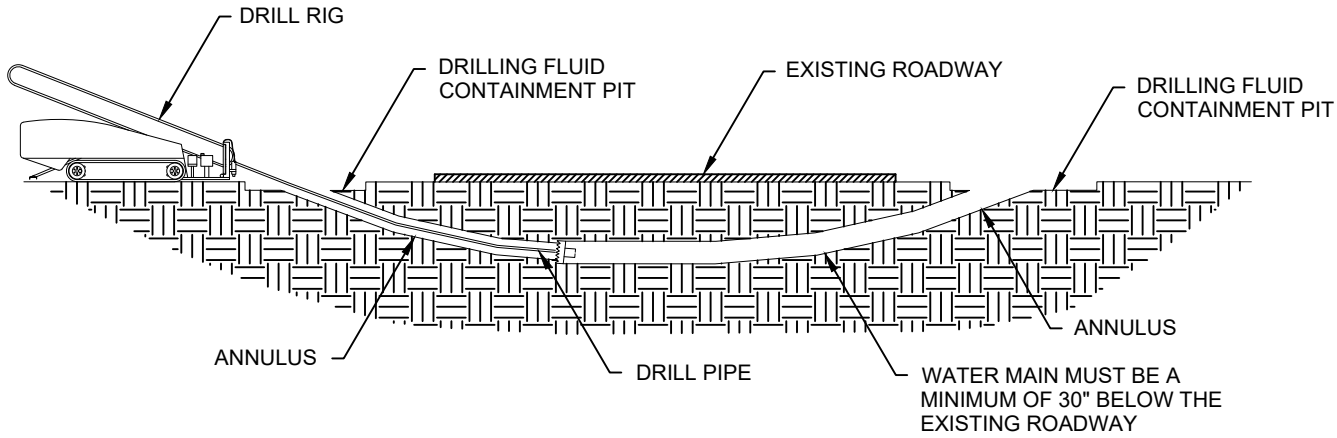
SD19

STANDARD DETAIL

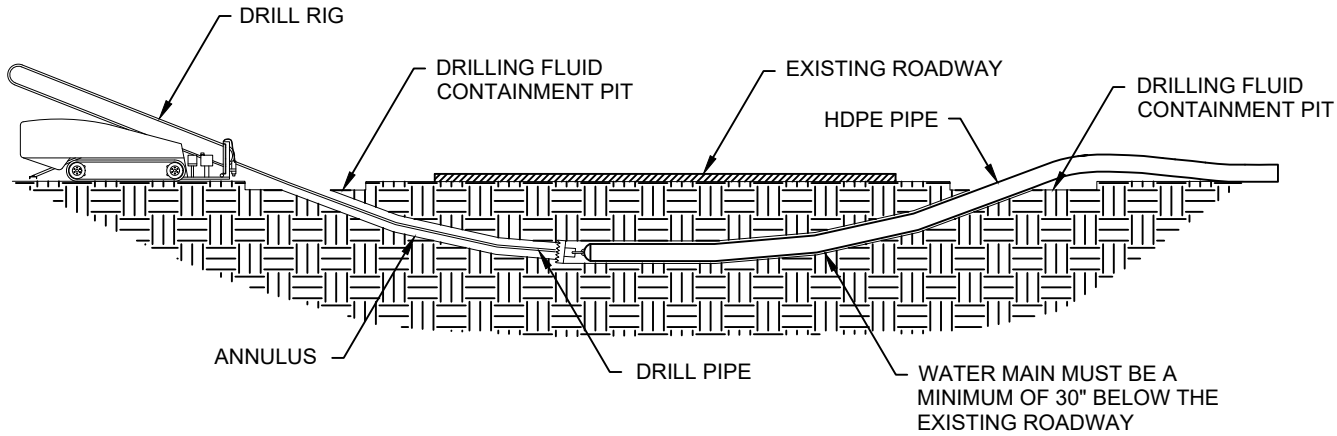
PILOT HOLE



PREREAMING



PULLBACK



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DIRECTIONAL DRILL

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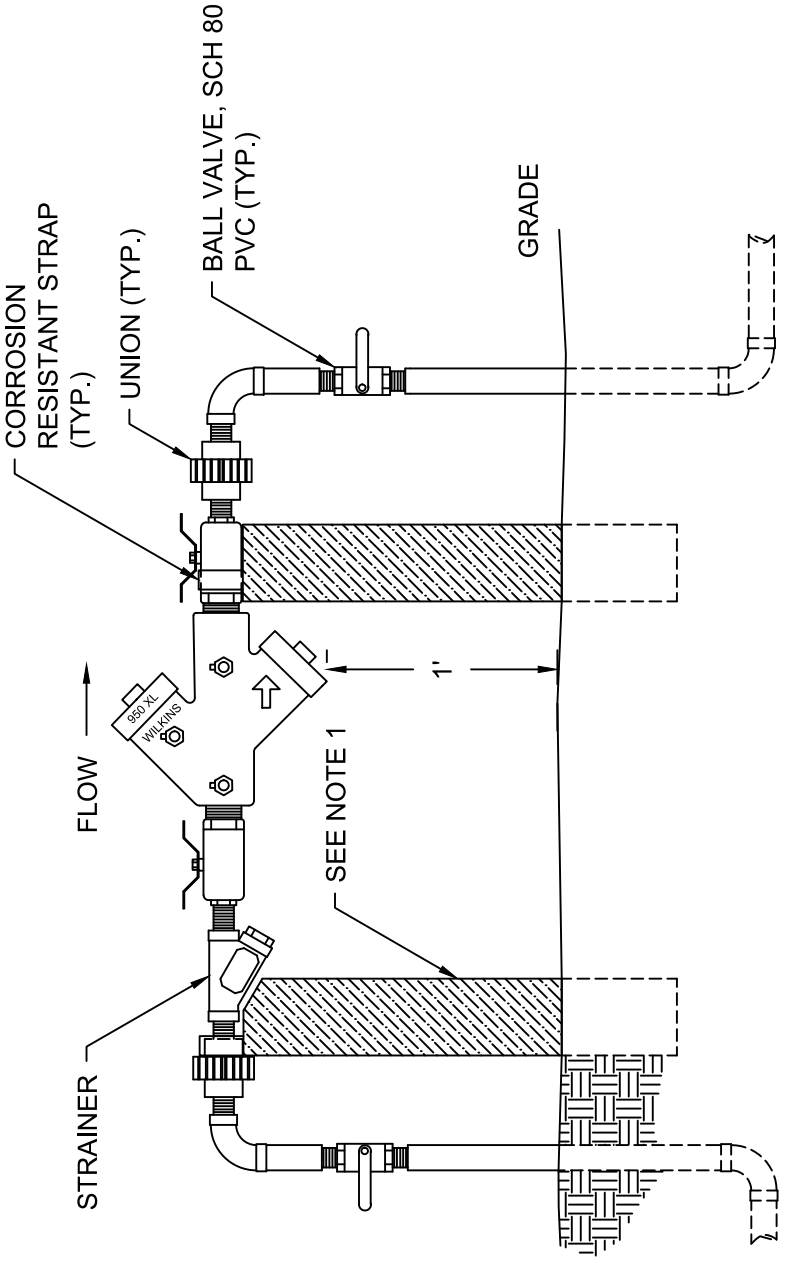
SD20

STANDARD DETAIL



NOTE:

1. MIN. 2-INCH X 4-INCH PRESSURE TREATED FOR DEVICES 1-INCH AND LESS. MIN. 4-INCH X 4-INCH ABOVE 1-INCH UP TO 2-INCH.
2. NO CONNECTIONS BETWEEN THE METER AND BACKFLOW ASSEMBLY ARE PERMITTED.
3. PIPING SHALL BE THREADED OR SOLVENT WELDED JOINTS. SCH 80 PVC, BRASS OR TYPE K COPPER.
4. ALL HARDWARE SHALL BE STAINLESS STEEL.
5. STRAINERS ARE REQUIRED ON 2-INCH ASSEMBLIES AND OPTIONAL ON ASSEMBLIES LESS THAN 2-INCH.
6. ASSEMBLIES UP TO 2-INCH SHALL BE INSTALLED WITH TWO UNIONS TO ALLOW REMOVAL OF THE BACKFLOW DEVICE WITHOUT CUTTING THE PIPE.
7. DOUBLE CHECK ASSEMBLIES MAY BE INSTALLED IN AN UNDERGROUND VAULT PROVIDED THERE IS A MINIMUM OF 12-INCHS OF OF CLEARANCE ON ALL SIDES, BETWEEN THE VAULT AND THE ASSEMBLY.

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2-INCH AND LESS
DOUBLE CHECK
BACKFLOW DEVICE

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SD21

STANDARD DETAIL

NOTE:

1. MIN. 2-INCH X 4-INCH PRESSURE TREATED FOR DEVICES 1-INCH AND LESS. MIN. 4-INCH X 4-INCH ABOVE 1-INCH UP TO 2-INCH.
2. NO CONNECTIONS BETWEEN THE METER AND BACKFLOW ASSEMBLY ARE PERMITTED.
3. PIPING SHALL BE THREADED OR SOLVENT WELDED JOINTS. SCH 80 PVC, BRASS OR TYPE K COPPER.
4. ALL HARDWARE SHALL BE STAINLESS STEEL.
5. STRAINERS ARE REQUIRED ON 2-INCH ASSEMBLIES AND OPTIONAL ON ASSEMBLIES LESS THAN 2-INCH.
6. ASSEMBLIES UP TO 2-INCH SHALL BE INSTALLED WITH TWO UNIONS TO ALLOW REMOVAL OF THE BACKFLOW DEVICE WITHOUT CUTTING THE PIPE.
7. DOUBLLE CHECK ASSEMBLIES MAY BE INSTALLED IN AN UNDERGROUND VAULT PROVIDED THERE IS A MINIMUM OF 12-INCHS OF OF CLEARANCE ON ALL SIDES, BETWEEN THE VAULT AND THE ASSEMBLY.

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2-INCH AND LESS
REDUCED PRESSURE ZONE
BACKFLOW DEVICE

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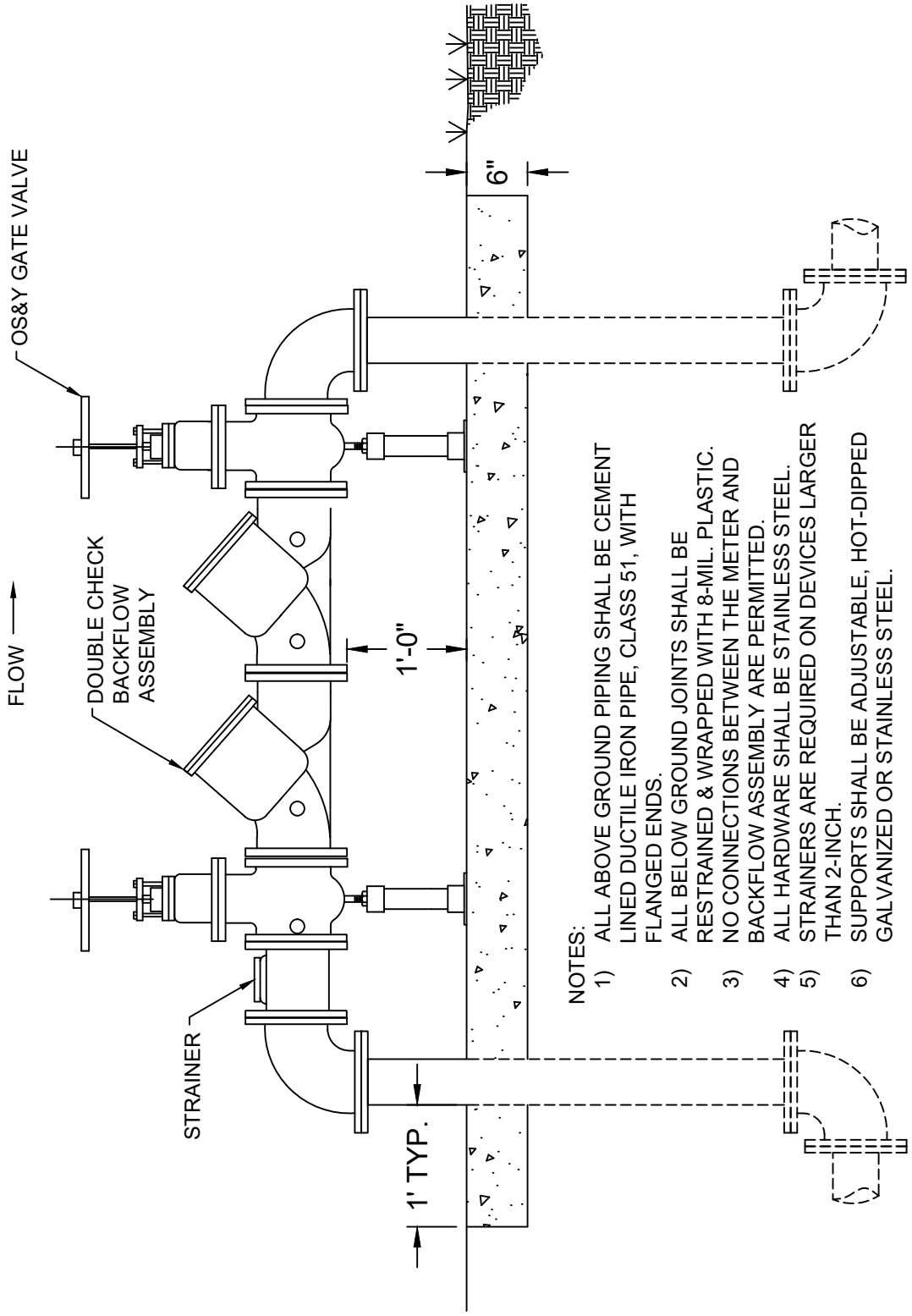
SD22

STANDARD DETAIL



NOTES:

1) ALL ABOVE GROUND PIPING SHALL BE CEMENT LINED DUCTILE IRON PIPE, CLASS 51, WITH FLANGED ENDS.
2) ALL BELOW GROUND JOINTS SHALL BE RESTRAINED & WRAPPED WITH 8-MIL. PLASTIC.
3) NO CONNECTIONS BETWEEN THE METER AND BACKFLOW ASSEMBLY ARE PERMITTED.
4) ALL HARDWARE SHALL BE STAINLESS STEEL.
5) STRAINERS ARE REQUIRED ON DEVICES LARGER THAN 2-INCH.
6) SUPPORTS SHALL BE ADJUSTABLE, HOT-DIPPED GALVANIZED OR STAINLESS STEEL.

THE ISLAND WATER ASSOCIATION, INC
3651 SANIBEL-CAPTIVA ROAD, SANIBEL FL 33957
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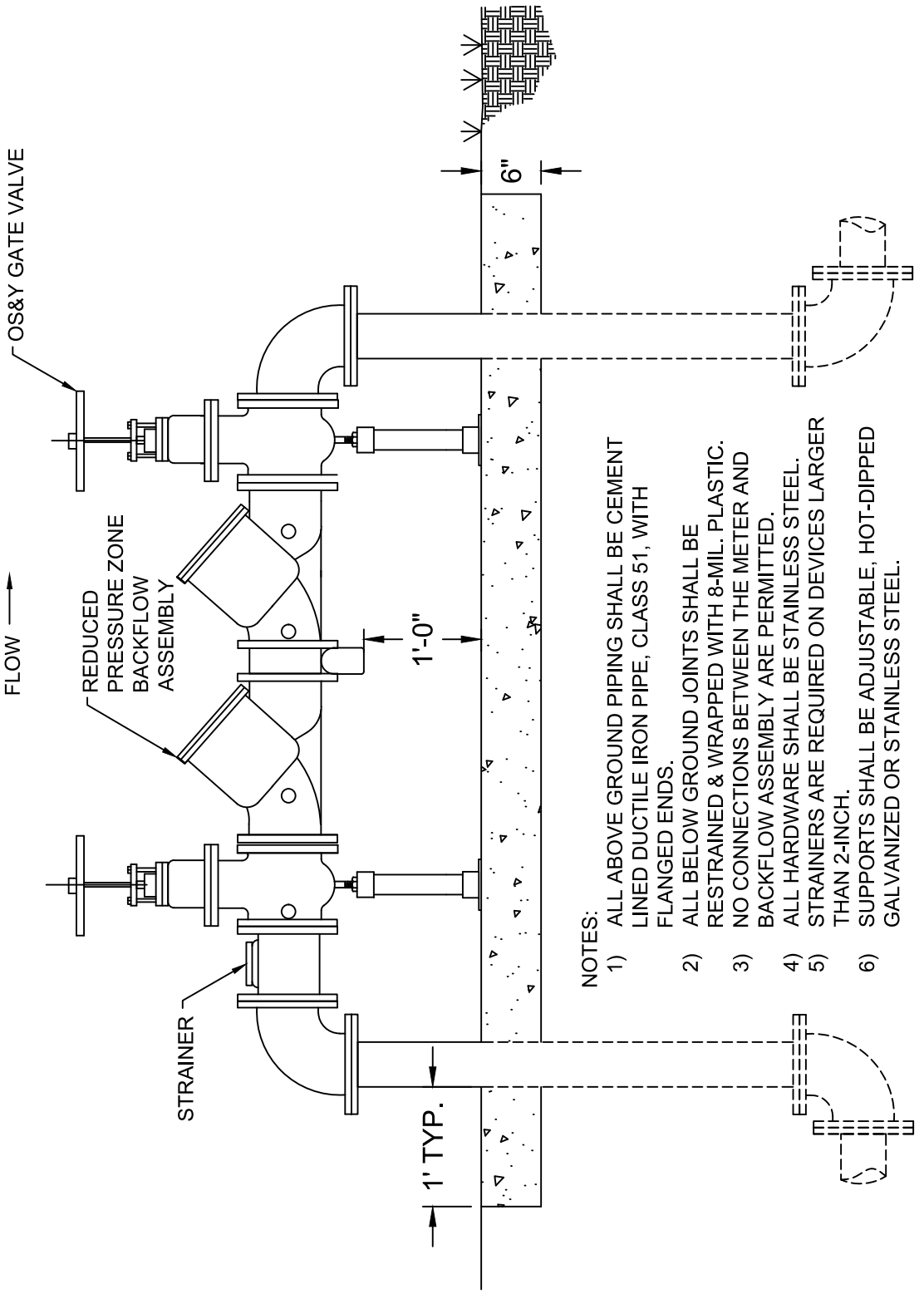
LARGER THAN 2-INCH
DOUBLE CHECK
BACKFLOW DEVICE

DATE REVISED	REV
6/20/2020	A

SD23

STANDARD DETAIL



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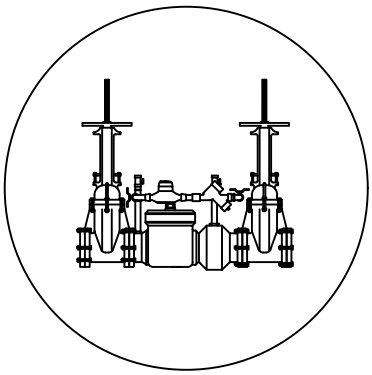
LARGER THAN 2-INCH
REDUCED PRESSURE ZONE
BACKFLOW DEVICE

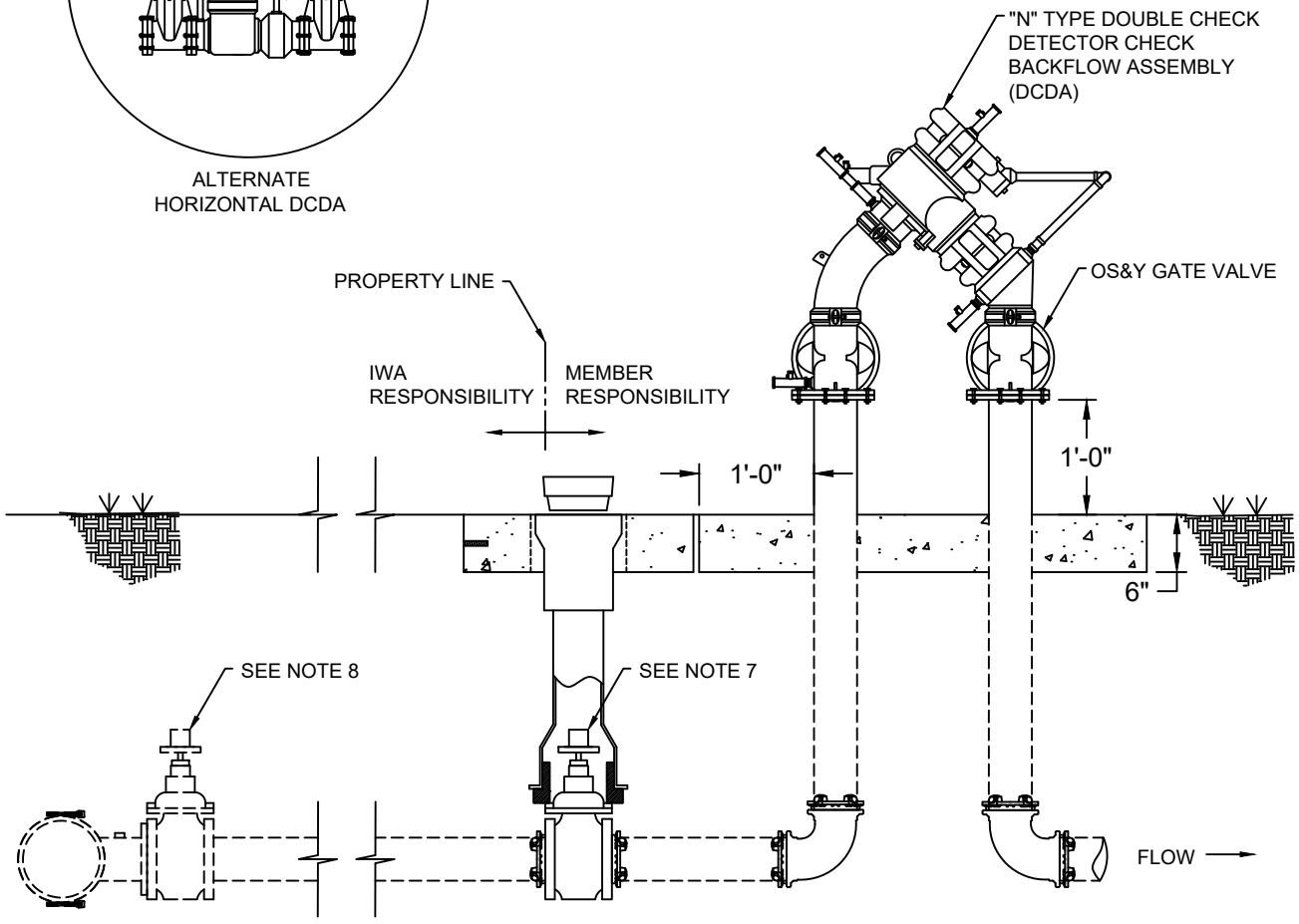
DATE REVISED	REV
6/20/2020	A

SD24

STANDARD DETAIL



ALTERNATE
HORIZONTAL DCDA



NOTES:

1) INSTALLATION SHALL CONFORM TO LOCAL FIRE DISTRICT, NFPA, AND ALL APPLICAPABLE STANDARDS.
2) ALL ABOVE GROUND PIPING SHALL BE CEMENT LINED DUCTILE IRON PIPE, CLASS 51, WITH FLANGED ENDS.
3) ALL BELOW GROUND JOINTS SHALL BE RESTRAINED & WRAPPED WITH 8-MIL. PLASTIC.
4) ALL HARDWARE SHALL BE STAINLESS STEEL.
5) SUPPORTS SHALL BE ADJUSTABLE, HOT-DIPPED GALVANIZED OR STAINLESS STEEL.
6) HORIZONTAL DCDA INSTALLATIONS ARE ACCEPTABLE.
7) FIRE LINE CONNECTIONS SHALL HAVE THEIR OWN SEPARATE CONNECTION TO THE WATER MAIN AND HAVE AN ISOLATION VALVE LOCATED AT THE EDGE OF THE MEMBERS PROPERTY.
8) VALVE, VALVE BOX AND TAPPING SADDLE HAVE SEPARATE STANDARD DETAILS.

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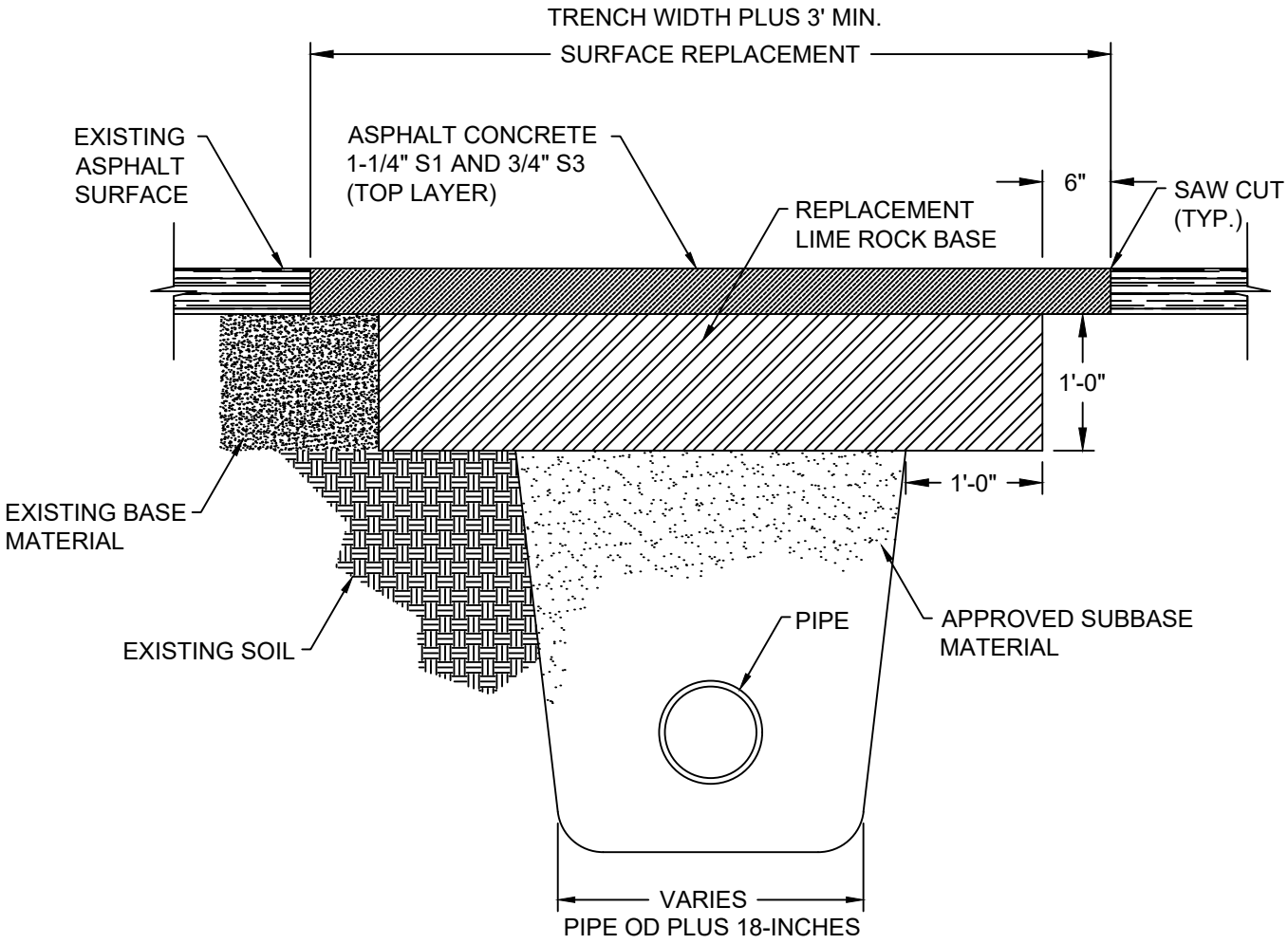
FIRE SPRINKLER SERVICE

DATE REVISED	REV
6/20/2020	A

SD25

STANDARD DETAIL



NOTES:

1) FOR BIKE AND SHARED USE PATHS ASPHALT REPLACEMENT SHALL BE THE FULL WIDTH USING S1-TYPE ASPHALT IN TWO 2-INCH LIFTS.
2) LIME ROCK MATERIAL (MIN. LBR 100) SHALL BE COMPACTED TO 98% DENSITY, AASHTO T-180
3) APPROVED SUB-BASE MATERIAL (MIN. LBR 40) SHALL BE COMPACTED IN 8" LAYERS TO MAXIMUM 98% DENSITY, AASHTO T-180.
4) ASPHALT CONCRETE PAVEMENT JOINT SHALL BE MECHANICALLY SAWED.
5) CONSIDERATION FOR OTHER OPTIONS SHALL BE SUBMITTED TO AND APPROVED BY THE PUBLIC WORKS DIRECTOR.

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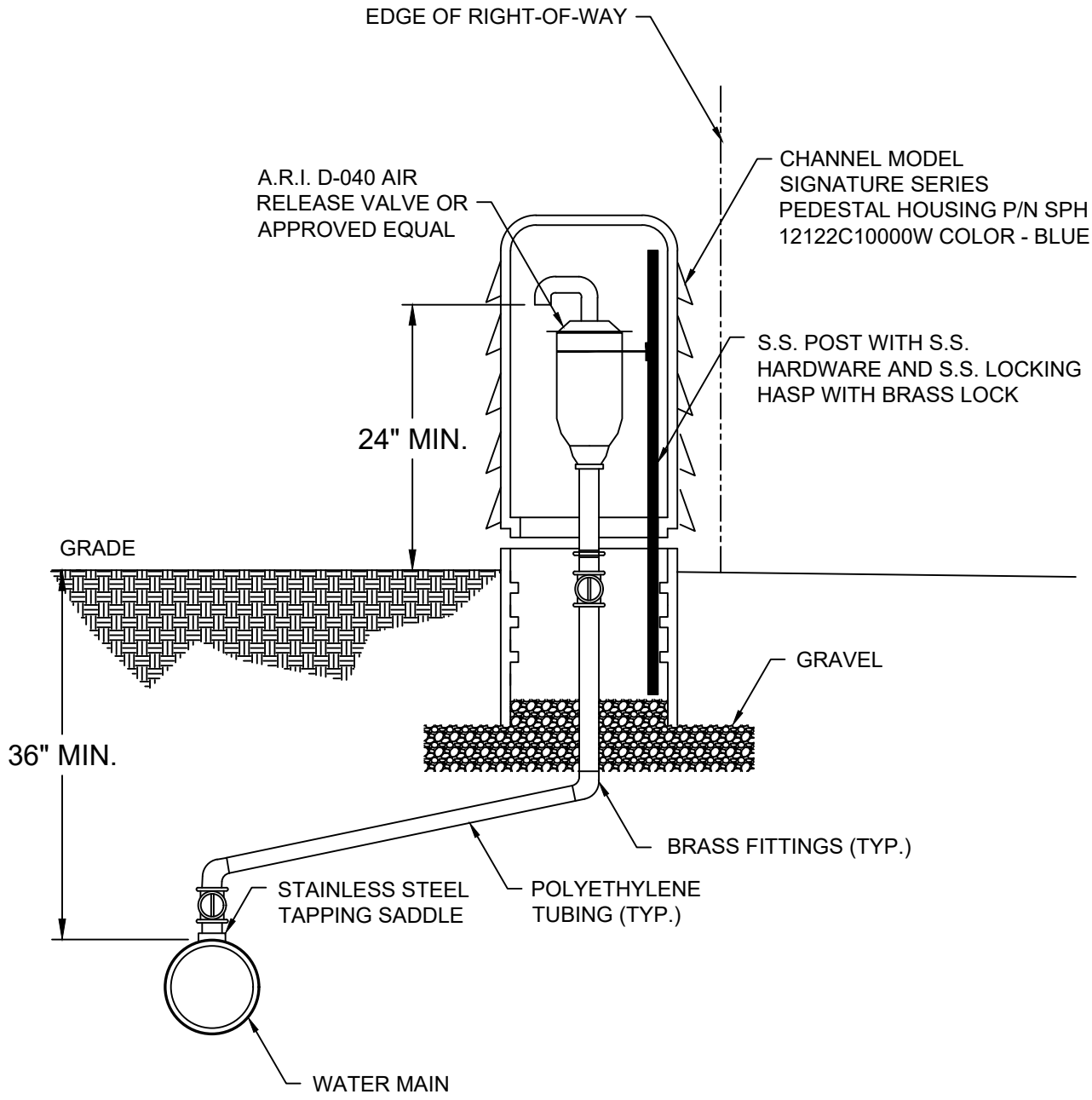
ROADWAY CUT

DATE REVISED	REV
6/20/2020	A

SD26

STANDARD DETAIL



NOTE:

1. BOLLARDS AND/OR PLANTINGS MAY BE REQUIRED DEPENDING ON LOCATION OF VALVE.

2. SIZE TO BE 1" FOR WATER MAINS 12" DIAMETER AND SMALLER. SIZE TO BE 2" FOR WATER MAINS LARGER THAN 12".

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AUTOMATIC AIR RELEASE VALVE

DATE REVISED	REV
6/20/2020	A

SD27